

Table 4.3.1 Population of the Pilot Project Area

Village	Population	Village Area (km ²)	No. of Household	Population Density (Person/km)
1 Survey Area - A				
1) Marumbe	797	12.65	129	63.02
2) Muchina	637	11.00	103	57.87
3) Makarichi	466	18.35	79	25.40
4) Sekema	325	16.20	55	20.03
5) Muza	590	7.60	100	77.63
Sub-total/Average	2,815	65.80	466	42.78
2 Survey Area - B				
1) Murandu	503	9.40	75	53.46
2) Magonyo	540	9.50	71	56.80
3) Hlamba	243	5.85	32	41.57
4) Jeffrey	415	15.70	62	26.46
Sub-total/Average	1,701	40.45	240	42.04
3 Survey Area - C *				
1) Komboni	166	5.70	23	29.05
2) Gunde	552	9.85	60	56.04
3) Mahvondo	631	6.35	77	99.43
4) Mabarani	745	15.45	81	48.23
5) Mujubeki	194	3.40	43	56.91
6) Mateuro	382	1.65	53	231.27
Sub-total/Average	2,669	42.40	337	62.96
Total/Average	7,185	148.65	1,043	48.34

Note: * - Survey Area - C is the area known to the Survey Team as a result of Stage II Survey's public hearing. They are indirectly affected villages in the downstream area.

Table 4.3.2 Estimated Livestock Population and Holding Size in the Pilot Project Area ^{1/, 2/}

Items	Jeffrey, Mateuro, Gunde, Mabarani & Mujubeki Project Area									
	Hlamba	Magonyo	Murandu	Sekema	Makarichi	Muchina	Marumbe & Mahvondo	Komboni & Mahvondo	Mabarani & Mujubeki	Pilot Project Area
No. of Household	32	71	75	55	179	232	215	184	1,043	
Average Holdings per Household										
- Cattle	9.3	3.4	3.5	3	3	7	5	4	4.6	
- Goat	6.1	0.9	0.6	7	7	3	4	3	3.8	
- Pig	1.1								-	
- Donkey		0.1							-	
Total Holdings per Household	16.5	4.4	4.1						8.4	
LU's per Household	2.4	1.7	1.7	2.1	2.1	3.7	2.8	2.2	2.6	
Total Holdings in Village										
- Cattle	140	227	247	165	537	1,624	1,075	736	4,751	
- Goat	92	59	42	385	1,253	696	860	552	3,939	
- Pig	17									
- Donkey		5								
Total Holdings in Village	249	291	289	550	1,790	2,320	1,935	1,288	8,712	
LU's in Village	77.4	119.7	127.4	115.5	375.9	858.4	602.0	404.8	2,681	

1/: Data on Hlamba, Magonyo & Murandu villages based on the livestock inventory survey by the JICA Study Team

2/: Data on other villages approximated by: No. of households x average holding size of livestock per household = total holding size in village

Source: the livestock inventory survey & the socio-economic environment survey by the JICA Study Team

Table 4.3.3 Villager's Perceived Livestock Development Needs

Priority	Development Option	Villagers' Comments
High	Water Development	Water development is important for primary and secondary use in this semi-arid area.
	Grazing Area Development	Grazing schemes should be fenced in communal grazing area; important for improving grazing, crop protection, releasing labour for field work (relief from herding duties), providing animals for fattening schemes; important to find out more about veld rehabilitation and improvement; need a dam and means to reticulate water.
	Beef Fattening	For beef fattening, it is important to use home grown feed (grains and stovers) as there is an advantage in terms of cost compared to bought feed; should be done as a group so as to qualify for "free" transport to market (i.e. sell/transport more than 15 head each time as a group); probably fatten off veld rather than in pens, but both systems possible; would need credit for concentrate feed to mix with locally produced feed.
	Goat Fattening	Goat fattening is important as goats are relatively easy and cheap to keep, and would fatten especially male kids; fattening flock should be properly herded and housed or penned on a joint group basis; marketing needs to be developed; need male Boer goat to produce larger kids for fattening.
	Poultry Development (Broiler)	Mainly hybrid broilers; important to consider needs of women and youths; useful in providing food during harvest periods (in suitable quantities for feeding hired help) and in post-harvest periods (when people have a little money in their pockets); would need runs, feeding & watering trays, water and initial credit to buy stock (chicks) and concentrate to mix with home grown feed.
	Draft Power Improvement	Draft animal feeding is important and should be based on use of improved paddocking in grazing areas and crop residues and feeds; possible to develop fodder crops below Mahacha Dam, but would need information; would need fencing for grazing scheme.
Medium	Dairy Development	Dairy development is important as there is a general shortage of nutritious fresh milk in the area; could be done by first contributing to Gokwe Dairy Center, and, when electricity becomes available (scheduled for August 2000, but more likely to be in a few years time), then set up a local collection and processing point; would need credit to buy livestock and concentrate feed to mix with locally produced feed.
	Poultry Development (Layer)	Eggs should be produced mainly from hybrid layers; important to consider needs of women and youths.
	Pigs Development	Pigs are important as there is an unsatiated demand in the area; has the advantage of using cheaper home grown feeds (grains) and adding value; would need sties and credit to obtain stock and buy feed; consider both local and town markets.
	Fodder Development	Fodder development is unknown, but it is important to find out more as knowledge is limited; important to keep animals better; may be a high priority development if enough information is available.

Table 4.3.4 Rural Organizations in the Pilot Project Area -1/3: Village Organization

Kraal (Village)	Name	Type of Organization 1/	Year of Establishment		Membership		Participation Rate (%) 2/	Function/Activities	Current Status of Activity	Remarks 3/
			1992	1994	Male	Female				
1. Marumbe	1. Scud Missile	S	30	0	30	0	23	Football & entertainment	Active	
	2. Vanavevhu	A	40	23	63	0	49	Farming & provision of loan	Active	
	3. Chiumbu Group Lending	A	1992	1992	9	7	16	12 Lending group / provision of loan & mailing	Active	Organised by COTCO
2. Muchina	1. Muchina Burial Society	S	1984	1984	7	4	11	11 Burial services & savings	Active	
	2. Arsenal Football Club	S	1993	1993	23	0	23	22 Entertainment & farming	Active	
	3. Muchina Youth Group	A	1993	1993	16	7	23	22 Farming	Active	
	4. Muchina Group Lending	A	1992	1992	10	12	22	21 Lending group / provision of loan & mailing	Active	Organised by COTCO
	5. Simbanabadza Group	A	1992	1992	12	4	16	16 Poultry & gardening	Active	
	6. Muchina Club	A (Women's Group)	1995	1995	0	20	20	19 Gardening, poultry & sewing	Active	
	7. Muchina Farmers Club	A	1995	1995				Association / purchasing of farm inputs	Active	Under S.W.A
3. Makarichi	1. Pepukai Burial Society	S	1999	1999	8	8	16	20 Burial services & savings	Active	
	2. Murume Mukuru Football C.	S	1994	1994	30	3	33	42 Football & entertainment	Active	
	3. Makarichi Group Lending	A	1991	1991	15	0	15	19 Lending group / provision of loan & farming	Active	Organised by COTCO
	4. Kushinga Group	A	1992	1992	12	17	29	37 Farming & sewing	Active	
	5. Tambanevhu Club	A	1992	1992	30	23	53	67 Farming & provision of loan	Active	
	6. Murume Mukuru Club	A	1994	1994	3	15	18	23 Farming & sewing	Active	
4. Sekema	1. B/H 28 Football Club	S	1998	1998	22	0	22	40 Football & entertainment	Active	
	2. Badzaradisa	A	1996	1996	21	6	27	49 Lending group / provision of loan & farming	Active	Organised by COTCO
5. Muza	1. Muza Income Generation G.	S	1998	1998	2	11	13	13 Poultry, sewing, saving, gardening & pre-school	Active	
	2. Muza Lending Group	A	1992	1992	10	7	17	17 Lending group / provision of loan & farming	Active	Organised by COTCO
	3. Chitendereno Group	A	1996	1996	25	15	40	40 Farming & provision of loan	Active	
6. Murandu	1. Mahacha	A (Women's Group)	1999	1999	0	18	18	24 Vegetable production/demonstration	Active	
	2. Murandu Group	A	1996	1996	8	16	24	32 Lending group / provision of loan & farming	Active	Organised by COTCO
	3. Murandu Farmers Club	A						Association / purchasing of farm inputs	Active	Under S.W.A

