

APPENDIX – XIII
PROJECT EVALUATION

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1. Project Evaluation of the Kudu Dam Irrigation Project

1.1 General

Project evaluation is made through assessment of the project feasibility in view of economic, financial and social aspects. The economic viability of the project is found by estimating economic internal rate of return (EIRR), benefit-cost ratio (B/C) and benefit minus cost (B-C) for the whole project area. EIRR may be defined as the rate of discount at which the total present value of cost incurred during the life of the project is equal to the total present value of benefits accruing during the life of the project. Sensitivity analysis is also made in order to elucidate the economic viability of the project against the changes in benefits and project costs. Financial analysis is carried out by analysing the capacity to pay for the water charges at the farm level. Social internal rate of return (SIRR) is calculated to evaluate distribution efficiency.

1.2 Economic Evaluation

1.2.1 Basic Assumptions

Basic assumptions for project evaluation are as follows;

- (a) The economic life of the project is 50 years,
- (b) All prices are expressed at June, 2000 constant prices. They are kept constant throughout the Project period,
- (c) The exchange rate of US\$ 1.00= Z\$ 38.0 , =JYE 105 is applied,
- (d) The main cause of low productivity in the Study Area is due to the lack of irrigation water. So the present agricultural conditions are regarded as without the project case,
- (e) The construction period is 10 years including 2 years for the preparatory works, detailed design and evaluation for the whole project, and
- (f) Benefits from irrigation development, livestock development, rural road rehabilitation and industrial/domestic water supply, are taken into account.

1.2.2 Evaluation of Economic Factors

All the costs and benefits are identified. Economic (shadow) prices are then applied to these costs and benefits, to find their real impact on national income. A series of conversion factors have been calculated to convert financial prices to their economic values. For evaluation of economic prices and costs, the following criteria have been used.

(1) Standard Conversion Factor (SCF)

In order to evaluate project costs and benefits with respect to world market prices, a SCF of 0.93 is applied to the prices of non-traded goods and services. This figure is calculated on the basis of export and import statistics for the years 1994-1998 as

shown in Table 1.

(2) Construction Cost Conversion Factor (CCF)

The Construction Cost Conversion Factor is estimated at 0.8.

(3) Conversion Factors for Agricultural inputs, Wage Rate and Transportation

Conversion Factors for fertilisers, chemicals, seeds, labour and transportation are estimated as shown in the following table. Conversion factors for agricultural cost components such as fertiliser, chemicals and seeds have been calculated taking into account foreign cost components, skilled and unskilled labour as well as transfer payments.

Conversion Factors for Agricultural Inputs, Transportation and Energy

Particulars	Conversion Factors	Remarks
(a) Fertilisers	0.86	Refer to Table 2
(b) Chemicals	0.76	Refer to Table 2
(c) Seeds	0.76	Refer to Table 2
(d) Shadow Wage Rate		
. Skilled Labour	1.00	Refer to Table 2
. Unskilled Labour	0.40	
(e) Transportation (truck)	0.68	World Bank Estimate
(f) Transportation (railroad)	0.73	World Bank Estimate
(g) Energy	0.62	World Bank Estimate

1.2.3 Transfer Payment

From the international economic point of view, the transfer payment such as contract tax, duty, subsidy, and interest are considered as domestic monetary movement without direct productivity. These transfer payments are excluded from the project costs and agricultural inputs in the economic evaluation.

1.2.4 Economic Farm-gate Prices of Agricultural Inputs and Outputs

Economic prices of farm inputs such as seeds, fertilisers and chemicals are calculated on Table 3. Financial prices of locally traded agricultural products such as cabbage, tomato, etc. were converted to economic prices using Standard Conversion Factor (SCF) of 0.93 as shown in Table 4. Economic farm-gate prices of internationally traded agricultural production e.g. cotton, maize and wheat, are estimated by the international border prices at Durban (refer to Table 4 - 8).

1.2.5 Economic Cost

(1) Project Cost

The financial construction costs are converted into the economic construction costs by applying construction cost conversion factor (CCF) of 0.8 as described above. The economic cost is summarised as follows.

Summary of Project Cost

(Unit: 1,000 Z\$)		
Financial Cost	Conversion Factor	Economic Cost
9,919,264	0.8	7,935,411

(2) Replacement Cost

Replacement costs are estimated at 1.0 % of the capital cost.

(3) Operation and Maintenance Cost

Operation and maintenance costs are estimated at 1.2% of the capital cost.

1.2.6 Economic Benefit

(1) General

Benefits are estimated by calculating the difference of the annual production values under future with and the without project conditions. This is the incremental benefit caused by the project less the benefit that was occurring before the inception of the project and the cost of project development. The assessment of the project's viability mainly depends on its tangible benefits, measurable in monetary terms. However, intangible benefits that are not measurable in monetary terms are additional factors for the justification of the project. Residual values at the end of the evaluation period have not been considered due to their negligible impact on the projects' internal rate of return.

(2) Economic Benefit from Irrigation Development

The direct Benefit to be expected in the project Area is derived from the increased crop production attributed to a stable irrigation water supply. The farmers are anticipated to add some new crops to their cropping pattern. The benefit will therefore be incremental to the existing benefit. The balance of total amount of economic net return obtained from crop production, between future with and without project conditions is the direct benefit and is summarised in the following table. The detailed economic crop budgets for individual crops without and with project conditions are calculated in Tables 9 - 19. The benefit is expected to increase year by year after the completion of irrigation project. The anticipated incremental net production value in the full stage is shown in Table 20 and is summarized below.

Incremental Net Benefit from Irrigation Development

(Unit: Z\$ 1,000)

Financial/Economic Value	Without Project Condition	With Project Condition	Incremental Net Benefit
Financial Value	28,419	1,039,195	1,010,776
Economic Value	120,643	1,507,535	1,386,892

(3) Urban/Industrial water Benefit

Construction of Kudu Dam enables to supply the urban water of 60 MCM annually. Although, Urban/Industrial water supply is small comparing with irrigation water requirement, benefits from water supply are estimated as follows ;

$$UW = WP \times \alpha$$

Where,

UW: urban/industrial water benefit (Z\$)

WP: willingness to pay for the urban water supplied (Z\$/m³)

α : amount of urban water supplied (m³)

The value of water estimated by the construction of Kudu dam is Z\$ 0.958/m³. This price was obtained applying the water pricing method of the Ministry of Rural Resources and Water Development, Jan. 1999 (refer to Table 21). Based on this figure the Urban/Industrial water benefit is estimated at Z\$ 57,480 thousand in Financial prices and Z\$ 53,460 thousand in Economic prices which is summarised in the following table ;

Benefit from Urban/Industrial Water Supply

Dams	Particulars	Amount of Water Supplied (1000 m ³)	Unit Price of Water (Z\$/m ³) ^b	Total Amount (Z\$,1000)
Kudu Dam	Financial Prices	60,000	0.958	57,480
	Economic Prices	60,000	0.891	53,460

Note: 1) Financial Price is Converted to Economic Price using SCF of 0.93.

(4) Domestic Water Supply Benefit

Rehabilitation of 90 boreholes and construction of 101 new boreholes are projected in the study area. The domestic water benefit in the study area is calculated by the following formula :

$$DW = WP * \beta$$

Where,

DW: Domestic water benefit

WP: Willingness to pay for the domestic water supplied (Z\$/m³)

β : Amount of domestic water supplied

The amount of water supplied from boreholes is calculated in Table 21 and is summarized as follows:

$$191 \text{ units} * 10 \text{ m}^3/\text{day} * 365 \text{ days} = 697,150 \text{ m}^3/\text{year}$$

Benefit from Domestic Water Supply

Particulars	Amount of Water Supplied (m ³)	Unit Price of Water (Z\$/m ³) ¹⁾	Total Amount (Z\$)
Financial Prices	697,150	15.9	11,096
Economic Prices	697,150	14.8	10,319

(5) Benefits from Maize Stalk/Residues

Animal husbandry is a common activity in the Study Area as it is regarded as a resource of wealth and insurance against crop failure or any other problems. Livestock production depends on achieving a better balance between the livestock population and feed supply. Maize stalk is expected as a stable source of fodder. The benefit expected from maize stalk is calculated as shown in the following table :

Benefits from Maize Stalk/Residues

Particulars	Without Project Conditions	With Project Conditions	Increment
Cropped Area(ha) ¹⁾	10,500	4,500	-6,000
Per ha Stalk Production (1,000kg) ²⁾	8,400	27,000	18,600
Price (Z\$/kg) ³⁾ :Financial	1.8	1.8	-
:Economic ⁴⁾	1.67	1.67	-
Total Value (Z\$ 1,000) : Financial	15,120	48,600	33,480
:Economic	14,028	45,900	31,062

Note: 1) Under future without project and with project conditions 42% and 18% out of total (25,000ha). Cropped Area is estimated under maize crop.

2) Dry matter basis; assuming grain: stalk ratio=1:1; Per ha yield of maize is estimated 0.8ton/ha and 6.0ton/ha for without and with project conditions respectively.

3) Household Survey, November 1998

4) Financial Price is converted to Economic Price Using a SCF of 0.93

(6) Benefit from Road Rehabilitation/Construction

The project includes the component of road development of 279 km, i.e., rehabilitation of track roads to gravel roads. The following formula is applied to quantify the road benefit. Detailed figures are illustrated in Table 22 and are summarized below.

$$TVOC = ADT * 365 \text{ days} * L * VOC$$

Where,

TOVC: Annual saving amount of vehicle operation cost (Z\$)

ADT: Average daily traffic (Unit/day)

L: Total length of road improvement (km)
 VOC: Saving of vehicle operation cost per unit Z\$/km/unit

Rural Road Rehabilitation Benefit

Prices	ADT (unit/day)	Days/yr	L (km)	VOC (Z\$/km/unit)	Total Amount (Z\$ 1000)
Financial Prices	105	365	279	1.8	19,247
Economic Prices	105	365	279	1.44	15,397

Furthermore, 24 km new gravel road from Nyarupakwe to Gokwe are proposed and the benefits are conservatively estimated taking account only the agricultural products and inputs in and around the Pilot Project areas presently transported to and from Nyarupakwe to Sanyati (64km), will be diverted to Gokwe, and the person trips between Nyarupakwe and Gokwe. The benefits estimated are Z\$ 3,582 thousands in financial prices and Z\$ 2,436 thousand in economic prices respectively as shown in the following table. For details refer to Table 23.

Nyarupakwe to Gokwe Road Construction Benefit

Particulars	Amounts (Z\$ 1000)	
Agricultural Products Transportation Savings	522	
Input Transportation savings	140	
Person Trips Benefit	2,920	
Total	Financial Prices	3,582
	Economic Prices	2,436

(7) Benefits from Livestock Development

Livestock benefit is expected from savings in herding livestock, surface soil conversion and livestock water development scheme. Benefits from livestock development are shown in Table 24 and are summarised below.

Livestock Development Benefit

Particulars	Financial Prices (Z\$ 1,000)	Economic Prices (Z\$ 1,000)
Livestock Development	12,067	5,590

1.2.7 Economic Evaluation

In order to compute EIRR, B/C and B-C, annual economic costs and benefits flows are prepared as shown in Table 25 and the result of economic evaluation is summarised in the following table. As shown in the following table, EIRR is estimated at 10.5%, B/C 1.06 and B-C Z\$ 337,753 thousand at discount rate of

10% respectively. The evaluation result shows that the Project is economically feasible.

Results of Economic Evaluation

Particulars	Results	Remarks
EIRR (%)	10.5	
B/C Ratio	1.06	Discount Rate 10%
B-C (1,000 Z\$)	337,753	Discount Rate 10%

1.2.8 Sensitivity Analysis

Sensitivity analysis for the whole project Area is made to evaluate the soundness of the project against unexpected adverse changes in future for the following cases :

- (a) If the cost runs over the price and physical contingencies by 10%
- (b) If the expected benefit decreases by 10%
- (c) Combination of (a) and (b)

The effects of these changes in EIRR are shown in Tables 26 - 28 and are summarised below.

Results of Sensitivity Analysis

Particulars	EIRR (%)
1. Case (a), Increment of cost 10%	9.7
2. Case (b), decrease of benefit 10%	9.7
3. Case (c), Combination of Case (a) and (b)	8.9

1.3 Financial Evaluation

1.3.1 General

Financial viability of the project is evaluated from the viewpoint of the farmers. Farm budget analysis is conducted to access whether the project will generate enough income in the farmers' economy. Cost and benefits are identified, valued and compared to see if the project is viable.

1.3.2 Farm Budget Analysis and Capacity to Pay

The payment capacity is defined as the ability of the beneficiary farmers to bear the expenses for operation and maintenance and water charges. The estimated average per farm household net income is Z\$ 53,688 for the Whole Kudu dam area. Deducting the household expenditure the forecast capacity to pay is obtained at Z\$ 38,031. The analysis results for respective cases are summarised in the following table. For detail refer to Table 29.

Household Budget

(Unit: Z\$)

Particulars	Project Condition	
	Without Project Condition	With Project Condition
Net Agricultural Income	8,487	45,566
Net Livestock Income	636	636
Off Farm Income	7,486	7,486
Total Net Income	16,609	53,688
Living Expenditure	13,615	15,657
Net reserve	2,994	38,031

1.4 Social Evaluation

1.4.1 General

According to the World Development Report 1998/99 (World Bank), in Zimbabwe the lowest 20 percent income group occupies only 4 percent of the whole economy, highest 20 percent occupies 62.3 percent and the highest 10 percent occupies 46.9 percent indicating the large income disparity.

Social evaluation emphasises on distribution efficiency. It is measured in terms of poverty alleviation and relief of the weak. In other words the basic concept of the social internal rate of return (SIRR) is to put more value on one dollar for low income brackets than one dollar for high income brackets. In economic analysis each dollar of income is equally important to each individual in society. In other words each dollar of income receives an income weight of 1 regardless of who receives it. Social internal rate of return (SIRR) is calculated using Shadow Income Weight (SIW). The weights are uniformly progressive, the lower the income levels the greater the weight. The average rural household income in Zimbabwe was quoted from "Income, Consumption and Expenditure Survey Report 1990/91, CSO, 1994" and those figures were inflated to up to date 2000 figures. Figures for the Study Area are from "Household and Household Member Survey" conducted by the Study Team.

