

BASIC INFORMATION OF THE PROJECT

DETAIL PROJECT REPORT (D.P.R.)

(I.W.M.P.- V- JALAUN)

**INTEGRATED WATERSHED MANAGEMENT PROGRAMM IN R.B.YAMUNA WATERSHED, BLOCK- Mahewa,
DISTRICT- JALAUN (UTTAR PRADESH)**



Submitted to: -
Department of
Land Development
&
Water Resources.
Lucknow (U.P.)

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Land Development & Water Resources Government of U.P. Lucknow

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PROJECT AT A GLANCE

1.	Name of Project	-	I.W.M.P. Vth Jalaun
2.	Name of Block	-	Mahewa
3.	Name of District	-	Jalaun
4.	Name of State	-	Uttar Pradesh 4
5.	Name of watershed	-	R.B.Yamuna
6.	Name of Concern villages	-	Narhan Must., Narhan Diwara, Pandari Diwara,Pandari Must.,Shekhpur Must., Shekhpur Diwara, Kutra Must., Kutar Diwara, Mangaraul Must., Mangaraul Diwara, Keeratpur, Gurha Khas Must., Gurha Khas Diwara, Mainupur Must., Mainupur Diwara, Heerapur Must., Heerapur Diwara, Devkali Must., Devkali Diwara. ChakDevkali, Shekhpur Bulda, Sipah
7.	Code of Micro Watershed	-	2C2H2f2a, 2C2H2f1d, 2C2H1e1b, 2C2H2f1c, 2C2H2f1b, 2C2H2f1a, 2C2H1e1a,
8.	Total area of Project.	-	5872.00 ha.
9.	Proposed area for treatment.	-	4578.00 ha.
10.	Cost per hectare	-	Rs. 12000.00
11.	Project period	—	2010-11 to 2013-14
12.	Total Cost of Project	-	Rs. 549.36 Lacs
13.	Proposed Mandays	-	247200 Nos.

14. Year wise Phasing Physical & Financial item wise.-

S. No.	Item	Physical Year wise (area in ha.)					Financial Year wise (Rs.in Lacs.)				
		2010-11	2011-12	2012-13	2013-14	Total	2010-11	2011-12	2012-13	2013-14	Total
1	Administrative	-	-	-	-	-	10.9872	13.734	19.2276	10.9872	54.936
2	D.P.R Preparation	-	-	-	-	-	5.4936	-	-	-	5.4936
3	Monitoring & Evaluation	-	-	-	-	-	5.4936	2.7468	2.7468	-	10.9872
4	Entry Point Activity	-	-	-	-	-	21.9744	-	-	-	21.9744
5	Institutional and Capacity building	-	-	-	-	-	10.9872	10.9872	5.4936	-	27.468
6	Watershed works	-	2289	2289	-	4578	-	137.34	137.34	-	274.68
7	Livelihood & Income Generating	-	-	-	-	-	54.936	-	-	-	54.936
8	Production System development	-	-	-	-	-	-	27.468	27.468	16.4808	71.4168
9	Consolidation Phase	-	-	-	-	-	-	-	-	27.468	27.468
	Total	-	2289	2289	-	4578	109.872	192.276	192.276	54.936	549.36

RESOURCE CONSERVATION AND WATER MANAGEMENT IN R.B.YAMUNA WATERSHED, BLOCK- MAHEVA, JALAUN DISTRICT (UTTAR PRADESH)

1. EXECUTIVE SUMMARY

2. The Yamuna river watershed comprises of Twenty Two villages namely Narhan Mustikil, Narhan Diwara, Padri Mustikil, Padri Diwara, Sekhpur Gurha Mustikil, Sekhpur Gurha Diwara, Kutra Mustikil, Kutra Diwara, Magraul Mustikil, Magraul Diwara, Keeratpur, Gurha Khas Mustikil, Gurha Khas Diwara, Mainupur Mustikil, Mainupur Diwara, Hirapur Mustikil, Hirapur Diwara, Devkali Mustikil, Devkali Diwara, Chakdevkali, Sipah, Sekhpur Bulda block- Mahewa of Jalaun district of Uttar Pradesh. This watershed has been identified by the state department under NWDPR scheme by proper prioritization of different parameters for watershed selection criteria. The watershed is located in the North-East of Jalaun district. It lies between 26° -0' to 26-7'N latitude and 79° -0' to 79° -41' E longitude (**Code No. 2C2H2f2a, 2C2H2f1d, 2C2H1e1b, 2C2H2f1c, 2C2H2f1b, 2C2H2f1a, 2C2H1e1a.**). Its altitude ranges from 114 to 122m above the mean sea level (MSL). The total area of watershed is 5872.00 ha. It is surrounded by the catchment of river Yamuna.

The climate of the region is characterized as arid to semi-arid with average annual rainfall less than 520 mm annually with an average of 35 rainy days. Out of which about 85 percent is received during the monsoon season from July to September. The area receives very less rainfall in the winter season. Temperature ranges from as high as 49°C in the May-June to as low as 4°C during December-January. The trend of rainfall is highly erratic and maximum (62%) water goes as runoff.

The top most portion (South to West) of the watershed is ravinous catchment of river Yamuna of flat land interlocked between the hillocks. The soils of the area loamy sand to sand loam. The middle portion of watershed is relatively flat land with heavy soil texture. These soils are black to yellow in colour and are inherently high in fertility status. Soil texture is clay loam particularly in depressions and loam in the elevated portion.

Agriculture is the main source of income of the farmers of the watershed. In Kharif the main crops are Jawar, Bajra, Arhar, Til and Urd. Most of the lands are kept fallow because maximum areas are rainfed and the main Rabi crop is taken with the conserved moisture of rainfall. In Rabi the main crops are Gram, Wheat, Pea, Lentil, Mustard, Barley and linseed. The wheat and Pea crops are taken in the irrigated fields while the other crops are mostly taken in the rainfed conditions. In Zaid season there is no cropping due to hot weather and ANNA PRATHA. Horticultural crops are taken in very less area. Only some vegetable crops are taken for domestic purpose and some fruit trees in scattered manner.

Animal Husbandry is not in good condition because of local breeds. Their milk production is low. Unavailability of green fodder with poor feeding and health management.

Natural vegetation of the watershed area is very poor. The forest vegetation is predominant with Vilayati Babul (*Prosopis juliflora*) followed by Babul (*Acacia nilotica*). There are occasional occurrence of Neem plants (*Azadirachta indica*), Pipal, Bargad. There is no grass land in the watershed. Grass patches are seen only on the bunds, road sides and other such places. The principal grass is Moonj.

The problem of erosion of the watershed is to be tackled by harvesting additional water in existing water harvesting structures, which have lost most of their capacity due to siltation and creating new water bodies. Water stored in the water harvesting structures shall be properly recycled to provide supplemental irrigation at critical growth stages of crops and for the establishment of fruit orchards and forest trees. The agricultural land will be treated with bunding along with minor leveling. Waste land will be treated with the engineering measures like staggered trenches and afforestation etc.

Budget for the various components is given as below

S. No.	Budget Component	Total (Lakhs)
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A	1. Administrative	54.936
	2. Monitoring	5.4936
	3. Evaluation	5.4936
B	Preparatory Phases	54.936
C.	WATERSHED WORKS	274.68
(i)	Livelihood Programm	54.936
(ii)	Production System and microenterprises	71.4168
D.	CONSOLIDATION PHASE	27.468
	GRAND TOTAL	549.36

CHAPTER-1

PROJECT BACKGROUND

Project background

The water shed , with code No. 2C2H2f2a, 2C2H2f1d, 2C2H1e1b, 2C2H2f1c, 2C2H2f1b, 2C2H2f1a, 2C2H1e1a, having area of 5872 ha is located in North East Part of Jalaun district of U.P. The area of watersheds is proposed to be taken up by Bhoomi sanrakshan Adhikari, Department of land development & water resources Jaluan for integrated watershed management programme (IWMP) starting from the year 2010-11. The project will be completed by 2013-14.

The R.B. Yamuna watershed in Mahewa Block of Jalaun district (U.P.) is Located near Kalpi about 48Km from Jalaun and 14Km from Mahewa Block .the watershed comprises of 22 village namely Narhan Mustikil, Narhan Diwara, Padri mustaki, Padri diwara, Sekhpur guha Mustakil, Sekhpur Gurha Diwara, Kutra Mustikil ,kutra diwara, Mangraul Mustikil, Mangraul Diwara , keeratpur ,Guha Khas Mustikil ,Guha Khas diwara , Mainupur Mustikil , Mainupur Diwara ,Hirapur Mustikil , Hirapur Diwara, Devkali Mustakil, Devkali diwara , chak devkali, Sipah , Sekhpur Bulda . The Area lies between 26°- 0' to 26°-7' 'N' latitude and 79° -0 ' to 79° - 41' E longitude .

Total Area of the watershed is 5872 ha (Treatable area 4578 ha) Elavation ranges from 114 to 122 m above mean sea level Catchment of river Yamuna of flat land inter locked between the hillocks . Top most portion (South to west) is ravineous. The soil of the area are loamy sand to Sandy loam . Middle portion of the watershed is relatively flat with heavy soil texture . These soil are black to yellow in texture and high in fertility status .

Table 1.1 Basic Project Information

S No	Name of the project	Villages	Gram panchayat	Tehsil	District	Total are of the project	Area proposed to be treated	Total project cost(Rs in Lack)	PIA
1	I.W.M.P Vth	1. Narhan Mast 2. Narahan Diwara 3. Pandri Diwara 4. Pandri Mustikal 5. Sekhpur Mustakil 6. Sekhpur Diwara 7. Kutra Mustikal 8. Kutra Diwara 9. Mangraul Must 10. Mangraul Diwara 11. Keeratpur 12. Gurha khas Must	1 Pandri Mustikal 2 Sekhpur 3 Kurta Mustikal 4 Magraul Must 5 Keeratpur 6 Gurha khas Must 7 Mainupur Must 8 Heerapur Must 9 Chak Dev Kali	kalpi	jalaun	5872 ha	4578 ha	549.36	Bhoomi Sanrakshan Adhikari Department of land Development and water resource

		13. Gurha Khas Diwara							
		14. Mainupur Must							
		15. Mainupur Diwara							
		16. Heerapur Must							
		17. Heerapur Diwara							
		18. Devkali Must							
		19. Devkali Diwara							
		20. Chak Dev Kali							
		21. Shekhpur Bulda							
		22. Sipah							

PROBLEMS AND NEEDS OF THE AREA

Problem Identification and prioritization

Food sufficiency, economic growth and environmental security were identified as the major issues to be addressed in the watershed area. The area has undulating topography, steep unstable slopes, excessive channel gradient and hence highly prone to soil erosion. Effective soil depth is limited and spatially highly variable hampering good crop growth.

