ANNEX-V

ROAD AND OTHER INFRASTRUCTURES

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ROAD AND OTHER INFRASTRUCTURES

Chapter V-1 AGRICULTURE INFRASTRUCTURE

V-1.1 Irrigation Schemes in the Study Area

The inventory survey on irrigation schemes in Bhutan has been periodically conducted by DRDS of MOA and according to the survey conducted in 1999, irrigation facilities are mainly introduced for the cultivation of rice on the paddy field in the Study Area except some Gewogs located at the southern part of Mongar with actually no rice field. As a whole, most of the beneficiaries have been recognized that the productivity is at least moderate or more than that in case with irrigation facilities. (Refer to Table V-1 to V-3)

Thus, in order to make the proper plan for the agricultural production increase, improvement or renovation for the existing irrigation facilities and new irrigation facilities construction are obviously indispensable in the Study Area in terms of the unit crop yield increase and horizontal extent of cultivating area absolutely.

Then the existing irrigation schemes were simply categorized in irrigated area-wise as the Study has to aim to facilitate the improvement and development of the irrigation facilities. It seemed that the irrigated area is related to the components and kinds of the irrigation facilities, but the length of irrigation canal is obviously not consistent to the irrigated area extent. The categorization is as follows;

Categorization

Scheme	Irrigated Area
A	More than 100 ha
B	20 ha to 100 ha
C	Less than 20 ha

Almost all of the irrigation schemes were categorized to C that is 72.6 % in Lhuntse and 85.4 % in Mongar respectively. The components of the irrigation facilities were mostly same in the all categorizations and that is composing of earthen canal and masonry lining especially in the kind of canal lining.

As for the facilities in the canal, some facilities in function, like spillway, sand trap and drop to reduce and control the velocity of irrigation water conveyance were introduced to protect the erosion and scour inside of the canal. Those facilities seemed to be very effective for such steep slope canal in the Study Area for the operation and maintenance of the irrigation facilities.

The results of above inventory survey are summarized as follows;

Summary of Inventory Survey (Lhuntse)

Category	Nos.	%	Beneficiaries Nos. of HH	wua/ wuc	Nos.	%	wua/wuc Exist	Nos.	%
A	3	4.8	90 - 148	FMIS	43	69.4	no	47	75.8
B	14	22.6	13 - 90	NIP	16	25.8	exist	15	24.2
C	45	72.6	2 - 33	GAS	3	4.8			
Total	62	100.0		Total	62	100.0	Total	62	100.0

Productivity	Nos.	%	Perception	Nos.	%	Impression	Nos.	%
Moderately productive	28	45.2	Just enough	11	17.7	Moderately good	29	46.8
Highly Productive	14	22.6	Enough	24	38.7	Moderate	16	25.8
Moderately unproductive	17	27.4	Abundant	22	35.5	Good	3	4.8
Highly unproductive	-	-	Scare	5	8.1	Excellent	6	9.7
			Not available	-	-	Moderately poor	7	11.3
						Poor	1	1.6
						Very bad	-	-
N.A.	3	4.8	N.A.	-	-	N.A	-	-
Total	62	100.0	Total	62	100.0	Total	62	100.0

Note: Productivity of field, Perception of irrigation water condition, Impression of irrigation facilities

Summary of Inventory Survey (Mongar)

Category	Nos.	%	Beneficiaries Nos. of HH	wua/ wuc	Nos.	%	wua/wuc Exist	Nos.	%
A	1	2.1	199	FMIS	29	60.4	no	37	77.1
B	6	12.5	50 - 95	NIP	6	12.5	exist	11	22.9
C	41	85.4	4 - 100	GAS	13	27.1			
Total	48	100.0		Total	48	100.0	Total	48	100.0

Productivity	Nos.	%	Perception	Nos.	%	Impression	Nos.	%
Moderately productive	39	81.3	Just enough	25	52.1	Moderately good	23	47.9
Highly productive	2	4.2	Enough	-	-	Moderate	-	-
Moderately unproductive	5	10.4	Abundant	4	8.3	Good	-	-
Highly unproductive	1	2.1	Scare	12	25.0	Excellent	1	2.1
			Not available	4	8.3	Moderately poor	14	29.2
						Poor	-	-
						Very bad	8	16.7
N.A.	1	2.1	N.A.	3	6.3	N.A	2	4.2
Total	48	100.0	Total	48	100.0	Total	48	100.0

Note: Productivity of field, Perception of irrigation water condition, Impression of irrigation facilities

V-1.2 Proposed Irrigation Schemes

In the course of the Study, Problem Analysis Workshops were held calling Gups, Extension Agents and other personnel concerned from all 24 Gewogs in total, 8 in Lhuntse and 16 in Mongar respectively. At that time, questionnaire investigation regarding irrigation scheme was carried out and the proposals for the irrigation scheme were submitted in consideration of their understanding of physical condition at the site, experience through their activities in the Gewogs and so on. Truly there was no proposal from Jurme, Kengkhar and Silambi Gewogs in southern Mongar, because of no paddy field.

Remaining 21 Gewogs submitted the proposal for existing irrigation scheme of rehabilitation or renovation and new irrigation facilities construction and it could be inferred that their conscious and necessity for the irrigation scheme are very high and there were also few large scale scheme exceeding expected irrigated area of 50 ha among proposed irrigation schemes.

The proposed irrigation schemes listed by Gups and Extension Agents by Gewog at the Problem Analysis Workshop are 38 in/both Lhuntse and Mongar for both rehabilitation and new construction. Some schemes out of 38 are listed in the 9th FYP, too. The final proposed irrigation schemes readjusted in the Master Plan as the Irrigation Development Sub-program are shown in Table V-14.

Then it is preferable to implement such irrigation schemes through beneficiaries' participation approach in accordance with the national policy. Because the proposed irrigation schemes are appropriate contents to be able to implement in scale-wise with the assistance of materials and engineering support by MOA in general. It was also confirmed in the hearing survey carried out according to the categorization. Usually, the irrigation schemes have implemented by farmers themselves. This concept is also confirmed by hearing survey conducted by category as shown in Table V-4.

V-1.3 Irrigation Facilities to be Introduced

In consideration of the above results from the inventory survey of irrigation scheme conducted by DRDS and beneficiaries' participation approach for implementing the Irrigation Development Sub-program, simple and economical facilities shall be introduced

Therefore it is thought that the facilities to reduce and control the velocity of irrigation water conveyance together with the introduction of masonry lining to the part of the steep slope in the canal is preferable. In the same way, installation of flexible pipe like polyethylene pipe is effective at the meandering canal of steep slope with a small irrigation water requirement comparatively (not large cross-sectional area of flow) in consideration of the construction, operation, maintenance and protection of debris by land slide. Because small size of pipe has being improved and is available in Bhutan at present.

V-1.4 Cost Estimation

The cost estimation for the proposed Irrigation Development Sub-program were calculated on the basis of the unit cost for the existing irrigation facilities' renovation and new construction indicated in the 9th 5Year Plan shown in Table A-5.

The irrigation schemes proposed by Gups and EAs by Gewog are slightly different from that indicated in 9th FYP in the project status of new construction and renovation. In the Master Plan, since the status shown by Gewog seems to indicate more actual situation than that of 9th FYP, the irrigation schemes proposed by Gewog were adopted as the proposed Irrigation Development Sub-program. Then the minimum unit cost on average in the renovation irrigation scheme of 9th FYP in the Study Area was adopted in consideration of the other schemes, which are not indicated in 9th FYP and their actual situation confirmed in the Workshop.

Chapter V-2 FARM ROAD

V-2.1 Farm Road Development in the Study Area

RGOB has transferred the mandate of farm road construction to MOA from DOR of MOC, after MOA formulated the Guidelines for Farm Roads Development and its Proposal for Implementation in 2000 based on the guidelines formulated by the NEC. In those documents, it is described that farm road shall be constructed by active participation from a community with government assistance of technical guidance and provisions of equipment and machinery services. Once a farm road is constructed and handed over to a community, the responsibility of repair and maintenance is placed with the community. From this thing, the participatory approach is the principal for the development and maintenance of farm roads including farm mule tracks.

Besides, as the following points are described in the Guidelines and Proposal, taking into consideration of project economy and environmental aspect derived from those points, the farm road development plan including farm mule track was formulated.

- a minimum of ten households of 70 people per km should be benefited,
- total cultivated area per season should not be less than 30 acres per km,
- drainage structure and/or bridges should be multi-cell culvert or wooden bridge,
- unskilled labor should be provided by the beneficiaries as labor contribution, and
- construction machinery, tools and materials would be provided by the government(MOA)

There are 8 Gewogs in Lhuntse and 16 Gewogs in Mongar respectively and all Gewog centers are deemed to be a distributing and trading center. They should be at least planned to be connected to either District Road, National Highway or Feeder Road to take into consideration of the road plan committed by the Government, equity development and marketability in the Study Area entirely on the basis of the Guidelines.

The principal of farm road development in the Study Area is to connect among all Gewog centers through certain farmland and proper motorable roads to promote more agricultural activities along the connected roads and its vicinity to be influenced by the farm road development.

Finally the following programs including farm mule track and light-load bridge were identified and planned in the FARM ROAD DEVELOPMENT PROGRAM (FRDP) of the Master Plan targeting the development by 2012 in consideration of above basic policy, screening and existing road system and road planning in the Study Area. The details of the proposed farm roads, the farm mule tracks and the related facilities are shown in Figure V-1 to V-22.

Farm Road Construction Program in Lhuntse

S/N	Name of Gewog	Farm Road	Approx. Length	Remarks
R1	Menbi & Metsho	Takila to Ongar	42.8 km	14.0 HH per km*
R2	Menbi	Thinleypang to Takila	~~9.8 km~~	Dropped (Feeder road to be constructed by DOR)
R3	Tsenkhar	Phawan to Domkhar	10.6 km	24.4 HH per km
R4	Tsenkhar	Autsho to Tsenkhar	23.0 km	7.4 HH per km
R5	Tsenkhar	Budur to Wambur	7.3 km	11.8 HH per km
R6	Gangzur	Thimyul to Jangcholing	5.2 km	11.3 HH per km

S/N	Name of Gewog	Farm Road	Approx. Length	Remarks
R7	Gangzur	Lingabee to Ney	9.5 km	12.4 HH per km
		Total	98.4 km	

Note: *; Anticipated household number in 10 years with a population growth rate of 2.5 % per year.

Farm Road Construction Program in Mongar

S/N	Name of Gewog	Farm Road	Approx. Length	Remarks
R8	Serimuhang, Balam & Drametse	Serizong to Narang through Balam	~~62.8 km~~ 20.0 km	From Bagengla to Narang (Drametse, 22.0 HH* per km)
R9	Serimuhang	Kafu to Sonakhar	~~20.5 km~~	Dropped (Feeder road to be constructed by DOR)
R10	Mongar, Chali and Tsakaling	Themnangbi to Rewan through Chali	~~40.0 km~~ 12.0 km	From Themnangbi to Chali (23.8 HH per km)
R11	Tsamang	Yongkala to Banjar	~~26.5 km~~	Proposed for the 11th FYP (10.6 HH per km)
R12	Drepong	Gyelposhing to Laptsa	23.5 km	11.3 HH per km
R13	Thangrong	Chaskhar to Thangrong	12.3 km	27.6 HH per km
R14	Saleng	Kalapang to Resa	16.8 km	Selected for FRCP (11.3 HH per km)
	Total		84.6 km	

Note: *; Anticipated household number in 10 years with a population growth rate of 2.5 % per year.

Farm Mule Track Construction Program in Lhuntse

S/N	Name of Gewog	Farm Road	Approx. Length	Remarks
M1	Khoma	Suspension bridge to Khoma	6.3 km	52.5 HH per km*
M2	Jaray	Autsho to Ladrong	22.4 km	11.5HH per km
			28.7 km	

Note: *; Anticipated household number in 10 years with a population growth rate of 2.5 % per year

Farm Mule Track Construction Program in Mongar

S/N	Name of Gewog	Farm Road	Approx. Length	Remarks
M3	Jurme & Kengkhar	Jurme (opposite side of S/N8) to Kengkhar	34.6 km	Starting from planned feeder road to Nganglam. 19.1 HH per km*
M4	Gongdue & Silambi	Kuri Chhu (nearby Gorthongla) to Nagor	50.8 km	Light-load bridge is required to cross Kuri Chhu. Starting from the Kuri Chhu River. 11.3 HH per km
			85.4 km	

Note: *; Anticipated household number in 10 years with a population growth rate of 2.5 % per year.

Light-load Bridge Construction Program

S/N	Gewog connected	Bridge Location	Approx. Length Including Approach Facilities	Remarks
B1	Khoma	Khoma (Kuri Chhu)	90 m	Suspended bridge (replacement)
B2	Jaray	Autsho (Kuri Chhu)	100 m	Suspension bride (replacement)
B3	Gongdue	Gorthongla (Kuri Chhu)	120 m	Suspension bride (new construction)
			310 m	

V-2.2 Plan and Design for Farm Road

Though almost all the motorable roads in Bhutan have been constructed and maintained by DOR even now, MOA shall execute the program of farm road development with initiative from now on.

MOA has prepared the Feeder Road Manual on the basis of the Road Design Manual of DOR. The feeder road of MOA is a Farm Road and it is corresponding to the feeder road categorized Class "C" road type of the Road Design Manual of DOR. The feeder road of class c is a motorable road without black-topping (asphalt pavement) and the engineering parameters described in the Guidelines are also decided in consideration of the Road Design Manual of DOR. Accordingly, the plan and design for farm road will be basically carried out using the Manual prepared by MOA in the engineering office of Dzongkhag.

V-2.3 Technical Consideration

Farm Road Development Plan in the Study Area was carried out in consideration of the following physical conditions in particular and engineering parameters evaluated based on the Guidelines.

(1) Site Selection and Alignment

It is described in the Guidelines that the proposed farm road shall benefit certain sphere of production area of agriculture and should either connect production areas directly to markets or feed to Feeder Road/National Highway. However, there are the following three major constraints for deciding proper alignment of the farm road in the Study Area.

- Scattered distribution of farmland
- Farmland located at high altitude
- Hard rocky area with steep slope

For example, most of Feeder Road or National Highway generally runs at altitude ranging from 600 m to 1,200 m in the Study Area, while farmland is situated at around 2,000 m especially dry land.

Keeping the proper gradient of 7 % described as a limiting gradient of engineering parameters in the Guidelines for deciding the alignment of farm road, the length of alignment must be physically assured about 14.0 km, it is felt longer distance as follows, and actually the alignment length of the on-going farm road construction at Minjay in Lhuntse, which is even deemed to have comparatively good physical condition is to be about 4.0 km from District road up to certain farmland compared with the direct distance less than 1.0 km.

- 2,000 - 1,000 (assumed) = 1,000/ 0.07 = about 14.0 km

In addition to this situation, farmlands are almost scattered in the Study Area sparsely. Therefore, it is difficult to connect the scattered farmlands properly and economically. Moreover, in connecting the scattered farmlands, the alignment sometimes has to pass the area, not only deep forest but also rocky steep slope. This is also serious constraint for deciding proper alignment of farm road.

Therefore the site selection and alignment for the farm roads proposed were basically examined using the land use map, reflecting the production area of agriculture, of 1 to 50,000 scale with 200 m interval of contour line to take into consideration of farmland distribution and its elevation, and the farm road construction request from each Gewog, Lhuntse and Mongar Dzongkhag as much as possible.

(2) Modification of Alignment

As aforementioned, the alignment of the farm road was examined using the land use map, and simultaneously the routes of some existing mule track or footpath were supplementally surveyed using GPS to confirm where they are.

The alignment identified on the map will be finally modified to the proper alignment on the basis of the data surveyed by GPS, physical conditions, and economical and engineering aspects.

(3) Engineering Parameters and Standard Cross Section

The following parameters and standard cross section are introduced to follow strictly in consideration of the environmental friendly and economical farm road construction in the Guidelines. (Refer to Figure V-16, V-17)

The following engineering parameters for farm mule track were decided in consideration of that of farm road and the width of light-load bridge which a power tiller transportation is permissible.