1.4.2 Calculation of Shadow Income Weight (SIW)

$$SIW(n) = AI / I(n)^e$$

Where,

- SIW(n) : Shadow income weight in income group n
- AI : Average income
- I(n) : Income in income group n
- e : Elasticity of marginal utility (usually, e=1)

The SIW is calculated by dividing the National Rural Average Income by the average income of the Project Area (refer to Table 30). The SIW is 1.19 as shown below.

$$\text{SIW} = (19,826/16,609)^{1.0} = 1.19$$

1.4.3 Results of Social Evaluation

Total economic benefits are converted to social prices multiplied by SIW (1.19) as described before and are evaluated. Results of evaluation are shown in Table 31 and are summarised below.

Social Internal Rate of Return (FIRR)

Particulars	Results	Remarks
SIRR (%)	12.0	
B/C Ratio	1.27	Discount Rate 10%
B-C (1,000 Z\$)	1,443,449	Discount Rate 10%

1.5 Socio-Economic Impacts

There are various intangible benefits expected from the implementation of the project. Major impacts expected after the implementation of the project are described here.

(1) Improvement of farm roads in the project Area

Local transportation will be improved by the construction of the farm roads along the canals and the rehabilitation of village roads. The expanded road system will not only enhance the economic activities but also contribute inter-regional accessibility and communication.

(2) Improvement of living condition

The increment and diversification of crop production will generate a considerable amount of net profit to farmers. Hence the farmers will be in a position to have substantial surplus. This might give them an opportunity to renovate and rebuild their houses. They can spend more on their clothing, health care, sanitation, education etc. This will improve social and cultural amenities of village and give an impetus to further development in the area.

(3) Improvement of domestic water supply condition

The construction of irrigation canals will improve the situation of water supply for daily use and drinking water for livestock. Availability of clean water will improve the sanitary situation of the area and will prevent sickness of farmers and livestock.

(4) Increase of employment opportunity

The project will generate employment opportunities during the construction period.

Farmers will gain more experience, technical know-how, skills in various working fields and those skills would be applied to the future development in the region as well as O & M activities. In addition the project will create a demand of farm labour due to increased farming activities.

(5) Food availability throughout the year

Irrigation will intensify crop production and the food will be available throughout the year and there is a chance of a more balanced food intake on household level especially by children.

(6) Foreign exchange savings

The incremental production of agricultural products will contribute to food security, which has been a concern for long, both the regional level and the national level. The incremental production of cereal crops i.e., maize and wheat will save foreign currency.

(7) Empowerment of women

The project will improve agricultural production condition and bring income increase to farmers. Such income increase will enable women to have a time to participate in activities related to education, culture, leisure, etc, which will elevate their social standing.

(8) Demonstration effects to other similar projects

The successful implementation of the project including operation, maintenance and water management will bring the demonstration effect to other similar irrigation projects. Especially, technical knowledge on operation, maintenance and water management for irrigated agriculture can be transferred to other relevant staffs.

2. Project Evaluation of the Nyarupakwe Pilot Project

2.1 General

The economic viability of the Pilot Project is found by estimating economic internal rate of return (EIRR), benefit cost ratio (B/C) and benefit minus cost (B-C). Sensitivity analysis is also made to verify negative impacts by various uncertainties. The financial viability of the Project is examined by analysing the farm budget.

2.2 Economic Evaluation

2.2.1 Basic Assumptions

Basic assumptions for project evaluation are as follows ;

- (a) The economic life of the project is 50 years,
- (b) All prices are expressed at June, 2000 constant prices. They are kept constant throughout the Project period,
- (c) The exchange rate of US\$ 1.00= Z\$ 38.0 , =JYE 105 is applied,
- (d) The main cause of low productivity in the Study Area is due to the lack of irrigation water. So the present agricultural conditions are regarded as without the project case,
- (e) The construction period is 5 years including 2 years for the preparatory works, detailed design and evaluation for the project, and
- (f) nefits from irrigation development, livestock development, urban/industrial water supply, domestic water supply, road rehabilitation are taken into account.

2.2.2 Economic Conversion Factors

Conversion Factors and prices of inputs, outputs etc., are applied as same as applied for the whole Kudu Dam Project.

2.2.3 Economic Cost

(1) Capital Cost

The economic cost of the Pilot Project is estimated at Z\$ 206,122 thousand as summarized in the following table :

Summary of Pilot Project Cost

(Unit: Z\$ 1,000)		
Financial Cost	Conversion Factor	Economic Cost
257,652	0.8	206,122

(2) Replacement Cost

Replacement costs are estimated at 1% of the capital cost

(3) Operation and Maintenance Cost

Operation and maintenance costs are estimated at 1.2% of the capital cost.

2.2.4 Economic Benefit

(1) Benefits from Irrigation Development

The balance of total amount of net returns obtained from crop production, between future with and without project conditions are the direct benefits and are shown in Table 32 and are summarized below.

Incremental Net Benefit from Irrigation Development

(Unit: Z\$ 1,000)

Financial/Economic Value	Without Project Condition	With Project Condition	Incremental Net Benefit
Financial Value	519	2,494	1,975
Economic Value	816	3,618	2,802

(2) Livestock and Domestic water Benefit

Construction of Nyarupakwe Dam enables to supply the livestock and domestic water of 85 thousand m³ annually. Although, these water supply is small comparing with irrigation water requirement, benefits from water supply are estimated as follows :

$$UW = WP \times \alpha$$

Where,

UW: urban/industrial water benefit (Z\$)

WP: willingness to pay for the urban water supplied (Z\$/m³)

α : amount of urban water supplied (m³)

The value of water estimated by the construction of Nyarupakwe dam is Z\$ 13.9/m³. The prices are obtained applying the water pricing method of the Ministry of Rural Resources and Water Development, Jan. 1999 (refer to Table 33). Based on this figure the Industrial water benefit is estimated at Z\$ 1,182 thousand in Financial prices and Z\$ 1,097 thousand in Economic prices which is summarised in the following table :

Benefit from Water Supply of Nyarupakwe Dam

Dams	Particulars	Amount of Water Supplied (1000 m ³)	Unit Price of Water (Z\$/m ³) ¹⁾	Total Amount (Z\$,1000)
Nyarupakwe Dam	Financial Prices	85	13.9	1,182
	Economic Prices	85	12.9	1,097

Note: 1) Financial Price is Converted to Economic Price using SCF of 0.93

While, the rehabilitation of 4 boreholes and construction of 15 new boreholes are projected in the Pilot Project Area. The domestic water benefit in the area is calculated by the following formula :

$$DW=WP*\beta$$

Where,

DW: Domestic water benefit

WP: Willingness to pay for the domestic water supplied (Z\$/m³)

β : Amount of domestic water supplied

The amount of water supplied from boreholes is calculated in Table 33 and is summarised as follows:

$$19 \text{ units} * 10 \text{ m}^3/\text{day} * 365 \text{ days} = 69,350 \text{ m}^3/\text{year}$$

Benefit from Domestic Water Supply of Boreholes

Particulars	Amount of Water Supplied (m ³)	Unit Price Of Water (Z\$/m ³) ¹⁾	Total Amount (Z\$ 1,000)
Financial Prices	69,350	15.9	1,103
Economic Prices	69,350	14.8	1,026

(4) Benefits from Maize Stalks

Maize stalk is expected as a stable source of fodder. The benefit expected from maize stalk is calculated in Table 34 and is summarised below.

Benefits from Maize Stalk/Residues

Prices	Benefits (Z\$ 1,000)
Financial	89
Economic	82

(5) Livestock/Fishery Benefit

Livestock benefit is expected from savings in herding livestock, surface soil conversion and livestock water development scheme. Benefits from livestock/fishery development are shown in Table 35 and are summarised below.

Benefits from livestock/fishery development

Particulars	Financial Prices (Z\$ 1,000)	Economic Prices (Z\$ 1,000)
Livestock /Fishery Development	1,751	921

(6) Benefit from Road Rehabilitation/Construction

The Pilot project includes the rehabilitation of 22 km of track roads to gravel roads. The following formula is applied to quantify the road benefit. Detailed figures are

illustrated in Table 36 and are summarised below. The calculation method is same as for the whole project area.

$$TVOC = ADT * 365 \text{ days} * L * VOC$$

Where,

- TOVC : Annual saving amount of vehicle operation cost (Z\$)
 ADT : Average daily traffic (Unit/day)
 L : Total length of road improvement (km)
 VOC : Saving of vehicle operation cost per unit Z\$/km/unit

Rural Road Rehabilitation Benefit

Prices	ADT (unit/day)	Days/yr	L (km)	VOC (Z\$/km/unit)	Total Amount (Z\$ 1000)
Financial Prices	65	365	22	1.8	939
Economic Prices	65	365	22	1.44	752

Note: ADT: Average daily traffic, L: Length of road to be rehabilitated, VOC: Vehicle operation cost

24 km new gravel road from Nyarupakwe to Gokwe are proposed and the benefits are conservatively estimated taking account only the agricultural products and inputs in and around the Pilot Project areas presently transported to and from Nyarupakwe to Sanyati (64km), will be diverted to Gokwe, and the person trips between Nyarupakwe and Gokwe. The benefits estimated are Z\$ 3,582 thousands in financial prices and Z\$ 2,436 thousand in economic prices respectively as shown in the following table :

Nyarupakwe to Gokwe Road Construction Benefit

Particulars		Amounts (Z\$ 1000)
Agricultural Products Transportation Savings		522
Input Transportation savings		140
Person Trips Benefit		2,920
Total	Financial Prices	3,582
	Economic Prices	2,436

Note: Detailed figures are quoted in part I (Whole Study Area)

2.2.5 Economic Evaluation

The Pilot Project is indispensable for smooth transition to irrigation cultivation for beneficial farmers so that the whole Kudu Dam Irrigation Project will success in increasing crop products. The evaluation of the Pilot Project is, therefore, made considering the difference of period for obtaining irrigation benefit with and without

Pilot Project conditions as shown below.

- With Pilot Project : full benefit will be obtained 7 years after completion of construction works of irrigation facilities.
- Without Pilot Project : full benefit will be obtained 14 years after completion of construction works of irrigation facilities.

Based on the above assumption, the Economic Internal Rate of Return (EIRR) of the Pilot Project is estimated at 26 % as shown in Table 37, which shows the Pilot Project is justified economically.

2.3 Financial Evaluation

The financial evaluation of typical farm household economy is made as shown in Table 38 and the result is summarized below.

Particulars	With Project	Without Project
Net Agricultural Income	19,395	61,653
Net Livestock Income	781	781
Off Farm Income	8,410	8,410
Total Net Income	28,586	70,844
Living Expenditure	16,577	19,064
Net reserve	12,009	51,780

In the above calculation, it is assumed that the standard farm household will have an irrigation area of 1 ha and 5 ha of rainfed area after irrigation development. As shown in the above table, the net annual income of typical farm will be increased to about 4 times of the present, and the beneficiary farmer will have enough capacity to pay of water charge and O&M cost of about Z\$ 4,000/year.

TABLES

Table 1 Calculation of Standard Conversion Factor (SCF)

(Unit: Z\$ Million)

Particulars/Year	1994	1995	1996	1997	1998	5 Yrs Average
Export of goods and services (f.o.b)	18,009	18,359	24,209	30,207	45,208	27,198
Import of goods and services (c.i.f)	18,271	23,048	28,095	36,555	59,350	33,064
Export Subsidy	0	0	0	0	0	0
Export Tax	0	0	0	0	0	0
Import Subsidy	0	0	0	0	0	0
Import Tax	2,576	2,676	3,686	5,105	7,106	4,230
SCF	0.93	0.94	0.93	0.93	0.94	0.93

Source: National Accounts 1985-1998, Central Statistical Office, January 2000

Note: $SCF = (E+I) / [(E+Es-Et)+(I-Is+It)]$

Where,

- E: Export of Goods and Services
- I: Import of Goods and Services
- Es: Export Subsidy
- Et: Export Tax
- Is: Import Subsidy
- It: Import Tax

Table 2 Conversion Factors for Seeds, Chemicals and Fertilizer

Cost Component	Fertiliser	Chemicals ¹⁾	Seeds ²⁾
Financial Cost Component			
Materials:			
Local	44	3	26
Imported	38	76	33
Labour	16	1	36
Taxes and Surcharges	2	20	5
Total	100	100	100
Economic Cost Component			
Materials			
Local	44	3	26
Imported	38	76	33
Labour ³⁾	9	1	21
Taxes and Surcharges ⁴⁾			
Total	91	80	80
Less 5 % Adjustment ⁵⁾	5	4	4
Total	86	76	76
Economic Conversion Factor (ECF)	0.86	0.76	0.76

Source: Based on Special Programme for Food Security in Zimbabwe, FAO, November, 1998

Note: 1) Pesticides, insecticides, and other chemicals

2) Imported Components include bags, dressing fumigants

3) Labour is 30% skilled and 70% unskilled.

The shadow wage rate is 1 and 0.4, respectively.

4) Taxes and surcharges represent transfer payments and are therefore reduced to zero.