Source: Survey on Socio-economic Environment & interview survey with FAEO

1/; S --- Organisation for social services; A --- Agricultural organisation

2/; Estimated figures: Total membership/No. of household in the village x 100

3/; Legal background for organisation or main institution supported formation; S. W. A. = Social Welfare Act, C. S. A. = Cooperatives Society Act

Table 4.3.4 Rural Organizations in the Pilot Project Area -2/3: Village Organization

Kraal (Village)	Name	Type of Organization 1/	Year of Establishment	Membership		Participation Rate(%) 2/	Function/Activities	Current Status of Activity	Remarks 3/
				Male	Female				
7. Magonyo	1. Magonyo Group	A	1996	12	17	29	41 Lending group / provision of loan & farming	Active	Organised by COTCO
	2. Mahacha	A (Women's Group)	1999	0	28	28	39 Vegetable production/demonstration	Active	
8. Hlamba	1. Tongwe Club	A	1975	13	15	28	88 Livestock management	Active	
9. Jeffrey	1. Nyamacheni 80	A	1995	20	6	26	42 Lending group / provision of loan & farming	Active	Organised by COTCO
	2. Kwayedza	S (Women's Group)	1993	0	14	14	23 Saving club & cookery	Not Active	
10. Komboni	1. Matingwende	A	1998	1	1	2	9 Broiler production	Active	
	2. Kufuma Ishungu	A	1998	2	0	2	9 Buying & selling off layers	Active	
11. Gunde	1. Gunde Football Club	S	1991	100	0	100	167 Entertainment	Active	
	2. Nyarupakwe Bridge	S	1992	88	88	176	293 Construction of bridge	Active	
	3. Gunde Women's Club	S	1990	0	12	12	20 Sewing & knitting	Active	
	4. Batanai	S	1994	0	6	6	10 Group purchasing (women's group)	Active	
	5. Cut Cost Cooperative S.	S	1995	3	8	11	18 Cooperative / rural industry (sewing)	Active	
	6. Gunde	A	1995	5	0	5	8 Poultry production	Active	
	7. Gunde Gardens	A	1990	44	44	88	147 Lending group / provision of loan & farming	Active	
	8. Tavengwa AFC	A	1994	8	5	13	22 Farming & provision of loan	Active	
	9. Murandu Farmers Club	A					Association / purchasing of farm inputs	Active	Under S.W.A
12. Mahvondo	1. Rufaro Poultry Club	A	1999	4	6	10	13 Broiler production	Active	
	2. Group 5	A	1996	25	6	31	40 Lending group / provision of loan & farming	Active	Organised by COTCO
	3. Kuronga	A (Women's Group)	1997	0	22	22	29 Gardening	Active	
13. Mabarani	1. Mabarani Group	A	1996	12	30	42	52 Lending group / provision of loan & farming	Active	Organised by COTCO
14. Mujubeki	1. Mujubeki Group	A	1997	10	20	30	70 Lending group / provision of loan & farming	Active	Organised by COTCO
15. Mateuro	1. Barika	A	1998	15	3	18	34 Lending group / provision of loan & farming	Active	Organised by COTCO
	2. Kupfamaishungu	A	1999	4	3	7	13 Broiler production	Active	
Total in Pilot Project Area				699	550	1,249	120		

1/: S --- Organisation for social services; A --- Agricultural organisation

2/: Estimated figures: Total membership/No. of household in the village x 100

3/: Legal background for organisation or main institution supported formation; S. W. A. = Social Welfare Act, C. S. A. = Cooperatives Society Act

Source: Survey on Socio-economic Environment & interview survey with FAEO

Table 4.3.4 Rural Organizations in the Pilot Project Area -3/3: Inter-village Organization

Kraal (Village)	Name	Type of Organization 1/	Year of Establishment		Membership		Participation Rate(%) 2/	Function/Activities	Current Status of Activity	Remarks 3/	
			1959	2000	Male	Female					Total
Inter-kraals	1. Zvitirei Club	S			5	32	37	Sewing, gardening, banking, singing, net ball & volley ball	Active		
Inter-kraals	2. Tongwe Disabled Cooperative Society	S		2000	8	2	10	Gardening, general dealer/store, bottle store & grinding mill	Active		
Inter-kraals	3. Nyamacheni Bakery	S (Women's Group)		1996	0	51	51	Baking of bread & buns Sewing & knitting	Active		
Inter-kraals	4. Umniati Producers Cooperative Society Ltd.	A		1961			865	Purchasing & marketing of farm products Farm inputs supply & coop. Shop	Active	Under C.S.A.	
Inter-kraals	5. Nyarupakwe Cattle Fattening	A		1982	50	3	53	Cattle fattening & marketing	Not Active		
Inter-kraals	6. Nyamacheni Club/Cattle Fattening	A		1992	52	3	55	Cattle fattening, purchasing and marketing provision of loan	Active		
Inter-kraals	7. Nyarupakwe Good Farming Competition	A		1978	50	60	110	Farming competitions	Active		
Inter-kraals	8. Tongwe Young Farmers Club	A		1998	4	3	7	Provision of loan for farm equipment Group purchasing	Not Active		
Inter-kraals	9. Nyamacheni Central	A		1991	40	36	76	Farming competitions & provision of loan	Active		
Inter-kraals	10. Nyamacheni Good Farming Competition	A		1976	74	85	159	Farming competitions	Active		
Inter-kraals	11. Nyamacheni Farmers Association (ZFU)	A		1984	85	15	100	Purchasing of farm inputs	Active	Under S.W.A.	
Inter-kraals	12. Nyamacheni Oil Seeds Group	A (Women's Group)		1995	0	85	85	Growing & selling of groundnuts	Active		
Inter-kraals	13. Nyamacheni Master Farmers	A		1995	52	0	52	Farming & york making	Active		
Inter-kraals	14. Nyamacheni Sorghum Group	A		1994	7	8	15	Sorghum production & selling to Chibuku	Active		
Total							427	383	1,675		

Source: Survey on Socio-economic Environment & interview survey with FAEO

1/: S --- Organisation for social services; A --- Agricultural organisation

2/: Estimated figures: Total membership/No. of household in the village x 100

3/: Legal background for organisation or main institution supported formation; S. W. A. = Social Welfare Act, C. S. A. = Cooperatives Society Act

Table 4.3.6 Coverage of Extension/Support Services in the Pilot Project Area

Inquiry	AGRITEX	VET	ZFU	Agribank	COTCO
1. Farmers Understanding of Availability of Services (%)					
- Proportion of respondents know the availability	80	82	92	54	99
2. Past Experiences in Receiving Services (%)					
- Received Services Every Year	25	60	58	27	93
- Received Services 2 to 3 Times in Last 5 Years	6	10	2	3	1
- Received Services Once in Last 5 Years	9	5	5	7	0
- Never Received Services in Last 5 Years	60	25	45	63	6
	100	100	100	100	100

Source: Survey on Socio-economic Environment conducted by the JICA Study Team, Feb. - April, 2000

Table 4.3.7 Terms and Conditions of Main Credit Schemes Operated in the Pilot Project Area

Scheme & Types	Credit Institution	Interest/Mark-up	Terms & Conditions	Performance 1/
Group Lending Credit Scheme	Agribank	62 %	Loan Amount: No ceiling amount	Beneficiary in 1999
- Group loan to small farmers	Gokwe Branch	66 % per ann.	Loan Period: - Short term: < 12 months - Medium term: 2 - 5 years - Long term: 5 - 20 years	- 167 groups - 2,000 members
			Eligibility: Elder than 19 years old Not a defaulter Collateral: Basically not needed Other Conditions: Encouraging to include women in a group	Recovery Rate: 95 %
	Rural Banking Office, Sanyati			Beneficiary in 1999 - 103 groups - 1,452 members (male:1089/female:363)
Group Lending Credit Scheme	COTCO	25 %	Group: 20 - 50 cotton growers	Beneficiary in 1999
- Group loan to registered cotton growers, supplying farm inputs	Gokwe Ginnyery	per season (mark-up)	Loan Amount: Z\$5,000-12,000/ha Loan Period: about 6 months	- 150 groups
- Individual responsibility & not group guarantee system			Eligibility: Registered as a cotton grower by COTCO More than 2 seasons of cotton cultivation	Recovery Rate: 96 %
- When crop failure, rescheduled to next season			Loan: Basically in kinds; seed, fertiliser, chemical, bail etc.	
Credit Scheme	Umnati Producers Coop. Society	17 % per season (mark-up)	Loan Period: about 6 months	Beneficiary in 1999
- Credit scheme to members for purchasing farm inputs & farm implements etc.				- 300 - 400 members

1/: Performance - performance in Gokwe South District

Source: Agribank Gokwe South Branch, COTCO Gokwe Ginnyery & Umnati Producers Cooperative Society Ltd.