Engineering Parameters of Farm Road and Farm Mule Track

Parameters	Farm Road	Farm Mule Track
Ruling gradient	6 % (1 in 16.7)	Same as Farm Road
Limiting gradient	7 % (1 in 14.3)	Ditto
Exceptional gradient	10 % (1 in 10)	Ditto
Type of pavement	- Road with ordinary earth surface	Ditto
	- Water bound Macadam (WBM)	Compaction and soling
B/R Wall	- Hammer dressed dry wall for < 3m in height	Same as Farm Road
	- Rubble masonry for wall > 3 m	Not applicable
Formation width	4.6 m	2.2 m
Road width	4.0 m	2.2 m
Carriageway width	3.0 m	1.7 m
Shoulder	0.5 m	0.25 m
Side drain width	0.6 m	Same as Farm Road
Side slope	1 in 2 in loose soil and 1 in 4 in stiff clay	Ditto
Design speed of road	20 - 40 km per hour	10-15 km per hour
Pavement cross fall	4 % in straight sections of road	2 % in straight sections of road
Radius of curvature	- Minimum – 25.0 m	- Minimum – 25.0 m
	- Exceptional – 10.0 m	- Exceptional – 10.0 m

V-2.4 Unit Cost for Farm Road and Farm Mule Track

The unit cost for farm road construction and farm mule track construction was calculated based on the standards of cost estimation published from Quality Control Division of MOC by required labor, materials and machinery in consideration of the following assumptions reflected physical conditions and hearing survey in the Study Area. The details of the calculation are shown by required labor, materials and machinery in Table, including the calculation process corresponding to Bhutan's construction practice at site. (Refer to Table V-6 to V-12).

Assumptions of Farm Road Construction (per Length = 1,000 m)

- Clearing: Width 7.0 m x 1,000 m
- Felling Trees: 1 No. per 10m
- Earth Work (Geological Features): Soft Rock 25 %, Hard Rock 25 %, Soft Rock 25 %, Hard Soil 25 %
- Soil Disposal: 80 % of the above earth work (considering the environment friendly road construction method)
- Culvert: 3 Nos. per 1,000 m
- Side Ditch: Length 1,000 m (on the side of mountain)
- Basement: Compaction, Subgrade, Soling, Blinding and Wearing (considering in accordance with the farm road cross section standard of MOA)
- Stone Edging: 2,000 m (both sides)
- Shoulder: 2,000 m (both sides)
- Retaining Wall: Length 50 m (10 % of soft soil area)

Assumptions of Farm Mule Track Construction (per Length = 1,000 m)

- Clearing: Width 2.0 m x 1,000 m (BSR Code: E0001, refer to calculation of F. R.)
- Felling Trees: 1 No. per 10m (BSR Code: E0002, refer to calculation of F. R.)
- Earth Work by blasting: 1.5m^3 x 1,000 m (BSR Code: 0458, refer to calculation of F. R.)
- Labor requirement: 1,000 persons (from hearing survey)

V-2.5 Standard Drawing

The standard drawings including the related facilities for the Farm Road Development Plan are prepared in consideration of the physical conditions in the Study Area and the past road construction project in terms of especially implementing it by mainly farmers themselves on the basis of the Guideline for Farm Roads Development and are as shown in FigureV-1 to V-21.

Tables

Table V-1 Irrigation Scheme Inventory (Status) (1/4)

Lhuntse District(1/2)

No.	Category	ID	Gewog	Name	Year	Type	Beneficiaries	wua/wuc	Area (ha)	Area (Acre)	command	Productivity	Status
1	C	187	Gangzur	Fakchu Irri.	1970	FMIS	14	no	12.1	30.0	Five or more separate areas	Moderately productive	Defunct due to beneficiaries' inability
2	C	188	Gangzur	Nobey Irri.	Before1970	FMIS	14	no	8.1	20.0	Five or more separate areas	Moderately productive	Functioning
3	B	190	Gangzur	Phuchu Irri.	1970	FMIS	45	no	48.6	120.0	Five or more separate areas	Moderately productive	Functioning
4	B	191	Gangzur	Magar Irri.	1995	NIP	90	exist	27.1	67.0	small patches of wetland scattered	Moderately productive	Functioning
5	C	195	Gangzur	Ngar Irri.	1983	NIP	16	no	7.3	18.0	small patches of wetland scattered	Moderately productive	Defunct due to natural causes
6	B	296	Gangzur	Jang Irri.		NIP	38	exist	44.5	110.0	small patches of wetland scattered	Highly productive	Functioning
7	C	297	Gangzur	Shawa Irri.		FMIS	7	no	1.2	3.0	Five or more separate areas	Moderately unproductive	Functioning
8	B		Gangzur	Tongling Irri.		NIP	50	exist	60.7	150.0			Functioning
			Sub Total				274		209.6	518.0			
9	C		Jaray	Pam Irri.		FMIS	21	no	6.3	15.6	2 or more seprate areas	Moderately unproductive	Functioning
10	C		Jaray	Yumchen Irri.		FMIS	14	no	1.0	2.4	2 or more seprate areas	Moderately unproductive	Functioning
11	C		Jaray	Sogang Irri.		FMIS	20	no	3.5	8.6	2 or more seprate areas	Moderately unproductive	Functioning
12	C		Jaray	Kharchung Irri.		FMIS	14	no	1.7	4.1	3 or more seprate areas	Moderately unproductive	Functioning
13	C		Jaray	Chubar Irri.		FMIS	2	no	0.5	1.2	3 or more seprate areas	High	Functioning
14	C		Jaray	Ladrong Irri.		FMIS	23	no	4.2	10.5	4 or more seprate areas	Moderately unproductive	Functioning
15	C		Jaray	Lhachen Irri.		FMIS	14	no	5.5	13.6	2 or more seprate areas	Moderately unproductive	Functioning
16	C		Jaray	Nangay Irri.		FMIS	28	no	4.3	10.6	2 or more seprate areas	Moderately unproductive	Functioning
17	C		Jaray	Zangkhar Irri.		NIP	20	exist	16.2	40.0	2 or more seprate areas	Moderately unproductive	Functioning
			Sub Total				156		43.2	106.6			
18	B		Khoma	Panngkhar Irri.	1984	FMIS	26	no	36.4	90.0	4 or more seprate areas	Moderately unproductive	Functioning
19	C		Khoma	Ngalamdung Irri.		FMIS	19	no	10.1	25.0	5 or more seprate areas	Moderately unproductive	Functioning
20	C		Khoma	Wagla Irri.		FMIS	12	no	4.9	12.0	2 or more seprate areas	Moderately unproductive	Functioning
21	B		Khoma	Khoma Baptong		NIP	39	exist	60.7	150.0	2 or more seprate areas	Moderately unproductive	Functioning
22	C		Khoma	Chhubar Irri.	1984	FMIS	8	no	1.6	4.0	2 or more seprate areas	High	Functioning
23	C		Khoma	Borpa Irri.		FMIS	17	no	14.2	35.0	3 or more seprate areas	Moderately unproductive	Functioning
24	C		Khoma	Sentigan Irri.		FMIS	7	no	2.4	6.0	2 or more seprate areas	Moderately unproductive	Functioning
25	C		Khoma	Shhuma Irri.		FMIS	11	no	16.2	40.0	2 or more seprate areas	Moderately unproductive	Functioning
26	C		Khoma	Dragten Irri.		FMIS	8	no	4.0	10.0	2 or more seprate areas	Moderately unproductive	Functioning
			Sub Total				147		150.5	372.0			
27	B	194	Kurtoe	Chudigangchu	1996	NIP	13	exist	24.3	60.0	small patches of wetland scattered	Highly productive	Functioning
28	C	298	Kurtoe	Golang Irri.	1970	FMIS	20	no	12.1	30.0	small patches of wetland scattered	Highly productive	Functioning
29	C	299	Kurtoe	Shabargang Irri.	1970	FMIS	6	no	2.4	6.0	small patches of wetland scattered	Highly productive	Functioning
30	C	300	Kurtoe	Chusa Irri.	1970	FMIS	5	no	2.0	5.0	Five or more separate areas	Highly productive	Functioning
31	C	302	Kurtoe	Doubling Irri.	1980	FMIS	5	no	1.2	3.0	Five or more separate areas	Moderately productive	Functioning
32	B	303	Kurtoe	Dungkhar Irri.	1999	NIP	60	no	68.8	170.0	Two separate areas	Highly productive	Defunct due to natural causes
33	C	305	Kurtoe	Waiway Irri.	1980	FMIS	8	no	2.8	7.0	Three separate areas	Moderately productive	Defunct due to natural causes
34	C	306	Kurtoe	Chagzom Irri.	1980	FMIS	13	no	2.8	7.0	Two separate areas	Moderately productive	Functioning
			Sub Total				130		116.6	288.0			

ID of DRDS, Data are complemented by hearing survey. FMIS:Farmers Management Irrigation Scheme, NIP:National Irrigation Policy, GAS:Government Assisted Scheme

Category A ≧ Area 100ha, Area 20ha ≦ Category B < Area 100ha, Category C < Area 20ha

Table V-1 Irrigation Scheme Inventory (Status) (2/4)

Lhuntse District(2/2)

No.	Category	ID	Gewog	Name	Year	Type	Beneficiaries	wua/wuc	Area (ha)	Area (Acre)	command	Productivity	Status
35	B	301	Menbi	Manjabee Irri.	1994	NIP	43	exist	21.0	52.0	Three separate areas	Highly productive	Defunct due to natural causes
36	A	304	Menbi	Gorgan Irri.	1987	NIP	101	exist	110.9	274.0	Two separate areas	Highly productive	Functioning
37	C		Menbi	Nungmaling Irri.		FMIS	17	no	13.7	33.8	3 or more seprate areas	Moderately productive	Functioning
38	C		Menbi	Dangling Irri.		FMIS	11	no	4.0	10.0	2 or more seprate areas	Highly productive	Functioning
39	A		Menbi	Tangmachu Irri.		NIP	148	exist	105.1	259.8	6 or more seprate areas	Highly productive	Functioning
40	B		Menbi	Shungkhar Irri.		FMIS	85	no	33.0	81.5	3 or more seprate areas	Highly productive	Functioning
41	C		Menbi	Yomay Irri.		FMIS	13	no	6.1	15.0	4 or more seprate areas	Moderately productive	Functioning
			Sub Total				*98*		*293.9*	*726.1*			
42	C		Metsho	Tongthrong Irri.	1978	FMIS	15	no	4.1	10.1	2 or more seprate areas	Moderately productive	Functioning
43	C		Metsho	Ongar Irri.		FMIS	26	no	4.9	12.0	4 or more seprate areas	Moderately productive	Functioning
44	C		Metsho	Drola Tepang Irri.		FMIS	18	no	10.1	25.0	3 or more seprate areas	Moderately productive	Functioning
45	C		Metsho	Pangshing Irri.		FMIS	11	no	2.4	6.0	2 or more seprate areas	Moderately productive	Functioning
46	C		Metsho	Chumulungpa Irri.		FMIS	8	no	2.2	5.5	2 or more seprate areas	Moderately productive	Functioning
47	C		Metsho	Gortsum Irri.		NIP	16	exist	8.1	20.0	3 or more seprate areas	Moderately productive	Defunct conflict among beneficiaries
48	C		Metsho	Bumdir Irri.	1975	FMIS	17	no	5.1	12.6	3 or more seprate areas	Moderately productive	Functioning
49	C		Metsho	Fulumai Irri.		FMIS	12	no	2.0	5.0	2 or more seprate areas	Moderately productive	Functioning
50	C		Metsho	Tsho Brang Irri.		FMIS	7	no	2.4	6.0	2 or more seprate areas	Moderately productive	Functioning
51	C		Metsho	Tshochen Irri.		FMIS	13	exist	4.5	11.0	3 or more seprate areas	Moderately productive	Functioning
52	C		Metsho	Thrasi Nang Irri.		FMIS	4	no	1.6	4.0	2 or more seprate areas	Moderately productive	Functioning
			Sub Total				147		47.4	117.2			
53	C	189	Minjay	Sham Irri.	1994	NIP	32	exist	14.2	35.0	Three separate areas	Moderately productive	Functioning
54	A	193	Minjay	Menji Irri.	1997	NIP	90	exist	101.2	250.0	Five or more separate areas	Highly productive	Functioning
55	B		Minjay	Lagpachu Irri.		NIP	67	exist	56.0	138.5			
56	C		Minjay	Bragong Irri.		FMIS	7	no	8.5	21.0			
57	C		Minjay	Jalang Irri.		FMIS	32	no	19.4	48.0	Three separate areas	Moderately productive	Functioning
58	C		Minjay	Changayling Irri.		FMIS	33	no	13.8	34.0			
			Sub Total				*261*		*213.1*	*526.5*			
59	B	192	Tsenkhar	Domkhar Irri.	1997	NIP	53	exist	64.8	160.0	Four separate areas	Moderately productive	Functioning
60	B	293	Tsenkhar	Wambur Irri.	1980	GAS	40	no	28.3	70.0	small patches of wetland scattered	Moderately productive	Functioning
61	C	294	Tsenkhar	Autsho Irri.	1970	GAS	20	no	9.3	23.0	Four separate areas	Moderately productive	Functioning
62	B	295	Tsenkhar	Aumling Irri.	1980	GAS	35	no	40.5	100.0	Five or more separate areas	Moderately productive	Functioning
			Sub Total				148		142.9	353.0			
			Total				1361		1217.1	3007.4			

ID of DRDS, Data are complemented by hearing survey. FMIS:Farmers Management Irrigation Scheme, NIP:National Irrigation Policy, GAS:Government Assisted Scheme

Category A≧Area 100ha, Area 20ha≦Category B＜Area 100ha, Category C＜Area 20ha

Table V-1 Irrigation Scheme Inventory (Status) (3/4)

Mongar District(1/2)

No.	Category	ID	Gewog	Name	Year	Type	Beneficiaries	wua/wuc	Area (ha)	Area (Acre)	command	Productivity	Status
			Balam	Nil or no report			0		0.0	0.0			
1	B	253	Chaskhar	Kharnang canal	Ongoing	FMIS	88	no	93.1	230.0	Four separate areas	Moderately productive	Construction/Renovation ongoing
2	A	254	Chaskhar	Losum Irrigation	1972	GAS	199	exist	303.5	750.0	Five or more separate areas	Moderately productive	Functioning
			Sub Total				287		396.6	980.0			
		~~282~~	~~Chali~~	~~Wanglarongba~~		~~GAS~~	~~34~~	~~no~~	~~18.2~~	~~45.0~~			~~Defunct due to natural causes~~
3	C	283	Chali	Wanglarongba		GAS	34	exist	18.2	45.0	One continuous area	Moderately productive	Defunct due to natural causes
4	C	284	Chali	Wangmakhar	1980	GAS	34	exist	12.1	30.0	One continuous area	Moderately productive	Functioning
5	C	290	Chali	Numabi Yorwa	Before1970	FMIS	16	no	6.9	17.0	One continuous area	Moderately productive	Functioning
			Sub Total				84		37.2	92.0			
6	C	270	Drametse	Ushingzorrelam	Before1970	FMIS	44	no	4.5	11.0	Two separate areas	Moderately productive	Defunct due to natural causes
7	C	271	Drametse	Mani Zor	Before1970	FMIS	17	no	3.2	8.0	Four separate areas	Moderately productive	Functioning
8	C	272	Drametse	Rollong canal	1972	GAS	21	exist	12.1	30.0	Two separate areas	Moderately productive	Functioning
9	C	273	Drametse	Remungrelam	1994	NIP	77	exist	12.1	30.0	Four separate areas	Moderately productive	Functioning
10	C	274	Drametse	Tshangfay Relam	Before1970	FMIS	18	no	7.3	18.0	Five or more separate areas	Moderately productive	Functioning
11	B	275	Drametse	Mochu Relam	Before1970	FMIS	95	no	44.5	110.0	Five or more separate areas	Moderately productive	Functioning
			Sub Total				272		83.8	207.0			
			Drepong	Nil or no report			0		0	0			
			Gongdue	Nil or no report			0		0	0			
			Jurme	Nil or no report			0		0	0			
			Kengkhar	Nil or no report			0		0	0			
12	B	269	Mongar	Tokpaling	1995	NIP	55	exist	24.3	60.0	Two separate areas	Moderately productive	Functioning
13	B	279	Mongar	Khashuri Lam	Before1970	NIP	55	no	28.3	70.0	Two separate areas	Moderately productive	Functioning
		~~280~~	~~Mongar~~	~~Tokpaling Yaew~~	~~1995~~	~~NIP~~	~~55~~	~~no~~	~~24.3~~	~~60.0~~			~~Functioning~~
14	C	281	Mongar	Tshorong Yaw relam	Before1970	FMIS	14	no	7.3	18.0	Two separate areas	Moderately productive	Defunct due to beneficiaries' inability
15	C	285	Mongar	Serwangye	Before1970	FMIS	7	no	2.0	5.0	Three separate areas	Moderately productive	Functioning
16	C	292	Mongar	Chorchorma Rilam	Before1970	FMIS	15	no	10.1	25.0	One continuous area	Moderately productive	Functioning
			Sub Total				146		72.0	178.0			
17	C	276	Ngatshang	Sengdong canal	1986	GAS	100	no	10.9	27.0	Two separate areas	Moderately productive	Defunct due to natural causes
18	C	277	Ngatshang	Tagor ree Lam		FMIS	22	no	7.3	18.0	Two separate areas	Moderately productive	Defunct due to natural causes
19	C	278	Ngatshang	Khanna ree Lam	Before1970	FMIS	37	no	13.4	33.0	Two separate areas	Moderately productive	
			Sub Total				159		31.6	78.0			
20	C	241	Saleng	Rongtog	1979	FMIS	26	no	14.2	35.0	One continuous area	Moderately productive	Functioning
21	C	242	Saleng	Bargirilam	Before1970	FMIS	10	no	3.2	8.0	Three separate areas	Moderately unproductive	Defunct due to natural causes
22	C	243	Saleng	Gomparilam	Before1970	FMIS	8	no	3.2	8.0	One continuous area	Moderately unproductive	Defunct due to natural causes
23	C	244	Saleng	Galykhar Irri.canal	1982	FMIS	24	no	12.1	30.0	Three separate areas	Moderately productive	Defunct due to beneficiaries' inability