5) The bulk purchase of inputs reduces purchase costs by 5 %

Table 3 Financial and Economic Prices of Farm Inputs (1/2)

	Item	Unit	1 Financial Price	2 Sales Tax 5%	3 Financial Price Less Sales Tax	4 Conversion Factor	5=3*4 Economic Price	
Seeds	Cotton	Z\$/kg	16.7	0.8	15.9	0.76	12.1	
	Maize	Z\$/kg	28.5	1.4	27.1	0.76	20.6	
	Wheat	Z\$/kg	18.0	0.9	17.1	0.76	13.0	
	Paddy	Z\$/kg	16.0	0.8	15.2	0.76	11.6	
	Sugar Bean	Z\$/kg	72.0	3.6	68.4	0.76	52.0	
	Sunflower	Z\$/kg	62.0	3.1	58.9	0.76	44.8	
	Ground Nuts	Z\$/kg	35.0	1.8	33.3	0.76	25.3	
	Onion	Z\$/kg	2700.0	135.0	2565.0	0.76	1949.4	
	Irish Potatoes	Z\$/kg	15.0	0.8	14.3	0.76	10.8	
	Sweet Potatoes	Z\$/kg	6.0	0.3	5.7	0.76	4.3	
	Barley	Z\$/kg	6.3	0.3	6.0	0.76	4.5	
	Paprika	Z\$/kg	84.0	4.2	79.8	0.76	60.6	
	Soy Beans	Z\$/kg	15.8	0.8	15.0	0.76	11.4	
	Cow Peas	Z\$/kg	30.0	1.5	28.5	0.76	21.7	
	Dry Beans	Z\$/kg	72.0	3.6	68.4	0.76	52.0	
	Okra	Z\$/kg	1490.0	74.5	1415.5	0.76	1075.8	
	Cucumber	Z\$/kg	1500.0	75.0	1425.0	0.76	1083.0	
	Tomatoes	Z\$/kg	5529.6	276.5	5253.1	0.76	3992.4	
	Cabbage	Z\$/kg	1500.0	75.0	1425.0	0.76	1083.0	
	Baby Corn	Z\$/kg	151.0	7.6	143.5	0.76	109.0	
	Sugar Snap Peas	Z\$/kg	1500.0	75.0	1425.0	0.76	1083.0	
	Carrots	Z\$/kg	1116.0	55.8	1060.2	0.76	805.8	
	Millet	Z\$/kg	33.0	1.7	31.4	0.76	23.8	
	Sorghum	Z\$/kg	35.6	1.8	33.8	0.76	25.7	
	Garlic	Z\$/kg	1233.4	61.7	1171.7	0.76	890.5	
	Mange Tout	Z\$/kg	210.0	10.5	199.5	0.76	151.6	
	Fine Beans	Z\$/kg	72.0	3.6	68.4	0.76	52.0	
	Runner Beans	Z\$/kg	72.0	3.6	68.4	0.76	52.0	
	Fertilisers	Compound D	Z\$/kg	7.9	0.4	7.5	0.86	6.4
		Compound L	Z\$/kg	13.1	0.7	12.4	0.86	10.7
Compound S		Z\$/kg	12.8	0.6	12.1	0.86	10.4	
Ammonium Nitrate		Z\$/kg	8.3	0.4	7.9	0.86	6.8	
Manure		Z\$/t	0.2	0.0	0.2	0.86	0.2	
Gypsum		Z\$/kg	2.1	0.1	2.0	0.86	1.7	
Muriate of Potash		Z\$/kg	11.6	0.6	11.0	0.86	9.5	
Potassium Sulphate		Z\$/kg	17.7	0.9	16.8	0.86	14.5	
Lime		Z\$/l	2.1	0.1	2.0	0.86	1.72	
S.S.P		Z\$/kg	11.7	0.6	11.1	0.86	9.6	
Chemicals	Carbaryl 85 wp	Z\$/kg	375.0	18.8	356.3	0.76	270.8	
	Agrihrin	Z\$/l	196.0	9.8	186.2	0.76	141.5	
	Atrazine	Z\$/l	203.7	10.2	193.5	0.76	147.1	
	Endosulfan 35 mo	Z\$/l	1775.0	88.8	1686.3	0.76	1281.6	
	Dithane M 45	Z\$/kg	260.0	13.0	247.0	0.76	187.7	
	Thiram	Z\$/kg	160.0	8.0	152.0	0.76	115.5	
	Mancozeb 80 wp	Z\$/kg	366.8	18.3	348.5	0.76	264.8	
	Copper Oxochloride	Z\$/kg	270.0	13.5	256.5	0.76	194.9	
	Thiodan 1%	Z\$/kg	402.0	20.1	381.9	0.76	290.2	
	Rogor	Z\$/l	277.2	13.9	263.3	0.76	200.1	
	Synthetic Pyretheriod	Z\$/l	618.8	30.9	587.9	0.76	446.8	
	Dimethote	Z\$/l	225.0	11.3	213.8	0.76	162.5	
	Benomyl 50 WP	Z\$/kg	138.6	6.9	131.7	0.76	100.1	
	Trichlorofon 2.5%	Z\$/kg	9.8	0.5	9.3	0.76	7.1	
	Demeton-S-Methyl 25EC .40	Z\$/l	163.8	8.2	155.6	0.76	118.3	

Table 3 Financial and Economic Prices of Farm Inputs (2/2)

	Item	Unit	1 Financial Price	2 Sales Tax	3 Financial Price Less Sales Tax	4 Conversion Factor	5=3*4 Economic Price
Chemicals	Aldarin 40 wP	Z\$/kg	45.7	2.3	43.4	0.76	33.0
	Aldrin	Z\$/kg	354.0	17.7	336.3	0.76	255.6
	Diofol 25% WP	Z\$/kg	215.0	10.8	204.3	0.76	155.2
	Malathion 50EC	Z\$/l	108.0	5.4	102.6	0.76	78.0
	Thiodan 35 mo	Z\$/l	725.2	36.3	688.9	0.76	523.6
	Lasso	Z\$/l	236.3	11.8	224.5	0.76	170.6
	Mithane	Z\$/l	111.9	5.6	106.3	0.76	80.8
	Fenvelerate	Z\$/l	618.8	30.9	587.9	0.76	446.8
	Sulphur	Z\$/kg	133.1	6.7	126.5	0.76	96.1
	Thionex	Z\$/l	520.8	26.0	494.8	0.76	376.0
	Vydate	Z\$/l	1274.6	63.7	1210.8	0.76	920.2
	Diazinon	Z\$/l	357.0	17.9	339.2	0.76	257.8
	Benlate	Z\$/kg	1120.0	56.0	1064.0	0.76	808.6
	Dursban	Z\$/l	365.0	18.3	346.8	0.76	263.5
	Furadan	Z\$/l	380.8	19.0	361.8	0.76	274.9
	Pfumo	Z\$/l	618.8	30.9	587.9	0.76	446.8
	Bravo	Z\$/l	574.3	28.7	545.6	0.76	414.6
	Agro-wet	Z\$/l	347.6	17.4	330.2	0.76	251.0
	Dithane M 45	Z\$/l	111.9	5.6	106.3	0.76	80.8
	Innoculant	Z\$/bottle	9.8	0.5	9.3	0.76	7.1
	Thiram, 80 wp	Z\$/kg	105.0	5.3	99.8	0.76	75.8
Makathion 25 wp	Z\$/kg	477.4	23.9	453.5	0.76	344.7	
Marshall	Z\$/kg	551.6	27.6	524.0	0.76	398.3	
Cosan	Z\$/kg	140.0	7.0	133.0	0.76	101.1	
Energy	Z\$/l	22.0	1.1	20.9	0.62	13.0	
Machinery & Equipment	Scotch cart	Z\$/unit	4200.0	0	4200.0	0.93	3906.0
	Cultivator	Z\$/unit	2513.0	0	2513.0	0.93	2337.1
	Wheelburrow	Z\$/unit	1225.0	0	1225.0	0.93	1139.3
	Plough	Z\$/unit	2095.8	0	2095.8	0.93	1949.1
	Sickle	Z\$/unit	79.7	11.9 *	67.7	0.93	63.0
	Hoe	Z\$/unit	79.7	11.9 *	67.7	0.93	63.0
	Napsak Sprayer	Z\$/unit	3634.8	181.7	3453.1	0.93	3211.4
	Bags	Z\$/unit	7.8	0.4	7.4	0.93	6.9
	Bale	Z\$/unit	30.0	1.5	28.5	0.93	26.5
	Hand Tractor	Z\$/unit	168.0	8.4	159.6	0.93	148.4
Tractor	Z\$/unit.day	700.0	35.0	665.0	0.93	618.5	
Labour Charges	Skilled Labour	Z\$/man.day	560.0	0	560.0	1.0	560.0
	Unskilled Labour	Z\$/man.day	38.5	0.0	38.5	0.4	15.4
	Draft Animal	Z\$/ox.day	546.0	0	546.0	0.4	218.4
Water Charges	Water Charge	Z\$/1000m ³	310.0	0	310	0.93	288.3
	Bags Transport	Z\$/unit	11.0	0.0	11.0		

Source: AGRITEX (Harare, Kadoma, Gweru), Windmill Pvt. Ltd., and Traders and Farmers in and around the Study Area.

Note: * Sickle and hoe have 15% sales tax

** Conversion Factor for Energy, Paraffin etc. is 0.62

Table 4 Financial and Economic Prices of Farm Out-puts

Domestically Traded Commodities			Internationally Traded Commodities			Remarks
Particular /Price	Financial Price (Z\$/kg.)	Economic Price (Z\$/kg.)	Particular/Price	Financial Price (Z\$/kg.)	Economic Price (Z\$/kg.)	
1 Groundnuts	10.0	9.3	1 Cotton	14.9	17.4	refer to Table
2 Paprika	30.0	27.9	2 Grain Maize	6.4	7.5	refer to Table
3 Baby Corn	60.0	55.8	3 Wheat	7.6	9.3	refer to Table
4 Tomatoes	3.8	3.5				
5 Cabbage	3.0	2.8				

Source: AGRITEX (Harare, Kadoma, Gweru) and Traders and Farmers in and around the Study Area
 Note: Financial prices of domestically traded commodities are adjusted by Standard Conversion Factor (SCF) of 0.93 to convert economic prices and the economic prices of internationally traded Commodities are derived by their Import/Export parity prices as calculated in Table 5.

Table 5 Price Structure of Cotton

Particulars/Prices	Unit	2000 Price		
		Financial Price	Conversion Factor	Economic Price
1. Projected 2000 Price of Cotton (outlook, A index), middling 1-3/32 inch CIF, Europe	US\$/t	1,235	-	-
Projected 2000 CIF Export Price of Cotton (1 US\$= 38.00Z\$)	Z\$/t	46,930	-	-
2. Corresponding FOB Export Price Durban ¹⁾	Z\$/t	64,220.5	n.r	64,220.5
Less Export Tax (%)	Z\$/t	0.0	n.r	n.r
Less Export Subsidy (%)	Z\$/t	0.0	n.r	n.r
3. Less Port Handling Charge	Z\$/t	1,007.5	0.4 ²⁾	403
4. Less Estimated COTTOCO Export Margin 15%	Z\$/t	9,482.0	0.93 ³⁾	8,818.2
5. Yielding Ratio of Cotton Lint from Seed 41%	Z\$/t	21,492.4	n.r	22,549.7
6. Less Ginning Cost	Z\$/t	3,000.0	0.93 ⁴⁾	2,790
7. Less Transport and Handling Charge from Project Area to Durban/Packing Charge	Z\$/t	3,632.9	0.662 ⁵⁾	2,405.0
Farm-Gate Price	Z\$/t	14,860	1.17	17,354.7
	Z\$/kg	14.9		17.4

Source: Global Commodity Markets, a Comprehensive Review and Price Forecast, IBRD, April 2000, Numl NRZ, COTTOCO and Traders

- Note: 1) Considered to reflect the long term relationship between FOB Durban and FOB Gulf Ports
 2) Shadow Wage Rate for Non Skilled labour
 3) SCF
 4) SCF
 5) Refer to Table 6

Table 6 Price Structure of Wheat

Particulars/Prices	Unit	2000 Price		
		Financial Price	Conversion Factor	Economic Price
1. Projected 2000 price of Wheat Canadian No.1 Western Red Spring (CWRS) in Store, St. Lowrance, Export Price	US\$/t	120	-	-
Projected 2000 Export Price of Wheat US\$ 1= 38.0 Z\$)	Z\$/t	4,560	-	-
2. Corresponding FOB Export Price Durban ¹⁾	Z\$/t	14,740.0	n.r	14,740.0
Less Export Tax (%)	Z\$/t			
Less Export Subsidy (%)	Z\$/t			
3. Less Port Handling Charge	Z\$/t	767.6	0.4 ²⁾	307.0
4. Less Estimated GMB Export Margin 25%	Z\$/t	3,493.1	0.93 ³⁾	3,248.6
5. Less Transport and Handling Charge from Project Area to Durban	Z\$/t	2,551.8	0.683 ⁴⁾	1,742.9
6. Less Approved Agent Margin (2 %)	Z\$/t	158.5	0.93 ⁵⁾	147.4
7. Less Packing Charge	Z\$/t	212.0	0.4 ⁶⁾	84.8
Farm-Gate Price	Z\$/t	7,557.0	1.22	9,209.3
	Z\$/kg	7.6		9.2

Source: Global Commodity Markets, a Comprehensive Review and Price Forecast, IBRD, April 2000, Nur NRZ, GMB and Traders

- Note: 1) Considered to reflect the long term relationship between FOB Durban and FOB Gulf Ports
 2) Shadow Wage Rate for Non Skilled labour
 3) SCF
 4) Refer to Table 6
 5) SCF
 6) Shadow Wage Rate for Non Skilled labour

Table 7 Price Structure of Maize

Particulars/Prices	Unit	2000 Price		
		Financial Price	Conversion Factor	Economic Price
1. Projected 2000 Export Price of Maize (US No.2 Yellow) FOB US Gulf Ports	US\$/t	100	-	-
Projected 2000 Export Price of Maize (US\$ 1= 38.0Z\$)	Z\$/t	3,800	-	-
2. Corresponding FOB Export Price Durban ¹⁾	Z\$/t	11,595.0	n.r	11,595.0
.Less Export Tax (%)	Z\$/t			
.Less Export Subsidy (%)	Z\$/t			
3. Less Port Handling Charge	Z\$/t	767.6	0.4 ²⁾	307.0
4. Less Estimated GMB Export Margin 15%	Z\$/t	1,624.1	0.93 ³⁾	1,510.4
5. Less Transport and Handling Charge from Project Area to Durban	Z\$/t	2,548.8	0.685 ⁴⁾	1,745.9
6. Less Approved Agent Margin (1.21 %)	Z\$/t	80.5	0.93 ⁵⁾	74.9
7. Less Packing Charge	Z\$/t	200.0	0.4 ⁶⁾	80.0
Farm-Gate Price	Z\$/t	6,373.990	1.24	7,876.745
	Z\$/kg	6.4		7.9