Table 4.3.8 Farmers Organizations in and around the Pilot Project Area

Name	Type / Features	Organised under / by "Social Welfare Act"	Related Agencies	Location/ Coverage	Established in 1991	Membership		Functions/Activities /Performance in 1999 & etc.	
						Male	Female		Total
ZFU, Gokwe district office	- Union of farmers association - Apex organization of farmers association	"Social Welfare Act"	MOLA	Gokwe	1991	10,000	4,000	14,000 (membership in district)	- To support members in: - ensuring a better package - negotiating for producers prices - coordinating marketing facilities - coordinating transport arrangement - working for sales tax exemption - facilitating purchase of implement - providing technical services - Member fee: Z\$50/year
Chisina 1 Farmers Association	- Federation of farmers clubs at ward level - Federation of 16 clubs/Villages	"Social Welfare Act"	MOLA	Nyarupakwe					
Marandu Farmers Club				Murandu					
Ganyungu Farmers Club	- Village level farmers association	"Social Welfare Act"	MOLA	Ganyungu					
Muchina Farmers Club	- Grass root level organization of ZFU			Muchina					
Umniati Producers Cooperatives Society Ltd.	Producers cooperatives Society	"Cooperatives Society Act" No. 6 of 1990	MNAECC	Nyarupakwe	1961	865			- Purchasing & marketing of cotton, maize, sunflower, livestock etc. - Supply of farm inputs - Provision of loan - Operation of cooperative shop - Tractor hiring/transportation services
Lending Groups in 12 Villages	Group of cotton growers registered & organised by COTCO for group loan services provided by the firm	by support of COTCO		12 villages in Project Area	1991 { 1998	167	130	297	- Organised for group loan scheme provided by COTCO - Supply of seed, fertiliser, chemical, bail basically in kinds - Individual responsibility - Delivery cotton at collection points
Women's Group - Muchina Club	- Group of women farmers	-	AGRITEX	Muchina	1995	-	20	20	Gardening, poultry & sewing group
- Mahacha	- Group of women farmers	-	AGRITEX	Murandu Magonyo	1999	-	46	46	Vegetable production (demonstration) group of 2 villages
- Kuronga	- Group of women farmers	-	AGRITEX	Mahvondo	1997	-	22	22	Gardening group
- Nyamacheni Oil Seeds Group	- Group of women farmers	-	AGRITEX	Inter-kraals	1995	-	85	85	Production & selling of groundnut

Source: Interview with relevant institutions, extension staff & Survey on Socio-economic Environment

Table 4.3.9 Nyarupakwe Pilot Area EIA Matrix

Phase	Location		Activities/Components and Effects	Potential Significance of Impact	Outcome: Environmental and social risk
Construction Period	Dam Wall (constr.)	Upstream	Borrow pit excavation	xx	low
			Replacement access road	x	low
			Earth moving /machinery use	x	low
			Construction camp	x	low
	Irrigation Scheme (constr.)	Downstream	Supply canal built	xx	low
			Road access improvements	*	low
			Social infrastructure	none/*	low
			Machinery use	x	low
			Labour camp	none	n.a.
Implementation Process	Dam Wall and Reservoir (creation)	Upstream	Employment and income	**	low
			Community health	x	low
			Relocation and resettlement	none	n.a.
			Tech'cal training and facilitation	*	low
	Irrigation Area (development)	Downstream	Employment and income	*	low
			Environmental health	x	low
			Re-allocation of land	xx	medium
			Facilitation and farmer training	*	low
			Cultivated land loss	x	low
Project Operational Period	Dam and Reservoir	Upstream	Irrigation water supply	**	medium
			Urban water supply	none	n.a.
			New conservation area/habitat	**/xx	medium
			Local recreation area	*	low
			Fisheries development	*	medium
	Project Zone	Downstream	New livelihoods creation	*/**	low
			Agricultural production	**	low
			Improved access/infrastructure	none	n.a.
			Local business development	*	low
			Agri-chemicals/machinery use	x	low
			Landscape/env. onmental change	x	low
			Communal Areas decongestion	none	n.a.
			Gender effects	?	low
Traditional cultural impacts	?	low			

Note: Significance: Refers to the potential magnitude of positive or negative impacts in relation to the receiving environment

Outcome: Refers to the risk of a negative eventuality despite mitigation attempts

Key: Potentially significant negative impacts
x (least), x, xx, xxx, xxxx, xxxxx (greatest)

Potentially significant positive impacts
* (least), **, ***, ****, ***** (greatest)

Explanation of Potential Environmental Impacts Matrix

Construction Period

Dam wall construction – earth fill dam created built over duration 1.5 years

Borrow pit excavation: disruption and landscape impacts of transport and excavation of earth fill materials for construction

Access road creation: 1.5 km of replacement road on alternative alignment across dam wall

Earth moving/machinery use: siltation and erosion effects

Construction camp: building of (temporary) new housing and sanitation

Irrigation scheme -- construction of canal and irrigation system

Supply canal built: construction of water supply canal from dam to irrigation area

Road access improvements: improvements in access roads to irrigation area

Social infrastructure: improvements to centres, schools, clinics, bore holes

Machinery use: soil erosion risks during construction of irrigation system

Labour camp: any requirement of housing etc during construction

Implementation Process

Dam wall and reservoir creation – technical assistance and development process

Employment and Income: temporary employment for 100 villagers over construction period

Community health: possible spread of disease (malaria and STDs) between local and 20-25 skilled external workers, dangers relating to accidents and safety

Relocation and resettlement: none, some compensation for loss of cultivated land

Technical training and facilitation: beneficial “know how” spin-off from external assistance

Irrigation area development – technical assistance in development process

Employment and income: temporary job creation effects

Environmental health: possible disease spread effects, accidents and safety

Re-allocation of land: depends on policy and determination of government to subdivide irrigation plots to achieve new household livelihood units in line with resettlement project policy (1-2 ha irrigation in place of 4 ha existing in pilot project old settlement area)

Facilitation and farmer training: training and extension benefit

Project Operational Period

Dam and reservoir – new natural resource and change in environmental conditions

Irrigation water supply: maintenance of canal and assurance of water supply from catchment and dam reservoir through drought years

Urban water supply: not relevant

New conservation area/habitat: environmental values maintained

Local recreation area: community value of new resource

Fisheries development: productive and nutritional values

Project zone – agricultural development

New livelihoods creation: viable new household production units

Agricultural production: increased yields and assured production of higher value crops

Improved access infrastructure: road and communications improvements

Local business development: direct and indirect benefit to sustainable commercial and service support for local economy

Agri-chemicals/machinery use: water contamination, health and safety in handling chemicals and machinery

Landscape/environmental change: extent of vegetation cover and erosion protection

Communal Areas decongestion: indirect environmental benefit from relief on over-exploited land resources

Gender effects: indirect benefit to attitudes, empowerment of women

Traditional cultural impacts: loss of traditional values

Table 4.4.1 Interview Guide to Key Informants (1/2)

Key Issues	Key Informants	Key Questions
<ul style="list-style-type: none"> * Identification of the overall population to be served by the Nyarupakwe Pilot Project * Identification of sub-groups of diversified needs from one area to the other * Socio-economic profile of each sub-group 	<p>GSDA, Agritex EO, VSO, Ward's Local Councillor Local Committee's Chairperson</p>	<ul style="list-style-type: none"> * Who and Where do you consider to be the legitimate population that should be served by the Nyarupakwe * What categories of different sub-groups can be easily identified? * How do you come about with such categories?
<ul style="list-style-type: none"> * Description and examination of historical activities of agricultural development * Action and efforts made by local population for operation and maintenance * Satisfaction/dissatisfaction with government * Willingness and ability to participate 	<p>GSDA, Agritex EO, Headman</p>	<ul style="list-style-type: none"> * Have the local people been involved in any agricultural and rural development projects in the past? * In cases where government was involved, how good was the government's involvement? * In what capacity were the people involved? * Who had initiated these projects? Where and why? * What was the community's input? * Was every one involved, if not Why? * In what way did the community benefit? * Was the community willing to participate in the NDP and What could constrain their participation?
<ul style="list-style-type: none"> * Experience of local population with new crops and cropping patterns and its agricultural management * Conflicts among local population * Local customs and beliefs that could influence farmer organisation formation and functioning * Needs of deployment community mobilization 	<p>Agritex EO, VSO, Councillor, Headman</p>	<ul style="list-style-type: none"> * How well has introducing new crops and cropping patterns been accepted by the people? * Were there any difference before and after? * Were there any new technological innovations introduced with projects? * Are the activities connected with such projects still
<ul style="list-style-type: none"> * Differing roles of males and females and time allocation in household and productive activities * Relative access of men and women to resources for the use of agricultural facilities and their potential 	<p>VSO, Traditional Leaders, School Headmasters, Kraal Heads, Shop Owners, Cooperative</p>	<ul style="list-style-type: none"> * What type of gender cohesion, if any, is observed in this area? * What household task do women perform?