Problems identified and prioritized during the transact walk and PRA exercises in all villages, Narhan Must., Pandari Must., Shekhpur Must., Kutra Must., Mangraul Must., Keeratpur Must., Gurha Khas Must. Mainupur Must., Heerapur Must., Devkali Must. were pooled and a list of nine problems representing the whole watershed was prepared. Problems were ranked as per their total weight age in these villages. Lack of irrigation water was the greatest problem experienced by the people followed by low production of field crops, lack of fodder availability and low animal productivity .

Strength, weakness, opportunity and threat (SWOT) analysis is a useful decision support tool, A SWOT analysis of the watershed is presented in Table 1.3.

Table 1.2 Problem identification and prioritization for watershed

S.N	Problem	Rank
1.	Low production of field crops	5
2.	Lack of drinking water	3
3.	Lack of irrigation water	1
4.	Lack of fodder availability	8
5.	Non-availability of fuel wood	7
6.	Lack of inputs like quality seeds, fertilizer, pesticides etc.	4

7.	Lack of market facility	9
8.	Lack of medical, educational and transportation facilities	2
9.	Medical and Health care facilities for milching animals and low productivity.	6

Table 1.3. SWOT analysis of the watershed

Strengths (S)	Weakness (W)
<ul style="list-style-type: none"> i. Cooperative work culture in traditional activities ii. Close ethnic ties iii. Road at the top as well as outlet of the watershed iv. Hard working v. Resource pool of crop genetics diversity vi. Awareness of farmers about watershed management programme vii. Well established CPR maintaining and sharing system viii. Good productivity of soil ix. Social outlook of the community towards land less 	<ul style="list-style-type: none"> i. Poor water management ii. Resource poor farmers iii. Out migration of youth iv. Low and erratic rainfall v. Fragile geography vi. Fragmented land holding vii. Heavy infestation of wild animals viii. Problem of fuel and fodder ix. ANNA-PRATHA
Opportunities (O)	Threats (T)
<ul style="list-style-type: none"> i. Wide range of annual and perennial crops 	

ii. Scope of regular employment opportunities to check out migration iii. Strengthening of existing irrigation system iv. Conducive climate for rainfed crop diversification v. Good scope for Agro forestry and dry land horticulture vi. Potential for collective action and management of CPR	i. Prone to adverse climate like drought ii. High market risk iii. Social conflicts owing to PRI and WSM policies and local politics iv. Weak coordination among line departments v. Lack of expertise of implementing agency in different aspects of WSM
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Total number of families in the watershed is 3186 of 121 families belong to schedule caste. Agriculture is the main source of income of the farmers of the watershed. Ground water strata in the area varies between 18 to 23 meter in the month of April to June . Ground water is sweet and fit for drinking .

The watershed falls under the semi – arid region of Tropical climate The average annual rainfall is 520 mm spreading over 35 rainy days Most of the rainfall (about 85 %)is received during July to September rainfall is of moderate to high intensity. The Area receives no or Scanty rainfall in winter seasons .The Temperature ranges from as high as 49°C in the month of May – June to as low as 4°C in December - January.

Table no. 1.4: Weightage of the project

Project name	Project Type	Weightage													
IWMP 5	IWMP	I	li	lii	lv	v	vi	vii	viii	ix	x	xi	xii	xiii	xiv
		7.5	5	5	5	0	10	10	5	10	15	10	10	0	92.50

Table no. 1.4.1 Criteria and weightage for selection of watershed

Criteria	Maximum Score	Ranges & Scores			
Poverty index (% of poor to	10	Above 80 % (10)	80 to 50 % (7.5)	50 to 20 % (5)	Below 20 % (2.5)

population)					
% of SC/ ST population	10	More than 40 % (10)	20 to 40 % (5)	Less than 20 % (3)	
Actual wages	5	Actual wages are significantly lower than minimum wages (5)	Actual wages are equal to or higher than minimum wages (0)		
% of small and marginal farmers	15	More than 80 % (10)	50 to 80 % (5)	Less than 50 % (3)	
Ground water status	15	Over exploited (5)	Critical (3)	Sub critical (2)	Safe (0)
Moisture index/ DPAP/ DDP Block	10	-66.7 & below (15) DDP Block	-33.3 to -66.6 (10) DPAP Block	0 to -33.2 (0) Non DPAP/ DDP Block	
Area under rain-fed agriculture	15	More than 90 % (15)	80 to 90 % (10)	70 to 80% (5)	Above 70 % (Reject)

Drinking water	15	No source (10)	Problematic village (7.5)	Partially covered (5)	Fully covered (0)
Degraded land	10	High – above 20 % (15)	Medium – 10 to 20 % (10)	Low- less than 10 % of TGA (5)	
Productivity potential of the land	15	Lands with low production & where productivity can be significantly enhanced with reasonable efforts (15)	Lands with moderate production & where productivity can be enhanced with reasonable efforts (10)	Lands with high production & where productivity can be marginally enhanced with reasonable efforts (5)	
Contiguity to another watershed that has already been developed/ treated		Contiguous to previously treated watershed & contiguity within the micro watersheds in the project (10)	Contiguity within the micro watersheds in the project but non contiguous to previously treated watershed (5)	Neither contiguous to previously treated watershed nor contiguity within the micro watersheds in the project (0)	

Cluster approach in the plains (more than one contiguous micro-watersheds in the project)		Above 6 micro-watersheds in cluster (15)	4 to 6 micro watersheds in cluster (10)	2 to 4 micro watersheds in cluster (5)	
Cluster approach in the hills (more than one contiguous micro-watersheds in the project)		Above 5 micro-watersheds in cluster (15)	3 to 5 micro watersheds in cluster (10)	2 to 3 micro watersheds in cluster (5)	
	150	150	90	41	2.5

Table no. 1.5 Watershed information

Name Of the Project	No. of water sheds to be treated	Watershed Code	Watershed regime/type/order
IWMP 5 th Jalaun	7	2C2H2f2a, 2C2H2f1d, 2C2H1e1b, 2C2H2f1c, 2C2H2f1b, 2C2H2f1a	Mini Watershed

		2C2H1e1a	
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1.6 Other developmental projects/schemes running in the Eval village

These villages being very back ward, has been on top priority of a number of developmental projects. These programmes are Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), Swarnajayanti Gram Swarajgar Yojana (SGSY), Indira Awas Yojana (IAY). Intrigrated Watershed Management Program me in other areas of the district are under operation in the department of Agriculture.

Chapter – 2

PROJECT IMPLEMENTING AGENCY

PROJECT IMPLEMENTING AGENCY (PIA)

U.P. Government, Land Development And Water Resources Department section -1 Lucknow has nominated as PIA to Bhoomi Sanrakshan Unit, Land development and water resources Department Kalpi Dist- Jalaun for IWMP-Vth vide letter no- 666(10)/54-1-10-1(9)02008 Dated 28-5-2010.

Detail Staffing Pattern of PIA :

S.No.	Name	Desingnation	Qualification
1	2	3	4
1-	Shri K.L Choudhry	Bhoomi Sanrakshan Adhikari	Intermediate, Ag. Engg. Diploma.
2-	„ Shailesh Kumar Rai	Junior Engineer	Intermediate, Civil Engg. Diploma.
3-	„ Ram Chandra Yadav	Junior Engineer	Intermediate, Civil Engg. Diploma.
4-	„ Satish Chandra Srivastava	Draughtsman	M.A. Diploma in Draughtsman (Civil)
5-	„ Rajendra Kumar Dixit	Accountant	M.Com
6-	„ Rajendra Nath sharma	Accountant	B.Com
7-	„ Sarjuprasad gupta	Accountant	B.Com
8-	„ Surendra kumar Mishra	Junior clerk	Intermediate
9-	Smt. Pratibha	Junior clerk	M.A.
10-	Shri. Jagdish Kumar	Junior clerk	B.A.
11-	Shri. Satendra kumar	Treacer	High School

12-	„ Desh Bhakt Singh Arya	A.S.C.I.	M.Sc. (Ag.)
13-	„ Rakesh kumar Mishra	Zildar	Intermediate
14-	„ Rajendra kumar singh	Irrigation Sup.	Intermediate
15-	„ Avdhesh Kumar Tripathi	Irrigation Sup.	Intermediate
16-	„ Babu Lal Yadav	Irrigation Sup.	Intermediate
17-	„ Om Prakash Verma	Irrigation Sup.	Intermediate
18-	„ Jay Prakash Dixit	Munshi	B.A.
19-	„ Shusheel kumar Yadav	Munshi	B.A.
20-	Smt. Rekha Shukla	Munshi	Intermediate
21-	Shri. Shusheel Kumar Kashyap	Munshi	B.A.
22-	„ Ramdev Verma	Seenchpal	Intermediate
23-	„ Ramprasad	Seenchpal	Intermediate
24-	„ Pradeep Kumar Dohare	Seenchpal	High School
25-	„ Ramdev	Driver	High School
26-	„ Masiuddeen khan	IVth Class	Intermediate
27-	„ Mataprasad	IVth Class	Class 5 Pass
28-	Smt. Pushpa Rani Yadav	IVth Class	J.H.School
29-	Shri. Surendra kumar	IVth Class	High School
30-	„ Praveen singh	IVth Class	Intermediate

Institutional Arrangement at Project level:

Project management Agency (PIA)

The SLNA would evolve appropriate mechanisms for selecting and approving the PIAs, who would be responsible for implementation of watershed projects in different districts. These PIAs may include relevant line departments. Autonomous organizations under State/Central Governments, Government Institutes/Research bodies, Intermediate Panchayats, Voluntary Organizations (VOS).

However, the following criteria may be observed in the selection of these PIAs:

- 1- They should preferably have prior experience in watershed related aspects or management of watershed development projects.
- 2- They should be prepared to constitute dedicated Watershed Development Teams.

Selected PIAs will sign a contract/MOU with the concerned DWSUs/District Level Committee as referred in para29 that will spell out well –defined annual outcomes, against which the performance of each PIA will be monitored each year and evaluated on a regular basis by institutional evaluators from a panel approved by the SLNA/Departmental Nodal Agency at the central level.

Each PIA must put in position a dedicated watershed development team (WDT) with the approval of DWDU. The WDT will be hired on contract/deputation. Transfer etc for a term not exceeding the project period. The composition of the WDT will be indicated in the contract/MOU. No programme funds for DPR and watershed works under any circumstances should be released to either the PIA or Watershed Committee (WC) unless the composition of the WDT has been clearly indicated in the MOU/contract and the team members are fully in place.

Roles and Responsibilities of the PIA:

The project Implementing Agency(PIA) will provide necessary technical guidance to the Gram Panchayat for preparation of development plans for the watershed through Participatory Rural Appraisal(PRA) exercise, undertake community organization and training for the village communities, supervise watershed development activities, inspect and authenticate project accounts, encourage adoption of low cost technologies and build upon indigenous technical knowledge, monitor and review the overall project implementation and set up institutional arrangements for post-project operation and maintenance and further development of the assets created during the project period.