Source: Global Commodity Markets, a Comprehensive Review and Price Forecast, IBRD, April 2000, Nur NRZ, GMB and Traders

- Note: 1) Considered to reflect the long term relationship between FOB Durban and FOB Gulf Ports
 2) Shadow Wage Rate for Non Skilled labour
 3) SCF
 4) Refer to Table 6
 5) SCF
 6) Shadow Wage Rate for Non Skilled labour

Table 8 Transport and Handling Charge from Project Area to Durban

Transport/Handling/Cost	Means of Transportation	Distance (Km)	Cotton			Maize			Wheat		
			Financial Cost (Z\$/ton)	Conversion Factor	Economic Cost (Z\$/ton)	Financial Cost (Z\$/ton)	Conversion Factor	Economic Cost (Z\$/ton)	Financial Cost (Z\$/ton)	Conversion Factor	Economic Cost (Z\$/ton)
Project Area to Sanyati Depot	Truck	40	88	0.68	59.8	160.0	0.68	108.8	160.0	0.68	108.8
Handling Charge at Sanyati Depot	n.r.	-	30.3	0.4	12.1	130.0	0.4	52.0	130.0	0.4	52.0
Sanyati Depot to Kadoma Depot	Truck	110	242	0.68	164.6	440.0	0.68	299.2	440.0	0.68	299.2
Handling Charge at Kadoma Depot	n.r.	-	665.8 ¹⁾	0.4	266.3	130.0	0.4	52.0	130.0	0.4	52.0
Kadoma Depot to Beit Bridge	Train	567	870.2	0.73	635.2	580.3	0.73	423.6	583.3	0.73	425.8
Beit Bridge to Durban Port	Train	1341	1736.6	0.73	1,267.7	1,108.5	0.73	809.2	1,108.5	0.73	809.2
Total Cost		n.r.	3632.9	0.662	2,405.8	2,548.8	0.685	1,744.8	2,551.8	0.685	1,747.0

Source: NRZ, GMB, COTCO and Traders.

1) Including bale wrapping, tying etc.

Table 9 Economic Crop Budget for Maize Without Project Condition

(unit:kg,man-day, Z\$)

Particulars	Materials			Labor			Animal/Machine			Total Value	Remarks
	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value		
1. Production Cost											
1) Land preparation											
-Plowing				0.8	15.4	12.3	1.6	218	349	361.8	
2) Nursery preparation											
3) Seeding											
-Seed preparation											
-Seeding	25	20.60	515	4.48	15.4	69				584	
4) Transplanting, if any											
5) Fertilizing											
-Basal Compound D	40	6.40	256							256	
-Top/side dressing											
1st Ammonium Nitrat	40	6.80	272	1.5	15.40	23.1				295.1	
6) Earthing											
7) Weeding				22.5	15.40	347	0.3	333	100	446.5	
8) Spraying of agrochemical											
-Thiodan	1.6	290	464	1.56	15.40	24				488.3	
9) Irrigating											
10) Harvesting											
-Harvesting				1.6	15.40	24.6				24.64	
-Drying											
-Threshing				2.4	15.40	37				36.96	
-Hauling											
11) Miscellaneous Bags(piece)	16	6.90	110							110.4	
Bag transport	16	7.50	120							120	
2. Others											
3) Administration costs											
Total			1738			537			449	2724	
3. Gross Income				Unit yield (ton/ha)		Unit Price		Gross Income			
				0.80		Z\$ 7500 /ton		Z\$ 6000 /ha			
4. Net Income											
Z\$			3276	/ha							

Table 10 Economical Crop Budget for Cotton Without Project Condition

(unit: kg, man-day,Z\$)

Particulars	Materials			Labor			Animal/Machine			Total Value	Remarks
	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value		
1. Production Cost											
1) Land preparation											
-Plowing				0.4	15.4	6.2	1.6	218.4	349.4	355.6	
2) Nursery preparation											
3) Seeding											
-Seed preparation											
-Seeding	25.0	12.10	302.5	6.0	15.4	92.4				394.9	
4) Transplanting, if any											
5) Fertilizing											
-Basal Compound L	60.0	10.70	642.0			0.0				642.0	labor incl.
-Top/side dressing											
1st Ammonium Nitrate	30.0	6.80	204.0	1.0	15.4	15.4				219.4	
6) Earthing											
7) Weeding			0.0	30.0	15.40	462	0.45	333.2	149.9	611.9	
8) Spraying of agrochemical											
-Marshal(litre)	0.3	398	119.5	4.7	15.40	72.4				191.9	
-Carbryl	1.2	271	325.0	4.7	15.40	72.4				397.3	
-Synthetic Pyretheroid(litre)	0.6	447	268.1	4.7	15.40	72.4				340.5	
9) Irrigating											
10) Harvesting											
-Harvesting (z\$/kg)			0.0	600	0.18	108.0				108.0	
-Hauling											
11) Miscellaneous											
bags,bale	3.6	55.80	200.9							200.9	
transport/bale	3.6	108.8	391.7							391.7	
2. Others											
3) Administration costs											
	Total		2454			901			499	3854	
3. Gross Income	Unit yield (kg/ha)			Unit Price			Gross Income				
	600			Z\$ 17.4 /kg			Z\$ 10440				
4. Net Income	Z\$	6586 /ha									

Table 11 Economical Crop Budget for Groundnuts Without Project Condition
(unit: kg, man-day,Z\$)

Particulars	Materials			Labor			Animal/Machine			Total Value	Remarks
	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value		
1. Production Cost											
1) Land preparation											
-Plowing				0.4	15.4	6.2	1.6	218	349.4	355.6	
2) Nursery preparation											
3) Seeding											
-Seed preparation											
-Seeding kg	100.0	25.30	2530	7.2	15.4	111				2640.9	
4) Transplanting, if any											
5) Fertilizing											
-Basal Gypsum, kg	50.0	1.70	85	0.41	15.4	6.31				91.3	
-Top/side dressing											
6) Earthing											
7) Weeding				19.5	15.4	300.3	1.70	333	566	866.7	
8) Spraying of agrochemical											
9) Irrigating											
10) Harvesting				3.0	15.4	46.2				46.2	
-Harvesting (z\$/kg)											
-Drying											
-Shelling				15.0	15.4	231.0				231.0	
-Hauling											
11) Miscellaneous bags,bale transport/bale											
2. Others											
Total			2615			701			916	4232	
3. Gross Income				Unit yield (kg/ha)		Unit Price		Gross Income			
				500		Z\$ 9.3 /kg		Z\$ 4650			
4. Net Income	Z\$	418 /ha									

Table 12 Economic Crop Budget for Maize With Project Condition

(unit:kg,man-day, Z\$)

Particulars	Materials			Labor			Animal/Machine			Total Value	Remarks
	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value		
1. Production Cost											
1) Land preparation											
-Plowing				0.8	15.4	10	1.6	218	349	359	
2) Nursery preparation											
3) Seeding											
-Seed preparation											
-Seeding	25.0	20.6	515	4.5	15.4	68				583	
4) Transplanting, if any											
5) Fertilizing											
-Basal Compound D	450.0	6.4	2880							2880	
-Top/side dressing											
1st Ammonium Nitrat	500.0	6.8	3400	2.0	15.4	31				3431	
6) Earthing											
7) Weeding				22.5	15.4	347	0.3	333	100	447	
8) Spraying of agrochemical											
-Thiodan	4.0	290.2	1161	3.9	15.4	60				1221	
-(specify)											
-(specify)											
9) Water Charge/Irrigating	4.0	288.3	1153	12.0	15.4	185				1338	
10) Harvesting											
-Harvesting				10.0	15.4	154				154	
-Drying											
-Threshing				15.0	15.4	231				231	
-Hauling											
11) Miscellaneous Bags(piece)	100.0	6.9	690							690	
Bag transport	14.0	7.5	105							105	
2. Others											
3) Administration costs											
Total			9904			1086			449	11439	
3. Gross Income				Unit yield (ton/ha)			Unit Price			Gross Income	
				6.0			Z\$ 7.5 /kg		Z\$	45000	
4. Net Income	Z\$	33561 /ha									

Table 13 Economic Crop Budget for Cotton With Project Condition

Particulars	Materials			Labor			Animal/Machine			Total Value	Remarks
	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value		
1. Production Cost											
1) Land preparation											
-Plowing				0.8	15.4	12	1.6	218	349	361	Ox drawn
2) Nursery preparation											
3) Seeding											
-Seeding	25.0	12.1	303	3.0	15.4	46				349	
4) Transplanting, if any											
5) Fertilizing											
-Basal	Compound L	250.0	10.7	2675	3.0	15.4	46			2721	
-Top/side dressing											
1st	Ammonium Nitrate	100.0	6.8	680	1.5	15.4	23			703	
6) Earthing											
7) Weeding											
			0	30.0	15.4	462	0.45	333	150	612	
8) Spraying of agrochemical											
-Marshal(litre)	0.5	398.3	199	7.8	15.4	120				319	
-Carbryl	2.0	270.8	542	3.9	15.4	60				602	
-Synthetic Pyretheroid(litre)	1.0	446.8	447	3.9	15.4	60				507	
9) Water Charge/Irrigating											
		4.0	288.3	1153	16.0	15.4	246			1399	
10) Harvesting											
-Harvesting	(z\$/kg)			2500	0.18	450				450	
11) Miscellaneous											
	bags,bale	9.0	26.5	239						239	
	transport/bale	14.0	108.8	1523						1523	
2. Others											
3) Administration costs											
Total			7760		1525			499	9784		
3. Gross Income											
			Unit yield (ton/ha)	2.5	Unit Price	Z\$ 17.4 /kg	Gross Income			Z\$ 43500	
4. Net Income											
Z\$	33716		/ba								

Table 14 Economic Crop Budget for Groundnuts With Project Condition

(unit: kg, man-day,Z\$)

Particulars	Materials			Labor			Animal/Machine			Total Value	Remarks
	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value		
1. Production Cost											
1) Land preparation											
-Plowing				0.4	15.4	6	1.6	218	349	355	
-Harrowing				0.3	15.4	5				5	
-Seeding kg	100.0	25.3	2530	7.2	15.4	111				2641	
4) Transplanting, if any											
5) Fertilizing											
-Basal S.S.P	300.0	9.6	2880							2880	labor catered
-Top/side dressing 1st Gypsum	100.0	1.7	170	0.41	15.4	6				176	
6) Earthing											
7) Weeding											
				19.5	15.4	300	1.7	333	566	866	
8) Spraying of agrochemical											
-Innoculant bottle	2.0	7.1	14	3.9	15.4	60				74	
-Dimethoate litre	0.9	162.5	146	3.9	15.4	60				206	
-Thiram, 80WP bag	0.1	75.8	8	3.9	15.4	60				68	
9) Water Charge/Irrigating											
	4.0	288.3	1153	10.0	15.4	154				1307	
10) Harvesting											
-Harvesting (z\$/kg)				6.0	15.4	92				92	
-Drying											
-Shelling				29.0	15.4	447				447	
-Hauling											
11) Miscellaneous											
packing, bag	50.0	6.9	345							345	
transport	14.0	7.5	105							105	
2. Others											
3) Administration costs											
Total			7351	1301			915			9567	
3. Gross Income											
			Unit yield (ton/ha)			Unit Price			Gross Income		
			2.5			Z\$ 9.3 /kg			Z\$ 23250		
4. Net Income											
Z\$		13683 /ha									

Table 15 Economic Crop Budget for Wheat With Project Condition

(unit: kg, man-day, Z\$)

Particulars	Materials			Labor			Animal/Machine			Total Value	Remarks
	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value		
1. Production Cost											
1) Land preparation											
-Plowing				0.8	15.4	12	1.6	218.4	349	361	
2) Nursery preparation											
3) Seeding											
-Seed preparation											
-Seeding	130.0	13.0	1690	0.5	15.4	8				1698	
4) Transplanting, if any											
-Transplanting											
5) Fertilizing											
-Basal Compound D	550.0	6.4	3520	1.0	15.4	15				3535	
-Top/side dressing											
1st Ammonium nitrate	400.0	6.8	2720	0.5	15.4	8				2728	
Muriate of Potash	100.0	9.5	950							950	
6) Earthing											
7) Weeding				45.0	15.4	693				693	
8) Spraying of agrochemical											
-Demeton-S-Methyl 25EC	0.4	118.3	47	3.9	15.4	60				107	
-Aldrin	2.0	255.6	511	3.9	15.4	60				571	
9) Water Charge/Irrigating	4.0	288.3	1153	8.0	15.4	123				1276	
10) Harvesting											
-Harvesting (z\$/kg)				10.0	15.4	154				154	
-Threshing				12.0	15.4	185				185	
-Drying				10.0	15.4	154				154	
11) Miscellaneous											
packing, bag	42.0	6.9	290							290	
transport	1180.0	0.1	142							142	
2. Others											
3) Administration costs											
Total			11023			1472			349	12844	
3. Gross Income											
			Unit yield (ton/ha)			Unit Price				Gross Income	
			4.2			Z\$ 9.3 /kg				Z\$ 39060	
4. Net Income											
Z\$			26216 /ha								

Table 16 Economic Crop Budget for Tomato With Project Condition

(unit: kg, man-day,Z\$)