Note: EO - Extension Officer, VSO - Veterinary Service Officer, GSDA - Gokwe South District Administration

Table 4.4.1 Interview Guide to Key Informants (2/2)

Key Issues	Key Informants	Key Questions
<ul style="list-style-type: none"> * Priority of the needs of sub-groups * Differences among sub-groups in terms of priority of needs in Nyarupakwe Pilot Project * Decision making by males and females on major farming activities 	<p>Agritex EO, VSO, Headman, Kraal Heads, Cooperative Managers</p>	<ul style="list-style-type: none"> * For each and every sub-group that you have identified, please identify related needs to agricultural * Specifically how do you think the local population will benefit from an agricultural development? * How would you rank these needs, starting with most * What difficulties do you think men and women participating in irrigation activities? * What agricultural activities do women perform? * What agricultural activities do men perform? * What household tasks do men perform? * Who owns agricultural resources and facilities in this area (i.e. land, equipment, etc.) * Who controls the use of land in this community? * Who decides on major projects and farming activities in this community?
<ul style="list-style-type: none"> * Sub-groups that may be disadvantaged by Nyarupakwe Pilot Project * Socio-economic profile of each vulnerable sub-group * Options of avoiding, mitigating or compensating sub-groups in relation to Nyarupakwe Pilot Project 	<p>Agritex EO, Ward's Local Councillor, VSO, Kraal Heads, Headman, Farmers Sub-groups</p>	<ul style="list-style-type: none"> * Who do you think will be disadvantaged by the NDP and how? * Do you think there will be some people who will not be willing to relocate as agricultural project is introduced. * What can be done to make sure that these people will not be greatly affected?

Note: EO - Extension Officer, VSO - Veterinary Service Officer, GSDA - Gokwe South District Administration

Table 4.4.2 Ranking List of the Result of Household Survey : Needs and Demands (1/2)

Figures indicate "1: First, 2: Second, 3: Third, VL:Very Low"

Item	Subgroup 1			Subgroup 2			Subgroup 3			Subgroup 4			Subgroup 5		
	Marumbe	Muchina	Makarich	Muza	Sekema	Magonyo	Hlamba	Murandu	Jeffrey	Maseruro	Mujubeki	Mahwondo	Komboni	Gunde	Mabharani
1 Needs and Demands*															
1) Water	4	1	1	1	1	1	2	9	1	1	5	1	-	3	1
2) Road/Bridge	1/6	1	1	2	2	2	7	2	5	3	3	3	2/6	1/4	1
3) Health Care	3	3	4	4	6	10	2	1	2	2	1	2	3	2	1
4) Communication	-	-	-	-	8	-	-	-	-	-	4	-	-	-	-
5) Stock Farming **	5	4	3	3	12	5	5	3/6	3	6	-	6	4	-	-
6) Transportation	2	5	5	4	3	4	1	4	4	4	1	4	-	-	1
2. Availability of Water															
a. Domestic															
1) Very Severe	VL	1	1	1	1	2	1	3	1	1	-	VL	-	2	-
2) Severe	1	2	2	2	1	1	2	2	2	-	-	-	-	2	VL
3) Not Severe	-	3	3	VL	3	3	3	1	3	2	-	1	1	1	1
b. Farming															
1) Very Severe	VL	1	1	1	1	1	1	2	1	1	-	1	-	-	-
2) Severe	1	VL	2	VL	VL	2	2	3	2	-	-	-	-	VL	2
3) Not Severe	VL	2	VL	VL	VL	VL	-	1	-	2	-	VL	1	1	1
c. Livestock Watering															
1) Very Severe	2	1	1	1	1	2	1	2	1	1	-	1	-	-	-
2) Severe	1	VL	-	-	VL	1	2	3	2	-	-	VL	-	2	VL
3) Not Severe	-	2	-	-	VL	2	3	1	3	VL	-	VL	1	1	1
3 Use of Water															
a. River															
1) Domestic Use	1	1	VL	VL	VL	-	-	2	VL	-	-	-	-	2	VL
2) Fishing	-	-	-	-	1	-	-	-	-	VL	-	2	-	1	-
3) Farming	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4) Livestock	-	-	1	1	2	-	1	1	-	VL	-	VL	VL	3	1
b. Borehole															
1) Domestic Use	-	1	-	1	-	1	1	-	1	1	1	1	1	1	1
2) Fishing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3) Farming	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4) Livestock	-	-	-	-	-	VL	-	-	-	-	-	-	-	-	-

Note: * - If the number of responses were the same number, higher ranking is shown. "4/6" denotes 4th and 6 th in ranking of the separate items listed but fall into the same category of industry.
 ** - Any industry related to cattle rearing including grazing area management, etc. are included.

Table 4.4.2 Ranking List of the Selected Result of Household Survey : Needs and Demands (2/2)

Figures indicate "1": First, 2: Second, 3: Third, VL: Very Low"

Item	Subgroup 1			Subgroup 2			Subgroup 3			Subgroup 4			Subgroup 5			
	Marumbe	Muchina	Makarich	Muza	Sekema	Magonyo	Hlamba	Murandu	Jeffrey	Materuro	Mujubeki	Mahvondo	Komboni	Gunde	Mabharani	
3 Use of Water (continued)																
c. Dug-out Well																
1) Domestic Use	1	VL	1	1	1	1	-	1	1	VL	-	-	-	-	-	
2) Fishing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3) Farming	-	-	-	-	-	-	-	-	-	-	-	VL	-	-	-	
4) Livestock	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4 Lack of Road																
1) Very Severe	1	1	1	1	2	1	1	1	1	2	1	1	1	1	2	
2) Severe	-	2	VL	-	1	2	-	-	VL	3	VL	3	2	2	1	
3) Not Severe	-	-	-	-	3	-	2	-	-	1	-	2	-	-	-	
5 Lack Bridge																
1) Very Severe	2	1	1	1	1	1	1	1	1	1	-	1	1	1	-	
2) Severe	1	2	2	-	1	2	-	2	2	-	-	-	VL	1	1	
3) Not Severe	-	VL	3	VL	3	3	2	-	VL	2	3	2	-	-	2	
6 Lack of Transportation																
a. Passenger																
1) Very Severe	2	1	1	1	1	-	1	1	2	1	1	-	1	1	-	
2) Severe	1	VL	3	2	VL	2	2	-	1	2	3	1	2	2	1	
3) Not Severe	-	-	2	-	-	1	-	VL	-	2	2	2	3	3	2	
b. Cargo																
1) Very Severe	VL	1	1	1	3	3	2	1	2	-	1	1	1	1	-	
2) Severe	VL	3	2	VL	1	2	1	3	-	2	-	2	2	2	2	
3) Not Severe	-	2	2	-	2	1	-	2	1	1	VL	2	-	-	1	
7 Lack of Medical Service																
1) Very Severe	1	1	1	1	1	1	1	1	1	-	1	1	1	1	2	
2) Severe	2	2	2	-	2	2	2	2	2	-	3	3	VL	1	1	
3) Not Severe	-	-	3	-	-	3	-	3	-	-	2	2	-	-	-	

Note: * - If the number of responses were the same number, higher ranking is shown. "4/6" denotes 4th and 6 th in ranking of the separate items listed but fall into the same category of industry.
 ** - Any industry related to cattle rearing including grazing area management, etc. are included.