ID of DRDS, Data are complemented by hearing survey. FMIS:Farmers Management Irrigation Scheme, NIP:National Irrigation Policy, GAS:Government Assisted Scheme

Category A ≧ Area 100ha. Area 20ha ≦ Category B < Area 100ha. Category C < Area 20ha

Table V-1 Irrigation Scheme Inventory (Status) (4/4)

Mongar District(2/2)

No.	Category	ID	Gewog	Name	Year	Type	Beneficiaries	wua/wuc	Area (ha)	Area (Acre)	command	Productivity	Status
24	C	245	Saleng	Baimethang	Before1970	FMIS	25	no	8.9	22.0	One continuous area	Moderately unproductive	Functioning
25	C	246	Saleng	Masangdaza	1974	GAS	33	exist	6.5	16.0	Five or more separate areas	Moderately productive	Functioning
26	C	247	Saleng	Karbi Irri.canal		GAS	16	no	5.7	14.0	Three separate areas	Moderately unproductive	Functioning
27	C	248	Saleng	Bondima Irrigation	Before1970	GAS	50	no	16.2	40.0	Three separate areas	Moderately unproductive	Functioning
28	C	249	Saleng	Dangri Irri.Canal	Before1970	FMIS	20	no	4.0	10.0	Three separate areas	Moderately productive	Defunct due to natural causes
			Sub Total				212		74.1	183.0			
29	C	255	Sherimung	Batongla Irrigation	1973	FMIS	4	no	2.8	7.0	Five or more separate areas	Moderately productive	Functioning
30	C	256	Sherimung	Kalakey Irrigation	Before1970	FMIS	9	no	6.1	15.0	Two separate areas	Moderately productive	Functioning
31	C	257	Sherimung	Radirelam	Before1970	FMIS	48	no	6.5	16.0		Highly productive	Defunct due to beneficiaries' inability
32	C	258	Sherimung	Batongla Irrigation canal	1985	FMIS	6	no	4.0	10.0	Five or more separate areas	Moderately productive	Functioning
33	C	259	Sherimung	Samadrang lam	1988	GAS	64	exist	12.1	30.0	Two separate areas	Moderately productive	Defunct due to beneficiaries' inability
34	C	260	Sherimung	Changchu Irrigation	1977	FMIS	25	no	6.1	15.0	Three separate areas	Moderately productive	Functioning
		~~261~~	~~Sherimung~~	~~Phiere~~	~~Before1970~~	~~GAS~~	~~64~~	~~no~~	~~10.1~~	~~25.0~~			~~Functioning~~
35	C	262	Sherimung	Phuere	Before1970	GAS	64	exist	10.1	25.0	Three separate areas	Moderately productive	Functioning
36	C	263	Sherimung	Bomey Irrigation	1997	GAS	18	exist	6.5	16.0	One continuous area	Moderately productive	Functioning
37	C	264	Sherimung	Goorelam	Before1970	FMIS	14	no	2.4	6.0	One continuous area	Moderately productive	Defunct due to beneficiaries' inability
38	B	265	Sherimung	Gagbrangsa	Before1970	FMIS	50	no	26.3	65.0	Five or more separate areas	Moderately productive	Functioning
39	C	266	Sherimung	Rocksharelam	Before1970	FMIS	50	no	8.1	20.0	Three separate areas	Moderately productive	Defunct due to beneficiaries' inability
		~~267~~	~~Sherimung~~	~~Radirelam~~	Before1970	~~GAS~~	~~7~~	~~no~~	~~4.0~~	~~10.0~~			~~Defunct due to natural causes~~
40	C	268	Sherimung	Radirelam	2010	GAS	7	no	4.0	10.0	One continuous area	Moderately productive	Defunct due to natural causes
			Sub Total				359		95.1	235.0			
			Silambi	Nil or no report			0		0.0	0.0			
			Thangrong	Nil or no report			0		0.0	0.0			
41	B	286	Tsakaling	Takhambi	1996	NIP	51	exist	64.8	160.0	Five or more separate areas	Highly productive	Functioning
42	C	287	Tsakaling	Rawanchu		GAS	20	no	5.7	14.0	Two separate areas		Functioning
43	C	288	Tsakaling	Tesichu	1971	FMIS	15	no	2.8	7.0	One continuous area	Moderately productive	
44	C	289	Tsakaling	Petshongbi		FMIS	15	no	1.6	4.0	One continuous area	Moderately productive	Functioning
45	C	291	Tsakaling	Thumling	1997	NIP	90	no	11.3	28.0	Three separate areas	Moderately productive	Defunct due to beneficiaries' inability
			Sub Total				191		86.2	213.0			
46	C	250	Tsamang	Tshepshingye lam	Before 1970	FMIS	9	no	1.2	3.0	Two separate areas	Moderately productive	Defunct due to natural causes
47	C	251	Tsamang	Chudar-re-dang	Before 1970	FMIS	20	no	4.9	12.0	One continuous area	Moderately productive	Functioning
48	C	252	Tsamang	Bagin Reza	1997	NIP	14	no	0.8	2.0	One continuous area	Highly unproductive	Defunct due to beneficiaries' inability
			Sub Total				43		6.9	17.0			
			Total				1753		883.5	2183.0			

ID of DRDS, Data are complemented by hearing survey. FMIS:Farmers Management Irrigation Scheme, NIP:National Irrigation Policy, GAS:Government Assisted Scheme

Category A≧Area 100ha, Area 20ha≦Category B<Area 100ha, Category C<Area 20ha

Table V-2 Irrigation Scheme Details (Facilities in Canal) (1/4)

Example: Facilities' Location & Name of Facilities

Lhuntse(1/2) Unit: m at 484 intake

No.	Gewog	Name	Elevation	Length	Major Facilities from Intake in Order	Perception	Impression
1	Gangzur	Fakchu Irri.	1,910	2,000		just enough	moderately poor
2	Gangzur	Nobey Irri.	1,120	1,530		abundant	moderately good
3	Gangzur	Phuchu Irri.	1,960	2,250		abundant	moderately good
4	Gangzur	Magar Irri.	1,750	3,500	0 intake, 484 outlet	abundant	excellent
5	Gangzur	Ngar Irri.	1,920	1,560	0 outlet box	abundant	moderately poor
6	Gangzur	Jang Irri.	1,720	3,000	0 inlet tank, 1060 R/wall with drop, 2060 distribution tank	abundant	moderately good
7	Gangzur	Shawa Irri.	2,860	1,200		abundant	moderately good
8	Gangzur	Tongling Irri.		3,600		abundant	moderately good
	Sub Total			18,640			
9	Jaray	Pam Irri.		650		abundant	moderate
10	Jaray	Yumchen Irri.		930		just enough	moderate
11	Jaray	Sogang Irri.		360		just enough	moderate
12	Jaray	Kharchung Irri.		500		just enough	moderate
13	Jaray	Chubar Irri.		400	0 intake(masonry 6m)	just enough	moderate
14	Jaray	Ladrong Irri.		2,110		just enough	moderate
15	Jaray	Lhachen Irri.		243		abundant	moderate
16	Jaray	Nangay Irri.		2,000		enough	excellent
17	Jaray	Zangkhar Irri.		2,000		enough	moderate
	Sub Total			9,193			
18	Khoma	Panngkhar Irri.		2,000		enough	moderate
19	Khoma	Ngalamdung Irri.		3,800		enough	moderate
20	Khoma	Wagla Irri.		8,740		enough	moderate
21	Khoma	Khoma Baptong		4,890		abundant	good
22	Khoma	Chhubar Irri.		100		abundant	moderate
23	Khoma	Borpa Irri.		180		abundant	moderate
24	Khoma	Sentigan Irri.		1,400		enough	moderate
25	Khoma	Shhuma Irri.		2,800		enough	moderate
26	Khoma	Dragten Irri.		1,050		enough	moderate
	Sub Total			24,960			
27	Kurtoe	Chudigangchu	2,040	2,000	0 block, 210 inlet box, 606 outlet, 816 inlet box, 882 outlet, 1369 inlet box, 1399 outlet,	abundant	excellent
28	Kurtoe	Golang Irri.	2,600	1,800		abundant	moderately poor
29	Kurtoe	Shabargang Irri.	2,300	210		abundant	excellent
30	Kurtoe	Chusa Irri.	2,419	750		abundant	moderately poor
31	Kurtoe	Doubling Irri.	2,260	180		scarce	moderately poor
32	Kurtoe	Dungkhar Irri.	1,890	3,000	6 R/wall (30 m long)	enough	moderately poor
33	Kurtoe	Waiway Irri.	2,665	2,250		scarce	moderately poor
34	Kurtoe	Chagzom Irri.	2,300	2,170		just enough	moderately good
	Sub Total			12,360			
35	Menbi	Manjabee Irri.	1,650	4,500		just enough	moderately good
36	Menbi	Gorgan Irri.	1,780	4,200		scarce	moderately good
37	Menbi	Nungmaling Irri.		850		enough	good
38	Menbi	Dangling Irri.		1,500		scarce	poor
39	Menbi	Tangmachu Irri.		8,730		abundant	moderately good

Note: Perception=Perception of irrigation water condition, Impression=Impression of irrigation facilities

Table V-2 Irrigation Scheme Details (Facilities in Canal) (2/4)

Example: Facilities' Location & Name of Facilities at 484 intake

Lhuntse(2/2) Unit: m

No.	Gewog	Name	Elevation	Length	Major Facilities from Intake in Order	Perception	Impression
40	Menbi	Shungkhar Irri.		2,700		enough	moderately good
41	Menbi	Yomay Irri.		2,340		enough	moderately good
	Sub Total			24,820			
42	Metsho	Tongthrong Irri.		1,200		abundant	moderately good
43	Metsho	Ongar Irri.		650		enough	moderately good
44	Metsho	Drola Tepang Irri.		3,000		enough	moderately good
45	Metsho	Pangshing Irri.		630		enough	moderately good
46	Metsho	Chumulungpa Irri.		570		enough	moderately good
47	Metsho	Gortsum Irri.		2,000		enough	moderately good
48	Metsho	Bumdir Irri.		1,900		enough	moderately good
49	Metsho	Fulumai Irri.		2,500		enough	moderately good
50	Metsho	Tsho Brang Irri.		500		enough	moderately good
51	Metsho	Tshochen Irri.		2,100		enough	moderately good
52	Metsho	Thrasi Nang Irri.		240		enough	moderately good
	Sub Total			15,290			
53	Minjay	Sham Irri.	2,900	2,000		just enough	moderately good
54	Minjay	Menji Irri.	2,000	6,000		abundant	excellent
55	Minjay	Lagpachu Irri.		6,420		abundant	moderately good
56	Minjay	Bragong Irri.		660		enough	moderately good
57	Minjay	Jalang Irri.		630		enough	moderately good
58	Minjay	Changayling Irri.		1,440		scarce	moderately good
	Sub Total			17,150			
59	Tsenkhar	Domkhar Irri.	1,730	4,050	53 outlet, 80 outlet	abundant	excellent
60	Tsenkhar	Wambur Irri.	1,950	2,000		just enough	moderately good
61	Tsenkhar	Autsho Irri.	2,210	1,400	0 intake	just enough	moderately good
62	Tsenkhar	Aumling Irri.	2,150	2,500	0 tank, 23 R/wall, 40 R/wall	abundant	good
	Sub Total			9,950			
	Total			12,840			

Note: Perception=Perception of irrigation water condition, Impression=Impression of irrigation facilities

Table V-2 Irrigation Scheme Details (Facilities in Canal) (3/4)

Example: Facilities' Location & Name of Facilities

Mongar(1/2) Unit: m at 484 intake

No.	Gewog	Name	Elevation	Length	Major Facilities from Intake in Order	Perception	Impression
	Balam	Nil or no report					
1	Chaskhar	Kharnang canal	1,600	2,100	1560 outlet, 1830 outlet, 1950 outlet, 2010 outlet, 2070 outlet, 2100 outlet	just enough	moderately poor
2	Chaskhar	Losum Irrigation	1,800	6,720	720 control gate, 1260 cross drainage, 1890 spillway gate, 2550 silt trap, 2880 spillway gate, 3300 outlet, 3540 silt trap	just enough	moderately good
	Sub Total			8,820			
	~~Chali~~	~~Wanglarongba~~	~~1,600~~	~~1,243~~			
3	Chali	Wanglarongba	1,600	1,243	0 intake, 794 sand trap, 952 off take	scarce	moderately good
4	Chali	Wangmakhar	1,700	4,900	0 intake, 262 box, 557 box, 876 sandtrap, 1201sand trap, 1529 box, 1799 sand trap, 2416 off take, 2446 off take, 3376 sand trap	scarce	moderately good
5	Chali	Numabi Yorwa	1,340	908		scarce	moderately good
	Sub Total			7,051			
6	Drametse	Ushingzorrelam	1,500	1,470	330 off take, 450 off take, 510 off take, 600 off take, 690 off take, 1110 off take, 1410 off take	scarce	very bad
7	Drametse	Mani Zor	1,810	1,020	180 outlet, 210 outlet, 420 outlet, 540 outlet, 600 outlet, 660 outlet, 720 outlet, 780 outlet, 960 outlet	scarce	very bad
8	Drametse	Rollong canal	890	2,790	0 intake, 120 spillway, 1260 spillway, 1530 spillway, 1630 sand trap, 1650 chute, 1990 off take	abundant	excellent
9	Drametse	Remungrelam	560	3,430	0 intake with screener, 480 off take, 510 off take, 570 off take, 600 off take, 660 off take, 1620 off take, 3420 off take	just enough	moderately good
10	Drametse	Tshangfay Relam	1,010	990	570 off take, 630 outlet, 660 outlet	just enough	
11	Drametse	Mochu Relam	2,010	2,460	870 outlet, 1410 outlet, 1500 outlet, 1590 outlet, 1620 outlet, 1770 outlet, 1830 outlet, 1920 outlet		moderately good
	Sub Total			12,160			
	Drepong	Nil or no report					
	Gongdue	Nil or no report					
	Jurme	Nil or no report					
	Kengkhar	Nil or no report					
12	Mongar	Tokpaling	2,030	2,500		abundant	moderately good
13	Mongar	Khashuri Lam	2,040	1,409		scarce	moderately good
	~~Mongar~~	~~Tokpaling Yaew~~					
14	Mongar	Tshorong Yaw	2,060	1,500		just enough	moderately good
15	Mongar	Serwangye	2,080	1,226		just enough	
16	Mongar	Chorchorma Rilam	1,620	393		scarce	moderately good
	Sub Total			7,028			
17	Ngatshang	Sengdong canal	1,500	2,111		scarce	moderately poor
18	Ngatshang	Tagor ree Lam	1,630	678		just enough	moderately poor
19	Ngatshang	Khanna ree Lam	1,720	2,854		scarce	moderately poor
	Sub Total			5,643			
20	Saleng	Rongtog	900	750	650 outlet, 750 outlet	just enough	moderately poor
21	Saleng	Bargirilam	670	1,110	480 off take, 540 off take, 720 culvert	scarce	moderately poor
22	Saleng	Gomparilam	670	870	720 off take, 870 off take,	just enough	moderately poor
23	Saleng	Galykhar Irri.canal	610	1,140	180 off take, 360 off take, 540 off take, 1140 off take	just enough	moderately good
24	Saleng	Baimethang	520	350	350 off take	just enough	moderately good
25	Saleng	Masangdaza	820	3,300	50 sand trap, 250 cross drainage, 450 spillway, 550 sand trap, 700 sand trap, 1150 spillway, 1550 R/wall, 1650 sand trap	just enough	moderately good
26	Saleng	Karbi Irri.canal	640	2,150	850 sand trap with spillway, 1150 drop, 1300 outlet, 1400 outlet	just enough	moderately good