Particulars	Materials			Labor			Animal/Machine			Total Value	Remarks
	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value		
1. Production Cost											
1) Land preparation											
-Plowing				0.37	15.4		6	26.0	13.0	338	344
-Harrowing				0.3	15.4		5	9.5	13.0	123	128
2) Nursery preparation											
3) Seeding											
-Seed preparation											
-Seeding	0.15	3992	599								599
4) Transplanting, if any											
-Transplanting				15.8	15.4	243	12.3	4.0		49	292
5) Fertilizing											
-Basal											
Compound S	800.0	10.4	8320	3.7	15.4	57	0.5	4.0	2		8379
Pottasium sulphate	1000.0	14.5	14500								14500
Lime	1000.0	1.72	1720								1720
-Top/side dressing											
1st											
Ammonium nitrate	100.0	6.8	680	10.9	15.4	168	1.65	4.0	7		855
K2O											
6) Earthing											
7) Weeding				25.3	15.4	390					390
8) Spraying of agrochemical											
-Mancozeb 80 WP	15.0	265.0	3972	7.8	15.4	120					4092
-Makathion 25WP	2.0	345.0	689	7.8	15.4	120					809
-Carbaryl	0.8	271.0	217	7.8	15.4	120					337
9) Irrigating	Z\$/1000ton	6.0	288.0	1730	11.0	15.4	169	4.4	4.0	18	1917
10) Harvesting											
-Harvesting	(z\$/kg)				135.0	15.4	2079				2079
-Threshing											
-Drying											
11) Miscellaneous											
packing, bag	42.0	6.9	290								290
transport	75000	0.25	18750								18750
2. Others											
3) Administration costs											
Total			51467			3477			537	55481	
3. Gross Income				Unit yield (ton/ha)		Unit Price				Gross Income	
				75.0		Z\$ 3.5 /kg				Z\$ 262500	
4. Net Income	Z\$		207019	/ha							

Table 17 Economic Crop Budget for Cabbage With Project Condition

(unit: kg, man-day,Z\$)

Particulars	Materials			Labor			Animal/Machine			Total Value	Remarks
	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value		
1. Production Cost											
1) Land preparation											
-Plowing				0.3	15.4	5	28.6	13.0	372	377	
-Harrowing				0.3	15.4	5	10.5	13.0	137	141	
2) Nursery preparation											
3) Seeding											
-Seed preparation											
-Seeding	0.45	1083.0	487	2.8	15.4	43				530	
4) Transplanting, if any											
-Transplanting				69.6	15.4	1072				1072	
5) Fertilizing											
-Basal Compound S	1000	10.4	10400	1.1	15.4	17	9.9	4.0	40	10457	
-Top/side dressing											
1st Ammonium nitrate	200	6.8	1360	8.9	15.4	137	1.65	4.0	7	1504	
6) Earthing											
7) Weeding				24.6	15.4	379				379	
8) Spraying of agrochemical											
-Mancozeb 80 WP	0.9	264.4	224	7.8	15.4	120				344	
-Dimethoate	2.5	162.5	407	7.8	15.4	120				527	
-Cosan WP	4.5	101.1	455	7.8	15.4	120				575	
9) Water Charge/Irrigating	10.0	288.3	2880	17.0	15.4	262				3142	
10) Harvesting											
-Harvesting (z\$/kg)				42.6	15.4	656				656	
11) Miscellaneous											
transport	50.0	408.0	20400							20400	
2. Others											
3) Administration costs											
Total			36613			2936			555	40104	
3. Gross Income											
			Unit yield (ton/ha)			Unit Price				Gross Income	
			50.0			Z\$ 2.8 /kg				Z\$ 140000	
4. Net Income											
	Z\$		99896 /ha								

Table 18 Economic Crop Budget for Paprika With Project Condition

(unit: kg, man-day,Z\$)

Particulars	Materials			Labor			Animal/Machine			Total Value	Remarks
	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value		
1. Production Cost											
1) Land preparation											
-Plowing				0.8	15.4	12	1.6	218.4	349	361	
2) Nursery preparation											
3) Seeding											
-Seed preparation											
-Seeding	10.0	60.6	606	4.5	15.4	69				675	
4) Transplanting, if any											
5) Fertilizing											
-Basal Compound D	750.0	6.4	4800	2.0	15.4	31				4831	
-Top/side dressing											
1st Ammonium nitrate	75.0	6.8	510	2.0	15.4	31				541	
2st Ammonium nitrate	75.0	6.8	510	4.0	15.4	62				572	
6) Earthing											
7) Weeding				22.5	15.4	346	0.3	333	100	446	
8) Spraying of agrochemical											
-Carbyrl 85WP	30.0	271.0	8124	3.9	15.4	60				8184	
-Dithane M4S	48.0	188.0	9010	3.9	15.4	60				9070	
9) Irrigating Z\$/1000ton	4.0	288.0	1153	14.0	15.4	216				1369	
10) Harvesting											
-Harvesting (z\$/kg)				30.0	15.4	462				462	
-Threshing											
-Drying											
11) Miscellaneous transport to market	3.0	170.0	510							510	
bags	30.0	6.9	207							207	
2. Others marketing costs, 13% of gross income										10881	
1) Interests											
2) Tax											
3) Administration costs											
Total			25430			1349			449	38109	
3. Gross Income			Unit yield (ton/ha)			Unit Price				Gross Income	
			3.0			Z\$ 27.9 /kg				Z\$ 83700	
4. Net Income	Z\$		45591 /ha								

Table 19 Economic Crop Budget for Babycorn With Project Condition

(unit:kg,man-day, Z\$)

Particulars	Materials			Labor			Animal/Machine			Total Value	Remarks	
	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value			
1. Production Cost												
1) Land preparation												
-Plowing				0.8	15.4	12	1.6	218.4	349		361	
2) Nursery preparation												
3) Seeding												
-Seed preparation												
-Seeding	40.0	109.0	4360	4.5	15.4	68					4428	
4) Transplanting, if any												
5) Fertilizing												
-Basal	Compound D	600.0	6.4	3840							3840	
	Manure											
-Top/side dressing												
1st	Ammonium Nitrate	300.0	6.8	2040	2.0	15.4	31				2071	
	Muriate of potash	50.0	9.5	475							475	
	K2O											
6) Earthing												
7) Weeding												
				22.5	15.4	346	0.3	333.2	100		446	
8) Spraying of agrochemical												
-Thiodan, 1%		14.0	290.2	4060	3.9	15.4	60				4120	
-Atrazin, litre		2.0	147.1	294	3.9	15.4	60				354	
-Lasso, litre		3.5	170.6	598	3.9	15.4	60				658	
9) Water Charge/Irrigating												
		3.2	288.3	922	12.0	15.4	185				1107	
10) Harvesting												
-Harvesting				10.0	15.4	154					154	
11) Miscellaneous												
	Transport to market	1.0	170.0	170							170	
2. Others												
1) Marketing cost 10% of gross income												
											5580	
Total			16759				976				449	23764
3. Gross Income												
		Unit yield (ton/ha)			Unit Price			Gross Income				
		1.0			Z\$ 55.8 /kg			Z\$			55800	
4. Net Income												
	Z\$	32036 /ha										

Table 20 Cropwise Net Return with and without Project Conditions

(At Financial Prices)

Crops	Without Project Conditions										With Project Conditions									
	Share to total area (a)	Cropped area (b)	Yield (c)	Total prod. (d)=(b)*c	Price Z\$/kg (e)	Total amount (f)=(d)*e	Prod. cost (g)	Total prod. cost (h)=(b)*g	Net return (i)=(f)-(h)	Share to total area (a)	Cropped area (b)	Yield (c)	Total prod. (d)=(b)*c	Price Z\$/kg (e)	Total amount (f)=(d)*e	Prod. cost (g)	Total prod. cost (h)=(b)*g	Net return (i)=(f)-(h)	Incremental net return (j)=(i)-(i)	
1 COTTON	0.52	13,000	0.80	7,800	14.90	116,220,000	6,732	87,518,000	28,704,000	0.700	17,500	2.50	43,750	14.90	651,875,000	14,882	262,185,000	389,690,000	360,938,000	
2 MAIZE	0.42	10,500	0.80	8,400	6.40	53,760,000	4,789	50,074,500	3,685,500	0.190	4,500	6.00	27,000	6.40	172,800,000	16,042	72,188,000	100,611,000	96,923,500	
3 WHEAT	0.00	0	0.00	0	7.60	0	0	0	0	0.630	15,750	4.20	66,150	7.60	502,740,000	18,274	287,815,500	214,824,500	214,824,500	
4 GROUNDNUTS	0.06	1,500	0.50	750	10.00	7,500,000	7,647	11,470,500	-3,970,500	0.050	1,250	2.50	3,125	10.00	31,250,000	14,779	18,473,750	12,776,250	16,746,750	
5 CABBAGE	0.00	0	0.00	0	3.00	0	0	0	0	0.035	875	50.00	43,750	3.00	131,250,000	58,053	50,796,375	80,453,625	80,453,625	
6 TOMATOES	0.00	0	0.00	0	3.80	0	0	0	0	0.035	875	75.00	65,625	3.80	249,375,000	78,191	66,417,125	180,957,875	180,957,875	
7 BABY CORN	0.00	0	0.00	0	60.00	0	0	0	0	0.035	875	1.00	875	60.00	52,500,000	31,517	27,577,375	24,922,625	24,922,625	
8 PAPRIKA	0.00	0	0.00	0	30.00	0	0	0	0	0.035	875	3.00	2,625	30.00	78,750,000	50,161	43,890,375	34,859,125	34,859,125	
Total	1.00	25,000	-	-	-	177,480,000	-	149,061,000	28,419,000	1.700	42,500	-	-	-	1,870,540,000	-	831,345,000	1,039,195,000	1,010,776,000	

Net Return	Incremental
Per ha Z\$	40.431

(At Economic Prices)

Crops	Without Project Conditions										With Project Conditions									
	Share to total area (a)	Cropped area (b)	Yield (c)	Total prod. (d)=(b)*c	Price Z\$/kg (e)	Total amount (f)=(d)*e	Prod. cost (g)	Total prod. cost (h)=(b)*g	Net return (i)=(f)-(h)	Share to total area (a)	Cropped area (b)	Yield (c)	Total prod. (d)=(b)*c	Price Z\$/kg (e)	Total amount (f)=(d)*e	Prod. cost (g)	Total prod. cost (h)=(b)*g	Net return (i)=(f)-(h)	Incremental net return (j)=(i)-(i)	
1 COTTON	0.52	13,000	0.80	7,800	17.40	135,720,000	3,854	50,102,000	85,618,000	0.700	17,500	2.50	43,750	17.40	761,250,000	9,784	171,220,000	590,030,000	504,412,000	
2 MAIZE	0.42	10,500	0.80	8,400	7.50	63,000,000	2,724	28,602,000	34,398,000	0.180	4,500	6.00	27,000	7.50	202,500,000	11,438	51,475,500	151,024,500	116,526,500	
3 WHEAT	0.00	0	0.00	0	9.30	0	0	0	0	0.630	15,750	4.20	66,150	9.30	615,195,000	12,844	202,283,000	412,902,000	412,902,000	
4 GROUNDNUTS	0.06	1,500	0.50	750	9.30	6,975,000	4,232	6,348,000	627,000	0.050	1,250	2.50	3,125	9.30	29,082,500	9,567	11,958,750	17,103,750	16,476,750	
5 CABBAGE	0.00	0	0.00	0	2.80	0	0	0	0	0.035	875	50.00	43,750	2.80	122,500,000	40,104	36,081,000	87,408,000	87,408,000	
6 TOMATOES	0.00	0	0.00	0	3.50	0	0	0	0	0.035	875	75.00	65,625	3.50	229,687,500	55,481	48,545,875	181,141,625	181,141,625	
7 BABY CORN	0.00	0	0.00	0	55.80	0	0	0	0	0.035	875	1.00	875	55.80	48,825,000	23,764	20,793,500	28,031,500	28,031,500	
8 PAPRIKA	0.00	0	0.00	0	27.90	0	0	0	0	0.035	875	3.00	2,625	27.90	73,237,500	38,108	33,345,375	39,892,125	39,892,125	
Total	1.00	25,000	-	-	-	205,695,000	-	85,052,000	120,643,000	1.700	42,500	-	-	-	2,082,257,500	201,092	574,723,000	1,507,534,500	1,386,891,500	

Net Return	Incremental
Per ha Z\$	55.475

Table 21 Water Benefits

(1) Industrial Water Benefit from Kudu Dam

Particulars	Z\$
1 Dam Construction Cost	3,640,574,000
2 Rate of Return (7% per annum on construction cost)	254,840,180
3 O & M Cost (1% of construction cost)	36,405,740
4 Depreciation Charge (construction cost/depreciation period, 50 yrs)	72,811,480
5 Total Annual Cost(2+3+4)	364,057,400
6 Annual Yield of Dam (m3)	380,000,000
7 Cost of Water (Z\$/m3)	0.958
8 Quantity of Water Allocated for Urban/Industrial Use (m3/year)	60,000,000
8 Actual Total Cost of Water for Urban/Industrial Use (Z\$)	Financial Prices 57,482,747 SCF 0.93 Economic Price: 53,458,955

(2) Domestic Water Benefit from Boreholes

Particulars	Z\$
1 Borehole Construction/Rehabilitation Cost	110,960,000
2 Rate of Return (7% per annum on construction cost)	7,767,200
3 O & M Cost (1% of construction cost)	1,109,600
4 Depreciation Charge (construction cost/depreciation period, 50 yrs)	2,219,200
5 Total Annual Cost(2+3+4)	11,096,000
6 Annual Yield of Borehole (m3)	697,150
7 Cost of Water (Z\$/m3)	15.9
8 Quantity of Water Available for Domestic Use ((m3/year), 3650 m3/unit/year*191unit))	697,150
8 Actual Total Cost of Water for Urban/Industrial Use (Z\$)	Financial Prices 11,096,000 SCF 0.93 Economic Price: 10319280

Table 22 Benefits from Road Rehabilitation

Area	Type of Road	Prices and Conversion Factors	Length of Road to be Rehabilitated (km) (a)	Savings of Fuel Cost (Z\$/km/unit) (b)	Savings of Maintenance Cost (Z\$/km/unit) ©	Savings of Labour Cost (Z\$/km/unit) (d)	Savings of Depreciation (Z\$/km/unit) (e)	Savings of tyres and Oils (Z\$/km/unit) (f)	Average Daily Traffic (Unit/day) (g)	Annual Savings (Z\$) (h)=(b)+...+(f)*279km*81unit*365days
Kadoma, Gokwe North, Gokwe South, Kwakwe	Track→Gravel	Financial Prices	279	0.6	0.5	0.2	0.3	0.2	105	19,246,815
		Conversion Factor	-	0.62	0.93	1.0	0.93	0.62	-	-
		Economic Prices	279	0.37	0.47	0.20	0.28	0.12	105	15,397,452

Note: 1) The maintenance and operation cost of a truck/bus in normal road is Z\$ 12.9/km. This amount comprises: fuel 36%, maintenance 27%, labour 13%, depreciation 16% and tyres and oils 8% respectively. The basic assumption of this estimation is that the overall cost i.e., the vehicle operation and maintenance cost in gravel road is 1.36 times of normal road and track road is 1.1 times of gravel road.