The PIA, after careful scrutiny, shall submit the action plan for watershed development project for approval of the DWDU/DRDA and other arrangements. The PIA shall submit the periodical progress report to DWDU. The PIA shall also arrange physical, financial and social audit of the work undertaken. It will facilitate the mobilization of additional financial resource from other government programmes, such as NREGA, BRGF, SGRY, National Horticulture Mission, Tribal, Welfare Schemes, Artificial Ground Water Recharging, Greening India, etc.

आदेश

भारत सरकार ग्रामीण विकास मंत्रालय, नई दिल्ली द्वारा जारी वाटर शेड विकास परियोजनाओं के लिए समान मार्गदर्शी सिद्धान्त-2008 के पैरा 5-3 के अनुसार जनपद- जालौन में स्वीकृत परियोजना आई०डब्ल्यू०एम०पी० कालपी के समान मार्गदर्शी सिद्धान्त के अनुसार क्रियान्वयन हेतु निम्न प्रकार से जल संग्रहण विकास दल (W.D.T.) का गठन किया जाता है एवं आदेशित किया जाता है कि समान मार्गदर्शी सिद्धान्त के पैरा 5-4 के अनुसार कार्यवाही सुनिश्चित करें।

क्र०	सदस्य का नाम	पदनाम	योग्यता	व्यावहारिक अनुभव	सम्बन्धित कार्यक्षेत्र
1	2	3	4	5	6
1	श्री के। त्रिलाल चौधरी	भूमि संरक्षण अधिकारी	इंटरमीडिएट एग्री० इन्जी० डिप्लोमा	जल संग्रहण परियोजनाओं के अन्तर्गत कृषि विकास आदि का 30 वर्ष का अनुभव	भूमि एवं जल प्रबन्धन
2	श्री भौले। कुमार राय	अवर अभियन्ता	इंटरमीडिएट सिविल इन्जी० डिप्लोमा	जल संग्रहण परियोजनाओं के क्रियान्वयन में 29 वर्षों का अनुभव	भूमि एवं जल प्रबन्धन
3	श्री देवभक्त सिंह आर्य	संभू०सं०नि०	एम०एस०सी० एग्री०	जल संग्रहण परियोजनाओं के संचालन में 28 वर्ष का अनुभव	भूमि एवं जल प्रबन्धन
4	कु० उमाकांती	सा०कार्यकर्त्री	बी०एस०सी०	स्वयं सहायता समूह संचालन में 05 वर्ष का अनुभव	सामाजिक संगठन/संस्था-गत

भूमि संरक्षण अधिकारी
आई०डब्ल्यू०एम०पी० कालपी, (जालौन)

कार्यालय- भूमि संरक्षण अधिकारी, आई०डब्ल्यू०एम०पी० कालपी जालौन।

पत्रांक: भू०सं०अ०/05 / प्रा०अनु०/आई०डब्ल्यू०एम०पी०/10-11/दिनांक- 10.06.2010

प्रतिलिपि:- निम्नलिखित को उपरोक्तानुसार आवधिक कार्यवाही हेतु।

- वाटर शेड विकास दल (W.D.T) के समस्त सदस्यों को।
- उपनिदेशक (भू०सं०), भूमि विकास एवं जल संसाधन विभाग (रामगंगा कमाण्ड परियोजना), झाँसी की सेवा में सूचनार्थ प्रेषित।
- परियोजना निदेशक, जिला ग्राम्य विकास अभिकरण, जालौन स्थान उरई।
- मुख्य विकास अधिकारी, जालौन स्थान उरई।
- जिलाधिकारी, जालौन स्थान उरई।
- अध्यक्ष एवं प्रशासक, रामगंगा कमाण्ड परियोजना, कानपुर।
- अध्यक्ष एवं प्रशासक भारदा सहायक समादेश क्षेत्र विकास परियोजना लखनऊ।
- विशेष सचिव, भूमि विकास एवं जल संसाधन विभाग, उ०प्र० भासन लखनऊ।

भूमि संरक्षण अधिकारी

WATERSHED DEVELOPMENT TEAM:

The WDT is an integral part of the PIA and will be set up by the PIA. Each WDT should have at least four members, broadly with knowledge and experience in agriculture, soil science, water management, social mobilization and institutional building. At least one of the WDT members should be a woman. The WDT members should preferably have a professional degree. However, the qualification can be relaxed by the DWDU with the approval of SNLA in deserving cases keeping in view the practical field experience of the candidate. The WDT should be located as close as possible to the watershed project. At the same time, it must be ensured that the WDT should function in close collaboration with the team of experts at the district and state level. The expenses towards the salaries of the WDT members shall be charged from the administrative support to the PIA. DWDU will facilitate the training of the WDT members.

Roles and Responsibilities of WDT:

The WDT will guide the watershed committee (WC) in the formulation of the watershed action plan. An indicative list of the roles and responsibilities of the WDT would include among other s, the following.

- a. Assist Gram Panchayat /Gram Sabha in constitution of the watershed committee and their functioning.
- b. Organizing and nurturing User Groups and Self-Help Groups.
- c. Mobilizing women to ensure that the perspectives and interests of women are adequately related in the watershed action plan.
- d. Conducting the participatory base –line surveys, training and capacity building.
- e. Preparing detailed resource development plans including water and soil conservation or redamation etc. to promote sustainable livelihood at household level.
- f. Common property resource management and equitable sharing.
- g. Preparing Detailed Project Report (DPR) for the consideration of Gram Sabha.

- h. Undertake engineering surveys, prepare engineering drawing and cost estimates for any structure to be built.
- i. Monitoring, checking, accessing, and undertaking physical verification and measurement of work done.
- j. Facilitating the development of livelihood opportunities for the landless.
- k. Maintaining project accounts.
- l. Arranging physical, financial and social audit of the work undertaken.
- m. Setting up suitable arrangements for post-project operation, maintenance and future development of the assets created during the project period.

CHAPTER-3

3.0 PRESENT LAND USE IN THE WATERSHED

The watershed has diversified land uses namely agriculture, waste land (open scrub), seasonal water bodies etc. The varied present land use and area under different categories in watershed is shown in Table 3.1 & 3.2. The mixed land use followed in the watershed is almost similar in other parts of the UP. During PRA exercise, the villagers prepared land use. One such map of village of the watershed is shown in Annexure Map.

Table 3.0.1 Present land under different categories in the watershed

S. No.	Name of watershed/ Code no.	Name of Concern villages	Land Use					
			Agriculture	Wastland all type	Pasture	Forest	Others	Total
1	Padri must.2C2H2f2a	1- Narhan must. 2- Narhan diwara 3- Padri Must. 4- Padri Diwara 5- Shekhpur Gurha Diwara	582.40	151.71	-	25.55	75.24	834.87
2	Kutra must.2C2H2f1d	1- Kutra must. 2- Kutra Diwara 3- Magraul must.	397.15	103.45	-	17.47	51.23	569.27
3	Magraul must.2C2H1e1b	1- Magraul Diwara 2- Magraul must. 3- Keeratpur	563.55	146.78	-	24.77	72.80	807.84
4	Shekhpur Gurha must.2C2H2f1c	1-Magraul must. 2- Gurha Khash must. 3-ShekhpurGurha must.	506.28	131.86	-	22.25	65.40	725.74
5	Mainupur must.2C2H2f1b	1- Mainupur Must. 2- Mainupur Diwara 3- Gurha khash must. 4- Gurha khash Diwara	531.60	138.48	-	23.36	68.58	762.05

6	Heerapur must.2C2H2f1a	1- Heerapur must. 2- Heerapur diwara 3- Mainupur must. 4- mainupur diwara 5- Shekhpur bulda	1052.12	274.04	-	46.15	135.84	1508.20
7	Keeratpur 2C2H1e1a	1- Keeratpur 2- Chak Devkali 3- Devkali must. 4- Davkali Diwara 5- Sipah	463.50	120.94	-	20.35	59.80	664.42
	Total		4096.60	1067.00	-	179.90	528.89	5872.39

Table 3.0.2 Present land use of the watershed

S.No.	Land use	Present (ha)
1	Agriculture	4096.60
A	Rainfed	3604.00
	I Crops	3604.00
	II Agro-forestry	-
B	Irrigated	492.60
	I Assured	295.70
	II Partial	196.90
2	Waste land	1067.00
A	Afforestation	179.90
B	Pasture	-
C	Untreatable	-
3	Village land	528.89
	Total	5872.39

3.1 Agriculture

Various agricultural land uses in the watershed are extended to diversified land capabilities starting from marginal to good class II lands. The watershed distinctly has three types of lands i.e. leveled, sloping and degraded and undulating. The agriculture is practiced on all these soil types though the productivity considerably varies. The total area under agriculture in the watershed is about 4096 ha out of which 3604 ha is under rain-fed agriculture. The water (both irrigated and drinking) is most scarce natural resource in the watershed. The operation of tube wells for irrigation of agricultural crops frequently leads to the drinking water problem to the farmers of watershed forcing them to carry drinking water from outside the watershed area. The agricultural field bunds are common in the watershed, however, they frequently breach on heavy rains adversely affecting the *in situ* percolation of rain water in the soils.

The agriculture soils in the watershed have diversified texture i.e. loam sand, silty clay loam and boulder mixed textures which are located in patches throughout the watershed. The heavy soils are almost kept fallow during rainy season. The agricultural soils also have hard calcium pan at variable depths. The irrigation water is conveyed in earthen channels and surface irrigation methods following mainly flood method of irrigation by the farmers in the watershed. These factors substantially reduce the water use efficiency of limited available and valuable irrigation water in the watershed. The quality of irrigation water needs to be tested for assessing fitness of the quality for irrigation and other purposes.

Rehabilitation of waste lands with appropriate drought hardy species like *Prosopis juliflora*, introduction of suitable multi-purpose trees, promoting agro-forestry on agricultural lands with appropriate fruit and forest species, suitable vegetative barriers on sloping lands can of high future value in meeting out not only fire wood and fodder demands in the watershed but also for soil and water conservation, rehabilitation of wasteland and substantial income generation for socio-economic upliftment of farmers in the watershed.

One year rotation

Rainfed Agriculture

Single cropping

Fallow-mustard/ wheat/ gram/Pea/ lentil/ winter vegetables, Arhar.

Double cropping

jowar/ sesame/ black gram/ green gram- Pea/ wheat/ gram/ lentil/ winter vegetables

Irrigated agriculture

One year rotation

Bajra/ jowar/ sesame/ black gram/ green gram- Pea/ wheat/ winter vegetables

Crop productivity

The agricultural productivity is primarily driven by the amount and distribution of rain water specifically during two cropping seasons i.e. rabi and kharif. Productivity of kharif crops is also affected by the late onset or early withdrawal of monsoon as well as intermittent droughts of variable duration and intensity. The farmers also do not have suitable cropping systems to deal aberrant weather. Weeds impose considerable constraint in productivity of kharif crops under irrigated as well as rain-fed production system.

The mixed cropping is in practice in limited area with kharif crops like Arhar and jowar but it is not only irrational but also unscientific and beset with low productivity. Imbalanced use of fertilizers is common in rabi and kharif crops both in rain-fed and irrigated production system. The recommended deep Ploughing for enhanced in situ residual soil moisture conservation and higher production is also not followed in the watershed. The shallow plowing tractor drawn tillage implements are available with the farmers in the watershed but deep plowing implements yet need to be introduced.