Note: Perception=Perception of irrigation water condition, Impression=Impression of irrigation facilities

Table V-2 Irrigation Scheme Details (Facilities in Canal) (4/4)

Example: Facilities' Location & Name of Facilities

Mongar(2/2) Unit: m at 484 intake

No.	Gewog	Name	Elevation	Length	Major Facilities from Intake in Order	Perception	Impression
27	Saleng	Bondima Irrigation	640	1,250	0 sand trap with spillway, 150 cross draonage, 250 sand trap, 650 cross drainage, 750 off take, 800 off take	just enough	moderately good
28	Saleng	Dangri Irri.Canal	660	1,030	1030 off-take		moderately poor
	Sub Total			11,950			
29	Sherimung	Batongla Irrigation	1,920	1,140	360 off take, 380 off take, 880 off take, 960 off take, 1130 off take	just enough	very bad
30	Sherimung	Kalakey Irrigation	1,480	1,200	780 outlet, 810 outlet, 870 outlet, 900 outlet, 960 outlet	just enough	moderately poor
31	Sherimung	Radirelam	740	1,080	65 off take, 950 off take		moderately poor
32	Sherimung	Batongla Irrigation	1,820	1,320	750 outlet, 810 outlet, 870 outlet, 1200 outlet,	not available	very bad
33	Sherimung	Samadrang lam	1,750	2,040	390 spillway, 1410 cross drainage	abundant	very bad
34	Sherimung	Changchu	1,840	1,980	1200 outlet, 1260 outlet, 1380 outlet, 1440 outlet, 1650 outlet, 1710 outlet, 1770 outlet, 1830 outlet	just enough	moderately good
~~Sherimung~~	~~Phiere~~	~~1,600~~	~~1,350~~				
35	Sherimung	Phuere	1,600	1,360	270 off take, 570 off take, 660 off take, 130 off take	just enough	moderately poor
36	Sherimung	Bomey Irrigation	1,600	660	0 intake, 270 box, 390 off take, 450 off take, 510 off take, 540 off take	just enough	moderately good
37	Sherimung	Goorelam	1,610	2,250		not available	very bad
38	Sherimung	Gagbrangsa	1,820	2,640	1170 outlet, 1470 outlet, 2640 outlet	scarce	moderately poor
39	Sherimung	Rocksharelam	1,560	960	750 off take, 950 off take, 960 off take	not available	very bad
~~Sherimung~~	~~Radirelam~~	~~810~~	~~1,500~~				
40	Sherimung	Radirelam	810	1,500	360 off take, 1410 off take	scarce	very bad
	Sub Total			18,130			
	Silambi	Nil or no report					
	Thangrong	Nil or no report					
41	Tsakaling	Takhambi	2,090	3,600	0 inlet, 1000 box, 1015 sandtrap, 1098 cross drainage, 1355 R/wall, 1390 cross drainage	just enough	moderately good
42	Tsakaling	Rawanchu	1,200	250		abundant	moderately good
43	Tsakaling	Tesichu	1,960	2,200		just enough	moderately good
44	Tsakaling	Petshongbi	2,040	300		just enough	moderately good
45	Tsakaling	Thumling	1,600	585	0 intake, 271 inlet, 355 sand trap, 385 inlet, 585 outlet	just enough	moderately poor
	Sub Total			6,935			
46	Tsamang	Tshepshingye lam	1,400	690			moderately good
47	Tsamang	Chudar-re-dang	1,450	750	600 off-take	just enough	moderately good
48	Tsamang	Bagin Reza	580	870	60 intake, 330 box, 660 spillway	not available	moderately poor
	Sub Total			2,310			
	Total			*17,320*			

Note: Perception=Perception of irrigation water condition, Impression=Impression of irrigation facilities

Table V-3 Irrigation Scheme Details (Canal Lining) (1/4)

Symbol: EC=Earthen Channel, ML=Masonry Lining, WF=Wooden Flume, PS=Pipe Steel, PP=Pipe HDPE

Example: 0-30, EC 900=Stretch(or Location) of Lining, Kind of Lining Length(in m)

Lhuntse(1/2)

No.	Gweog	Name	length	Major Lining from Intake in Order							
1	Gangzur	Fakchu Irri.	2,000	0-30, EC 900	30-35, WF 150	35-66, EC 93					
2	Gangzur	Nobey Irri.	1,530	0-0.50, PS 15	0.50-51, EC 1530						
3	Gangzur	Phuchu Irri.	2,250	0-1, WF 30	1-74, EC 2220						
4	Gangzur	Magar Irri.	3,500	0-20, ML 20	20-470, EC 450	470-484, ML 14	484-578, EC, 94	578-772, ML 194	772-927, EC 155	927-1038, ML	1038-1254, EC 216
5	Gangzur	Ngar Irri.	1,560	0-180, ML 180	180-1560, EC						
6	Gangzur	Jang Irri.	3,000	0-60, ML 60	60-170, ML 110	170-1050, ML	1050-1080, ML	1080-2060, ML	2060-2360, ML	2360-3000, EC	
7	Gangzur	Shawa Irri.	1,200	0-600, EC 600	600-1200, EC						
8	Gangzur	Tongling Irri.	3,600								
	Sub Total		18,640								
9	Jaray	Pam Irri.	650	EC 654	WF 6						
10	Jaray	Yumchen Irri.	930	EC 826	WF 104						
11	Jaray	Sogang Irri.	360	EC 352	WF 8						
12	Jaray	Kharchung Irri.	500	EC 500							
13	Jaray	Chubar Irri.	400	EC 400							
14	Jaray	Ladrong Irri.	2,110	EC 2091	WF 19						
15	Jaray	Lhachen Irri.	243	EC 243							
16	Jaray	Nangay Irri.	2,000	EC 1836	WF 164						
17	Jaray	Zangkhar Irri.	2,000								
	Sub Total		9,193								
18	Khoma	Panngkhar Irri.	2,000	Lined 201	Unlined 2049.5						
19	Khoma	Ngalamdung	3,800	Lined 44.7							
20	Khoma	Wagla Irri.	8,740	Lined 400	Unlined 8628	WF 190					
21	Khoma	Khoma	4,890								
22	Khoma	Chhubar Irri.	100	EC 100							
23	Khoma	Borpa Irri.	180	EC 180							
24	Khoma	Sentigan Irri.	1,400								
25	Khoma	Shhuma Irri.	2,800	EC 2800							
26	Khoma	Dragten Irri.	1,050	EC 1050							
	Sub Total		24,960								
27	Kurtoe	Chudigangchu	2,000	0-180, EC 180	180-203, EC 23	203-210, ML 7	210-606, PP 396	606-620, ML 14	620-719, EC 99	719-726, ML 7	726-810, EC 84
28	Kurtoe	Golang Irri.	1,800	0-60, WF 60	60-1500, EC	1500-1800, EC					
29	Kurtoe	Shabargang Irri.	210	0-210, EC 210							
30	Kurtoe	Chusa Irri.	750	0-70, WF 70	70-750, EC 680						
31	Kurtoe	Doubling Irri.	180	0-6, EC 180							
32	Kurtoe	Dungkhar Irri.	3,000	0-6, ML	6-9, EC	9-20, EC	20-25, ML	25-27, ML	27-30, ML	30-36, ML/EC	36-45, ML
33	Kurtoe	Waiway Irri.	2,250	0-8, WF 240	8-66, EC 1980						
34	Kurtoe	Chagzom Irri.	2,170	0-3, WF 75	3-70, EC 2095						
	Sub Total		12,360								
35	Menbi	Manjabee Irri.	4,500	0-200, ML 200	200-3000, EC	3000-3200, PP	3200-3900, ML	3900-4500, EC			
36	Menbi	Gorgan Irri.	4,200	0-300, EC 300	300-310, ML 10	310-1500, EC	1500-1600, EC	1600- 2600, EC	2600-2900, EC	2900-3800, EC	3800-4200, EC 400
37	Menbi	Nungmaling	850	EC 850							
38	Menbi	Dangling Irri.	1,500	EC 1500							
39	Menbi	Tangmachu Irri.	8,730	Lined 823.5	One side lining	Un lined 7199.6					

Table V-3 Irrigation Scheme Details (Canal Lining) (2/4)

Symbol: EC=Earthen Channel, ML=Masonry Lining, WF=Wooden Flume, PS=Pipe Steel, PP=Pipe HDPE

Lhuntse(2/2) Example: 0-30, EC 900=Stretch(or Location) of Lining, Kind of Lining Length(in m)

No.	Gweog	Name	length	Major Lining from Intake in Order								
40	Menbi	Shungkhar Irri.	2,700	EC 655	WF 54.8							
41	Menbi	Yomay Irri.	2,340									
	Sub Total		24,820									
42	Metsho	Tongthrong Irri.	1,200	EC 1200								
43	Metsho	Ongar Irri.	650	EC 650								
44	Metsho	Drola Tepang	3,000	EC 3000								
45	Metsho	Pangshing Irri.	630									
46	Metsho	Chumulungpa	570	EC 570								
47	Metsho	Gortsum Irri.	2,000	Lined 569								
48	Metsho	Bumdir Irri.	1,900	EC 1900								
49	Metsho	Fulumai Irri.	2,500	EC 2500								
50	Metsho	Tsho Brang Irri.	500	EC 500								
51	Metsho	Tshochen Irri.	2,100	EC 2100								
52	Metsho	Thrasi Nang	240	EC 240								
	Sub Total		15,290									
53	Minjay	Sham Irri.	2,000	0-150, ML 150	150-207, EC 57	207-356, ML 149	356-718, EC 362	718-1066, ML	1066-1423, EC	1423-1676, ML	1676-2070, EC 394	
54	Minjay	Menji Irri.	6,000	0-402, PP 402	402-582, ML 180							
55	Minjay	Lagpachu Irri.	6,420	Lined 2183.4	Unlined 4230.6	WF 130.5						
56	Minjay	Bragong Irri.	660	Unlined 641	PP 19							
57	Minjay	Jalang Irri.	630	EC 630								
58	Minjay	Changayling	1,440	EC 1440	WF 40							
	Sub Total		17,150									
59	Tsenkhar	Domkhar Irri.	4,050	0-240, ML 240	240-270, EC 30	270-436, ML 166	436-480, EC 44	480-936, ML 456	936-1373, EC	1373-1558, ML	1558-1768, EC 210	
60	Tsenkhar	Wambur Irri.	2,000	0-500, ML 500	500-850, EC 350	850-1050,	1050-1550, EC	1550-1820, ML	1820-2000, EC			
61	Tsenkhar	Autsho Irri.	1,400	0-14, ML 17	14-28, ML/EC 20	28-35, EC	35-42, EC	42-49, ML				
62	Tsenkhar	Aumling Irri.	2,500	0-45, ML 45	45-144, EC 99	144-190, ML 46	190-290, EC 100	290-500, ML 210	500-1000, EC	1000-2500, EC		
	Sub Total		9,950									
	Total		132,363									

Table V-3 Irrigation Scheme Details (Canal Lining) (3/4)

Symbol: EC=Earthen Channel, ML=Masonry Lining, WF=Wooden Flume, PS=Pipe Steel, PP=Pipe HDPE

Example: 0-30, EC 900=Stretch(or Location) of Lining, Kind of Lining Length(in m)

Mongar(1/2)

No.	Gweog	Name	length	Major Lining from Intake in Order								
	Balam	Nil or no report										
1	Chaskhar	Kharnang canal	2,100	0-180, EC 180	180-330, ML 150	330-390, EC 60	390-420, ML 30	420-450, PP 30	450-930, EC 480	930-2100, EC		
2	Chaskhar	Losum	6,720	0-1470, ML 1470	1470-1500, ML	1500-2280, ML	2280-2310, ML	2310-4890, ML	4890-5010, EC	5010-5280, ML		
	Sub Total		8,820									
	~~Chali~~	~~Wanglarongba~~	~~1,243~~	~~0-20, WF 20~~	~~20-720, EC 700~~	~~720-794, PP 74~~						
3	Chali	Wanglarongba	1,243	0-20, WF 20	20-720, EC 700	720-794, PP 74	794-813, EC19	813-952, EC 139	952-971, PP 19	971-1078, EC	1078-1243, ML/PP 165	
4	Chali	Wangmakhar	4,900	0-215, ML 215	215-239, WF 24	239-4539, ML	4539-4929, EC	4929-4952, ML				
5	Chali	Numabi Yorwa	908	0-594, EC 594	594-668, WF 74	668-908, EC 240						
	Sub Total		7,051									
6	Drametse	Ushingzorrelam	1,470	0-5, WF 5	5-150, EC 145	150-153, WF 3	153-1470, EC					
7	Drametse	Mani Zor	1,020	0-30, EC 30	30-120, EC 90	120-210, EC 90	210-330, EC 120	330-420, EC 90	420-1020, EC			
8	Drametse	Rollong canal	2,790	0-2070, ML 2070	2070-2130, EC	2130-2160, ML	2160-2280, EC	2280-2490, ML	2490-2790, EC			
9	Drametse	Remungrelam	3,430	0-90, ML 90	90-102, PP 112	102-1560, ML	1560-1620, EC	1620-1650, ML	1650-1770, EC	1770-1890, ML		
10	Drametse	Tshangfay	990	0-30, EC 30	30-120, WF 90	120-150, EC 30	150-180, WF 30	180-360, WF 180	360-660, EC 300	660-990, EC 330		
11	Drametse	Mochu Relam	2,460	0-300, EC 300	300-330, WF 30	330-630, EC 300	630-1050, EC	1050-1080, WF	1080-2460, EC			
	Sub Total		12,160									
	Drepong	Nil or no report										
	Gongdue	Nil or no report										
	Jurme	Nil or no report										
	Kengkhar	Nil or no report										
12	Mongar	Tokpaling	2,500	0-300, ML 300	300-471, EC 171	471-789, MC 318	789-1200, EC	1200-2000,	2000-2500, EC			
13	Mongar	Khashuri Lam	1,409	0-133, ML 133	133-237, EC 104	273-334, EC 197	334-364, EC 130	364-416, ML 152	416-615, EC	615-645, ML 30	645-675, EC 130	
	~~Mongar~~	~~Tokpaling Yaew~~										
14	Mongar	Tshorong Yaw	1,500	0-1500, EC 1500								
15	Mongar	Serwangye	1,226	0-540, EC 540	540-553, WF 13	553-1226, EC						
16	Mongar	Chorchorma	393	0-60, ML 60	60-68, PP 8	68-447, EC 379						
	Sub Total		7,028									
17	Ngatshang	Sengdong canal	2,111	0-1374, ML 1374	1374-2111, EC							
18	Ngatshang	Tagor ree Lam	678	0-678, EC 678								
19	Ngatshang	Khanna ree Lam	2,854									
	Sub Total		5,643									
20	Saleng	Rongtog	3,300	0-200, ML 200	200-1350, ML	1350-1400, ML	1400-2100, ML	2100-2950, EC	2950-3000, EC	3000-3300, EC		
21	Saleng	Bargirilam	2,150	0-50, EC 50	0-50, EC 50	100-250, ML 150	250-350, ML 100	350-700, ML 250	700-850, EC 150	850-1150, ML	1150-1250, ML 100	
22	Saleng	Gomparilam	750	0-200, EC 200	200-400, EC 200	400-750, EC 350						
23	Saleng	Galykhar	1,110	0-1110, EC 1110								
24	Saleng	Baimethang	870	0-600, EC 600	600-610, PP/PS	610-870, EC 260						
25	Saleng	Masangdaza	1,140	0-360, EC 360	360-365, PS 5	365-1140, EC						
26	Saleng	Karbi Irri.canal	350	0-350, EC 350								