Table 23 Gokwe Road Construction Benefit of the Pilot Project

1. Pilot Project Area and Surrounding Area

Household No 1043
 Total Population 7185
 Cropped Area 7185 ha

(1) Benefit from Agricultural Outputs and Inputs Supply (Output)

Crops	Total Prod. (ton)	Marketable Surplus (ton)	Transportation to Sanyati 64km (Z\$/ton)	Total Amount Z\$	Transportation to Gokwe 24Km (Z\$/ton)	Total Amount (Z\$)	Estimated Saving Amount (Z\$)
Cotton	5,943	5,943	88	522,984	35	208,005	314,979
Maize	1,888	882	160	141,120	59	52,038	89,082
Groundnuts	883	740	160	118,400	59	43,660	74,740
Total							478,801

(Input)

Crops	Total Input (ton)	Transportation from Sanyati 64km (Z\$/ton)	Total Amount (Z\$)	Transportation from Gokwe (Z\$)	Total Amount (Z\$)	Estimated Saving Amount (Z\$)
Cotton	921	160	147,360	59	54,339	93,021
Maize	374	160	59,840	59	22,066	37,774
Groundnuts	0	-	-	-	-	-
Total						130,795

(2) Pilot Project Area (Including With Project Conditions)

Total Area 60 ha
 (Cropped Area: Without Project 60 ha With Project 102 ha)

(Outputs)

Crops	With project Marketable Surplus (ton)	Transportation to Sanyati 64km (Z\$/ton)	Total Amount Z\$	Transportation to Gokwe 24Km (Z\$/ton)	Total Amount (Z\$)	Estimated Saving Amount (Z\$)
Cotton	105	88	9,240	35	3,675	5,565
Maize	6	160	960	59	354	606
Wheat	119	160	19,040	59	7,021	12,019
Groundnuts	0	160	0	59	0	0
Cabbage	94.5	160	15,120	59	5,576	9,545
Tomatoes	142	160	22,720	59	8,378	14,342
Baby Corn	1.89	160	302	59	112	191
Paprika	5.67	160	907	59	335	573
Total						42,840

(Inputs)

Crops	Inputs (ton)	From Sanyati Z\$/ton	Total Amount(Z\$)	From Gokwe (Z\$/ton)	Total (Z\$)	Estimated Savings (Z\$)
Cotton	37	160	5,920	59	2,183	3,737
Maize	9	160	1,440	59	531	909
Wheat	34	160	5,440	59	2,006	3,434
Groundnuts	2.7	160	432	59	159.3	273
Cabbage	2.5	160	400	59	147.5	253
Tomatoes	2.5	160	400	59	147.5	253
Baby Corn	2.5	160	400	59	147.5	253
Paprika	2.5	160	400	59	147.5	253
Total						9,363

(3) Bus Service

2 Buses*2 Trips (Nyrapkwe—Gokwe)*50 persons =200/persons/day*365 days*Z\$40 Per Head=
 Z\$ 2,920,000 /year

Total Benefit	Financial Prices	3,581,799
	CF	0.68
	Economic Prices	2,435,623

Note: 1) marketable surplus is the remaining amount after the deduction of domestic consumption. Domestic consumption is estimated approximately at 140 kg/perhead for maize , wheat 40kg, and groundnuts 20 kg respectively based on Supplementary Household Survey. For Vegetables it is estimated at 10% of the production (including loss or low quality products for livestock).

Table 24 Benefits from Livestock Development Scheme

**(1) Livestock Water Development Scheme
Labour Saving in Watering/Herding Livestock**

	days/year	Wage/day	households/ trough	total units	Total Z\$
Financial	20	38.5	40	72	2,217,600
Economic	20	15.4	40	72	887,040

Labour Saving in Herding Livestock

	hrs/herd/ day	365 days	Z\$ 19.2/4hr herds	bloks	Total
Financial	4	365	19.2	30	10 8,409,600
Economic	4	365	7.68	30	10 3,363,840

(2) Surface Soil Conservation

	Z\$/ha/yr	ha	block	Total
Financial	240	600	10	1,440,000
SCF				0.93
Economic				1,339,200

Total

Financial 12,067,200

Economic 5,590,080

Table 25 Economic Cost and Benefit Stream (EIRR)

(Whole Kudu Dam Area: 25,000 ha.)

(Unit:Z\$ 1000.0)

Year in Order	Year	Cost Stream				Benefit Stream	Net Benefit	Present Worth Value	
		Capital Cost	O&M	Replacement	Total			Discount Rate 10%	
								Cost	Benefit
1	2001	409,846			409846	0	-409846	372587	0
2	2002	518,922			518922	0	-518922	428861	0
3	2003	632,912	7580		640492	0	-640492	481211	0
4	2004	994,105	19494		1013599	6902	-1006697	692302	4714
5	2005	1,168,865	33506		1202371	7490	-1194881	746578	4651
6	2006	1,184,314	47718		1232032	7968	-1224064	695450	4498
7	2007	1,274,986	62997		1337983	8561	-1329422	686597	4393
8	2008	897,860	73694		971554	186687	-784867	453237	87091
9	2009	449925	79129		529054	440853	-88201	224371	186965
10	2010	401954	83932		485886	618023	132137	187330	238275
11	2011	1724	83932		85656	796526	710870	30022	279178
12	2012		83932		83932	973697	889765	26743	310250
13	2013		83932		83932	1150868	1066936	24312	333365
14	2014		83932		83932	1328038	1244106	22102	349714
15	2015		83932		83932	1505156	1421224	20093	360322
16	2016		83932		83932	1505156	1421224	18266	327566
17	2017		83932		83932	1505156	1421224	16605	297787
18	2018		83932		83932	1505156	1421224	15096	270716
19	2019		83932		83932	1505156	1421224	13724	246105
20	2020		83932		83932	1505156	1421224	12476	223732
21	2021		83932	69943	153875	1505156	1351281	20793	203393
22	2022		83932		83932	1505156	1421224	10311	184902
23	2023		83932		83932	1505156	1421224	9373	168093
24	2024		83932		83932	1505156	1421224	8521	152812
25	2025		83932		83932	1505156	1421224	7747	138920
26	2026		83932		83932	1505156	1421224	7042	126291
27	2027		83932		83932	1505156	1421224	6402	114810
28	2028		83932		83932	1505156	1421224	5820	104373
29	2029		83932		83932	1505156	1421224	5291	94884
30	2030		83932		83932	1505156	1421224	4810	86258
31	2031		83932	69943	153875	1505156	1351281	8017	78417
32	2032		83932		83932	1505156	1421224	3975	71288
33	2033		83932		83932	1505156	1421224	3614	64807
34	2034		83932		83932	1505156	1421224	3285	58916
35	2035		83932		83932	1505156	1421224	2987	53560
36	2036		83932		83932	1505156	1421224	2715	48691
37	2037		83932		83932	1505156	1421224	2468	44264
38	2038		83932		83932	1505156	1421224	2244	40240
39	2039		83932		83932	1505156	1421224	2040	36582
40	2040		83932		83932	1505156	1421224	1854	33256
41	2041		83932	69943	153875	1505156	1351281	3091	30233
42	2042		83932		83932	1505156	1421224	1533	27485
43	2043		83932		83932	1505156	1421224	1393	24986
44	2044		83932		83932	1505156	1421224	1267	22715
45	2045		83932		83932	1505156	1421224	1151	20650
46	2046		83932		83932	1505156	1421224	1047	18772
47	2047		83932		83932	1505156	1421224	952	17066
48	2048		83932		83932	1505156	1421224	865	15514
49	2049		83932		83932	1505156	1421224	786	14104
50	2050		83932	69943	153875	1505156	1351281	1311	12822
		7935413	3765330	279772	11980515	59711229	47730714	5300668	5638421

EIRR 10.5%
 B/C 1.06 (Discount Rate 10%)
 B-C 337753 (Discount Rate 10%)

Table 26 Sensitivity Analysis : Cost 10 % Up

(Unit:Z\$ 1000.0)

Year in Order	Year	Cost Stream				Benefit Stream	Net Benefit	Present Worth Value	
		Capital Cost	O&M	Replacement	Total			Discount Rate 10%	
								Cost	Benefit
1	2001	450,830			450830	0	-450830	409845	0
2	2002	570,813			570813	0	-570813	471746	0
3	2003	696,203	8338		704541	0	-704541	529332	0
4	2004	1,093,515	21444		1114959	6902	-1108057	761532	4714
5	2005	1,285,751	36857		1322608	7490	-1315118	821236	4651
6	2006	1,302,746	52489		1355235	7968	-1347267	764995	4498
7	2007	1,402,485	69296		1471781	8561	-1463220	755256	4393
8	2008	987,646	81064		1068710	186687	-882023	498561	87091
9	2009	494917	87042		581959	440853	-141106	246807	186965
10	2010	442149	92325		534474	618023	83549	206063	238275
11	2011	1896	92325		94221	796526	702305	33024	279178
12	2012		92325		92325	973697	881372	29418	310250
13	2013		92325		92325	1150868	1058543	26743	333365
14	2014		92325		92325	1328038	1235713	24312	349714
15	2015		92325		92325	1505156	1412831	22102	360322
16	2016		92325		92325	1505156	1412831	20093	327566
17	2017		92325		92325	1505156	1412831	18266	297787
18	2018		92325		92325	1505156	1412831	16605	270716
19	2019		92325		92325	1505156	1412831	15096	246105
20	2020		92325		92325	1505156	1412831	13724	223732
21	2021		92325	76937	169262	1505156	1335894	22872	203393
22	2022		92325		92325	1505156	1412831	11342	184902
23	2023		92325		92325	1505156	1412831	10311	168093
24	2024		92325		92325	1505156	1412831	9373	152812
25	2025		92325		92325	1505156	1412831	8521	138920
26	2026		92325		92325	1505156	1412831	7747	126291
27	2027		92325		92325	1505156	1412831	7042	114810
28	2028		92325		92325	1505156	1412831	6402	104373
29	2029		92325		92325	1505156	1412831	5820	94884
30	2030		92325		92325	1505156	1412831	5291	86258
31	2031		92325	76937	169262	1505156	1335894	8818	78417
32	2032		92325		92325	1505156	1412831	4373	71288
33	2033		92325		92325	1505156	1412831	3975	64807
34	2034		92325		92325	1505156	1412831	3614	58916
35	2035		92325		92325	1505156	1412831	3285	53560
36	2036		92325		92325	1505156	1412831	2987	48691
37	2037		92325		92325	1505156	1412831	2715	44264
38	2038		92325		92325	1505156	1412831	2468	40240
39	2039		92325		92325	1505156	1412831	2244	36582
40	2040		92325		92325	1505156	1412831	2040	33256
41	2041		92325	76937	169262	1505156	1335894	3400	30233
42	2042		92325		92325	1505156	1412831	1686	27485
43	2043		92325		92325	1505156	1412831	1533	24986
44	2044		92325		92325	1505156	1412831	1393	22715
45	2045		92325		92325	1505156	1412831	1267	20650
46	2046		92325		92325	1505156	1412831	1151	18772
47	2047		92325		92325	1505156	1412831	1047	17066
48	2048		92325		92325	1505156	1412831	952	15514
49	2049		92325		92325	1505156	1412831	865	14104
50	2050		92325	76937	169262	1505156	1335894	1442	12822
		8728951	4141855	307748	13178554	59711229	46532675	5830732	5638421

EIRR 9.7%
 B/C 0.97 (Discount Rate10%)
 B-C -192311 (Discount Rate10%)

Table 27 Sensitivity Analysis : Benefit 10 % Decrease

(Unit:Z\$ 1000.0)