Table 4.4.3 Conveyance System - Design Alternatives

Alternative - I System Design for day-time irrigation (for 12 hours)									
Alternative	Design Option	Length of Pipe (m)	Length of Open canal (m)	Discharge (litres/sec)	Velocity in Pipe (m/sec)	Velocity in open canal (m/sec)	Dia of pipe (m)	Section of canal (m)	Cost in Z\$ million
I - (b)	Pipeline only	4,678	-	144	0.37	-	0.7	-	35
I - (a)	Pipeline and open canal	770	4,883	144	0.37	0.53	0.7	Trapezoidal 0.5 x 0.55	10
Alternative - II System Design for Continuous Irrigation (day & night - 24 hours)									
II - (a)	Pipeline and canal with	770	4,883	72	0.37	0.43	0.5	Rectangular 0.5 x 0.5	11

Feasibility Considerations:

- (i) Pipe (12 hours supply)
- Very costly and investments will not commensurate with the benefits
 - Bends, sluice valves and air relief valves are not available and will have to be imported/order made
 - Heavy machinery will be required for even minor repairs
 - Pipes are feasible only where head is more and flow passes at high velocity. Here both the head and the velocity of flow are very low
- (ii) Pipe and Open canal (12 hours supply)
- Every morning the flow will have to be started about 3-4 hours before the start of irrigation time to fill the empty canals
 - Flow of water after the ending time of irrigation will not be used by the farmers and the irrigation area will get reduced
- (iii) Pipe and covered canal (24 hours supply)
- Flow will be continuous for 24 hours and farmers will have to take water in the inconvenient times also.

Table 4.4.4 Conveyance System with Pipeline for Day-time (12 hours) Water Supply

Discharge 0.144 Cumec Velocity= $4 * Q / 3.1416*d^2$
 Dia.of Pipe 0.7 (assuming loss in bends etc 15%)
 R 0.175 Friction Loss = $1.15 * f \cdot L/D \cdot V^2/2g$
 C 140 ($f = 133.7/(C^{1.85} * D^{0.167} * V^{0.148})$)
 Total Enag 893.2 $V = 0.849C \cdot R^{0.63} \cdot I^{0.54}$
 StaticEnergy EL = Water El - Cumulative Friction loss
 (centre)* Velocity head = $v^2 / 2g$
 =893.5 - 0.3(loss from Intake to Off-take)

(*)-Theoretical to be finalised on the drawing

Particulars	R.D.	NSL	Trench level (*)	Velocity	Friction Loss	Static head(EL)	Velocity Head	Total Energy EL
Off-take	0	893.5	892	0.374	0.000	893.19	0.01	893.20
	268	894	892.5	0.374	0.103	893.09	0.01	893.10
	285	892	890.5	0.374	0.007	893.08	0.01	893.09
	460	892	890.5	0.374	0.068	893.02	0.01	893.02
	475	894	892.5	0.374	0.006	893.01	0.01	893.02
	578	892	890.5	0.374	0.040	892.97	0.01	892.98
TP-1	735	891	889.5	0.374	0.061	892.91	0.01	892.92
	840	892	890.5	0.374	0.041	892.87	0.01	892.88
TP-2	990	892	890.5	0.374	0.058	892.81	0.01	892.82
TP-3	1170	892	890.5	0.374	0.070	892.74	0.01	892.75
TP-4	1295	892	890.5	0.374	0.048	892.69	0.01	892.70
	1310	894	892.5	0.374	0.006	892.69	0.01	892.69
	1480	894	892.5	0.374	0.066	892.62	0.01	892.63
	1630	894	892.5	0.374	0.058	892.56	0.01	892.57
	1870	894	892.5	0.374	0.093	892.47	0.01	892.48
	2045	893	891.5	0.374	0.068	892.40	0.01	892.41
TP-5	2100	892.5	891	0.374	0.021	892.38	0.01	892.39
	2140	892	890.5	0.374	0.015	892.37	0.01	892.37
	2200	891	889.5	0.374	0.023	892.34	0.01	892.35
	2240	890	888.5	0.374	0.015	892.33	0.01	892.33
	2360	889	887.5	0.374	0.046	892.28	0.01	892.29
TP-6	2475	889	887.5	0.374	0.044	892.24	0.01	892.24
TP-7	2665	889	887.5	0.374	0.073	892.16	0.01	892.17
	2760		-1.5	0.374	0.037	892.13	0.01	892.13
	2785	889	887.5	0.374	0.010	892.12	0.01	892.12
	2943	890	888.5	0.374	0.061	892.06	0.01	892.06
TP-8	3073	890.8	889.3	0.374	0.050	892.01	0.01	892.01
TP-9	3273	891	889.5	0.374	0.077	891.93	0.01	891.94
	3463	890	888.5	0.374	0.073	891.86	0.01	891.86
	3568	890	888.5	0.374	0.041	891.81	0.01	891.82
	3748	890	888.5	0.374	0.070	891.75	0.01	891.75
	3818	890	888.5	0.374	0.027	891.72	0.01	891.73
TP-10	4078	889.7	888.2	0.374	0.100	891.62	0.01	891.63
	4518	889	887.5	0.374	0.170	891.45	0.01	891.46
PD	4678	888.3	886.8	0.374	0.062	891.39	0.01	891.39

Table 4.4.5 Conveyance System with Pipeline and Canal for Day-time (12 hours) Water Supply

Discharge 0.072 Cumec Velocity= $4 * Q / 3.1416 * d^2$
 Dia.of Pipe 0.5 (assuming loss in bends etc 15%)
 R 0.125 Friction Loss = $1.15 * f * L / D * V^2 / 2g$
 C 140 ($f = 133.7 / (C^{1.85} * D^{0.167} * V^{0.148})$)
 Total Enag 893.2 $V = 0.849C * R^{0.63} * I^{0.54}$
 StaticEnergy EL = Water El - Cumulative Friction loss
 (centre)* Velocity head = $v^2 / 2g$
 =893.5 - 0.3(loss from Intake to Off-take)

(*)-Theoretical to be finalised on the drawing

Particulars	R.D.	NSL	Trench level(*)	Velocity	Friction Loss	Static head (EL)	Velocity Head	Total EnergyEL	Remarks
Off-take	0.0	893.5	892	0.367	0.000	893.19	0.01	893.20	
	25.0	894	892.5	0.367	0.015	893.18	0.01	893.19	
	275.0	894	892.5	0.367	0.145	893.03	0.01	893.04	
	295.0	892	890.5	0.367	0.012	893.02	0.01	893.03	
	320.0	892	890.5	0.367	0.015	893.01	0.01	893.01	Valley
	360.0	892	890.5	0.367	0.023	892.98	0.01	892.99	
	375.0	892	890.5	0.367	0.009	892.98	0.01	892.98	
	417.0	894	892.5	0.367	0.024	892.95	0.01	892.96	
	435.0	892	890.5	0.367	0.010	892.94	0.01	892.95	Valley
	470.0	892	890.5	0.367	0.020	892.92	0.01	892.93	
	485.0	894	892.5	0.367	0.009	892.91	0.01	892.92	
	515.0	895	893.5	0.367	0.017	892.89	0.01	892.90	
	575.0	894	892.5	0.367	0.035	892.86	0.01	892.87	
	625.0	892	890.5	0.367	0.029	892.83	0.01	892.84	
	770.0	892	890.5	0.367	0.084	892.75	0.01	892.75	
					0.447				
Particulars/strs	R.D. metres	Inbetween distance (on map 1:5000) (1cm=50m) cm	Ground level (NSL)mts	Head Loss in structures/working head	Length of main canal	S-slope	Loss of head through slope	Proposed FSL u/s	Proposed FSL d/s
Off-take	770.0	0.30	892.0	0.10	15	0.0005556	0.0083333	892.50	892.40
P.Flume	785.0	6.20	892.0	0.20	310	0.0005556	0.1722222	892.39	892.19
TP-1	1095.0	1.70	892.0		85	0.0005556	0.0472222	892.02	892.02
TP-2	1180.0	2.40	892.0		120	0.0005556	0.0666667	891.97	891.97
TP-3	1300.0	5.80	892.0		290	0.0005556	0.1611111	891.91	891.91
Xing-1	1590.0	4.50	893.8	0.05	225	0.0005556	0.125	891.74	891.69
Xing-2	1815.0	6.80	894.0	0.05	340	0.0005556	0.1888889	891.57	891.52
TP-4	2155.0	4.00	892.3		200	0.0005556	0.1111111	891.33	891.33
Xing-3	2355.0	6.60	890.8	0.05	330	0.0005556	0.1833333	891.22	891.17
TP-5	2685.0	1.60	890.3		80	0.0005556	0.0444444	890.99	890.99
Xing-4	2765.0	4.30	890.5	0.05	215	0.0005556	0.1194444	890.94	890.89
Xing-5	2980.0	0.46	891.3	0.05	23	0.0005556	0.0127778	890.77	890.72
TP-6	3003.0	0.80	890.6		40	0.0005556	0.0222222	890.71	890.71
Drg.Xg-1	3043.0	3.50	889.0		175	0.0005556	0.0972222	890.69	890.69
TP-7	3218.0	2.30	890.0		115	0.0005556	0.0638889	890.59	890.59
Drg.Xg-2	3333.0	1.80	889.0		90	0.0005556	0.05	890.53	890.53
Xing-6	3423.0	6.00	890.0	0.05	300	0.0005556	0.1666667	890.48	890.43
TP-8	3723.0	2.50	890.5		125	0.0005556	0.0694444	890.26	890.26
Xing-7	3848.0	4.20	890.5	0.05	210	0.0005556	0.1166667	890.19	890.14
TP-9	4058.0	4.30	890.3		215	0.0005556	0.1194444	890.02	890.02
TP-10&X8	4273.0	10.70	890.0	0.05	535	0.0005556	0.2972222	889.90	889.85
Xing-9	4808.0	10.80	889.8	0.05	540	0.0005556	0.3	889.56	889.51
Xing-10	5348.0	3.90	889.1	0.05	195	0.0005556	0.1083333	889.21	889.16
TP-11	5543.0	2.20	888.5		110	0.0005556	0.0611111	889.05	889.05
PD	5653.0		888.0	0.20		0.0005556	0	888.99	888.79
				1.00			2.7127778		