Table V-3 Irrigation Scheme Details (Canal Lining) (4/4)

Symbol: EC=Earthen Channel, ML=Masonry Lining, WF=Wooden Flume, PS=Pipe Steel, PP=Pipe HDPE

Mongar(2/2) Example: 0-30, EC 900=Stretch(or Location) of Lining, Kind of Lining Length(in m)

No.	Gweog	Name	length	Major Lining from Intake in Order							
27	Saleng	Bondima	1,250	0-900, ML 900	900-950, EC 50	950-1200, MC	1200-1250, EC				
28	Saleng	Dangri	1,030	0-30, ML 30	30-1030, EC						
	Sub Total		11,950								
29	Sherimung	Batongla	1,140	0-90, EC 90	90-110, WF 20	110-330, EC 220	330-335, WF 5	335-360, EC 25	360-370, WF 10	370-1140, EC	
30	Sherimung	Kalakey	1,200	0-300, EC 300	0-300, EC 300	300-420, WF	420-660, EC 240	660-990, EC 330	990-1020, WF 30	1020-1200, EC	
31	Sherimung	Radirelam	1,080	0-1080, EC 1080							
32	Sherimung	Batongla	1,320	0-120, EC 120	120-180, ML 60	180-240, WF 160	240-270, ML 30	270-330, WF 10	330-360, ML 30	360-420, WF 60	
33	Sherimung	Samadrang lam	2,040	0-570, ML 570	570-600, EC 30	600-630, ML 30	630-670, EC 40	670-690, ML 20	690-695, WF 5	695-1470, EC	1470-1590, ML 120
34	Sherimung	Changchu	1,980	0-15, WF 15	15-285, EC 270	285-345, WF	345-495, EC 150	495-585, WF 190	585-885, EC 300	885-975, WF 190	975-1245, EC 270
	~~Sherimung~~	~~Phiere~~	~~1,350~~	~~0-30, ML 30~~	~~30-90, EC 60~~	~~90-120, ML 30~~	~~120-150, EC 30~~	~~150-157, ML 7~~	~~157-450, EC 293~~	~~450-660 ML 210~~	~~660-1350, EC 690~~
35	Sherimung	Phuere	1,360	0-30, ML 30	30-90, EC 60	90-120, ML 30	120-150, EC 30	150-157, ML 7	157-450, EC 290	450-660, ML 210	660-1350, EC 690
36	Sherimung	Bomey	660	0-90, ML 90	90-180, EC 90	180-210, ML 30	210-240, PP 30	240-270, EC 30	270-280, ML 10	280-300, PP 20	300-600 EC 300
37	Sherimung	Goorelam	2,250	0-2250, EC 2250							
38	Sherimung	Gagbrangsa	2,640	0-360, EC 360	360-390, WF 30	390-780, EC 390	780-930, EC 150	930-2640, EC			
39	Sherimung	Rocksharelam	960	0-960, EC 960							
	~~Sherimung~~	~~Radirelam~~	~~1,500~~	~~0-60, EC 60~~	~~60-90, WF 30~~	~~90-570, EC 480~~	~~570-580, WF 10~~				
40	Sherimung	Radirelam	1,500	0-60, EC 60	60-90, WF 30	90-570, EC 480	570-580, WF 10	580-820, EC 240	820-830, WF 10	830-1070, ML	1070-1500, WF/EC 430
	Sub Total		18,130								
	Silambi	Nil or no report									
	Thangrong	Nil or no report									
41	Tsakaling	Takhambi	3,600	0-1000, PP 1000	1000-1170, EC	1170-1195, ML	1195-1210, EC	1210-1225, RW	1225-1295, EC	1295-1325, ML	1325-1390, EC 65
42	Tsakaling	Rawanchu	250	0-250, EC 250							
43	Tsakaling	Tesichu	2,200	0-2200, EC 2200							
44	Tsakaling	Petshongbi	300	0-300, EC 300							
45	Tsakaling	Thumling	585	0-26, PP 26	26-193, ML 167	193-271, EC 78	271-355, ML 84	26-193, ML 167	385-585, PP 200		
	Sub Total		6,935								
46	Tsamang	Tshepshingye	690	0-690, EC 690							
47	Tsamang	Chudar-re-dang	750	0-750, EC 750							
48	Tsamang	Bagin Reza	870	0-90, ML 90	90-480, PP 390	480-630, ML 150	630-780, EC 150				
	Sub Total		2,310								
	Total		80,027								

Table V-4 Hearing Survey for Irrigation Scheme (1/3)

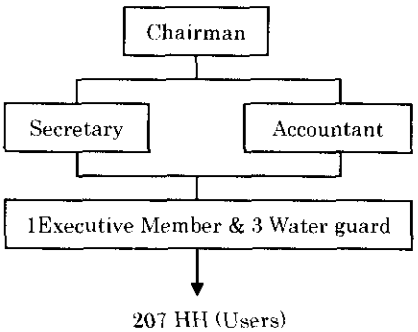
Losum Irrigation Scheme (Chaskhar Gewog, Mongar, Category: A)

Ⅰ. General Information

-Beneficiaries: 207H/H
-Area: Wetland Inventory: 750.0 acre (303.5ha), Hearing: 73.65 acre (29.81ha)
Cropping calendar: sowing(Mar.), Nursery(Jun.)transplanting (Jul.), harvest(Oct.)
Field acre
Major crops ex. Chili, Potato, around 10.00acre(4.00ha)
Cropping calendar: sowing(Jan.), nursery(Apr.), harvest(Jun.)
-Plowing by: Tiller, Bull, others
-Land tenure: Owner, Tenant, others
-Terrain along canal (Slope): Steep, Gentle, others
-Geological condition: Rock, Hard, Soft, collapse easily, Others
Sand: Hard, Soft, collapse easily, Others
-Vegetation: Well, Moderate, Poor, Others (Kind)
-Meteorological condition: Rainfall: Much, Moderate, Scare(___mm/year)
Snowfall: Much, Moderate, Scare(___times/year)
Temperature: Max. ____℃, Min. ____℃(Frozen or not in a year)
-Marketing: Exist or only for home consumption (If exist)
Through organization or individual (If organization is): Only for maize and potato
Its organization chart: None
-Way of Transportation for Marketing: Horse, Mule, Bike, Bicycle, Vehicle, Manual, Others

Ⅱ. Organization (Water Users Association)

-Existing organization: Yes. No.
-Establishment in 1998
-Organization chart and No. of personnel



-Function:
Q. Meeting: Once/year or in terms of necessary Kind:
A. To clean, to make budget
-Budget and its source: Budget is maintained by collecting Nu.2/0.1acre
-Comments for organization (If there is no organization):
Q. Why no
A. There is.
Q. Functioning to solve the problems (Farmers' ideas)
A. By doing meeting to solve the problem, minor is done by WUA and major cases reported to chairman and ask help from Gup.
-Others:
Q. Reason of defunct:
A. No answer
Q. Solution: Could be solved the above by only beneficiaries?
A. Can be solved by beneficiaries for minor, need help from Government for major.

Ⅲ. Operation and Maintenance

-Construction Plan: There is or not (Expansion or new facilities)

Q. Could be constructed by only beneficiaries?

A. No need help from Government.

Q. Could be prepared the budget by only beneficiaries?

A. They can manage little portion, for major need help from Government.

-Maintenance:

Q. Could be maintained by only beneficiaries?

A. Minor destruction can be maintained, for major destruction need help from Government.

A. Repairing: Can be repaired by themselves (In case of small scale of that)

A. Improvement: Can be repaired by themselves (In case of small scale of that)

Table V-4 Hearing Survey for Irrigation Scheme (2/3)

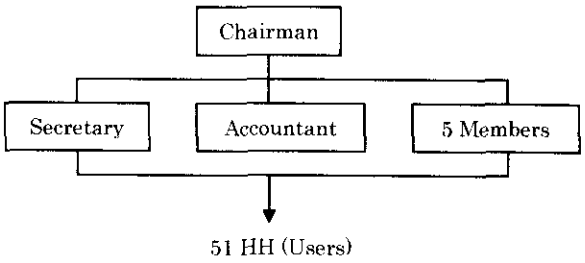
Tokpaling Irrigation Scheme (Mongar Gewog, Mongar, Category: B)

Ⅰ. General Information

-Beneficiaries: 51H/H
-Area: Wetland Inventory: 60.0 acre(24.3ha), Hearing: 45.66 acre(18.5ha)
Cropping calendar: sowing(Mar./Apr.), transplanting (May/Jun.), harvest(Sep./Oct.)
Field -- acre
Major crops ex. Chili, Potato, -- acre
Cropping calendar: sowing, nursery, transplanting, harvest
-Plowing by: Tiller, (Bull), others
-Land tenure: (Owner), Tenant, others
-Terrain along canal (Slope): (Steep), (Gentle), others
-Geological condition: Rock: Hard, (Soft), collapse easily, Others
Sand: Hard, (Soft), collapse easily, Others
-Vegetation: Well, (Moderate), Poor, Others (Kind)
-Meteorological condition: Rainfall: Much, Moderate, Scare(___mm/year)
Snowfall: Much, Moderate, Scare(___times/year)
Temperature: Max. ____℃, Min. ____℃(Frozen or not in a year)
-Marketing: Exist or only for home consumption (If exist)
Through organization or individual (If organization is)
Its organization chart: None
-Way of Transportation for Marketing: Horse, Mule, Bike, Bicycle, Vehicle, Manual, Others

Ⅱ. Organization (Water Users Association)

-Existing organization: (Yes.) No.
-Establishment in 1994
-Organization chart and No. of personnel



-Function:
Q. Meeting: Once/month Kind
A. To solve the problem of water.
-Budget and its source: Used to collect among farmers themselves
-Comments for organization (If there is no organization):
Q. Why no
A. There is.
Q. Functioning to solve the problems (Farmers' ideas)
A. No answer
-Others:
Q. Reason of defunct:
A. No answer
Q. Solution: Could be solved the above by only beneficiaries?
A. No answer

Ⅲ. Operation and Maintenance

-Construction Plan: There is or not (Expansion or new facilities)
Q. Could be constructed by only beneficiaries?

A. No answer
Q. Could be prepared the budget by only beneficiaries?
A. No answer
-Maintenance:
Q. Could be maintained by only beneficiaries?
A. Repairing: No answer (In case of small scale of that)
A. Improvement: No answer (In case of small scale of that)

Table V-4 Hearing Survey for Irrigation Scheme (3/3)

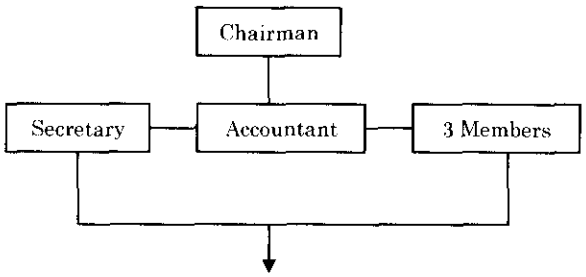
Thumling Irrigation Scheme (Tsakaling Gewog, Mongar, Category: C)

Ⅰ. General Information

-Beneficiaries: 96H/H
-Area: Wetland Inventory: 28.0 acre(11.3ha), Hearing: 30.60acre(12.38ha)
Cropping calendar: sowing(Apr./May), transplanting (Jun.), harvest(Oct./early Nov.)
Field -- acre
Major crops ex. Chili, Potato, -- acre
Cropping calendar: sowing, nursery, transplanting, harvest
-Plowing by: Tiller, Bull, others
-Land tenure: Owner, Tenant, others
-Terrain along canal (Slope): Steep, Gentle, others
-Geological condition: Rock: Hard, Soft, collapse easily, Others
Sand: Hard, Soft, collapse easily, Others
-Vegetation: Well, Moderate, Poor, Others (Kind)
-Meteorological condition: Rainfall: Much, Moderate, Scare(___mm/year)
Snowfall: Much, Moderate, Scare(___times/year)
Temperature: Max. ____℃, Min. ____℃(Frozen or not in a year)
-Marketing: Exist or only for home consumption (If exist)
Through organization or individual (If organization is)
Its organization chart: None
-Way of Transportation for Marketing: Horse, Mule, Bike, Bicycle, Vehicle, Manual, Others

Ⅱ. Organization (Water Users Association)

-Existing organization: Yes. (but not function well) No.
-Establishment in 1995
-Organization chart and No. of personnel



90 HH (Users before, now 96 HH)

-Function:
Q. Meeting: Kind
A. They used to hold the meeting before, but now not.
-Budget and its source: Used to collect from the owner according to the area they owned before.
-Comments for organization (If there is no organization):
Q. Why no
A. There is.
Q. Functioning to solve the problems (Farmers' ideas)
A. Due to the lack of their knowledge and the people are going to reform the organization like before.
-Others:
Q. Reason of defunct:
A. Because due to the often erosion at the source.
Q. Solution: Could be solved the above by only beneficiaries?
A. Yes of-course, but due to lack of materials.