The soil fertility/health restoration practices like green manuring, crop rotations and intercropping specifically with legumes, use of FYM/ compost, Vermicompost, bio fertilizers, soil and water conservation measures, use of brought up or in situ mulches are widely lacking in the watershed. The soil and water conservation measures are limited to mechanical/ earthen measures created by the state Govt. agencies. Conservation agronomical measures like seeding and plowing across the slope, weed mulching, agro-forestry, vegetative barriers etc also completely lack in the watershed.

3.2 Indigenous technological knowledge (ITK)

The agriculture is an old traditional practice of farmers in the watershed who have improved themselves with passage of the time according to their domestic need and technological reforms in the nearby areas. The villagers have their traditional village ponds, practice of field bunding which typically constitute agriculture related ITKs in the watershed.

3.3 Forest and Other Vegetation

Forests

There is no considerable forest area in the watershed.

Horticulture /Agro-forestry

No horticulture and Agro forestry practices were observed in the watershed.

3.4 Agro forestry

The agro-forestry practices are highly lacking in the watershed though it has good potential under existing dispositions and may play a vital role particularly with respect to minimization of cropping risk, build up soil fertility and productivity, soil conservation, partly meeting out the fire wood demand of rural community and moreover, optimizing the economical return from system as a whole under

typical semi arid climate in the watershed. The other agro-forestry systems like agri-silvi, agri-horti silvi-pastoral, and bund and boundary plantations also have good potential to cater the fire wood and fodder demands of the rural community in the watershed. The existing area under agro-forestry is almost negligible. *Prosopis juliflora* may be planted as block or sole plantation specifically on marginal and degraded lands in the watershed. The agro-forestry interventions comprising of ber, bail, aonla, guava, popular etc may be applied for benefit of the farmers under rain-fed to irrigated production systems on leveled to sloping and marginal agricultural using proper planting techniques and termite control measures. The multipurpose trees may also help in supplementing fire wood and fodder demands of the rural community in the watershed and may be planted as hedge rows on rain-fed, marginal and degraded lands.

3.5 Horticulture

The subtropical fruits and vegetables have very good potential in the watershed. The fruit trees are in limited in number like guava, papaya, lemon, lime, ber, aonla as well as vegetables like cucurbits, okra, radish, tomato, cauliflower, cabbage, garlic, onion, brinjal, chilly but they are found surviving well in the watershed villages. Organized orchards, commercial vegetable cultivation, horti-agri and other systems of agro-forestry etc are lacking but have good potential in the watershed.

3.6 SOIL AND LAND CAPABILITY CLASSIFICATION

3.7 Soil morphology

The watershed is located south west corner of the Jalaun district. The entire watershed is topographically divided into three major landforms. Accordingly, the soils of watershed have been grouped in three major categories.

- i) Plain land
- ii) Undulated land
- iii) Ravinous land

Soil profile- A representative soil profile (Dominant soil-Table 8)

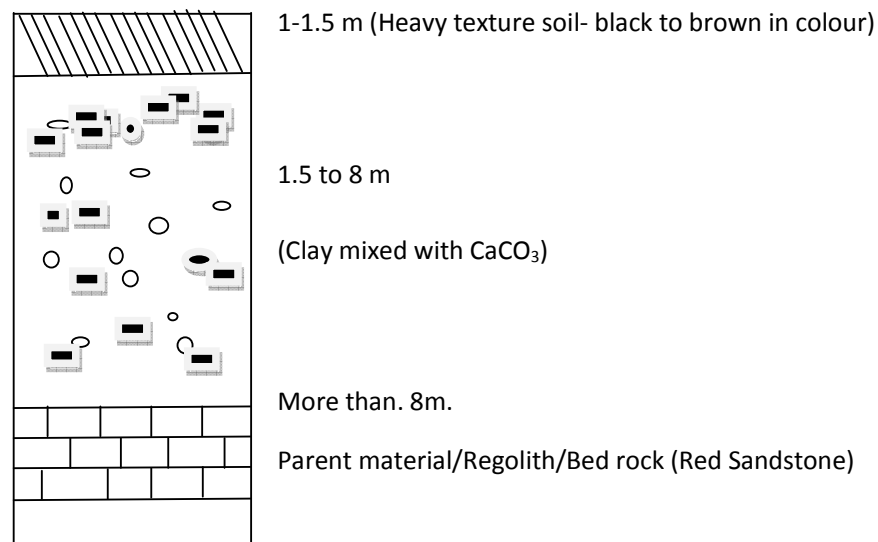


Table -3.7.1 Morphology of a typical soil profile of the watershed (dominant soil)

Horizon	Depth (cm)	Morphology
A	0-150	Black in color, clay content 28%, with free CaCO_3 , sticky when moist, hard when dry, high elasticity, fissures and cracks, occasional occurrence of free calcium carbonate granules pH 7-8
B	150-800	Whitish-yellow in colour, high effervescence with dilute HCl, very fine mixed with free CaCO_3 and granules, very hard when dry, compact & indurate hard pan, restricting development of root and downward water transmission
C	> 800	Red and white sandstone, Regolith (Parent material)

3.8 Soil characteristics and fertility status

Soil characteristics pertaining to soil fertility of various classes occurring around different villages are given in Table **Table**

3.8.1 Soil Characteristics and Fertility Status

Soil properties	LCC II	LCC IV	LCC VII/VIII
Sand (%)	27.90	53.00	72.90
Silt (%)	24.10	18.60	20.30
Clay (%)	46.30	25.18	6.68
Texture	Clay Loam	Loamy Sand	Sandy Loam
pH (1: 2)	7.30	7.25	7.15
EC (dS m ⁻¹)	0.17	0.12	0.15
Organic carbon (%)	0.38	0.31	0.20
Available N (kg ha ⁻¹)	370	308	238
Available P (kg ha ⁻¹)	11	9.00	7.95
Available K (kg ha ⁻¹)	308.10	291.80	264

*Values correspond to soil fraction < 2mm

3.9 Land Capability Classification (LCC)

Land capability classification was done to classify the soils in different groups based upon the limitations and to emphasize the hazards prevailing in the watershed under different kinds of soils. Initially reconnaissance survey was carried out for entire watershed in order to find out the different topo-sequences, landforms, soil depth and erosion hazards. This was followed by the detailed investigation of selected landforms to bring out the LCC classes of the Watershed. Three classes of land capability namely II, IV, and VII were demarcated in the watershed. The areas under different classes are shown in table 12 and Annexure map.

Table 3.9.1. Area under different land capability class under watershed

Land Capability Class	Type of land	Area (ha.)
II	Agriculture land	901.20
III	Agriculture land & Horticulture	3620.40
IV	Gullide land	528.10
VII	Forest land & Others	708.79
Total		5872.39

3.9.2 Land capability class II (Orange)

This group is one of the most extensive LCC class of the watershed. This group of soil is occupying around 901 ha of the watershed area. The soils are clay loam or silty clay loam in texture. The land under this class is nearly level to mild sloping (1-3%). The soils are deep and erosion hazard is slight. Most of the productive agriculture land comes under class II. The lands are almost flat, silty clay or clay loam in texture, deep and very mild sloping. The mapping unit for this class is given as under:

Land capability class II_e = scl-d₅/B-e₁

3.9.3 Land capability class III (Blue)

It is noted that at area of 3620 ha. Is occupied by class III in the watershed area. Almost entire area under this class occurring over lower, moderate and higher Slopes has been converted in to terrace for agriculture. Erosion hazard is moderate, since the terraces are nearly level and well banded in general. At Several points water from natural springs is diverted to the terraces for irrigation. Annexure map LCC.

3.9.4 Land capability class IV (Green)

A considerable area of watershed *i.e.* 528 ha is under class IV. This class is found in lower portion *i.e.* near the outlet of watershed. The soils are coarser in texture (loamy sand/sand), deep, susceptible to erosion hazard and undulating in topography. Rill and initiation of gully can be seen near the outlet of the watershed. The mapping unit for this class is as follows:

Land capability class IV_e = ls-d₅/C-e₃, IV_{es} = ls-d₃/D-e₃ (Foot hill soil)

3.9.5 Land capability class VII (Brenzil)

These lands are occupying an area of 708 ha of the watershed. This class of land is mostly found in ravinous area of watershed. The soils are unproductive with steep slope (>15%) and coarser in texture. Mostly red soils are found under this class.

Annexure for Land capabilities classification map of the watershed

3.9.6 Mapping units symbol

Soil depth (cm) d_5 - > 90 cm; d_3 - 22.5-45.0; d_1 <7.5 cm

Texture cl- clay loam; ls- loamy sand; gls-gravelly loamy sand

Slope (%) B-1-3; C-3-5; D-5-10%; H-25-33; I-33-50

Erosion e_1 - 25% of A horizon lost; e_2 - 50-75% of A horizon lost e_4 - 50-75% B horizon lost.

Conclusions

The land capability classification of the watershed provides reasonable good information with regard to capability of soil, that could be used for agriculture, agri-horticulture, silviculture and pasture development. The majority of land form is coming under class II, which give an insight of good agriculture production potential of this watershed. The productivity of these lands could be further enhanced by adoption of simple soil & water conservation measures like mild leveling, bunding, diversion drain and in-situ moisture conservation practices. The reasonable area is under class VII indicating greater potential of this watershed for forestry and pasture development. The major physical limitations in case of agriculture soils are the sub soil hardness, low water infiltrability and slope

3.10 Historical time line of villages of the project

Table 3.10.1 village Narhan

S.N.	Activities	Year
1	Established	1390
2	Construction Bandhi (water harvesting structure)	2008
3	Opening up Primary school	2002
4	Introduction of Tractor	1982
5	Establishment of P.H.C.	-
6	Kacha road	2004
7	Introduction of thresher	2004
8	First Tube well /Diesel pump set	1986
9	First Motorcycle	2002
10	TV and DVD player	2005
11	Over head water tank	-
12	Electricity in the village	2002
13	Bituminous road	2008
14	Temple renovation	2000
15	Planning for watershed project	2010

Table 3.10.2 village Magraul

S.No	Activities	Year
1	Established	1710
2	Construction Bandhi (water harvesting structure)	2007
3	Opening up Primary school	1965
4	Introduction of Tractor	1965
5	Establishment of P.H.C.	1989
6	Kacha road	1964
7	Introduction of thresher	1970
8	First Tube well /Diesel pump set	1968
9	First Motorcycle	1985
10	TV and DVD player	1990
11	Over head water tank	-
12	Electricity in the village	1991
13	Bituminous road	1973
14	Temple renovation	1975
15	Planning for watershed project	2010