Year in Order	Year	Cost Stream				Benefit Stream	Net Benefit	Present Worth Value	
		Capital Cost	O&M	Replacement	Total			Discount Rate 10%	
								Cost	Benefit
1	2001	409,846			409846	0	-409846	372587	0
2	2002	518,922			518922	0	-518922	428861	0
3	2003	632,912	7580		640492	0	-640492	481211	0
4	2004	994,105	19494		1013599	6211	-1007388	692302	4242
5	2005	1,168,865	33506		1202371	6741	-1195630	746578	4186
6	2006	1,184,314	47718		1232032	7171	-1224861	695450	4048
7	2007	1,274,986	62997		1337983	7705	-1330278	686597	3954
8	2008	897,860	73694		971554	168018	-803536	453237	78382
9	2009	449925	79129		529054	396768	-132286	224371	168268
10	2010	401954	83932		485886	556221	70335	187330	214447
11	2011	1724	83932		85656	716873	631217	30022	251260
12	2012		83932		83932	876327	792395	26743	279225
13	2013		83932		83932	1035781	951849	24312	300029
14	2014		83932		83932	1195234	1111302	22102	314742
15	2015		83932		83932	1354640	1270708	20093	324290
16	2016		83932		83932	1354640	1270708	18266	294809
17	2017		83932		83932	1354640	1270708	16605	268008
18	2018		83932		83932	1354640	1270708	15096	243644
19	2019		83932		83932	1354640	1270708	13724	221494
20	2020		83932		83932	1354640	1270708	12476	201359
21	2021		83932	69943	153875	1354640	1200765	20793	183053
22	2022		83932		83932	1354640	1270708	10311	166412
23	2023		83932		83932	1354640	1270708	9373	151284
24	2024		83932		83932	1354640	1270708	8521	137531
25	2025		83932		83932	1354640	1270708	7747	125028
26	2026		83932		83932	1354640	1270708	7042	113662
27	2027		83932		83932	1354640	1270708	6402	103329
28	2028		83932		83932	1354640	1270708	5820	93935
29	2029		83932		83932	1354640	1270708	5291	85396
30	2030		83932		83932	1354640	1270708	4810	77632
31	2031		83932	69943	153875	1354640	1200765	8017	70575
32	2032		83932		83932	1354640	1270708	3975	64159
33	2033		83932		83932	1354640	1270708	3614	58326
34	2034		83932		83932	1354640	1270708	3285	53024
35	2035		83932		83932	1354640	1270708	2987	48204
36	2036		83932		83932	1354640	1270708	2715	43821
37	2037		83932		83932	1354640	1270708	2468	39838
38	2038		83932		83932	1354640	1270708	2244	36216
39	2039		83932		83932	1354640	1270708	2040	32924
40	2040		83932		83932	1354640	1270708	1854	29931
41	2041		83932	69943	153875	1354640	1200765	3091	27210
42	2042		83932		83932	1354640	1270708	1533	24736
43	2043		83932		83932	1354640	1270708	1393	22487
44	2044		83932		83932	1354640	1270708	1267	20443
45	2045		83932		83932	1354640	1270708	1151	18585
46	2046		83932		83932	1354640	1270708	1047	16895
47	2047		83932		83932	1354640	1270708	952	15359
48	2048		83932		83932	1354640	1270708	865	13963
49	2049		83932		83932	1354640	1270708	786	12694
50	2050		83932	69943	153875	1354640	1200765	1311	11540
		7935413	3765330	279772	11980515	53740090	41759575	5300668	5074577

EIRR 9.7%
 B/C 0.96 (Discount Rate10%)
 B-C -226091 (Discount Rate10%)

Table 28 Sensitivity Analysis : Cost 10 % Up and Benefit 10 % Decrease

(Unit:Z\$ 1000.0)

Year in Order	Year	Cost Stream				Benefit Stream	Net Benefit	Present Worth Value	
		Capital Cost	O&M	Replacement	Total			Discount Rate 10%	
								Cost	Benefit
1	2001	450,830			450830	0	-450830	409845	0
2	2002	570,813			570813	0	-570813	471746	0
3	2003	696,203	8338		704541	0	-704541	529332	0
4	2004	1,093,515	21444		1114959	6211	-1108748	761532	4242
5	2005	1,285,751	36857		1322608	6741	-1315867	821236	4186
6	2006	1,302,746	52489		1355235	7171	-1348064	764995	4048
7	2007	1,402,485	69296		1471781	7705	-1464076	755256	3954
8	2008	987,646	81064		1068710	168018	-900692	498561	78382
9	2009	494918	87042		581960	396768	-185192	246808	168268
10	2010	442149	92325		534474	556221	21747	206063	214447
11	2011	1896	92325		94221	716873	622652	33024	251260
12	2012		92325		92325	876327	784002	29418	279225
13	2013		92325		92325	1035781	943456	26743	300029
14	2014		92325		92325	1195234	1102909	24312	314742
15	2015		92325		92325	1354640	1262315	22102	324290
16	2016		92325		92325	1354640	1262315	20093	294809
17	2017		92325		92325	1354640	1262315	18266	268008
18	2018		92325		92325	1354640	1262315	16605	243644
19	2019		92325		92325	1354640	1262315	15096	221494
20	2020		92325		92325	1354640	1262315	13724	201359
21	2021		92325	76937	169262	1354640	1185378	22872	183053
22	2022		92325		92325	1354640	1262315	11342	166412
23	2023		92325		92325	1354640	1262315	10311	151284
24	2024		92325		92325	1354640	1262315	9373	137531
25	2025		92325		92325	1354640	1262315	8521	125028
26	2026		92325		92325	1354640	1262315	7747	113662
27	2027		92325		92325	1354640	1262315	7042	103329
28	2028		92325		92325	1354640	1262315	6402	93935
29	2029		92325		92325	1354640	1262315	5820	85396
30	2030		92325		92325	1354640	1262315	5291	77632
31	2031		92325	76937	169262	1354640	1185378	8818	70575
32	2032		92325		92325	1354640	1262315	4373	64159
33	2033		92325		92325	1354640	1262315	3975	58326
34	2034		92325		92325	1354640	1262315	3614	53024
35	2035		92325		92325	1354640	1262315	3285	48204
36	2036		92325		92325	1354640	1262315	2987	43821
37	2037		92325		92325	1354640	1262315	2715	39838
38	2038		92325		92325	1354640	1262315	2468	36216
39	2039		92325		92325	1354640	1262315	2244	32924
40	2040		92325		92325	1354640	1262315	2040	29931
41	2041		92325	76937	169262	1354640	1185378	3400	27210
42	2042		92325		92325	1354640	1262315	1686	24736
43	2043		92325		92325	1354640	1262315	1533	22487
44	2044		92325		92325	1354640	1262315	1393	20443
45	2045		92325		92325	1354640	1262315	1267	18585
46	2046		92325		92325	1354640	1262315	1151	16895
47	2047		92325		92325	1354640	1262315	1047	15359
48	2048		92325		92325	1354640	1262315	952	13963
49	2049		92325		92325	1354640	1262315	865	12694
50	2050		92325	76937	169262	1354640	1185378	1442	11540
		8728952	4141855	307748	13178555	53740090	40561535	5830733	5074577

EIRR 8.9%
 B/C 0.87 (Discount Rate10%)
 B-C -756155 (Discount Rate10%)

Table 29 Household Budget

Particulars	Whole Kudu Dam Area	
	Without Project Condition	With Project Condition
1 Household Size (Person) ¹⁾	7.1	7.1
2 Average Farm Size (ha) ²⁾		
-Irrigated Area	0.0	1.0
-Non-Irrigated Area	4.91	2.91
3 Income Structure (Z\$)		
(1) Agricultural Income ³⁾		
Gross Farm Income	10,908	95,481
Production Cost	2,421	49,915
Net Farm Income	8,487	45,566
(2) Livestock Income ⁴⁾		
Gross Livestock Income	1,029	1,029
Livestock Input Cost	393	393
Net Livestock Income	636	636
(3) Other Income ⁵⁾		
Home Industry	240	240
Salary	4,518	4,518
Wage	750	750
Pension	340	340
Remittance	423	423
Private Business	950	950
Others	265	265
Total Off-Farm Income	7,486	7,486
4 Total Net Income (Z\$)	16,609	53,688
[(1)+(2)+(3)]		
5 Living Expenditure (Z\$) ⁶⁾		
Food	6,795	7,814
Clothes	3,581	4,118
Education	1,752	2,015
Housing	1,038	1,194
Others	449	516
Total Living Expenditure	13,615	15,657
6 Net Reserve (Z\$)	2,994	38,031

- Note
- 1) Household and Household Member Survey, 1999 and A Survey on the Incorporation of Social Dimension into the Nyarupakwe Pilot Project Area, 2000.
 - 2) Supplementary Survey, 1999 and 2000
 - 3) Based on the assumption that, 1 ha of irrigated land will be allocated to the farmers in exchange of 2 ha of non-irrigated land
 - 4) However the availability of drinking water, fodder and crop residues etc., will contribute to the growth of livestock production, the increment of livestock income attributed to the project is not included.
 - 5) Off-farm income is supposed to be remaining the same.
 - 6) The growth in living expenditure with project condition is estimated at 15%.

Table 30 Calculation of Shadow Income Weight

Household Category	Average Household Income(Z\$/year)	Shadow Income Weight		
		e=0.5	e=1.0	e=2.0
Average Rural Households	19,826	1.0	1.0	1.0
Large Scale Commercial Employees	37,178	0.73	0.53	0.28
Small Scale Commercial Farms	34,481	0.76	0.57	0.33
Communal Land Farmers	15,705	1.12	1.26	1.59
Resettlement Farmers	9,797	1.42	2.02	4.10
Communal and Resettlement Farmers in the Study Area	16,609	1.09	1.19	1.42

Source: Income, Consumption and Expenditure Survey Report 1990/91, CSO, 1994, p 14

Note: 1) Recent Figures on income distribution are not available, so the average household income of 1990/91 with base year of 1990=100 has been inflated to produce 2000 income figures multiply by 10.1 (index is 1009.6).

2) Figures for the Study Area are from the " Lower Munyati River Basin Agricultural Development Project Household and Household Member Survey" 1999

3) "e" indicates elasticity of marginal utility $((19,826/16,609)^{1.0}=1.19)$

Table 31 Social Internal Rate of Return (SIRR)

(Whole Kudu Dam Area: 25,000 ha.)

(Unit:Z\$ 1000.0)

Year in Order	Year	Cost Stream				Benefit Stream	Net Benefit	Present Worth Value	
		Capital Cost	O&M	Replacement	Total			Discount Rate 10%	
								Cost	Benefit
1	2001	409,846			409846	0	-409846	372587	0
2	2002	518,922			518922	0	-518922	428861	0
3	2003	632,912	7580		640492	0	-640492	481211	0
4	2004	994,105	19494		1013599	8256	-1005343	692302	5639
5	2005	1,168,865	33506		1202371	8959	-1193412	746578	5563
6	2006	1,184,314	47718		1232032	9532	-1222500	695450	5381
7	2007	1,274,986	62997		1337983	10241	-1327742	686597	5255
8	2008	897,860	73694		971554	223319	-748235	453237	104180
9	2009	449925	79129		529054	525378	-3676	224371	222812
10	2010	401954	83932		485886	739292	253406	187330	285029
11	2011	1724	83932		85656	952821	867165	30022	333958
12	2012		83932		83932	1164757	1080825	26743	371127
13	2013		83932		83932	1376692	1292760	24312	398779
14	2014		83932		83932	1588626	1504694	22102	418335
15	2015		83932		83932	1800562	1716630	20093	431040
16	2016		83932		83932	1800562	1716630	18266	391855
17	2017		83932		83932	1800562	1716630	16605	356232
18	2018		83932		83932	1800562	1716630	15096	323847
19	2019		83932		83932	1800562	1716630	13724	294406
20	2020		83932		83932	1800562	1716630	12476	267642
21	2021		83932	69943	153875	1800562	1646687	20793	243311
22	2022		83932		83932	1800562	1716630	10311	221192
23	2023		83932		83932	1800562	1716630	9373	201083
24	2024		83932		83932	1800562	1716630	8521	182803
25	2025		83932		83932	1800562	1716630	7747	166185
26	2026		83932		83932	1800562	1716630	7042	151077
27	2027		83932		83932	1800562	1716630	6402	137343
28	2028		83932		83932	1800562	1716630	5820	124857
29	2029		83932		83932	1800562	1716630	5291	113506
30	2030		83932		83932	1800562	1716630	4810	103188
31	2031		83932	69943	153875	1800562	1646687	8017	93807
32	2032		83932		83932	1800562	1716630	3975	85279
33	2033		83932		83932	1800562	1716630	3614	77526
34	2034		83932		83932	1800562	1716630	3285	70479
35	2035		83932		83932	1800562	1716630	2987	64071
36	2036		83932		83932	1800562	1716630	2715	58247
37	2037		83932		83932	1800562	1716630	2468	52952
38	2038		83932		83932	1800562	1716630	2244	48138
39	2039		83932		83932	1800562	1716630	2040	43762
40	2040		83932		83932	1800562	1716630	1854	39783
41	2041		83932	69943	153875	1800562	1646687	3091	36167
42	2042		83932		83932	1800562	1716630	1533	32879
43	2043		83932		83932	1800562	1716630	1393	29890
44	2044		83932		83932	1800562	1716630	1267	27173
45	2045		83932		83932	1800562	1716630	1151	24702
46	2046		83932		83932	1800562	1716630	1047	22457
47	2047		83932		83932	1800562	1716630	952	20415
48	2048		83932		83932	1800562	1716630	865	18559
49	2049		83932		83932	1800562	1716630	786	16872
50	2050		83932	69943	153875	1800562	1646687	1311	15338
		7935413	3765330	279772	11980515	71428105	59447590	5300668	6744118

SIRR 12.0%
 B/C 1.27 (Discount Rate 10%)
 B-C 1443449 (Discount Rate 10%)

Table 32 Cropwise Net Return with and without Project Conditions of the Pilot Project

(At Financial Prices)