Ⅲ. Operation and Maintenance

-Construction Plan: There is or not (Expansion or new facilities)

Q. Could be constructed by only beneficiaries?

A. Yes, if the materials exist.

Q. Could be prepared the budget by only beneficiaries?

A. Before they used to collect themselves. (Land owner)

-Maintenance:

Q. Could be maintained by only beneficiaries?

A. Repairing: Yes, but materials needed (In case of small scale of that)

A. Improvement: Yes (In case of small scale of that)

Table V-5 Irrigation Scheme in the Study Area in 9th 5 Year Plan(2002-2007)

District	Gewog	Location	Kms	Outlay (M. Nu)	Average (M. Nu)	Remarks
Lhuntse	Gangzur	Tsholing, Gangzoor,Ney,	18	5.4	0.300	New construction
	Gangzur	Amtse, Lingabee				
	Gangzur	Denkaling, Shawa, Magar,				
	Gangzur	Jang, Denkaling,	6	0.792	0.132	Renovation
	Gangzur	Semchenbee, Karsay,				
	Gangzur	Goenpa, Thimyul, Shamling				
	Jaray	Ladrong, Jarrey, Pam,	17	5.1	0.300	Renovation
	Jaray	yabee, Jarrey, Nganggay,				
	Jaray	Raling, Ladrong, Arteobee,				
	Jaray	Menchunglung				
	Khoma	Taya, Baptong, Pangkhar,	23	3.69	0.160	Renovation
	Khoma	Khoma, Naylamdung				
	Kurtoe	Tangrong, Thunpai, Jatsab,	8.25	2.48	0.301	Renovation
	Kurtoe	Chakzam, Chusa, Wai Wai				
	Menbi	Sungkhar, Khrsong, Dangl,	10	1.5	0.150	Renovation
	Menbi	Naybee, Drongmashong				
	Metsho	Tongthrong, Gortshum,	12	3.6	0.300	New construction
	Metsho	Yurong, Oonkhar, Obee, Bamdir				
	Minjay	Jalang, Amdrang,	3	0.9	0.300	New construction
	Minjay	Khamey, Budur, Kupinisa,	13.5	2.133	0.158	Renovation
	Minjay	Chenpling, Amdrang				
	Tsenkhar	Domkhar, Gorganwambur,	4	1.2	0.300	New construction
	Tsenkhar	Wambur, Umling, Domkha	9.5	1.45	0.153	Renovation
	Total		106.25	22.845		

District	Gewog	Location	Kms	Outlay (M. Nu)	Average (M. Nu)	Remarks
Mongar	Balam					
	Chaskhar	Chaskhar	7.16	1.17	0.163	Renovation
	Chali					
	Drametse	Shafangma	1.5	0.45	0.300	New construction
	Drametse	Yayung, Rollong	6.05	1.01	0.167	Renovation
	Drepong					
	Gongdue	Bagla	1	0.3	0.300	New construction
	Jurme					
	Kengkhar	Brongphu, Ngykphu	-	0.005		Rain water harvest (2nos)
	Mongar	Pekchurung	1.5	0.46	0.307	Renovation
	Ngatshang	Omkhar/Bacha	2	0.3	0.150	Renovation
	Saleng	Bethmethang	2	0.3	0.150	Renovation
	Sherimung	Kaphu	1.5	0.45	0.300	New construction
	Sherimung	Baochu(Shersong)	2	0.45	0.225	New construction
	Silambi					
	Thangrong					
	Tsakaling	Tesachu	2	0.6	0.300	New construction
	Tsamang	Rinzibi	1.5	0.45	0.300	New construction
	Total		28.21	5.945		

Table V-6 **Farm Road Construction Cost per km**
(including WBM and permanent structure)

No.	Items	Quantity	Unit.	Rate(Nu.)	Amount(Nu.)	Remarks
	LABOUR					
1	Labour (Male)	4,486.974	man/days	108.34	486,119	Beneficiaries' work
2	Labour (Female)	1,942.168	man/days	108.34	210,415	Beneficiaries' work
3	Mason 1	500.822	man/days	146.24	73,240	
4	Mason 2	1,414.715	man/days	130.22	184,224	
5	Blaster	16.074	man/days	130.80	2,102	
6	Supervision	33.027	man/days	156.24	5,160	
7	P. Operator	1.262	man/days	130.22	164	
8	Black smith	18.000	man/days	146.24	2,632	
9	Carpenter	89.320	man/days	146.24	13,062	
				Sub total	977,119	
	MACHINERY					
1	Front/Loader	63.822	days	9,648.02	615,758	
2	Truck	74.762	days	2,873.95	214,863	
4	Compressor	61.141	days	4,342.84	265,524	
5	Bull Dozer	36.802	days	20,337.28	748,444	
6	Excavator	25.340	days	12,434.00	315,078	
7	Roller	8.590	days	2,114.40	18,163	
8	C. mixer	1.262	days	590.00	744	
9	C. Vibrator	1.262	days	490.00	618	
				Sub total	2,179,193	
	MATERIALS					
1	Sand	327.278	m^3	180.00	58,910	
2	Boulders	1,595.292	m^3		0	To be collected at site
3	Cement	93.432	tone	10,520.00	982,906	
4	Bar	1,512.000	kg	19.00	28,728	
5	Ballies	330.963	m	17.80	5,891	
6	Timber	2.680	m^3	5,650.00	15,142	
7	Superdyne	842.437	kg	55.59	46,831	
9	Fuse Coil	1,063.997	each	34.00	36,176	
10	Detonator	1,204.817	each	4.21	5,072	
11	Drill rod	16.074	each	2,940.00	47,257	
12	Royalty	264.219	truck	50.00	13,211	
13	Mud Dry	90.000	m^3	47.51	4,276	
				Sub total	1,244,400	

	Total	4,400,712
Add 18.92% cost index from BSR 2001 S/Jongkhar rate		5,233,326
Add 5%(Work Charge)		5,494,993
	Grand total	5,494,993

Table V-7 Total Work Quantity for Farm Road Construction (Labor) (1/2)

1. Labor(1/2)

Unit : Day

Item	Labor(M)	Labor(F)	Mason1	Mason2	Blaster	Supervisor	P. Operator	Black Smith	Carpenter	Remarks
Clearing	94.500	140.000								
Felling tree	20.630	10.630								
Side ditch										
·Construction	1,479.470	1,109.360	431.600	802.800						
·Boulder	62.520				3.000					Supply at site
·Excavation	9.375	7.830								Soft soil
·Excavation	12.675	9.375								Hard soil
·Excavation	86.160	40.125								Rock
Earth Work										
·Soft soil						4.610				
·Hard soil						5.891				
·Soft rock						9.270				
·Hard rock						11.636				
·Blasting	14.104				8.815					
Basement										
·Soil	117.690	75.930								Compaction
·Rock	526.215	195.750								Compaction
·Subgrade	159.000			159.000						
·Boulder	31.260				1.500					Supply at site
·Breaking aggregate	882.000									
·Soling	238.500			238.500						
·Boulder	46.890				2.250					Supply at site
·Blinding material	18.810									
·Laying wearing	145.530	69.300								
Sub Total	3,945.329	1,658.300	431.600	1,200.300	15.565	31.406				

Note: P. Operator(Plant Operator)

Table V-7 Total Work Quantity for Farm Road Construction (Labor) (2/2)

1. Labor(2/2)

Unit : Day

Item	Labor(M)	Labor(F)	Mason1	Mason2	Blaster	Supervisor	P. Operator	Black Smith	Carpenter	Remarks
Stone Edging										
·Stone laying	66.000	132.000	66.000	34.000						
·Boulder	9.586				0.460					Supply at site
Shoulder Compaction	1.090									
Culvert										
·Excavation	5.625	4.698								Soft soil
·Excavation	7.605	5.625								Hard soil
·Excavation	25.848	12.038								Rock
·Blinding stone	1.431			1.431						
·Lean concrete	3.291	1.688	0.141	0.141		0.113	0.158			
·Breaking aggregate	11.758									
·Laying RCC	26.460	13.824	1.620	1.620		1.440	1.008			
·Breaking aggregate	32.040									
·Steel reinforcement	18.000							18.000		
·Shuttering	89.320								89.320	
Retaining Wall										
·Soling	5.168			5.168						
·Boulder	1.016				0.049					Supply at site
·RRM	232.337	112.965		170.595						
·Plaster	2.011	1.031	1.461	1.461		0.069	0.096			
·Breaking aggregate	3.060									
Sub Total	541.645	283.868	69.222	214.415	0.509	1.621	1.262	18.000	89.320	
Total	4,486.974	1,942.168	500.822	1,414.715	16.074	33.027	1.262	18.000	89.320	

Note: P. Operator(Plant Operator)

Table V-8 Total Work Quantity for Farm Road Construction (Machinery)

2. Machinery

Unit : Day

Item	Front/Loader	Truck	Compressor	Bulldozer	Excavator	Roller	C. Mixer	C. Vibrator	Remarks
Side ditch	4.200	19.440	19.440						
Earth Work									
·Soft soil				4.610					
·Hard soil				7.069					
·Soft rock					11.236				
·Hard rock					14.104				
·Hard rock blasting			14.104						Excavator and blasting are considered.
Basement									
·Soil						0.810			Compaction
·Rock						0.810			Compaction
·Subgrade	2.100	9.720	9.720						
·Soling	3.150	14.580	14.580						
·Blinding material	0.369	1.080							
·Laying wearing						6.930			
Soil Disposal	53.291	26.646		25.123					
Stone Edging	0.644	2.981	2.981						
Shoulder Compaction						0.040			
Culvert									
·Lean concrete							0.158	0.158	
·Laying RCC							1.008	1.008	
Retaining Wall									
·Soling	0.068	0.316	0.316						
·Plaster							0.096	0.096	
Total	63.822	74.762	61.141	36.802	25.340	8.590	1.262	1.262	

Note: C. Mixer(Concrete Mixer), C. Vibrator(Concrete Vibrator)

Table V-9 Total Work Quantity for Farm Road Construction (Material)

3. Material

Item	Sand (m3)	Boulder (m3)	Cement (t)	Bar (kg)	Ballies (m)	Timber (m3)	Superdyne (kg)	Fuse coil (each)	Detonator (each)	Drill rod (each)	Royalty (truck)	Mud dry (m3)	Remarks
Side ditch													
·Construction	274.180	600.000	77.350				97.200	136.200	194.400	3.000	109.200		Boulder to be supplied at site
·Excavation							16.875	22.500	22.500				Rock area
Earth Work							*585.316*	*705.200*	*705.200*	*8.815*			*Blasting requires at hard rock area.*
Basement													
·Subgrade		300.000					48.600	68.100	97.200	1.500	54.600		Boulder to be supplied at site
·Soling		450.000					72.900	102.150	145.800	2.250	81.900		Boulder to be supplied at site
·*Blinding material*												90.000	
Stone Edging		92.000					14.904	20.884	29.808	0.460	16.744		Boulder to be supplied at site
Culvert													
·Excavation							5.063	6.750	6.750				Rock
·Lean concrete	1.058	2.003	0.495										Crushed rock to be supplied at site
·Laying RCC	6.408	12.816	4.627										Crushed rock to be supplied at site
·Steel reinforcement				1,512.000									
·Shuttering					330.963	2.680							
Retaining Wall													
·Soling		9.750					1.580	2.213	3.159	0.049	1.775		Boulder to be supplied at site
·RRM	45.020	127.500	10.519										
·Plaster	0.612	1.224	0.442										
Total	327.278	1,595.292	93.432	1,512.000	330.963	2.680	842.437	1,063.997	1,204.817	16.074	264.219	90.000	

Table V-10 Work Volume

(for 1,000m long of farm road construction. Large scale facilities like bridge are not included.)

1. Clearing

Clearing : 7.0 * 1,000= 7,000 m^2

2. Felling tree(1No./10m)

Felling tree : 1,000/10= 100 Nos.

3. Earth work volume for 1,000m farm road

Distance	Slope in %	Degree	H. Length (m)	S. Length (m)	Ht of Cut (m)	W. of Road (m)	Length (m)	Volume (m^3)	Remarks
250	83.9	40°	5.82094274	7.59633	2.9578	4.6	250	2,809	Soft Rock
500	100.0	45°	6.133333333	8.672533	3.2522	4.6	250	3,526	Hard Rock
750	46.6	25°	5.206564799	5.742841	1.9458	4.6	250	1,397	Soft Soil
1,000	57.7	30°	5.375401694	6.208589	2.3000	4.6	250	1,785	Hard Soil
Total								9,516	

Note : Cut slope, 1 : 0.25 is considered based on the standard of farm road.

H. Length : Horizontal length
S. Length : Slope length of cut figure
Ht of Cut : Right angle length of the above
W. of Road : Width of farm road

4. Soil Disposal(80% of the above volume of cut soil should be treated.)

Disposal : 9,516 * 80%= 7,613 m^3

5. Culvert(3Nos., L=5.0m/No.)

Excavation : (2.0 + 3.0)/2 * 1.5 * 6.0 * 1= 22.5 m^3 (1 No. for soft soil)
Excavation : (2.0 + 3.0)/2 * 1.5 * 6.0 * 1= 22.5 m^3 (1 No. for hard soil)
Excavation : (2.0 + 3.0)/2 * 1.5 * 6.0 * 1= 22.5 m^3 (1 No. for rock)
Blinding stone : 1.5 * 0.1 * 6.0 * 3= 2.7 m^3 (for 3 Nos.)
Lean concrete : 1.5 * 0.1 * 5.0 * 3= 2.25 m^3 (for 3 Nos.)
Concrete ((1.4 * 1.4) - (1.0 * 1.0)) * 5.0 * 3= 14.40 m^3 (for 3 Nos.)
Steel Bar 4.8 *100kg/m3 * 3= 1,440 kg (for 3 Nos.)
Shuttering : (2(1.4+1.0)+1.0) * 5.0 * 1.1 * 3= 159.5 m^2 (for 3 Nos.)

6. Side Ditch(Length=1,000m)

Excavation : 0.5 * 0.3 * 250= 37.5 m^3 (for soft soil)
Excavation : 0.5 * 0.3 * 250= 37.5 m^3 (for hard soil)
Excavation : 0.5 * 0.3 * 500= 75.0 m^3 (for rock)

7. Basement

Compaction : 3.0 * 500= 1,500 m^2 (500m for soil)
Compaction : 3.0 * 500= 1,500 m^2 (500m for rock)
Subgrade 0.1 * 3.0 * 1,000= 300 m^3
Soling : 0.15 * 3.0 * 1,000= 450 m^3
Blinding : 0.03 * 3.0 * 1,000= 90 m^3
Wearing : 0.07 * 3.0 * 1,000= 210 m^3

8. Stone Edging

Dry masonry : 2 * 1,000= 2,000 m (both sides)

9. Shoulder Compaction

Soil Compaction : 0.5 * 0.1 / 2 *2,000= 50 m^3 (both sides)

10. Retaining Wall(L=50m, H=2.5m on average)

The following quantities per m are derived from Irrigation Engineering Manual of MOA.

Soling : 0.195 * 50= 9.75 m^3
RRM : 2.550 * 50= 127.5 m^3
Plaster : 0.550 * 50= 27.5 m^3

Table V-11 Work Quantity by Item for Farm Road Construction (1/6)

1. Works : Clearing Jungle

Work Item : Clearing jungle(per m^2)
BSR Code: E0001

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.01350	Day	7,000	94.500	
A0616	Labourer (Female)	LBR	0.02000	Day	7,000	140.000	

2. Works : Felling Trees

Work Item : Felling trees (per each)
BSR Code: E0002

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.20630	Day	100	20.630	
A0616	Labourer (Female)	LBR	0.10630	Day	100	10.630	

3. Works : Side Ditch

Work Item : Side ditch construction (per m)
BSR Code: E0677

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	1.47947	Day	1,000	1,479.470	
A0616	Labourer (Female)	LBR	1.10936	Day	1,000	1,109.360	
A0622	Mason GD-1	LBR	0.43160	Day	1,000	431.600	
A0623	Mason GD-2	LBR	0.80280	Day	1,000	802.800	
B0273	Sand	MAT	0.27418	m^3	1,000	274.180	Transportation shall be considered
B0275	Boulder	MAT	0.60000	m^3	1,000	600.000	Supplying at site
B0052	Cement	MAT	0.07735	t	1,000	77.350	Transportation shall be considered

Work Item : Supplying boulder at site (per m^3)
BSR Code: E0414

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.10420	Day	600	62.520	
A0607	Blaster	LBR	0.00500	Day	600	3.000	
B0032	Superdyne	MAT	0.16200	kg	600	97.200	
B0033	Fuse coil	MAT	0.22700	each	600	136.200	
B0034	Detonator	MAT	0.32400	each	600	194.400	
B0145	Drill rod	MAT	0.00500	each	600	3.000	
B0014	Royalty	MAT	0.18200	truck	600	109.200	
D0016	Front and loader	MCH	0.00700	Day	600	4.200	
D0148	Truck	MCH	0.03240	Day	600	19.440	
D0149	Compressor	MCH	0.03240	Day	600	19.440	

Work Item : Ditch excavation(per m^3)
BSR Code: E0022 (for soft soil)

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.25000	Day	37.5	9.375	
A0616	Labourer (Female)	LBR	0.20880	Day	37.5	7.830	

Work Item : Ditch excavation (per m^3)
BSR Code: E0023 (for hard soil)

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.33800	Day	37.5	12.675	
A0616	Labourer (Female)	LBR	0.25000	Day	37.5	9.375	

Work Item : Ditch excavation (per m^3)
BSR Code: E002 4 (for hard rock)

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	1.14880	Day	75	86.160	
A0616	Labourer (Female)	LBR	0.53500	Day	75	40.125	
B0032	Superdyne	MAT	0.22500	kg	75	16.875	
B0033	Fuse coil	MAT	0.30000	each	75	22.500	
B0034	Detonator	MAT	0.30000	each	75	22.500	

Table V-11 Work Quantity by Item for Farm Road Construction (2/6)

4. Works : Earth Works

Work Item : Excavation by bulldozer (per m^3)
BSR Code: E0388 (for soft soil)