Table 4.4.6 Conveyance System with Pipeline and Canal for Day-Night(24 hours) Water Supply

Discharge 0.072 Cumec Velocity= $4 \cdot Q / 3.1416 \cdot d^2$
 Dia.of Pipe 0.5 (assuming loss in bends etc 15%)
 R 0.125 Friction Loss = $1.15 \cdot f \cdot L/D \cdot V^2/2g$
 C 130 ($f = 133.7 / (C^{1.85} \cdot D^{0.167} \cdot V^{0.148})$)
 Total Enag 893.2 $V = 0.849C \cdot R^{0.63} \cdot I^{0.54}$
 Min.W.El 893.5 StaticEnergy EL = Water El - Cumulative Friction loss
 (centre)* Velocity head = $v^2 / 2g$
 =893.5 - 0.3(loss from intake to Off-take)

(*)-Theoretical to be finalised on the drawing

Particulars	R.D.	NSL	Trench level(*)	Velocity	Friction Loss	Static head (EL)	Velocity Head	Total Energy EL	Remarks
Off-take	0.0	893.5	892	0.367	0.000	893.19	0.007	893.20	
	25.0	894	892.5	0.367	0.010	893.18	0.007	893.19	
	275.0	894	892.5	0.367	0.097	893.09	0.007	893.09	
	295.0	892	890.5	0.367	0.008	893.08	0.007	893.09	
	320.0	892	890.5	0.367	0.010	893.07	0.007	893.08	Valley
	360.0	892	890.5	0.367	0.016	893.05	0.007	893.06	
	375.0	892	890.5	0.367	0.006	893.05	0.007	893.05	
	417.0	894	892.5	0.367	0.016	893.03	0.007	893.04	
	435.0	892	890.5	0.367	0.007	893.02	0.007	893.03	Valley
	470.0	892	890.5	0.367	0.014	893.01	0.007	893.02	
	485.0	894	892.5	0.367	0.006	893.01	0.007	893.01	
	515.0	895	893.5	0.367	0.012	892.99	0.007	893.00	
	575.0	894	892.5	0.367	0.023	892.97	0.007	892.98	
	625.0	892	890.5	0.367	0.019	892.95	0.007	892.96	
	770.0	892	890.5	0.367	0.056	892.89	0.007	892.90	
				Total Loss	0.299				
Particulars/strs	R.D.	Inbetween distance (on map 1:5000) (1cm=50m) cm	Ground level (NSL)mts	Head Loss in structures/working head	Length of main canal	S-slope	Loss of head through slope	Proposed FSL u/s	Proposed FSL d/s
Off-take	770.0	0.30	892.0	0.10	15	0.0007	0.0111	892.89	892.79
P.Flume	785.0	6.20	892.0	0.20	310	0.0007	0.2299	892.78	892.58
TP-1	1095.0	1.70	892.0		85	0.0007	0.0630	892.35	892.35
TP-2	1180.0	2.40	892.0		120	0.0007	0.0890	892.29	892.29
TP-3	1300.0	5.80	892.0		290	0.0007	0.2151	892.20	892.20
Xing-1	1590.0	4.50	893.8		225	0.0007	0.1669	891.99	891.99
Xing-2	1815.0	6.80	894.0		340	0.0007	0.2522	891.82	891.82
TP-4	2155.0	4.00	892.3		200	0.0007	0.1483	891.57	891.57
Xing-3	2355.0	6.60	890.8		330	0.0007	0.2447	891.42	891.42
TP-5	2685.0	1.60	890.3		80	0.0007	0.0593	891.17	891.17
Xing-4	2765.0	4.30	890.5		215	0.0007	0.1595	891.11	891.11
Xing-5	2980.0	0.46	891.3		23	0.0007	0.0171	890.96	890.96
TP-6	3003.0	0.80	890.6		40	0.0007	0.0297	890.94	890.94
Drg.Xg-1	3043.0	3.50	889.0		175	0.0007	0.1298	890.91	890.91
TP-7	3218.0	2.30	890.0		115	0.0007	0.0853	890.78	890.78
Drg.Xg-2	3333.0	1.80	889.0		90	0.0007	0.0667	890.69	890.69
Xing-6	3423.0	6.00	890.0		300	0.0007	0.2225	890.63	890.63
TP-8	3723.0	2.50	890.5		125	0.0007	0.0927	890.40	890.40
Xing-7	3848.0	4.20	890.5		210	0.0007	0.1557	890.31	890.31
TP-9	4058.0	4.30	890.3		215	0.0007	0.1595	890.16	890.16
TP-10&X8	4273.0	10.70	890.0		535	0.0007	0.3968	890.00	890.00
Xing-9	4808.0	10.80	889.8		540	0.0007	0.4005	889.60	889.60
Xing-10	5348.0	3.90	889.1		195	0.0007	0.1446	889.20	889.20
TP-11	5543.0	2.20	888.5		110	0.0007	0.0816	889.05	889.05
PD	5653.0		888.0	0.20		0.0007	0.0000	888.97	888.77
				0.50			3.6216		

Table 4.4.7 Proposed Programs for Institutional Strengthening under the Pilot Project (1/3)