Table 3.10.3 village Padri

S.No.	Activities	Year
1	Established	1700
2	Construction Bandhi (water harvesting structure)	2008
3	Opening up Primary school	1965
4	Introduction of Tractor	1964
5	Establishment of P.H.C.	-
6	Kacha road	2007
7	Introduction of thresher	1965
8	First Tube well /Diesel pump set	1985
9	First Motorcycle	1983
10	TV and DVD player	1980
11	Over head water tank	-
12	Electricity in the village	1985
13	Bituminous road	2009
14	Temple renovation	-
15	Planning for watershed project	2010

Table 3.10.4 village Sekhpur Gurha

S.No.	Activities	Year
1	Established	1470
2	Construction Bandhi (water harvesting structure)	2007
3	Opening up Primary school	1985
4	Introduction of Tractor	1972
5	Establishment of P.H.C.	1972
6	Kacha road	1980
7	Introduction of thresher	1990
8	First Tube well /Diesel pump set	1976
9	First Motorcycle	1990
10	TV and DVD player	1984
11	Over head water tank	-
12	Electricity in the village	1986
13	Bituminous road	1985
14	Temple renovation	1980
15	Planning for watershed project	2010

Table 3.10.5 village Hirapur

S.No.	Activities	Year
1	Established	1712
2	Construction Bandhi (water harvesting structure)	2007
3	Opening up Primary school	1965
4	Introduction of Tractor	1977
5	Establishment of P.H.C.	-
6	Kacha road	1970
7	Introduction of thresher	1980
8	First Tube well /Diesel pump set	1985
9	First Motorcycle	1972
10	TV and DVD player	2005
11	Over head water tank	-
12	Electricity in the village	1985
13	Bituminous road	1980
14	Temple renovation	1949
15	Planning for watershed project	2010

Table 3.10.6 village Devkali

S.No.	Activities	Year
1	Established	1270
2	Construction Bandhi (water harvesting structure)	2007
3	Opening up Primary school	1960
4	Introduction of Tractor	1975
5	Establishment of P.H.C.	1987
6	Kacha road	1980
7	Introduction of thresher	1975
8	First Tube well /Diesel pump set	1980
9	First Motorcycle	1975
10	TV and DVD player	1985
11	Over head water tank	1985
12	Electricity in the village	1980
13	Bituminous road	1991
14	Temple renovation	1964
15	Planning for watershed project	2010

Table 3.10.7 village Gurha Khas

S.No.	Activities	Year
1	Established	1650
2	Construction Bandhi (water harvesting structure)	2007
3	Opening up Primary school	1967
4	Introduction of Tractor	1996
5	Establishment of P.H.C.	-
6	Kacha road	1970
7	Introduction of thresher	1996
8	First Tube well /Diesel pump set	1982
9	First Motorcycle	1985
10	TV and DVD player	1995
11	Over head water tank	-
12	Electricity in the village	1991
13	Bituminous road	2000
14	Temple renovation	1953
15	Planning for watershed project	2010

Table 3.10.8 village Kutra

S.No.	Activities	Year
1	Established	1636
2	Construction Bandhi (water harvesting structure)	1997
3	Opening up Primary school	1967
4	Introduction of Tractor	1994
5	Establishment of P.H.C.	1901
6	Kacha road	1958
7	Introduction of thresher	1994
8	First Tube well /Diesel pump set	1979
9	First Motorcycle	1988
10	TV and DVD player	-
11	Over head water tank	-
12	Electricity in the village	2001
13	Bituminous road	2001
14	Temple renovation	2006
15	Planning for watershed project	2010

Table 3.10.9 village Keeratpur

S.No.	Activities	Year
1	Established	1870
2	Construction Bandhi (water harvesting structure)	1997
3	Opening up Primary school	1995
4	Introduction of Tractor	1990
5	Establishment of P.H.C.	-
6	Kacha road	2004
7	Introduction of thresher	1990
8	First Tube well /Diesel pump set	1980
9	First Motorcycle	1994
10	TV and DVD player	1988
11	Over head water tank	-
12	Electricity in the village	1988
13	Bituminous road	2005
14	Temple renovation	2007
15	Planning for watershed project	2010

Table 3.10.10 Historical time line for village Mainupur

S.No.	Activities	Year
1	Established	1318
2	Construction Bandhi (water harvesting structure)	2009
3	Opening up Primary school	1950
4	Introduction of Tractor	1970
5	Establishment of P.H.C.	1995
6	Kacha road	1990
7	Introduction of thresher	1970
8	First Tube well /Diesel pump set	2006
9	First Motorcycle	1960
10	TV and DVD player	1992
11	Over head water tank	-
12	Electricity in the village	1990
13	Bituminous road	1999
14	Temple renovation	-
15	Planning for watershed project	2010

3.11 Human and Livestock population

3.11.1 Human population

Total population of Ten villages under the watershed is 16778 with average family size of 5 persons (Table 2).

Table 3.11.1 Human population in the watershed

S.No	Name of village	Population				Total Family no.	SC Family no.
		Male	Female	Children	Total		
1	2	3	4	5	6	7	8
1	Narhan	231	185	107	523	77	6
2	Magraul	1718	1533	989	4240	959	29
3	Kutra	437	340	214	991	147	12
4	Mainupur	897	813	433	2143	431	12
5	Heerapur	727	681	348	1756	331	1
6	Gurha Khas	672	626	285	1583	269	1
7	Sekhpur Gurha	624	564	281	1469	271	2
8	Padri	250	193	112	555	80	30
9	Keeratpur	290	254	152	696	112	20
10	Devkali	1284	1031	507	2822	509	8
	Total	7130	6220	3428	16778	3186	121

3.11.2 Livestock population

Total livestock population of the watershed is 17030. Cows are preferred as milk animal, but milk yield is very low. Goats are also kept for milk as well as for meat purpose. The breakup of livestock population is as follows (Table 3.11.2)

Table 3.11.2 Livestock population in watershed

S. No.	Name of Village	livestock Resolution					
		Buffaloes	Cows	Bullocks	Goat	Other	Total
1	Narhar	118	104	32	300	35	589
2	Magraul	329	1260	278	2540	117	4524
3	Padri	210	150	10	504	60	934
4	Sekhpur Gurha	125	156	58	460	-	799
5	Hirapur	140	225	110	330	-	805
6	Gurha Khas	108	154	76	905	14	1257
7	Devkali	385	118	60	2350	-	2913
8	Kutra	345	385	56	1058	57	1901
9	Keeratpur	177	98	26	814	123	1238
10	mainupur	489	396	64	1067	54	2070
	Total	2426	3046	770	10328	460	17030

3.12 Hydrological Data in the watershed area.

Table 3.12.1 Ground water strata in the month of April to june in the villages of the project area

S.no.	Name of village	Ground water strata in month april to june	Particular place
1	Magraul	23 mts.	Near the house of Tulsiram
2	Narhan	22 mts.	In front of house of Ram Narayan
3	Padri	20 mts.	Near the house of Bhawanr Singh
4	Sekhpur Gurha	20 mts.	Near the house of Gram Pradhan
5	Hirapur	21 mts.	In front of house of Shyamu
6	Devkali	18 mts.	Behind the school
7	Gurha Khas	19 mts.	Near the house of Smt. Rukmin
8	Kutra	22 mts.	Near the house of Bhagwandeem
9	Keeratpur	20 mts.	In front of house of Roop chand Ahirwar
10	Mainupur	21 mts.	Near the door of Shri Krishna Dixit

Table 3.13 Distribution of farm families according to their size of land holding .

S. No.	Name of Villages	Land holding classification				
		Marginal	Small	Others	Landless	Total
1	Narhan	156	98	17	-	271
2	Magraul	525	275	108	-	908
3	Padri	183	24	9	-	216
4	Sekhpur Gurha	252	18	3	-	273
5	Heerapur	102	77	26	3	208
6	Gurha Khash	162	21	10	2	195
7	Keeratpur	107	92	51	3	253
8	Devkali	280	99	31	-	410
9	Kutra	93	89	14	1	197
10	Mainupur	198	82	72	5	357
	Total	2058	875	341	14	3288

3.14 Infrastructure social features

The watershed has moderate communication facilities and all Twenty two villages and Concern majra are approachable through motorable road. Mostly villages are electrified and have TV & telephonic connection. Nearest small market is at Kalpi about 0-15 km and nearest big market Kalpi is about 15 km from the watershed. Religious and ritual features are almost common as in other part of the U.P. Small land holding (average less than 2 ha) with large family size (average 6 person) and more than 45 % of the labour force of the total population living below poverty line indicate poor socio economic status of the watershed community. However, strong community spirit among the villager's show positive indication for the success of any programmed to be implemented in participatory mode. Traditionally the entire village community participates in the individual works. map of the watershed villages drawn by villagers themselves, depicting various village features is shown in Table as below.

S	Name of vill	Pakka	Electric	Primar	Jun.	Inter	Post	P.H.C.	Bank	Vetnary	Co-op.	Market	Agri.
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Narhan	√	√	√	√	31 km.	5 km.	5 km.	31 km.	5 km.	31 km.	15 km.	31 km.
2	Magraul	√	√	√	√	9 km.	√	√	9 km.	√	9 km.	9 km.	9 km.
3	Padri	1 km.	√	√	√	10km.	1 km.	1 km.	10 km.	1 km.	10 km.	10 km.	10 km.
4	Sekhpur	√	√	√	√	9 km.	3 km.	3 km.	9 km.	3 km.	9 km.	9 km.	9 km.
5	Hirapur	√	√	√	√	12 km.	3 km.	2 km.	12 km.	8 km.	12 km.	12 km.	12 km.
6	Devkali	√	√	√	√	6 km.	6 km.	√	6 km.	6 km.	6 km.	6 km.	6 km.
7	Gurha Khas	√	√	√	√	10 km.	3 km.	3 km.	10 km.	3 km.	10 km.	10 km.	10 km.
8	Kutra	√	√	√	√	6 km.	3 km.	3 km.	12 km.	3 km.	12 km.	12 km.	12 km.
9	Keeratpur	√	√	√	√	6 km.	6 km.	6 km.	6 km.	6 km.	6 km.	6 km.	6 km.
10	Mainupur	√	√	√	√	10 km.	√	10km.	10 km.	10 km.	10 km.	10 km.	10 km.

3.15 Livelihood

Out of the total population of 16778 in the watershed, a majority *i.e.* more than 80 % has farming as their major source of livelihood followed by 18 % laborers and 2 % service + business class.