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0635	Work Supervisor	LBR	0.00330	Day	1,397	4.610	
D0667	Bulldozer	MCH	0.00330	Day	1,397	4.610	

Work Item : Excavation by bulldozer (per m^3)
BSR Code: E0388 (for hard soil)

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0635	Work Supervisor	LBR	0.00330	Day	1,785	5.891	
D0667	Bulldozer	MCH	0.00396	Day	1,785	7.069	

Work Item : Excavation by excavator (per m^3)
BSR Code: Estimated (for soft rock)

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0635	Work Supervisor	LBR	0.00330	Day	2,809	9.270	
D	Excavator	MCH	0.00400	Day	2,809	11.236	Estimated

Work Item : Excavation by excavator (per m^3)
BSR Code: Estimated (for hard rock)

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0635	Work Supervisor	LBR	0.00330	Day	3,526	11.636	
D	Excavator	MCH	0.00400	Day	3,526	14.104	Estimated

BSR Code: E0458 (for hard rock)

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.00400	Day	3,526	14.104	
A0622	Blaster	LBR	0.00250	Day	3,526	8.815	
B0032	Superdyne	MAT	0.16600	kg	3,526	585.316	
B0033	Fuse coil	MAT	0.20000	each	3,526	705.200	
B0034	Detonator	MAT	0.20000	each	3,526	705.200	
B0145	Drill rod	MAT	0.00250	each	3,526	8.815	
D0149	Compressor	MCH	0.00400	Day	3,526	14.104	

5. Works : Basement

Work Item : Base compaction (per m^2)
BSR Code: E1947 (for soil)

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.07846	Day	1,500	117.690	
A0616	Labourer (Female)	LBR	0.05062	MCH	1,500	75.930	
B0275	Roller	MCH	0.00054	MCH	1,500	0.810	

Work Item : Base compaction (per m^2)
BSR Code: E1948 (for rock)

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.35081	Day	1,500	526.215	
A0616	Labourer (Female)	LBR	0.13050	Day	1,500	195.750	
B0275	Roller	MCH	0.00054	MCH	1,500	0.810	

Work Item : Subgrade (per m^3)
BSR Code: E0244

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.53000	Day	300	159.000	
A0623	Mason GD-2	LBR	0.53000	Day	300	159.000	
B0275	Boulder	MAT	1.00000	m^3	300	300.000	

Table V-11 Work Quantity by Item for Farm Road Construction (3/6)

Work Item : Supplying aggregate at site (per m^3)
BSR Code: E0414

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.10420	Day	300	31.260	
A0607	Blaster	LBR	0.00500	Day	300	1.500	
B0032	Superdyne	MAT	0.16200	kg	300	48.600	
B0033	Fuse coil	MAT	0.22700	each	300	68.100	
B0034	Detonator	MAT	0.32400	each	300	97.200	
B0145	Drill rod	MAT	0.00500	each	300	1.500	
B0014	Royalty	MAT	0.18200	truck	300	54.600	
D0016	Front and loader	MCH	0.00700	Day	300	2.100	
D0148	Truck	MCH	0.03240	Day	300	9.720	
D0149	Compressor	MCH	0.03240	Day	300	9.720	
A0615	Labourer (Male)	LBR	2.94000	Day	300	882.000	Breaking aggregates manually

Work Item : Soling (per m^3)
BSR Code: E0244

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.53000	Day	450	238.500	
A0623	Mason GD-2	LBR	0.53000	Day	450	238.500	
B0275	Boulder	MAT	1.00000	m^3	450	450.000	

Work Item : Supplying boulder at site (per m^3)
BSR Code: E0414

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.10420	Day	450	46.890	
A0607	Blaster	LBR	0.00500	Day	450	2.250	
B0032	Superdyne	MAT	0.16200	kg	450	72.900	
B0033	Fuse coil	MAT	0.22700	each	450	102.150	
B0034	Detonator	MAT	0.32400	each	450	145.800	
B0145	Drill rod	MAT	0.00500	each	450	2.250	
B0014	Royalty	MAT	0.18200	truck	450	81.900	
D0016	Front and loader	MCH	0.00700	Day	450	3.150	
D0148	Truck	MCH	0.03240	Day	450	14.580	
D0149	Compressor	MCH	0.03240	Day	450	14.580	

Work Item : Laying blinding materials (per m^3)
BSR Code: E1953

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.20900	Day	90	18.810	
B0249	Mud dry	MAT	1.00000	m^3	90	90.000	
D0016	Front and loader	MCH	0.00410	Day	90	0.369	
D0148	Truck	MCH	0.01200	Day	90	1.080	

Work Item : Laying wearing course (per m^3)
BSR Code: E1950

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.69300	Day	210	145.530	
A0616	Labourer (Female)	LBR	0.33000	Day	210	69.300	
D0672	Roller	MCH	0.03300	Day	210	6.930	

6. Works : Soil Disposal

Work Item : Disposal of cut soil (per m^3)
BSR Code: Estimated

Code	Description	Category	Quantity	Units	Work	Total	Remarks
D0016	Front and loader	MCH	0.00700	Day	7,613	53.291	
D0148	Truck	MCH	0.00350	Day	7,613	26.646	
D0667	Bulldozer	MCH	0.00330	Day	7,613	25.123	

Table V-11 Work Quantity by Item for Farm Road Construction (4/6)

7. Works : Stone Edging

Work Item : Stone edging (per m^3)
BSR Code: E0246

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.03300	Day	2,000	66.000	
A0616	Labourer (Female)	LBR	0.06600	Day	2,000	132.000	
A0622	Mason GD-1	LBR	0.03300	Day	2,000	66.000	
A0623	Mason GD-2	LBR	0.01700	Day	2,000	34.000	
B0275	Boulder	MAT	0.04600	m^3	2,000	92.000	Supplying at site

Work Item : Supplying boulder at site (per m^3)
BSR Code: E0414

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.10420	Day	92	9.586	
A0607	Blaster	LBR	0.00500	Day	92	0.460	
B0032	Superdyne	MAT	0.16200	kg	92	14.904	
B0033	Fuse coil	MAT	0.22700	each	92	20.884	
B0034	Detonator	MAT	0.32400	each	92	29.808	
B0145	Drill rod	MAT	0.00500	each	92	0.460	
B0014	Royalty	MAT	0.18200	truck	92	16.744	
D0016	Front and loader	MCH	0.00700	Day	92	0.644	
D0148	Truck	MCH	0.03240	Day	92	2.981	
D0149	Compressor	MCH	0.03240	Day	92	2.981	

8. Works : Shoulder Compaction

Work Item : Shoulder compaction (per m^3)
BSR Code: E1952

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.02180	Day	50	1.090	
D0672	Roller	MCH	0.00080	Day	50	0.040	

9. Works : Culvert

Work Item : Excavation for culvert (per m^3)
BSR Code: E0022(for soft soil) — 1 No. of culvert

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.25000	Day	22.5	5.625	
A0616	Labourer (Female)	LBR	0.20880	Day	22.5	4.698	

Work Item : Excavation for culvert (per m^3) — 1 No. of culvert
BSR Code: E0023 (for hard soil)

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.33800	Day	22.5	7.605	
A0616	Labourer (Female)	LBR	0.25000	Day	22.5	5.625	

Work Item : Excavation for culvert (per m^3) — 1 No. of culvert
BSR Code: E0024 (for hard rock)

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	1.14880	Day	22.5	25.848	
A0616	Labourer (Female)	LBR	0.53500	Day	22.5	12.038	
B0032	Superdyne	MAT	0.22500	kg	22.5	5.063	
B0033	Fuse coil	MAT	0.30000	each	22.5	6.750	
B0034	Detonator	MAT	0.30000	each	22.5	6.750	

Work Item : Blinding stone (per m^3) — To be prepared together with lean concrete below, 4.5m3
BSR Code: E0244

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.53000	Day	2.7	1.431	
A0623	Mason GD-2	LBR	0.53000	Day	2.7	1.431	

Table V-11 Work Quantity by Item for Farm Road Construction (5/6)

Work Item : Lean concrete (per m^3)
BSR Code: E0100

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	1.46250	Day	2.25	3.291	
A0616	Labourer (Female)	LBR	0.75000	Day	2.25	1.688	
A0622	Mason GD-1	LBR	0.06250	Day	2.25	0.141	
A0623	Mason GD-2	LBR	0.06250	Day	2.25	0.141	
A0635	Supervisor	LBR	0.05000	Day	2.25	0.113	
A0628	Plant operator	LBR	0.07000	Day	2.25	0.158	
B0273	Sand	MAT	0.47000	m^3	2.25	1.058	Transportation shall be considered
B0277	Boulder	MAT	0.89000	m^3	2.25	2.003	Supplying at site, plus 4.5m^3, blinding
B0052	Cement	MAT	0.22000	t	2.25	0.495	Transportation shall be considered
D0152	Concrete mixer	MCH	0.07000	Day	2.25	0.158	
D0153	Concrete vibrator	MCH	0.07000	Day	2.25	0.158	
A0615	Labourer (Male)	LBR	2.50000	Day	4.703	11.758	Breaking aggregates manually

Work Item : Laying RCC (per m^3)
BSR Code: E0100

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	1.83750	Day	14.4	26.460	
A0616	Labourer (Female)	LBR	0.96000	Day	14.4	13.824	
A0622	Mason GD-1	LBR	0.11250	Day	14.4	1.620	
A0623	Mason GD-2	LBR	0.11250	Day	14.4	1.620	
A0635	Supervisor	LBR	0.10000	Day	14.4	1.440	
A0628	Plant operator	LBR	0.07000	Day	14.4	1.008	
B0273	Sand	MAT	0.44500	m^3	14.4	6.408	Transportation shall be considered
B0277	Crushed rock	MAT	0.89000	m^3	14.4	12.816	Supplying at site
B0052	Cement	MAT	0.32130	t	14.4	4.627	Transportation shall be considered
D0152	Concrete mixer	MCH	0.07000	Day	14.4	1.008	
D0153	Concrete vibrator	MCH	0.07000	Day	14.4	1.008	
A0615	Labourer (Male)	LBR	2.50000	Day	12.816	32.040	Breaking aggregates manually

Work Item : Steel reinforcement (per kg)
BSR Code: E0145 (Fe 250)

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.01250	Day	1,440.0	18.000	
A0616	Blacksmith	LBR	0.01250	Day	1,440.0	18.000	
B0215	Bar, mesh etc.	MAT	1.05000	kg	1,440.0	1,512.000	

Work Item : Shuttering(per m^2) — 1 No. of culvert
BSR Code: E0155

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.56000	Day	159.5	89.320	
A0616	Carpenter GD2	LBR	0.56000	Day	159.5	89.320	
B0020	Ballies 75 to 125mm	MAT	2.07500	m	159.5	330.963	
B0293	Rough-sawn timber	MAT	0.01680	m^3	159.5	2.680	Class B

10. Works : Retaining Wall

Work Item : Soling (per m^3)
BSR Code: E0244

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.53000	Day	9.75	5.168	
A0623	Mason GD-2	LBR	0.53000	Day	9.75	5.168	
B0275	Boulder	MAT	1.00000	m^3	9.75	9.750	

Table V-11 Work Quantity by Item for Farm Road Construction (6/6)

Work Item : Supplying boulder at site (per m^3)
BSR Code: E0414

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.10420	Day	9.75	1.016	
A0607	Blaster	LBR	0.00500	Day	9.75	0.049	
B0032	Superdyne	MAT	0.16200	kg	9.75	1.580	
B0033	Fuse coil	MAT	0.22700	each	9.75	2.213	
B0034	Detonator	MAT	0.32400	each	9.75	3.159	
B0145	Drill rod	MAT	0.00500	each	9.75	0.049	
B0014	Royalty	MAT	0.18200	truck	9.75	1.775	
D0016	Front and loader	MCH	0.00700	Day	9.75	0.068	
D0148	Truck	MCH	0.03240	Day	9.75	0.316	
D0149	Compressor	MCH	0.03240	Day	9.75	0.316	in consideration of work term

Work Item : RRM for R/wall (per m^3)
BSR Code: E0219

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	1.82225	Day	127.5	232.337	
A0616	Labourer (Female)	LBR	0.88600	Day	127.5	112.965	
A0623	Mason GD-2	LBR	1.33800	Day	127.5	170.595	
B0273	Sand	MAT	0.35310	m^3	127.5	45.020	Transportation shall be considered
B0277	Boulder	MAT	1.00000	m^3	127.5	127.500	Supplying at site
B0052	Cement	MAT	0.08250	t	127.5	10.519	Transportation shall be considered

Work Item : Plaster (per m^3)
BSR Code: E0100

Code	Description	Category	Quantity	Units	Work	Total	Remarks
A0615	Labourer (Male)	LBR	0.07312	Day	27.5	2.011	
A0616	Labourer (Female)	LBR	0.03750	Day	27.5	1.031	
A0622	Mason GD-1	LBR	0.05313	Day	27.5	1.461	
A0623	Mason GD-2	LBR	0.05313	Day	27.5	1.461	
A0635	Supervisor	LBR	0.00250	Day	27.5	0.069	
A0628	Plant operator	LBR	0.00350	Day	27.5	0.096	
B0273	Sand	MAT	0.02225	m^3	27.5	0.612	Transportation shall be considered
B0277	Crushed rock	MAT	0.04450	m^3	27.5	1.224	Supplying at site
B0052	Cement	MAT	0.01606	t	27.5	0.442	Transportation shall be considered
D0152	Concrete mixer	MCH	0.00350	Day	27.5	0.096	
D0153	Concrete vibrator	MCH	0.00350	Day	27.5	0.096	
A0615	Labourer (Male)	LBR	2.50000	Day	1.224	3.060	Breaking aggregates manually

Table V-12 Farm Mule Track Construction Cost per km

(considering only excavation by blasting)

No.	Items	Quantity	Unit.	Rate(Nu.)	Amount(Nu.)	Remarks
	LABOUR					
1	Labour (Male)	1,035.062	man/days	108.34	112,139	Beneficiaries' work
2	Labour (Female)	41.063	man/days	108.34	4,449	Beneficiaries' work
3	Mason 1	0.000	man/days	146.24	0	
4	Mason 2	0.000	man/days	130.22	0	
5	Blaster	3.750	man/days	130.80	491	
6	Supervision	0.000	man/days	156.24	0	
7	P. Operator	0.000	man/days	130.22	0	
8	Black smith	0.000	man/days	146.24	0	
9	Carpenter	0.000	man/days	146.24	0	
				Sub total	117,078	
	MACHINERY					
1	Front/Loader	0.000	days	9,648.02	0	
2	Truck	0.000	days	2,873.95	0	
4	Compressor	6.000	days	4,342.84	26,057	
5	Bull Dozer	0.000	days	20,337.28	0	
6	Excavator	0.000	days	12,434.00	0	
7	Roller	0.000	days	2,114.40	0	
8	C. mixer	0.000	days	590.00	0	
9	C. Vibrator	0.000	days	490.00	0	
				Sub total	26,057	
	MATERIALS					
1	Sand	0.000	m^3	180.00	0	
2	Boulders	0.000	m^3		0	To be collected at site
3	Cement	0.000	tone	10,520.00	0	
4	Bar	0.000	kg	19.00	0	
5	Ballies	0.000	m	17.80	0	
6	Timber	0.000	m^3	5,650.00	0	
7	Superdyne	249.000	kg	55.59	13,842	
9	Fuse Coil	300.000	each	34.00	10,200	
10	Detonator	300.000	each	4.21	1,263	
11	Drill rod	3.750	each	2,940.00	11,025	
12	Royalty	0.000	truck	50.00	0	
13	Mud Dry	0.000	m^3	47.51	0	
				Sub total	36,330	
				Total	179,465	
Add 18.92% cost index from BSR 2001 S/Jongkhar rate					213,420	
				Grand total	213,420	