Program	Program Description/Objectives	Location or Target Area / Group	Program Components	Implementation Agency
I. Strengthening of Rural Institutions				
I-1. AGRITEX				
1. Establishment of Agricultural Extension Center (AEC)	<ul style="list-style-type: none"> - Establishment of AEC in & around the irrigated area - To establish a nucleus place for agricultural extension, especially for irrigated agriculture - To establish an office/place to accommodate all the field extension officers in the Project Area to make possible their integrated approach for 	In or around irrigated area	AEC Building (150 m ²) (3 office rooms, 1 class room & 1 store) Generator & electricity supply (1 set) 4 wheel vehicle (1 unit) Training equipment Office facilities & equipment	AGRITEX / Project Office
2. Logistic Support Strengthening	<ul style="list-style-type: none"> - Provision of motorcycles to FAEOs & 4 wheel vehicle to District Office - To enhance capability of FAEOs in the Project Area & to strengthening technical guidance to FAEOs from district or provincial AGRITEX 	<ul style="list-style-type: none"> - 4 FAEOs in Project Area (1 newly recruited staff) - AGRITEX District Office 	Motorcycle (4 units) 4 wheel vehicle (1 unit)	AGRITEX
3. Capacity Building of Field Extension Staff	<ul style="list-style-type: none"> - Periodical in-service training of FAEOs at province level - To improve capability of FAEOs through in-service training 	<ul style="list-style-type: none"> - 4 FAEOs in Project Area (1 newly recruited staff) 	In-service Training Course (5 days)	AGRITEX
4. Recruitment of FAEO	<ul style="list-style-type: none"> - To post a FAEO well experienced in irrigated agriculture, water management & high value - To meet farmers demand for technical guidance & training on irrigated agriculture 	<ul style="list-style-type: none"> - 1 FAEO 	Remuneration/allowances/year	AGRITEX
5. Strengthening of Technical Guidance of Provincial Staff	<ul style="list-style-type: none"> - Periodical visit of provincial staff to the Project Area for delivering technical guidance to FAEOs 	<ul style="list-style-type: none"> - Provincial staff (SMS) 		AGRITEX
I-2. VET				
1. Logistic Support Strengthening	<ul style="list-style-type: none"> - Provision of motorcycles to VEA & AHI & 4 wheel vehicle to District Office - To enhance field operation capability of an extension staff (VEA) & Animal Health Inspector (AHI) in the Project Area and to strengthening technical guidance and support from the district VET to meet requirements rising from the livestock development plans 	<ul style="list-style-type: none"> - VEA & AHI - VET District Office 	Motorcycle (2 units) 4 wheel vehicle (1 unit)	VET

Source: Program costs estimated based on current costs for similar programs implemented by AGRITEX

Table 4.4.7 Proposed Programs for Institutional Strengthening under the Pilot Project (3/3)

Program	Program Description/Objectives	Location or Target Area / Target Group	Program Components	Implementation Agency
I. Strengthening of Rural Institutions				
1-3. Pilot Project Area Community (VIDCOs & Village Assemblies) - continued	- Establishment of multipurpose community development center - To establish a multipurpose center to accommodate office space for Project Office & PMC, a multipurpose meeting hall, a lecture	Nyarupakwe BC	Center building (300 m ²) Generator & electricity supply Office facilities & equipment Training equipment Motorcycle Bicycle	Project Office/ RDC
4.	Establishment of Multipurpose Community Development Center			
II. Strengthening of Farmers Organizations				
1. Formation of WUG & IMC	- Supporting formation of WUG & IMC through Awareness program - WUG/IMC formation guidance - Workshops for formation of WUG/IMC - "Learning by Doing" under Project Office support - Study tour of representatives of the WUG - To support formation and establishment of WUG and IMC in the irrigated area responsible for the implementation, O&M and sustainability of - Supporting strengthening/formation of farmers organizations of livestock development - Grazing Area Develop. (strengthening) - Livestock Water Development Scheme (strengthening) - Fishery Development Scheme (formation)	Beneficiary groups of irrigation development	Awareness program WUG/IMC formation guidance Workshop (1 day) Study tour	AGRITEX/ Project Office
2. Strengthening / Formation of Farmers Organizations of Beneficiaries of Livestock Development Plans		Beneficiary groups of livestock development plan	Awareness program Farmer to farmer guidance Strengthening guidance (1 day) Formation guidance Workshop (1 day)	AGRITEX/ Project Office
3. Awareness Program at Village Level	- Awareness program for formation/establishment of farmers organizations - To support formation and establishment of farmers organizations in the Project Area such as producers group, marketing group, lending group, input purchasing group, women group. - Guidance/support on strengthening/formation of farmers organizations by extension staff & Project Office - To support formation and establishment of farmers organizations in the Project Area such as producers group, marketing group, lending group, input purchasing group, women group.	Village Assemblies members & youth	Awareness program	PIU / AGRITEX
4. Strengthening / Formation of Farmers Organizations		Village Assemblies members & youth	To be implemented through routine services provided by extension staff	PIU / AGRITEX

Source: Program costs estimated based on current costs for similar programs implemented by AGRITEX

Table 4.4.8 Proposed Programs for Strengthening Agricultural Support Services under the Pilot Project (1/2)

Program	Program Descriptions	Location or Target Area / Group & Components	Implementation Agency
I. Strengthening of Agricultural Extension Services			
1. Field Programs: Crop Production			
1) Demonstrations cum Trials Field crops: 1.0 ha Vegetables: 0.5 ha	<ul style="list-style-type: none"> - Adaptability tests, technology development & technology transfer - Demonstration cum trials on: <ul style="list-style-type: none"> - New crops & variety - Recommended practices, fertilization, pre planting - Irrigation method & water management - Training & periodical guidance by a FAEO experienced in irrigated agriculture to all farmer groups in irrigated area on water management, 	Primarily irrigated area & its beneficiaries <ul style="list-style-type: none"> - Demonstrations cum trials (1.0 ha) - Demonstrations cum trials (0.5 ha) - Water management (5 ha) 	AGRITEX
2) Training cum Field Guidance	<ul style="list-style-type: none"> - Training & periodical guidance by a FAEO experienced in irrigated agriculture to all farmer groups in irrigated area on water management, 	Farmer groups in irrigated area <ul style="list-style-type: none"> - Farmer training (3 days): 2 times - Supervision: 3 times - Field operation by FAEO(season) 	AGRITEX
2. Field Programs: Livestock			
1) Demonstrations	<ul style="list-style-type: none"> - Demonstration on improved technologies on animal husbandry - Demonstration on: <ul style="list-style-type: none"> - Beef fattening (15 heads/unit) - Pasture & veld establishment (1 ha/unit) - Agro-forestry Development (2 ha) 	Selected farmers groups in the Project Area <ul style="list-style-type: none"> - <i>Beef fattening</i> <ul style="list-style-type: none"> - Feed - Veterinary Treatment - Guidance/training - <i>Pasture & veld establishment</i> <ul style="list-style-type: none"> - Land preparation - Fertilization - Seeds/runners - Guidance/training 	AGRITEX
3. Farmer Training Programs: Crop			
1) Agronomy	<ul style="list-style-type: none"> - Farmer training course on special subjects on crop production on need & demand basis; (1 day/4 hours; 25 farmers/course) - Recommended practices, pest control, chemical use, farm mechanization etc. 	Agro-forestry Development <ul style="list-style-type: none"> - Establishment - Guidance/training 	AGRITEX
4. Farmer Training Programs: Livestock			
1) Animal Husbandry	<ul style="list-style-type: none"> - Farmer training course on special subjects on animal husbandry on need & demand basis; (1 day/4 hours; 25 farmers/course) - Herd management, herd health program, veld & pasture management, animal nutrition 	Selected farmers groups in the Project Area	AGRITEX

Source: Program costs estimated based on current costs for similar programs implemented by AGRITEX

Table 4.4.8 Proposed Programs for Strengthening Agricultural Support Services under the Pilot Project (2/2)

Program	Program Descriptions	Target Area / Group & Components	Location or Implementation Agency
I. Strengthening of Agricultural Extension Services - continued			
4. Farmer Training Programs: Livestock - continued	- Farmer training course on special subjects on animal health on need & demand basis; (1 day/4 hours; 25 farmers/course)	Selected farmers groups in the Project Area	VET
2) Animal Health	- Herd health program, genetic improvement		
5. Farmer Training Programs: Organization & Others			
1) Organization	- Farmer training course on organizational aspects; [3 days (12 hours); 25 farmers/course] - Leadership course, group dynamics, formation of group/organization etc.	Selected farmers groups in the Project Area	AGRITEX
2) Farm Management	- Farmer training course on farm management; [3 days (12 hours); 25 farmers/course] - Record keeping, marketing, financial planning & management etc.	Selected farmers groups in the Project Area	AGRITEX
3) Study Tour	- Study tour to advanced irrigation scheme, farming areas & livestock areas, marketing facilities etc. (1 day; 25 farmers/tour)	Selected farmers groups in the Project Area	AGRITEX
6. Workshop	- Workshop for seasonal evaluation & annual program planning - Workshop for innovation dissemination (1 day; 50 farmers/workshop)	FAEOs Representatives of farmers groups Selected farmers in the Project Area	AGRITEX / PMC
7. Field Guidance on Formation / Establishment of Farmers Organizations	- Strengthening of field guidance & support on formation or strengthening of farmers - Strengthening of guidance/support on group activities	Farmer groups in the Project Area	AGRITEX / Project Office
8. Guidance & Support of Senior Staff	- Periodical visits of senior staff for strengthening guidance & support to field staff (1 day by provincial SMS)	FAEOs Representatives of farmer groups	AGRITEX
II. Improvement of Marketing System			
1. Development of Open Market	- Construction of an open market Marketplace, loading bay & market facilities	Nyarupakwe BC - Market stalls (4 stalls) - Loading bay (1 unit) - Water & electricity supply facility(1 set) - Drain & waste disposal (1 set) - Toilet, fence (1 set)	RDC