3.16 Dependency on forest for fuel wood and fodder

a) Fuel wood

Villagers in the village do not use LPG to meet their cooking energy requirements. The main source of fuel is from cow dung cake, woody stem of Arhar crop and Mustard. About 60 to 65 percent of the domestic energy requirement is met from the agro-byproduct and cow dung cake. Rest is met out from the forest outside the village and watershed boundary. Most preferred fuel wood is *Prosopis juliflora*. Fuel wood is obtained from the forest of *Prosopis juliflora* standing along the river Yamuna situated outside the watershed boundary.

b) Fodder:

Villagers do not have any significant dependency on forest based fodder as these resources are not available in the forests.

ii) Low use of fertilizer per unit cropped area:

Farmers do not use sufficient fertilizer due to lack of water, scarcity of fertilizer in market and insufficient money for fertilizer. Many a times they don't get fertilizer at the right time.

iv) Traditional farming methods:

This also leads to low productivity. There is a lot of ignorance about the use of new farming methods and technologies such as multiple cropping. They don't use FYM and other input in a proper way; that is why they don't get 100% output. So these factors contribute to low productivity.

v) Lack of adequate farm machinery:

Even today a large number of farmers in water shade area use wooden ploughs and bullocks. They don't have adequate machinery like seed drill. So, old machineries take more time in tillage practices.

vi) Lack of finances for farmers:

In Eval most of the farmers are marginal and small. They do not have enough money to buy good quality seeds, machinery and other inputs.

vi) Lack of good quality seeds and fertilizers:

Good quality seed, fertilizer and pesticide are important factor in agriculture productivity. The use of good quality leads to higher land productivity. In watershed, however, there are two limitations in the use of fertilizer. First these fertilizers are most useful in irrigated condition. But in watershed 100 per cent of land depend on rainfall. mostly farmers use nitrogenous fertilizers especially urea. This has resulted in disproportionate use of fertilizer depleting the quality of land.

vii) Lack of other facilities such as storage and marketing:

5-10% of agriculture product damage after harvesting due to scarcity of proper storage and proper market for sale. So he sells to local traders at the low prices. Farmers mainly face proper means of transportation and roads. And second problem is farmers don't have proper storage facilities.

Chapter -4

WATERSHED ACTIVITIES

4.0 Watershed Activities

Watershed management as a strategy has been adopted by Government of India especially in the rain-fed regions of semi-arid tropics. These regions are characterized by low and undependable rain, low soil fertility, poor infrastructure development, low literacy and high incidence of migration. Several studies have identified that there is a dire need of a systematic and scientific approach to deal with watershed development. The common guidelines generate a fresh and flexible framework for the next generation watershed development.

4.1 Scientific Planning :-

1. **Cluster Approach :-**

This envisages integrated development of Geo-hydrological unit ie. Treatment of cluster of micro –watershed. The IWMPI Jalaun Project consist of 7 micro watershed namely 2C2H2f2a, 2C2H2f1d, 2C2H1e1b, 2C2H2f1c, 2C2H2f1b, 2C2H2f1a, And 2C2H1e1a

2. **Base line Survey**

To assess the impact of any watershed development programme a detailed baseline survey has to be conducted. This acts as a benchmark for any intervention during and post implementation of any development programme. A detailed baseline survey was undertaken which involved household census survey, Bio-physical survey and Village level data collection from *Talati –cum mantri*. Household census survey includes a detailed questionnaire which has been filled by visiting each and every household in the village. This gave in the details of the demographic profile of the village, the literacy percentage, SC/ST population, number of BPL household, cattle population, net consumption rate in the village, average milk production of the cattle and various schemes running and their benefits

Bio-physical survey was undertaken to identify various natural resources available in the village. It included the soil typology, well in the area, crop taken in the field, Cropping pattern, fertilizer used and various sources of irrigation in the field.,

- 3 **Participatory Rural Appraisal (PRA)**

The past experience of watershed has given tremendous input to focus on creating accountability of the stakeholders towards the programme. This has created an emphasis to include all the stakeholder communities and their local and Indigenous Technological Knowledge (ITK) while planning for any activity. Participatory approach provides a new path for planning, implementing, monitoring and post- withdrawal activities with a complete accountability of the stakeholders. Various PRA techniques like resource mapping, social mapping, and season calendars were used to understand the physical and social orientation of the village in general and watershed in specific. These tools put the villagers in ease than the complicated questionnaires.

4.2 Use of GIS and Remote sensing for planning

Use of various high science tools has been promoted at various stages of watershed development.

a) Prioritization

Geographical Information System (GIS) has been used for prioritization process. Various layer maps were created like Geo-morphological, Soil, BPL Population, SC/ST population, Ground water Status, Drinking water situation Slope percent. These were all given proper weightage according to the DoLR specification. This helped in prioritization of various watershed areas.

b) Planning

A action plan matrix was formulated by State Level Nodal Agency (SLNA) taking into account various features like the slope percent, soil Depth, Soil Texture, Soil erosion in the area for wasteland, forest land and agricultural land. Global positioning System (GPS) was used to identify each and every water conservation structures available in the project area. This was used to create a map. Contour Map of vertical interval of 0.3 meter at a scale of 1:4000 was used for identifying various locations for soil and water conservation structures.

c) Hydrological modelling

Hydrology modelling technique was used for locating drainage, stream length, flow direction, sink, Flow accumulation. This model overlaid over cadastral map to calculate the catchment area of each structures like the check dam etc. This has helped to remove the human error which generally occurs while calculating the catchment area of a check dam.

Details of Scientific Planning and Inputs in IWMP projects

Scientific criteria / input used	Whether scientific criteria was used
(A) Planning	
Cluster approach	Yes
Whether technical back-stopping for the project has been arranged? If yes, mention the name of the Institute	-
Baseline survey	Yes
Hydro-geological survey	Yes
Contour mapping	Yes

Participatory Net Planning (PNP)	Yes
Remote sensing data-especially soil/ crop/ run-off cover	-
Ridge to Valley treatment	-
Online IT connectivity between	-
(1) Project and DRDA cell/ZP	Yes
(2) DRDA and SLNA	Yes
(3) SLNA and DoLR	Yes
Availability of GIS layers	-
Cadastral map	Yes
Village boundaries	Yes
Drainage	Yes
Soil (Soil nutrient status)	Yes
Land use	Yes
Ground water status	Yes
Watershed boundaries	Yes
Activity	Yes
Crop simulation models#	No
Integrated coupled analyzer/ near infrared visible spectroscopy/ medium spectroscopy for high speed soil nutrient analysis	No
Normalized difference vegetation index (NDVI)#	No
Weather Station	-
(B) Inputs	NO
Bio-pesticides	No

Organic manures	No
Vermicompost	Yes
Bio-fertilizer	Yes
Water saving devices	Yes
Mechanized tools/ implements	Yes
Bio-fencing	Yes
Nutrient budgeting	Yes
Automatic water level recorders & sediment samplers	NO
Any other (please specify)	NO

4.3 WATERSHED DEVELOPMENT TEAM:

The WDT is an integral part of the PIA and will be set up by the PIA. Each WDT should have at least four members, broadly with knowledge and experience in agriculture, soil science, water management, social mobilization and institutional building. At least one of the WDT members should be a woman. The WDT members should preferably have a professional degree. However, the qualification can be relaxed by the DWDU with the approval of SNLA in deserving cases keeping in view the practical field experience of the candidate. The WDT should be located as close as possible to the watershed project. At the same time, it must be ensured that the WDT should function in close collaboration with the team of experts at the district and state level. The expenses towards the salaries of the WDT members shall be charged from the administrative support to the PIA. DWDU will facilitate the training of the WDT members.

4.3.1 Roles and Responsibilities of WDT:

The WDT will guide the watershed committee (WC) in the formulation of the watershed action plan. An indicative list of the roles and responsibilities of the WDT would include among other s, the following.

- a. Assist Gram Panchayat /Gram Sabha in constitution of the watershed committee and their functioning.
- b. Organizing and nurturing User Groups and Self-Help Groups.
- c. Mobilizing women to ensure that the perspectives and interests of women are adequately related in the watershed action plan.
- d. Conducting the participatory base –line surveys, training and capacity building.
- e. Preparing detailed resource development plans including water and soil conservation or redamation etc. to promote sustainable livelihood at household level.
- f. Common property resource management and equitable sharing.
- g. Preparing Detailed Project Report (DPR) for the consideration of Gram Sabha.
- h. Undertake engineering surveys, prepare engineering drawing and cost estimates for any structure to be built.
- i. Monitoring, checking, accessing, and undertaking physical verification and measurement of work done.
- j. Facilitating the development of livelihood opportunities for the landless.
- k. Maintaining project accounts.
- l. Arranging physical, financial and social audit of the work undertaken.
- m. Setting up suitable arrangements for post-project operation, maintenance and future development of the assets created during the project period.

4.3.2 Self Help Group

Self Help Groups are motivated, small homogenous groups organized together through credit and thrift activities. Self help group initiative especially for women help uplift their livelihood. Generally self help groups include landless and poor women. Before formation of the SHGs, during PRA activities, Focussed Group Discussions (FGDs) were held with the women, which came up with the following observations:

- a) Lack of proper credit facilities due to low intervention of formal financial credit institution.
- b) Excessive exploitation of weaker section by money lenders
- c) Lack of attitude for saving among poor people
- d) Lack of knowledge on credit and thrift activity and banking.

Details of Self Help Group in Project Area IWMP.- Kalpi(jalaun) Vth

S. No.	Name of Project (M.W.S.)	Code No. (M.W.S.)	Name of S.H.G.	Occupation of S.H.G.	Name of Chairman & No. Members
1	2	3	4	5	6
1.	Padari Must.	2C2H2f2as	1. parvati S.H.G.	Goat Farming	Smt. Gangavati W/o Ramcharan,10
			2. Jaylaxmi,, S.H.G	Dairy	Shri Abhilakh S/o Sriram,10
			3 JayKisan,, S.H.G	Dairy	Shri Moolchan S/o Tulai ,10
			4 Laxmi ,, S.H.G	Goat Farming	Shri Umadevi W/o Devlal, 11
			5 Bajragbali ,, S.H.G	Dairy	Smt. Mahaveer singh S/o Ahivran singh 12
2.	Kutra must.	2C2H2f1d	1. jay Durgema S.H.G.	Goat Farming	Smt. Kaushalya W/o Atarsingh 10
			2. Khushahali S.H.G.	Goat Farming	Shri Kamlesh Kumar S/o RamPrakash 10
3.	Mangraul	2C2H1e1b	1. Ghandhi S.H.G.	Dairy	Shri Veersingh S/o Vishram singh10
			2. Jyoti ,, S.H.G.	Dairy	Smt. Aneeta Divi W/o Durgesh, 10

4.	Shekhpur Gurha	2C2H2f1c	1. Jay bajrang bali S.H.G.	Goat Farming	Smt. Vimla W/o Bhawan 13
			2. Jay Bhole S.H.G. ,,	bandh Making	Shri Krasan kumar S/o Ramchandra 12
5.	Mainupur	2C2H2f1b	1. Savitri Devi bhooli ,, S.H.G.	Goat Farming	Smt. manju SAini W/o Jitendra Babu 10
			2. Eaklabya S.H.G. ,,	Dairy	Shri DeviPrasad S/o Ramprakash 10
			3 Bhole S.H.G. ,,	Goat Farming	Smt.Natthu Devi W/o Ramlakhan 10
			4 JayHind S.H.G. ,,	Dairy	Shri Bharatdas S/o Alamprasad 10
6.	Heerapur	2C2H2f1a	1. Yamuna S.H.G.	Goat Farming	Smt. rajkumari W/o Kalsingh 10
			2. Jayram S.H.G. ,,	Dairy	Shri Govindra S/o Shamle 10
7	Keeratpur	2C2H1e1a	1 Barsha S.H.G.	,,	Shri Mevalal S/o Ramautar 11
			2 Vyash S.H.G.	Goat Farming	Shri ramesh S/o Balakram 10
			3 JayBajrang S.H.G.	Dairy	Shri Phoolsingh S/o Ramprasad 11
			4. Shri Vyash ji ,,	,,	Shri Chandrashekar S/o ramnath 11

4.3.3 User Group:

User Groups are normally formed to manage an activity or asset created under the programme on a long term basis. The user group collect user charges from their members, oversee the works and manage the benefits.