Crops	Without Project Conditions										With Project Conditions									
	Share to total area		Cropped Area (ha)	Yield ton/ha	Total Prod (d)=(b)*e	Price Z\$/kg (e)	Total amount (f)=(d)*e	Prod. cost (g)	Total P.cost (h)=(b)*(g)	Net return (i)=(f)-(h)	Share to total area (a)	Cropped Area (ha)	Yield ton/ha	Total Prod (d)=(b)*e	Price Z\$/kg (e)	Total amount (f)=(d)*e	Prod. cost (g)	Total P.Cost (h)=(b)*(g)	Net return (i)=(f)-(h)	Incremental Net Return (j)=(i)-(i)
	(a)	(b)																		
1 COTTON	0.63	37.86	1.29	48.84	14.90	727.707	6732	254.874	472.834	0.70	42.00	2.50	105.00	14.90	1,564.500	14,962	629.244	985.256	462.422	
2 MAIZE	0.26	15.38	1.01	15.51	6.40	99.287	4769	73.252	26.035	0.18	10.80	9.00	64.80	6.40	414.720	16,042	173.254	241.466	215.431	
3 WHEAT	0.00	0.00	0.00	0.00	7.80	0	0	0	0	0.69	37.80	4.20	158.76	7.60	1,206.576	18,274	690.757	515.819	515.819	
4 GROUNDNUTS	0.11	6.78	1.07	7.25	10.00	72.546	7647	51.847	20.698	0.05	3.00	2.50	7.50	10.00	75.000	44,337	30.663	9.964		
5 CABBAGE	0.00	0.00	0.00	0.00	3.00	0	0	0	0	0.035	2.10	50.00	105.00	3.00	315.000	58,053	121,911	193,089	193,089	
6 TOMATOES	0.00	0.00	0.00	0.00	3.80	0	0	0	0	0.035	2.10	75.00	157.50	3.80	596.500	78,191	184,201	434,299	434,299	
7 BABY CORN	0.00	0.00	0.00	0.00	60.00	0	0	0	0	0.035	2.10	1.00	2.10	60.00	126.000	31,517	66,186	59,814	59,814	
8 PAPRIKA	0.00	0.00	0.00	0.00	30.00	0	0	0	0	0.035	2.10	3.00	6.30	30.00	189.000	50,161	105,338	83,662	83,662	
Total	1.00	60.00	-	-	-	899,540	-	379,972	519,568	1.70	102.00	-	-	-	4,489,296	-	1,995,228	2,494,068	1,974,500	

Incremental Net Return	41,588
Per ha Z\$	32,908

(At Economic Prices)

Crops	Without Project Conditions										With Project Conditions									
	Share to total area		Cropped Area (ha)	Yield ton/ha	Total Prod (d)=(b)*e	Price Z\$/kg (e)	Total amount (f)=(d)*e	Prod. cost (g)	Total P.cost (h)=(b)*(g)	Net return (i)=(f)-(h)	Share to total area (a)	Cropped Area (ha)	Yield ton/ha	Total Prod (d)=(b)*e	Price Z\$/kg (e)	Total amount (f)=(d)*e	Prod. cost (g)	Total P.Cost (h)=(b)*(g)	Net Return (i)=(f)-(h)	Incremental Net Return (j)=(i)-(i)
	(a)	(b)																		
1 COTTON	0.63	37.8	1.29	48.782	17.4	848,459	3,854	145,681	702,778	0.7	42.00	2.5	105	17.4	1,827,000	9,784	410,928	1,416,072	713,294	
2 MAIZE	0.26	15.6	1.01	15.756	7.5	118,170	2,724	42,494	75,676	0.18	10.80	6	64.8	7.5	486,000	11,439	123,541	362,459	286,783	
3 WHEAT	0	0	0	0	9.3	0	0	0	0	0.63	37.80	4.2	158.76	9.3	1,476,468	12,844	485,503	990,965	990,965	
4 GROUNDNUTS	0.11	6.6	1.07	7.082	9.3	65,677	4,232	27,931	37,745	0.05	3.00	2.5	7.5	9.3	69,750	9,567	28,701	41,049	3,304	
5 CABBAGE	0	0	0	0	2.8	0	0	0	0	0.035	2.10	50	105	2.8	294,000	40,104	84,218	209,782	209,782	
6 TOMATOES	0	0	0	0	3.5	0	0	0	0	0.035	2.10	75	157.5	3.5	551,250	55,481	116,510	434,740	434,740	
7 BABY CORN	0	0	0	0	55.8	0	0	0	0	0.035	2.10	1	2.1	55.8	117,180	23,764	49,904	67,276	67,276	
8 PAPRIKA	0	0	0	0	27.9	0	0	0	0	0.035	2.10	3	6.3	27.9	175,770	38,108	80,029	95,741	95,741	
Total	1.0	60.0	-	-	-	1,032,305	-	216,107	816,199	1.70	102.00	-	-	-	4,997,418	-	1,379,335	3,618,083	2,801,894	

Incremental Net Return	60,301
Per ha Z\$	46,698

Table 33 Water Benefit of the Pilot Project

(1) Industrial/Domestic Water benefit from Nyarupkwe Dam

Particulars	Z\$
1 Dam Construction Cost	118,565,000
2 Rate of Return (7% per annum on construction cost)	8,299,550
3 O & M Cost (1% of construction cost)	1,185,650
4 Depreciation Charge (construction cost/depreciation period, 50 yrs)	2,371,300
5 Total Annual Cost(2+3+4)	11,856,500
6 Annual Yield of Dam (m3)	850,000
7 Cost of Water (Z\$/m3)	13.9
8 Quantity of Water Allocated for Urban/Industrial Use Including for Livestock (m3/year)	85,000
9 Actual Total Cost of Water for Urban/Industrial Use (Z\$)	Financial 1,185,650
	0.93
	Economic 1,102,655

(2) Domestic Water Benefit from Boreholes

Particulars	Z\$
1 Borehole Construction/Rehabilitation Cost	11,037,898
2 Rate of Return (7% per annum on construction cost)	772,653
3 O & M Cost (1% of construction cost)	110,379
4 Depreciation Charge (construction cost/depreciation period, 50 yrs)	220,758
5 Total Annual Cost(2+3+4)	1,103,790
6 Annual Yield of Borehole (m3)	69,350
7 Cost of Water (Z\$/m3)	15.9
8 Quantity of Water Available for Domestic Use ((m3/year), 3650 m3/unit/year*19unit)	69,350
9 Actual Total Cost of Water for Urban/Industrial Use (Z\$)	Financial 1,103,790
	SCF 0.93
	Economic 1,026,525

Table 34 Benefit from Maize Stalk/Residues of the Pilot Project

Particulars	Without Project Condition	With Project Condition	Increment
Cropped Area (ha) ¹⁾	15.4	10.8	-4.6
Per ha Stalk Production (1,000 kg)	15.5	64.8	49
Price (Z\$/kg) ³⁾			
-Financial	1.8	1.8	
-Economic	1.67	1.67	
Total Value (Z\$ 1,000)			
-Financial	27.9	116.6	88.7
-Economic	25.9	108.2	82.3

Note: 1) Under future without project conditions 26% and 18% out of total (25,000 ha) cropped area is estimated under maize crop

2) Dry matter basis; assuming grains: stalk ratio=1:1; per ha yield of maize 1.01 ton/ha and 6.0 ton/ha for without and with project conditions respectively.

3) Supplementary household survey Nov. 1998

Table 35 Livestock Benefit of the Pilot Project

1. Benefit from Grazing Area Development						
(1) Labour Saving in Herding Livestock						
	hrs./herd/ day (a)	Total Hrs/yr/herd ©=(a)*365	Total Herds	Total Hrs/yr	Wage Z\$19.3/4hrs	Total Amount
Financial Prices	4	1,460	43	62,780	19.3	1,211,654
CF	-	-	-	-	0.40 ^d	-
Economic Prices	4	1,460	43	62,780	7.72	484,662
Note: 1) Shadow Wage Conversion Factor for Unskilled labour						
2. Benefit from Surface Soil Conservation						
	Z\$/ha/yr	Area (ha)	Total Amount (Z\$)			
Financial Prices	240	860	206,400			
CF	-	-	0.93 *			
Economic Prices	240	860	191,952			
Note: * Standard Conversion Factor						
3. Benefit from Livestock water Development Scheme						
	Saving labour/days	No of Household	Total labour Days Saved	Wage Z\$/day	Trough No.	Total Amount Saved
Financial Prices	20	80	1,600	38.5	2	123,200
CF	-	-	-	-	-	-
Economic Prices	20	80	1,600	15.4	2	49,280
Note: 1) Shadow Wage Conversion Factor for Unskilled labour						
4. Benefit from Fishery Development Scheme						
	production of Fish kg/yr	Price Z\$/kg	Total Amount Z\$/yr			
Financial Prices	3,500	60.0	210,000			
CF	-	-	0.93 *			
Economic Prices			195,300			
Note: * Standard Conversion Factor						
Total Livestock Development Benefit						
Financial Prices	Z\$yr	1,751,254				
Economic Prices	Z\$yr	921,194				

Table 36 Benefits from Road Rehabilitation of the Pilot Project

Area	Type of Road	Prices and Conversion Factors	Length of Road to be Rehabilitated (km) (a)	Savings of Fuel Cost (Z\$/km/unit) (b)	Savings of Maintenance Cost (Z\$/km/unit) (c)	Savings of Labour Cost (Z\$/km/unit) (d)	Savings of Depreciation (Z\$/km/unit) (e)	Saving of tyres and Oils (Z\$/km/unit) (f)	Average Daily Traffic (Unit/day) (g)	Annual Savings (Z\$) (h)=(b)+...+(f)*22km*65unit*365days
Kadoma, Gokwe		Financial Prices	22	0.6	0.5	0.2	0.3	0.2	65	939,510
North, Gokwe		Conversion Factor	-	0.62	0.93	1.0	0.93	0.62	-	-
South, Kwekwe	Track → Gravel	Economic Prices	22	0.37	0.47	0.20	0.28	0.12	65	751,608

Note: 1) The maintenance and operation cost of a truck/bus in normal road is Z\$ 12.9/km. This amount comprises: fuel 36%, maintenance 27%, labour 13%, depreciation 16% and tyres and oils 8% respectively. The basic assumption of this estimation is that the overall cost i.e., the vehicle operation and maintenance cost in gravel road is 1.56 times of normal road and track road is 1.1 times of gravel road.

Table 37 Economic Cost and Benefit Stream (EIRR) of the Pilot Project

(Unit: Z\$ 1000.0)

Year in Order	Year	Cost Stream				Benefit Stream	Net Benefit	Present Worth Value	
		Capital Cost	O&M	Replacement	Total			Discount Rate 10%	
								Cost	Benefit
1	2001	21,498			21498	0	-21498	19544	0
2	2002	56,890			56890	0	-56890	47017	0
3	2003	125,270			125270	0	-125270	94117	0
4	2004	1,232	2102		3334	6902	3568	2277	4714
5	2005	1,232	2102		3334	7490	4156	2070	4651
6	2006		2102		2102	7968	5866	1187	4498
7	2007		2102		2102	8561	6459	1079	4393
8	2008		2102		2102	44070	41968	981	20559
9	2009		2102		2102	88099	85997	891	37363
10	2010		2102		2102	132147	130045	810	50948
11	2011		2102		2102	176177	174075	737	61749
12	2012		2102		2102	220225	218123	670	70170
13	2013		2102		2102	264255	262153	609	76545
14	2014		2102		2102	308302	306200	554	81186
15	2015		2102	1752	3854	352350	348496	923	84350
16	2016		2102		2102	293920	291818	457	63966
17	2017		2102		2102	234910	232808	416	46476
18	2018		2102		2102	176180	174078	378	31688
19	2019		2102		2102	117469	115367	344	19207
20	2020		2102		2102	58740	56638	312	8731
21	2021		0		0	0	0	0	0
22	2022		0		0	0	0	0	0
23	2023		0		0	0	0	0	0
24	2024		0		0	0	0	0	0
25	2025		0		0	0	0	0	0
26	2026		0		0	0	0	0	0
27	2027		0		0	0	0	0	0
28	2028		0		0	0	0	0	0
29	2029		0		0	0	0	0	0
30	2030		0		0	0	0	0	0
31	2031		0		0	0	0	0	0
32	2032		0		0	0	0	0	0
33	2033		0		0	0	0	0	0
34	2034		0		0	0	0	0	0
35	2035		0		0	0	0	0	0
36	2036		0		0	0	0	0	0
37	2037		0		0	0	0	0	0
38	2038		0		0	0	0	0	0
39	2039		0		0	0	0	0	0
40	2040		0		0	0	0	0	0
41	2041		0		0	0	0	0	0
42	2042		0		0	0	0	0	0
43	2043		0		0	0	0	0	0
44	2044		0		0	0	0	0	0
45	2045		0		0	0	0	0	0
46	2046		0		0	0	0	0	0
47	2047		0		0	0	0	0	0
48	2048		0		0	0	0	0	0
49	2049		0		0	0	0	0	0
50	2050		0		0	0	0	0	0
		206122	35734	1752	243608	2497765	2254157	175371	671193

EIRR 26.0%
 B/C 3.83 (Discount Rate 10%)
 B-C 495822 (Discount Rate 10%)

Table 38 Household Budget of the Pilot Project

Particulars	Pilot Project Area	
	Without Project Condition	With Project Condition
1 Household Size (Person) ¹⁾	7.0	7.0
2 Average Farm Size (ha) ²⁾		
-Irrigated Area	0.0	1.0
-Non-Irrigated Area	7.0	5.0
3 Income Structure (Z\$)		
(1) Agricultural Income ³⁾		
Gross Farm Income	27,215	102,037
Production Cost	7,820	40,384
Net Farm Income	19,395	61,653
(2) Livestock Income ⁴⁾		
Gross Livestock Income	1,148	1,148
Livestock Input Cost	367	367
Net Livestock Income	781	781
(3) Other Income ⁵⁾		
Home Industry	41	41
Salary	5,741	5,741
Wage	478	478
Pension	817	817
Remittance	1,296	1,296
Private Business	37	37
Others	0	0
Total Off-Farm Income	8,410	8,410
4 Total Net Income (Z\$)	28,586	70,844
[(1)+(2)+(3)]		
5 Living Expenditure (Z\$) ⁶⁾		
Food	6,997	8,047
Clothes	4,885	5,618
Education	2,937	3,378
Housing	1,002	1,152
Others	756	869
Total Living Expenditure	16,577	19,064
6 Net Reserve (Z\$)	12,009	51,780

- 1) Household and Household Member Survey, 1999 and A Survey on the Incorporation of Social Dimension into the Nyarupakwe Pilot Project Area, 2000.
- 2) Supplementary Survey, 1999 and 2000.
Based on the assumption that, 1 ha of irrigated land will be allocated to the farmers in exchange of 2 ha of non-irrigated land.
- 3) However the availability of drinking water, fodder and crop residues etc., will contribute to the growth of livestock production, the increment of livestock income attributed to the project is not included.
- 4) Off-farm income is supposed to be remaining the same.
- 5) The growth in living expenditure with project condition is estimated at 15%.