Table V-13 Estimated Household Distribution for Farm Road Development

Lhuntse

No.	Road	Gewog	Benefited Household	Benefited by Exist. Road	Nil Benefited	Total Nos. of HH	Remarks
1	Takila to Ongar	Coverage	465	135	49	649	
		Menbi	270	135	-	405	
		Metsho	195	-	49	244	
2	Thinleypang to Takila	Coverage	-	-	-	-	To be implemented by
		Menbi	-	-	-	-	DOR
3	Phawan to Domkhar	Coverage	202	-	-	202	Total Nos. of HH at
		Tsenkhar	202	-	-	202	Tsenkhar is 403
4	Autsho to Tsenkhar	Coverage	134	-	-	134	
		Tsenkhar	134	-	-	134	
5	Budur to Wambur	Coverage	67	-	-	67	
		Tsenkhar	67	-	-	67	
6	Suspension bridge to Khoma	Coverage	258	-	65	323	The hinterland is extent.
		Khoma	258	-	65	323	
7	Thimyul to Jangcholing	Coverage	46	137	-	183	Total Nos. of HH at
		Gangzur	46	137	-	183	Gangzur is 459, 184 HH
8	Lingabee to Ney	Coverage	92	-	-	92	is left bank side of Kuri
		Gangzur	92	-	-	92	Chhu
9	Autsho to Ladrong	Coverage	202	-	14	216	
		Jaray	202	-	14	216	
	Total		1,466	272	128	1,866	

Mongar

No.	Road	Gewog	Benefited Household	Benefited by Exist. Road	Nil Benefited	Total Nos. of HH	Remarks
1	Serizong to Narang	Coverage	895	89	-	984	
		Drametse	481	53	-	534	
		Balam	172	9	-	181	
		Serimuhung	242	27	-	269	
2	Kafu to Sonakhar	Coverage	-	-	-	-	To be implemented by
		Serimuhung	-	-	-	-	DOR
3	Themnagabi to Rewan	Coverage	323	567	19	909	
		Mongar	92	369	-	461	
		Chali	131	131	-	262	
		Tsakaling	100	67	19	186	
4	Yongkala to Banjar	Coverage	219	-	55	274	
		Tsamang	219	-	55	274	
5	Gyelposhing to Laptsa	Coverage	206	-	11	217	
		Drepong	206	-	11	217	
6	Chaskhar to Thangrong	Coverage	426	241	66	733	
		Chaskhar	160	241	-	401	
		Thangrong	266	-	66	332	
7	Jurme to Kengkhar	Coverage	515	-	129	644	
		Jurme	208	-	52	260	
		Kengkhar	307	-	77	384	
8	Kuri Chhu to Nagor	Coverage	447	-	197	644	The hinterland is extent
		Gongdue	167	-	166	333	at Silambi.
		Silambi	280	-	31	311	
9	Kalapang to Resa	Coverage	147	146	-	293	
		Saleng	147	146	-	293	
	Total		3,178	1,043	477	4,698	

Table V-14 Irrigation Scheme by Gewog (1/5)

Lhuntse

No.	Gewog	Name of irrigation system/village	Irrigated area (ha)	Irrigated area (acre)	No. of beneficiaries (HH)	Water source (river name)	Canal length (km)	Condition of facilities	Activity of WUA	Unit cost(Mil. Nu) per Km	Estimate cost(Mil. Nu)	Remark.
	L1. Gangzur	Rehabilitation										
1		Somshing	40.5	100	50	Stream	4.0	Damaged	-	0.132	0.528	Included in 9th FYP.
2		Ney	60.7	150	60	Stream	5.0	-	-	0.132	0.660	
3		Tsholing	12.1	30	14	Stream	5.0	Damaged	-	0.132	0.660	
4		Shawa(Chuthigang)	18.2	45	30	River	2.0	-	-	0.132	0.264	
5		Jang	20.2	50	45	Stream	3.0	-	-	0.132	0.396	Included in 9th FYP.
6		Nimshong	40.5	100	40	Stream	6.0	On-going	-	0.132	0.792	
		Total	192.2	475	239		25.0				3.300	
		Proposed										
7		Maggar	40.5	100	48	Stream	5.0	-	-	0.300	1.500	Included in 9th FYP.
8		Ney(Dungkhartang)	20.2	50	60	River	5.0	-	-	0.300	1.500	Included in 9th FYP.
9		Shawa	4.0	10	30	River	3.0	-	-	0.300	0.900	Included in 9th FYP.
10		Denkaling	12.1	30	18	River	4.0	-	-	0.300	1.200	
		Total	76.9	190	156		17.0				5.100	
	L2. Jaray	Proposed										
11		Yabi Irrigation	20.2	50	22	Spring	1.5	On-going	-	0.300	0.450	Included in 9th FYP.
		Total	20.2	50	22		1.5				0.450	
	L3. Khoma	Rehabilitation										
12		Pangkhar	14.2	35	35	Pakachu	4.0	Partly damaged	Active	0.132	0.528	Included in 9th FYP.
13		Gangla	12.1	30	28	Spring	4.0	Partly damaged	Active	0.132	0.528	
14		Lawa	8.1	20	15	Spring	6.0	Good	Active	0.132	0.792	
15		Nylamdung	10.1	25	20	Spring	3.0	Damaged	-	0.132	0.396	Included in 9th FYP.
		Total	44.5	110	98		17.0				2.244	
	L4. Kurtoe	Rehabilitation										
16		Chusa	10.1	25	50	Stream	5.0	Partly damaged	Nil	0.132	0.660	Included in 9th FYP.
17		Jashabi	3.6	9	25	Stream	3.0	Partly damaged	Nil	0.132	0.396	Included in 9th FYP.
18		Thunpeng	12.1	30	60	Stream	8.0	Completely damaged	Nil	0.132	1.056	Included in 9th FYP.
19		Drogbber	2.4	6	5	Stream	6.0		Nil	0.132	0.792	
		Total	28.3	70	140		22.0				2.904	

Table V-14 Irrigation Scheme by Gewog (2/5)

Lhuntse

No.	Gewog	Name of irrigation system/village	Irrigated area (ha)	Irrigated area (acre)	No. of beneficiaries (HH)	Water source (river name)	Canal length (km)	Condition of facilities	Activity of WUA	Unit cost(Mil. Nu) per Km	Estimate cost(Mil. Nu)	Remark.
	L5. Menbi	Rehabilitation										
20		Serchu	80.9	200	90	Bengang chu	5.0	bad	Active	0.132	0.660	
21		Gorgan	93.1	230	200	Bengang chu	4.0	good	Active	0.132	0.528	
		Total	174.0	430	290		9.0				1.188	
	L6. Metsho	Rehabilitation										
		Gortsum	24.3	60	25	Stream	3.0	Poor, no working	Inactive	0.132	0.396	
22		Total	24.3	60	25		3.0				0.396	
		Proposed										
23		Tongthrom	40.5	100	20	Stream	6.0	-	-	0.300	1.800	Included in 9th FYP.
24		Tshochen	12.1	30	5	Stream	3.0	-	-	0.300	0.900	
25		Oungar	10.1	25	15	Stream	1.5	-	-	0.300	0.450	Included in 9th FYP.
26		Obe	8.1	20	2	Stream	3.0	-	-	0.300	0.900	Included in 9th FYP.
27		Tshochen	10.1	25	25	River	4.0	-	-	0.300	1.200	
28		Dung	8.1	20	18	River	0.1	-	-	0.300	0.029	
		Total	89.0	220	85		17.6				5.279	
	L7. Minjay	Rehabilitation										
29		Minjay	32.4	80	100	Stream	6.0	Partly damaged	On-going	0.132	0.792	
30		Legshogang	16.2	40	40	Stream	3.5	Partly damaged	On-going	0.132	0.462	
		Total	48.6	120	140		9.5				1.254	
		Proposed										
31		Kupenesa	1.2	3	20	Stream	3.0	-	-	0.300	0.900	
32		Jalang	10.1	25	50	Stream	4.0	-	-	0.300	1.200	Included in 9th FYP.
		Total	11.3	28	70		7.0				2.100	Included in 9th FYP.
	L8. Tsenkhar	Rehabilitation										
33		Wambur	7.3	18	45	Kheybachu	4.0	Good	Active	0.132	0.528	
34		Umling	6.9	17	15	Kheybachu	2.0	Good	Active	0.132	0.264	
35		Dhomkhar	10.1	25	45	Kheybachu	3.0	Damaged	Active	0.132	0.396	Included in 9th FYP.
		Total	24.3	60	105		9.0				1.188	
		Proposed										
36		Umling	4.0	10	15	Kheybachu	2.0	-	-	0.300	0.600	
37		Dhomkhar	10.1	25	45	Kheybachu	2.0	-	-	0.300	0.600	Included in 9th FYP.
		Total	14.2	35	60		4.0				1.200	
	Grand Total	Rehabilitation	536.2	1325	1037		94.5				12.474	
		Proposed	211.7	523	393		47.1				14.129	10% of indirect cost considered
		Total	747.9	1848	1430		141.6				26.603	29.3 (Grand Total)

Table V-14 Irrigation Scheme by Gewog (3/5)

Mongar

No.	Gewog	Name of irrigation system/village	Irrigated area (ha)	Irrigated area (acre)	No. of beneficiaries (HH)	Water source (river name)	Canal length (km)	Condition of facilities	Activity of WUA	Unit cost(Mil. Nu) per Km	Estimate cost(Mil. Nu)	Remark.
	M1. Balam	Rehabilitation										
1		Luehhilu	3.6	9	45	Shangshong	3.0	-	-	0.132	0.396	
		Total	3.6	9	45		3.0				0.396	
		New construction										
2		Khebishing	4.9	12	26	Ordeyhay	2.5	-	-	0.300	0.750	
		Total	4.9	12	26		2.5				0.750	
	M2. Chali	Rehabilitation										
3		- Chubli Chali	80.9	200	70	Thrirachu	8.0	good	Inactive	0.132	1.056	
		- Wamakhar										
		Total	80.9	200	70		8.0				1.056	
	M3. Chaskhar	Rehabilitation										
4		Chaskhar	44.5	110	250	Gudari	7.0	No good	active	0.132	0.924	Included in 9th FYP
5		Kharawang	20.2	50	100	Gudarijuke	2.5	Good		0.132	0.330	
		Total	64.8	160	350	0	9.5				1.254	
		Proposed										
6		Phakhdang	20.2	50	30	Phakhadang	5.0	-	-	0.300	1.500	
		Total	20.2	50	30		5.0				1.500	
	M4. Drametse	Rehabilitation										
7		Rolong	12.1	30	55	Bochar Dung	10.0	Old/ poor	Narang	0.132	1.320	Included in 9th FYP
8		Yayung	40.5	100	200	Gewa Dung	8.0	Old /poor	Drametse	0.132	1.056	Included in 9th FYP
9		Bazor	48.6	120	80	Leme Dung	5.0	New	Bazoor	0.132	0.660	
		Total	101.2	250	335	0	23.0				3.036	
		Proposed								0.300		
10		Shaphangma	12.1	30	70	Shangshong dung	6.0	-	-	0.300	1.800	Included in 9th FYP
11		Gomchu	8.1	20	60	Rolong chu	12.0	-	-	0.300	3.600	
12		Zimthung	6.1	15	40	Samgmari	5.0	-	-	0.300	1.500	
		Total	26.3	65	170		23.0				6.900	
	M5. Drepong	Rehabilitation										
13		Drepong	16.4	40.48	60	Spring	1.3	good	Drepong	0.132	0.172	
		Total	16.4	40.48	60		1.3				0.172	
		Proposed										
14		Bachheri	6.1	15	15	Hay karia	1.0	-	-	0.300	0.300	
		Total	6.1	15	15		1.0				0.300	

Table V-14 Irrigation Scheme by Gewog (4/5)

Mongar

No.	Gewog	Name of irrigation system/village	Irrigated area (ha)	Irrigated area (acre)	No. of beneficiaries (HH)	Water source (river name)	Canal length (km)	Condition of facilities	Activity of WUA	Unit cost(Mil. Nu) per Km	Estimate cost(Mil. Nu)	Remark.
	M6. Gongdue	Proposed										
15		Bagla	3.2	8	15	Bapungri	2.5	-	-	0.300	0.750	Included in 9th FYP
16		Dungkhar	2.0	5	30	Chunglagang	2.0	-	-	0.300	0.600	
17		Yanbari	8.1	20	5	Gorpala	5.0	-	-	0.300	1.500	
18		Daksa	5.7	14	32	Rangtana	5.0	-	-	0.300	1.500	
		Total	19.0	47	82		14.5				4.350	
	M7. Jurme	Nil	-	-	-	-	-	-	-	-	-	
	M8. Kengkhar	Nil	-	-	-	-	-	-	-	-	-	
	M9. Mongar	Rehabilitation										
19		Wengkhar	13.0	32	110	Tokpaung.	5.0	-	-	0.132	0.660	
		Total	13.0	32	110		5.0				0.660	
		Proposed										
20		Tailing	6.1	15	25	Chorchormajue	1.5	-	-	0.300	0.450	
21		Mrishing	4.9	12	20	Ganggola	5.0	-	-	0.300	1.500	
22		Themnangbi	6.1	15	20	Chompajue	4.0	-	-	0.300	1.200	
23		Khonbar	4.0	10	12	Hodongyea	3.0	-	-	0.300	0.900	
24		Pecklhurung	2.4	6	6	Choruorunjur	3.0	-	-	0.300	0.900	
		Total	23.5	58	83		16.5				4.950	
	M10. Ngatshang	Rehabilitation										
25		Yadhi	24.3	60	122	Spring water	5.0	Completely	-	0.132	0.660	
26		Ngatshang	28.3	70	82	stream	7.0	Expansion	-	0.132	0.924	
		Total	52.6	130	204		12.0				1.584	
	M11. Saleng	Rehabilitation										
27		Msangdaza	20.2	50	32	Shongjari	1.0	Running	Yes	0.132	0.132	
28		Tsanzibee	8.1	20	25	Shongja chu	1.0	Running	Yes	0.132	0.132	
		Total	28.3	70	57		2.0				0.264	
		Proposed										
29		Kalapang	12.1	30	25	Unaritop	2.0	-	-	0.300	0.600	
30		Kaleashing	16.2	40	35	Changkuchu	1.5	-	-	0.300	0.450	
		Total	28.3	70	60		3.5				1.050	
	M12. Serimuhung	Rehabilitation										
31		Bomey	10.1	25	21	Bomdy	1.0	Satisfactory	Nil	0.132	0.132	
32		Muhung	14.2	35	64	Samdrong	2.0	Poor	Nil	0.132	0.264	
		Total	24.3	60	85		3.0				0.396	

Table V-14 Irrigation Scheme by Gewog (5/5)

Mongar

No.	Gewog	Name of irrigation system/village	Irrigated area (ha)	Irrigated area (acre)	No. of beneficiaries (HH)	Water source (river name)	Canal length (km)	Condition of facilities	Activity of WUA	Unit cost(Mil. Nu) per Km	Estimate cost(Mil. Nu)	Remark.
	M12. Serimuhung	Proposed										
33		*Serzhong*	121.4	300	94	*Rari*	*10.0*	-	-	*0.300*	*3.000*	*Included in 9th FYP*
		Total	121.4	300	94		10.0	-	-		3.000	
	M13. Silambi	Nil	-	-	-	-	-	-	-	-	-	
	M14. Thangrong	Proposed										
34		Dueling Boucholing	12.1	30	70	-	7.0	-	-	0.300	2.100	
		Total	12.1	30	70		7.0				2.100	
	M15. Tsakaling	Rehabilitation										
35		Takhambi	22.3	55	56	Chimungchu	4.0	-	-	0.132	0.528	
36		Thumling	12.1	30	150	Lungkpuungch	25.0	-	-	0.132	3.300	
		Total	34.4	85	206		29.0				3.828	
		Proposed										
37		Tormashong	60.7	150	120	Taisachu	3.0	-	-	0.300	0.900	
38		*Palangphu*	*6.1*	*15*	25	*Manbarchu*	*1.5*	-	-	*0.300*	*0.450*	
		Total	66.8	165	145		4.5				1.350	
	M16. Tsamang	Nil	-	-	-	-	-	-	-	-	-	
	Grand Total	Rehabilitation	419.5	1036	1522		95.8				12.646	
		Proposed	328.6	812	775		87.5				26.250	10% of indirect cost considered
		Total	748.1	1848	2297		183.3				38.896	42.8 (Grand Total)