It was decided that each group would formulate certain internal rules and have a feeling of ownership with community spirit.

Users Group Details in Project Area – IWMP Jalaun-Vth

S.	Name of Project (M.W.S.)	Cod No. (M.W.S.)	Name of U.G.	Name of Group leader & No. of Cultivators.
1	2	3	5	6
1	Padari Must.	2C2H2f2a	No. 1	Shri Santosh singh S/o Bhagvansingh 10
			No. 2	Shri Ramprasad S/o Ramasare 11

			No. 3	Shri Ashok Kumar S/o Maukulal 10
			No. 4	Shri JagatSingh S/o HarnamSingh 8
			No. 5	Shri DeviPrasad S/o Dhaniram 11
2	Kutra must.	2C2H2f1d	No. 1	Shri Lalaram S/o mahadev 14
			No. 2	Shri Mansingh S/o Liladhar 6
			No.3	Shri lalsingh S/o Padam Singh 9
			No. 4	Shri Veerpal Singh S/o LalSingh 11
			No. 5	Shri Himmat Singh S/o Mahadev 12
			No. 2	Shri Mansingh S/o Liladhar 6
3.	Mangraul Must.	2C2H1e1b	No. 1	Shri Ramsevak S/o Baburam 10
			No. 2	Shri. Ramsajeevan S/o BhagvanDeen 12
			No. 3	Shri.Veersingh S/o Vishram Singh 8
			No.4	Shri. Devnarayan S/o Raghuvar 9
			No.5	Shri.Lalaram S/o Baburam 11
4	Shekhpur Gurha	2C2H2f1c	No. 1	Shri Khushali S/o Jodha 16
			No. 2	Shri Baburam S/o Shiv Prasad 10
			No. 3	Shri BrajVihari S/o Ayodhya Prasad 8
			No. 4	Shri Ramsevak S/o Devidyal 11
			No. 5	Shri RadheShyam S/o Dwarika 10
5.	Mainupur	2C2H2f1b	No. 1	Shri Ramsevak S/o Balakram 10
			No. 2	Shri Ramprakash S/o Raghuvar 10
			No. 3	Shri Rambabu S/o Vishvnath 16

			No. 4	Shri Dayasankar S/o ChoteLal 11
			No. 5	Shri Seetaram S/o jagdeesh Prasad 8
6	Heerapur	2C2H2f1a	No. 1	Shri Laxmi Narayan S/o Samle 10
			No. 2	Shri DhurvaKumar S/o Harishakar10
			No. 3	Shri Veerpal S/o Ramratn 9
			No. 4	Shri DayaShankar S/o Mahadev 11
			No.5	Shri Ramsroop S/o Ghaseete 12
7	Keeratpur	2C2H1e1a	No. 1	Shri Phoolsingh S/o Ramsevak 12
			No.2	Shri Kallu S/o Bhanvan Deen 16
			No.3	Shri santosh S/o Devkalee 17
			No.4	Shri Santram S/o BhagbanDas 9
			No.5	Shri Bhoora S/o damroo 12

4.4. Physical activities to be undertaken under IWMP, Jalaun vth

4.4.1 Entry Point activity (EPA)

EPA activities are taken up under watershed projects to build a rapport with the village community at the beginning of the project; generally, certain important works which are in urgent demand of the local community are taken up. A group Discussion was conducted with watershed Development Committee regarding the EPA activity, It was conveyed to the WC that an amount of Rs. 8.4 Lakh was allotted for EPA activity, which was 4 per cent of total allocated budget. The villagers discussed various activities which they felt is important but after a brief discussion it was conveyed to them that only those activities can be taken, which revive the common natural resources. It was also taken into priority that there should be an instrument of convergence which will result in sustainability of activities

4.4.1 Entry point activities (EPA) (All financial figures in lakh Rs.)

S.No.	Name of Villages	Amount earmarked for EPA	Entry Point Activities Planned	Estimated Cost (Rs.in Lakh)
	1. Narhan Mast	21.9766	(A) Panchvati	4.944
	2. Narahan Diwara			
	3. Pandri Diwara		(B) Well Repairing	4.200
	4. Pandri Mustikal			
	5. Sekhpur Must		(C) Bathroom CumCloths Changing Room for Female use near well, HandPump, Pond River etc.	0.8462
	6. Sekhpur Diwara			
	7. Kutra Mustikal			
	8. Kutra Diwara			
	9. Magraul Must		(D) Soaking Pit	1.1535
	10. Magraul Diwara			
	11. Keeratpur		(E) Primary school , Junier High School, other works Like	1.8200
	12. Gurha khas Must			

13. Gurha Khas Diwara 14. Mainupur Must 15. Mainupur Diwara 16. Heerapur Must 17. Heerapur Diwara 18. Devkali Must 19. Devkali Diwara 20. Chak Dev Kali 21. Shekhpur Bulda 22. Sipah		Repairs	
		(F) Handpump	4.26
		(G) Krishak Vikas Munch	4.272
		(H) Three Planting with brick Ground	0.4787

4.5 Watershed Development Work

Watershed Development works are proposed to be taken up from 2nd year of the initiation of the project .These work are proposed to be taken up from ridge to village .And allocation of Rs. 274.68 & 50% of the total cost has been made for watershed development works .

Area Treat Meant Plan

Integrated watershed development program envisage treatment of proposed area with soil & water conservation works along with development of Horticulture, Afforestation & development of silvi pastoral system in denuded land unfit for cultivation, following works are proposed under watershed Development works.

1. Contractions of bunds (Field bund, contour bund, submergence bund, Marginal & peripheral.
2. Renovation of Existing Bund for in-situ moisture conservation.
3. Rain fed Horticulture with and without fencing.
4. Construction of recharge Filter.
5. Construction of new & renovation of Existing structures/ gully plugs/Check dams.
6. Afforestation and development of silvi– pastoral system.
7. Drainge line treatment (pucca structures, gully plug, check dams).

4.5.1 Detail of activities of preparatory phase

Name of villages	Institutional and capacity buildings	Detailed propies report of	Total estimated cost
. Narhan Mast	27.468	5.4936	32.9616
2. Narahan Diwara			
3. Pandri Diwara			
4. Pandri Mustikal			
5. Sekhpur Must			
6. Sekhpur Diwara			
7. Kutra Mustikal			
8. Kutra Diwara			
9. Magraul Must			
10. Magraul Diwara			
11. Keeratpur			
12. Gurha khas Must			

13. Gurha Khas Diwara			
14. Mainupur Must			
15. Mainupur Diwara			
16. Heerapur Must			
17. Heerapur Diwara			
18. Devkali Must			
19. Devkali Diwara			
20. Chak Dev Kali			
21. Shekhpur Bulda			
22. Sipah			

4.6 Activity related to livelihood by self help groups (SHGS) in the project area

S.No.	No.of Groups			Total Groups	Proposed outlay (Rs. In lakh)	Expected annual income per SHG (Rs. In lakh)	Remark
	Dairy	Bund making	Goat Farming				
1. Pandri Mustikal	3	-	2	5		0.20 to	
2. Kurta Mustikal							
3. Magraul Must	-	-	2	2		0.40	

4. Sekhpur guha Must	2	-	-	2			
5. Mainupur	-	1	1	2			
6. Heerapur	2	-	2	4			
7. Keeratpur	1	-	1	2			
	3	-	1	4			
Total	11		9	21	16.6005	22.00	For project period

4.7 Other Activities of watershed works phase – Proposed Target

Name of villages, watersheds	Construction of bunds (Field bund, contour bund, submergence bund, Marginal bund & Peripheral bund.		Renovation of Existing bund for un –sites soil moisture conservation		Rain fed Horticulture with fencing		Rain fed Horticulture without fencing		Construction of Recharge filter	
	Area (ha)	Cost Rs.in Lakh	Area (ha)	Cost Lakh Rs	Area ha	Cost Rs. In Lakh	Area ha	Cost lakh Rs	Nos	Cost in lakhs Rs
1	2	3	4		5	6	7	8	9	10
22 Villages . 2C2H2f2a, 2C2H2f1d, 2C2H1e1b, 2C2H2f1c, 2C2H2f1b, 2C2H2f1a 2C2H1e1a	3418	143.761	478	21.510	1.040	6.3232	240.60	36.2103	16	2.5072

New and renovation of existing water harvesting structures/ gully plug /check dams		Afforestation and development of silvi pastoral System		Drainage line Treatment Pucca structure /gully plug /check dams	
Area ha	Cost in Lakh Rs.	Area ha	Cost in Lakh Rs .	Nos	Cost lakh in Rs.
11	12	13	14	15	16
405	48.7206	26	2.6897	10	12.958

Table. 4.8 Year wise financial outlays (lakh Rs.)

PHASING OF WORK (FINANCIAL & PHYSICAL)

1. Financial Outlays.

S.No.	Component	Unit	Quantity	Unit Cost (Lakhs)	1 st Year (Lakhs)	2 nd Year (Lakhs)	3 rd Year (Lakhs)	4 th Year (Lakhs)	Total (Lakhs)
A.	MANAGEMENT COSTS								
	Administrative cost- TD & DA, POL/ Hiring of vehicles/ Office and payment of electricity and phone bill, etc. computer, stationary and office consumable and contingency				10.9872	13.734	19.2276	10.9872	54.936

	Expert for monitoring and evaluation.	Nos	NA	NA	5.4936	2.7468	2.7468	-	10.9872
	Sub Total				16.4808	16.4808	21.9744	10.9872	65.9232
B.	PREPARATORY PHASES								
	(1.) Entry point Activities								
	a. Panchvati	nos	6	0.824	4.944	-	-	-	4.944
	b. Well repairing	nos	21	0.20	4.20	-	-	-	4.2000
	c. Bathroom Cum Cloth Changing room for Female use near Well, Hand Pump, Pond, River, etc.	nos	2	0.42310	0.8462	-	-	-	0.8462
	d. Soaking Pit	nos	30	0.03845	1.1535	-	-	-	1.1535
	e. Repairing of primary & Junior School	nos	-	-	1.820	-	-	-	1.820
	f. Hand Pump	nos	10	0.42600	4.26	-	-	-	4.260
	g. Krishak Vikas Manch	nos	6	0.71200	4.272	-	-	-	4.272
	h. Tree Planting with Brick Guard	nos	7	-	0.4787	-	-	-	0.4787
	Sub Total				21.9744	-	-	-	21.9744
	(2.) Institutional and Capacity Building		NA	-	10.9872	10.9872	5.4936	-	27.468
	(3.) Detail Project Report				5.4936	-	-	-	5.4936
	Sub Total				38.4552	10.9872	5.4936	-	54.936