Source: Program costs estimated based on current costs for similar programs implemented by AGRITEX

Table 4.5.1 Project Works of Nyarupakwe Pilot Project

Work Item	Description	Work Item	Description
I. Water Resources Development		IV. Rural Infrastructure Improvement	
(1) Nyarupakwe Dam		(1) Rural Road Improvement	
(a) Dam Type	Combined Type of Concrete Gravity Dam and Fill Dam	(a) Nyarupakwe to Gokwe Road (km)	24
(b) Dam Height (m)	15.5	(b) Farm to Market Link Road (km)	22
(c) Dam Crest Length	.	(2) Borehole Improvement	
- Concrete Dam Portion (m)	226.0	(a) Rehabilitation (nos.)	13
- Fill Dam Portion (m)	356.0	(b) New Construction (nos.)	6
(d) Dam Crest Width (m)	8.0	(3) Community Development Center (place)	1
(e) Concrete Volume (m ³)	29,500		
(f) Embankment Volume (m ³)	87,500	V. Institutional Strengthening	
(g) Spillway		(1) Agricultural Extension Center (place)	1
- Design Flood Discharge (m ³ /s)	400	(2) Institutional Strengthening Program	LS
- Type	Ungated Ogee Type at Concrete Dam Portion		
(h) Intake Discharge (m ³ /s)	0.074	VI. Agricultural Support Services Strengthening	
(2) Upstream Small Scale Dam		(1) Agricultural Support Services Program	LS
(a) Dam Type	Concrete Gravity Dam	(2) Open Market (unit)	1
(b) Dam Height (m)	7.2		
(c) Dam Crest Length (m)	61.0		
(d) Dam Crest Width (m)	2.0		
(e) Concrete Volume (m ³)	1,120		
(f) Overflow Section	W20m x H1m at the Center of Dam Wall		
H. Irrigation Development			
(1) Irrigation Area (ha)	60		
(2) Main Irrigation Canal			
(a) Design Discharge (l/s)	72		
(b) Canal Length			
- Pipeline, Dia.=500mm (m)	770		
- Open Canal (m)	4,883		
(3) On-farm Facilities (Tertiary canals, Watercourses, Farm Drains and Farm Roads)	LS		
III. Livestock Development			
(1) Fully Fenced Grazing Area (ha)	860		
(2) Water Trough (nos.)	2		
(3) Fish Farming in the Nyarupakwe Reservoir (ha)	20		

Table 4.5.2 Pilot Project Cost

Work Item	Work Qty		Amount(1,000Z\$)	Remarks
I. Water Resources Development				
1. Nyarupakwe Dam				
(a) Excavation	145,700	m ³	14,570	
(b) Embankment	87,500	m ³	8,050	
(c) Concrete	29,500	m ³	75,225	
(d) Form	5,900	m ²	3,245	
(e) Steel Bar	200	ton	4,000	
(f) Others		L.S	10,509	Σ(a-e)x10%
2. Small Scale Dam				
(a) Excavation	1,100	m ³	110	
(b) Concrete	1,120	m ³	2,856	
(c) Others		L.S	297	Σ(a-b)x10%
(Sub-total)			(118,862)	
II. Irrigation Development				
1. Main Irrigation Canal System				
(a) Excavation	17,300	m ³	1,211	
(b) Embankment	2,400	m ³	187	
(c) Concrete	800	m ³	3,104	
(d) Concrete Pipe	850	m	1,207	
(e) Form	1,710	m ²	941	
(e) Water Stop	2,300	m	1,426	
(f) Gate	4	nos.	1,170	
(g) Others		L.S	925	Σ(a-f)x10%
2. On-farm Facilities	60	ha	1,140	
(Sub-total)			(11,310)	
III. Livestock Development				
1. Grazing Area Development Scheme	860	ha	580	
2. Livestock Water Development Scheme	2	unit	40	
3. Fishery Development Scheme		L.S	55	
(Sub-total)			(675)	
IV. Rural Infrastructure Development				
1. Nyarupakwe-Gokwe Road Improvement	24	km	36,480	
2. Link Roads Improvement	22	km	8,360	
3. Improvement of Boreholes	4	nos.	1,520	
4. Construction of Boreholes	15	nos.	11,400	
5. Construction of Community Center		L.S	5,890	
(Sub-total)			(63,650)	
V. Institutional Strengthening				
1. Agricultural Extension Center	1	unit	3,800	
2. Institutional Strengthening Program		L.S	3,574	
(Sub-total)			(7,374)	
VI. Agricultural Support Services				
1. Agricultural Extension Services		L.S	1,047	
2. Development of Open Market	1	unit	760	
(Sub-total)			(1,807)	
VI. Engineering Services			(30,552)	Σ(I-VI)x15%
VII. Contingencies			(23,423)	Σ(I-VII)x10%
Grand Total			257,653	

Table 4.6.1 Cropwise Net Return With and Without Project Conditions of the Pilot Project

(At Financial Prices)

Crops	(Total Area 60 ha)											Incremental Net Return							
	Without Project Conditions						With Project Conditions												
	Share to total area (a)	Cropped area (b)	Yield ton/ha (c)	Total prod. (d)=(b)*(c)	Price Z\$/kg (e)	Total amount (f)=(d)*(e)	Prod. cost (g)	Total cost (h)=(b)*(g)	Net return (i)=(f)-(h)	Share to total area (a')	Cropped area (b')		Yield ton/ha (c')	Total amount (d')=(b')*(c')	Price Z\$/kg (e')	Total cost (f')=(d')*(e')	Prod. cost (g')	Total cost (h')=(b')*(g')	Net return (i')=(f')-(h')
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	14,982	629.244	935.256	462.422
2 MAIZE	0.26	15.36	1.01	15.51	6.40	99.237	4789	73.252	26.035	0.18	10.80	6.00	64.80	6.40	414.720	16,042	173.254	241.466	215.431
3 WHEAT	0.00	0.00	0.00	0.00	7.60	0	0	0	0	0.63	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	20.689	0.05	3.00	2.50	7.50	10.00	75.000	14,779	44.337	30.563	9.954
5 CABBAGE	0.00	0.00	0.00	0.00	3.00	0	0	0	0	0.035	2.10	50.00	155.00	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	598.500	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	1.00	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	-	378.972	519.568	1.70	102.00	-	-	-	4,489.296	-	1,995.228	2,494.068	1,974.500

Incremental Net Return	41,568
Per ha Z\$	32,908

(At Economic Prices)

Crops	(Total Area 60 ha)											Incremental Net Return							
	Without Project Conditions						With Project Conditions												
	Share to total area (a)	Cropped area (b)	Yield ton/ha (c)	Total prod. (d)=(b)*(c)	Price Z\$/kg (e)	Total amount (f)=(d)*(e)	Prod. cost (g)	Total cost (h)=(b)*(g)	Net return (i)=(f)-(h)	Share to total area (a')	Cropped area (b')		Yield ton/ha (c')	Total amount (d')=(b')*(c')	Price Z\$/kg (e')	Total cost (f')=(d')*(e')	Prod. cost (g')	Total cost (h')=(b')*(g')	Net return (i')=(f')-(h')
1 COTTON	0.63	37.8	1.29	48.762	17.4	848.459	3,854	145.681	702.778	0.7	42.00	2.5	105	17.4	1,827.000	9,794	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	488.000	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	7.062	9.3	65.677	4,232	27.931	37.745	0.05	3.00	2.5	7.5	9.3	69.750	9,587	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	38,109	80.029	95.741	95.741
Total	1.0	60.0	-	-	-	1,032.305	-	216.107	816.198	1.70	102.00	-	-	-	4,997.418	-	1,379.335	3,618.083	2,801.884

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

Table 4.6.2 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	21498			21498	0	-21498	19544	0
2	2002	56890			56890	0	-56890	47017	0
3	2003	125270			125270	0	-125270	94117	0
4	2004	1232	2102		3334	6902	3568	2277	4714
5	2005	1232	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 Rate10%)
B-C 495822 (Discount Rate10%)