C.	WATERSHED WORKS								
	(1.) Watershed Development Works								
	a. Construction of Bunds (Field Bund, Contour Bund, Submergence Bund, Marginal Bund and Peripheral Bund)	ha	3418.00	0.04206	-	71.8805	71.8805	-	143.761
	b. Renovation of the Existing Bund for <i>insitu</i> soil Moisture Conservation	ha	478.00	0.04500	-	10.755	10.755	-	21.510
	c. Rainfed Horticulture with Fencing	ha	10.40	0.60800	-	3.1616	3.1616	-	6.3232
	Rainfed Horticulture without Fencing	ha	240.60	0.15050	-	18.1051	18.1052	-	36.2103
	Total of Rainfed Horticulture	ha	251.10	-	-	21.2668	21.2667	-	42.53345
	d. Construction of Recharge Filter	nos	16	0.15670	-	1.2536	1.2536	-	2.5072
	e. New and Renovation of Existing Water Harvesting Structure/ Gully Plug/ Chek Dam	ha	405.00	0.1200	-	24.3603	24.3603	-	48.7206
	f. Afforestation and Development of Silvi-pastoral System	ha	26	0.10345	-	1.3449	1.3448	-	2.6897
	g. Drainage Line Treatment (Pucca Structure / Gully Plug and Chek Dam)	nos	10	-	-	6.479	6.479	-	12.958
	Sub Total				-	137.34	137.34	-	274.68
	(2.) Livelihood Programme (Community Based)								
	Income Generating Activities through S.H.G.'s								

	for Landless and Marginal Farmers								
	a. Establishment of Nadeb-Compost Units	nos	162	0.10400	16.848	-	-	-	16.848
	b. Dairy Work	nos	16	0.50000	8.00	-	-	-	8.000
	c. Goat-keeping	nos	25	0.43950	10.9875	-	-	-	10.9875
	d. General Merchant Shop	nos	10	0.25000	2.500	-	-	-	2.500
	e. Livestock Development Activities	Detail Attached			16.6005	-	-	-	16.6005
	Sub Total				54.936	-	-	-	54.936
	(3.) Production System and Micro-Enterprises								
	a. Crop Production, Diversification of Agriculture	ha	176	0.05975	-	4.0753	4.0753	2.3654	10.516
	b. Introduction of Agro-forestry / Horticulture	ha	22	2.26820	-	19.1719	19.1719	11.5566	49.9004
	c. Demonstration of Green Manuring	ha	1760	625.00	-	4.2208	4.2208	2.5588	11.334
	Sub Total				-	27.468	27.468	16.4808	71.4168
D.	CONSOLIDATION PHASE	-	-	-	-	-	-	27.468	27.468
	GRAND TOTAL				109.872	192.276	192.276	54.936	549.36

Note: Unit costs of different activities are given in annexure.

4.9 Physical Targets.

Activities Related To	1st Year (quantity)	2nd Year (quantity)	3rd Year (quantity)	4th Year (quantity)	Total (quantity)
ADMINISTRATIVE COSTS					
TD & DA, POL/ Hiring of vehicles/ Office and payment of electricity and phone bill etc. computer, stationary and office consumable and contingency.	√	√	√	√	√
Expert for monitoring and evaluation.	√	√	√	√	√
PREPARATORY PHASES					
Entry Point Activities improvement in Panchvati Drinking Water System, School, etc.	√	-	-	-	√
Institutional and capacity building	√	√	√	√	√
WATERSHED WORKS					
Watershed Development Works					
Construction of Bunds (Field Bund, Contour Bund, Submergence Bund, Marginal Bund and Peripheral Bund) Area Ha	-	1709.0	1709.00	-	3418.00

Renovation of the Existing Bund for <i>insitu</i> soil Moisture Conservation Area Ha	-	239.0	239.0	-	478.00
Rainfed Horticulture with Fencing Area Ha	-	5.20	5.20	-	10.40
Rainfed Horticulture without Fencing Area Ha	-	120.30	120.30	-	240.60
New and Renovation of Existing Water Harvesting Structure/ Gully Plug/ Chek Dam Area Ha	-	202.50	202.50	-	405.00
Afforestation and Development of Silvi-pastoral System Area Ha	-	13	13	-	26.00
Construction of recharge filter (Nos)	-	8	8	-	16
Drainage Line Treatment (Pucca Structure / Gully Plug and Chek Dam) (nos)	-	5	5	-	10
LIVELIHOOD PROGRAMME (community based)					
Income generating activities through SHG's for landless and marginal farmers.					
a. Goat keeping. (nos)	25	-	-	-	25
b. Establishment of Nadev Compost Unit. (nos)	162	-	-	-	162
c. Dairy Work. (nos)	16	-	-	-	16
d. General Merchant Shop. (nos)	10	-	-	-	10
e. Livestock development activities	√	√	√	√	√

PRODUCTION SYSTEM AND MICRO ENTERPRISES					
Demonstration and assessment of improved composting system using alternate materials (118 Nadeb-compost) and 100 nutrient analysis (Nos.)	162	-	-	-	162
	100	-	-	-	100
Introduction of improved crop production practices. i). For <i>Kharif</i> crops (ha). ii). For <i>Rabi</i> crops (ha).	36.00	28.00	20.00	20.00	104.00
	40.00	26.00	24.00	17.00	107.00
CONSOLIDATION PHASE	-	-	-	√	√

4.10 Technical specification of watershed works

Technical Specifaction of field Bund .

Particular	Value	Unit
Top Width	0.50	M
Height	0.50	M
Boottom width	1.50	M
Cross section	0.50	M ²
Length /Ha	200	M
Earth work	100	CUM
Cost/ Ha	3916	Rs.

Technical Specifaction of contoun bund.(1% slope land)

Particular	Value	Unit
Top Width	0.5	m
Height	0.7	m
Side Slop	1.5:7	-
Base of bund	2.60	m
Cross section	1.085	m ²
Length of bund/ha	150	m
Earth work	162.75	m
Cost/ Ha	6375	cum Rs..

Technical Specifaction of Submergance bund

Particular	Value	Unit
Height of Bund	0.90	m
Top Width	0.70	m
Side Slop 1.5:1	-	-
Base width	3.40	m
Cross section	1.845	m ²
Length of bund/ha	150	m
Earth work	276.75	cum
Cost/ Ha	10837.53 Say 10850	Rs.

Technical Specifaction of Submergance bund

Particular	Value	Unit
Top Width	0.70	m
Side Slop	1.5:1	-
Height of bund	1.30	m
Bottom width	4.60	m
Cross section	3.445	m ²
Cost/ metre	142.00	Rs..

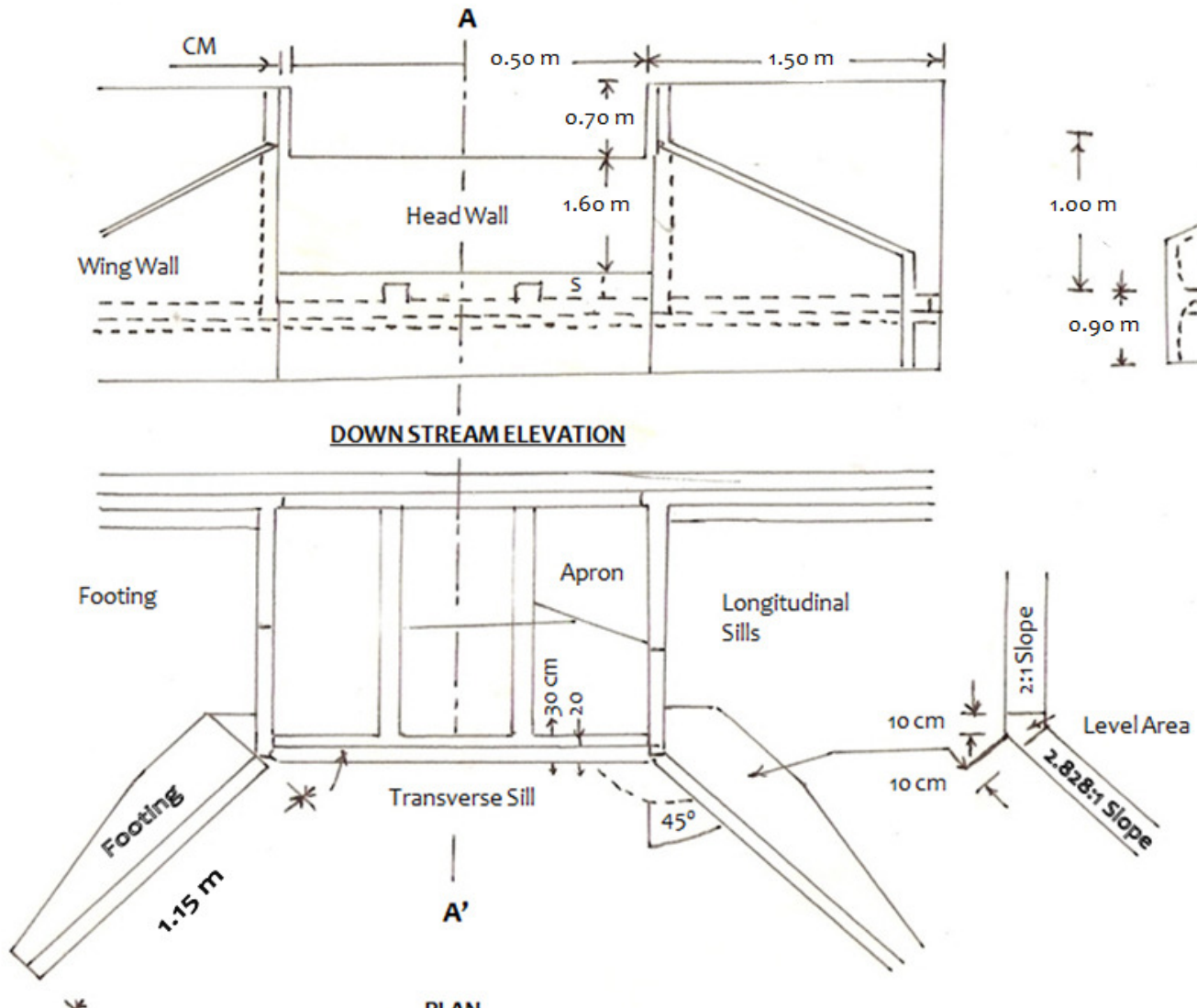
Technical Specifaction of check dam/gully plug

Particular	Value		Unit
	Small	Medium	
Top Width	1.50	2.00	m
Side Slop	2:1		-
Height	2.10	2:1	m
Bottom width	9.90		m
Cross section	11.97	2.5	m ²
Cost/ metre	551.45	12.00	Rs.
		17.50	
		839.12	

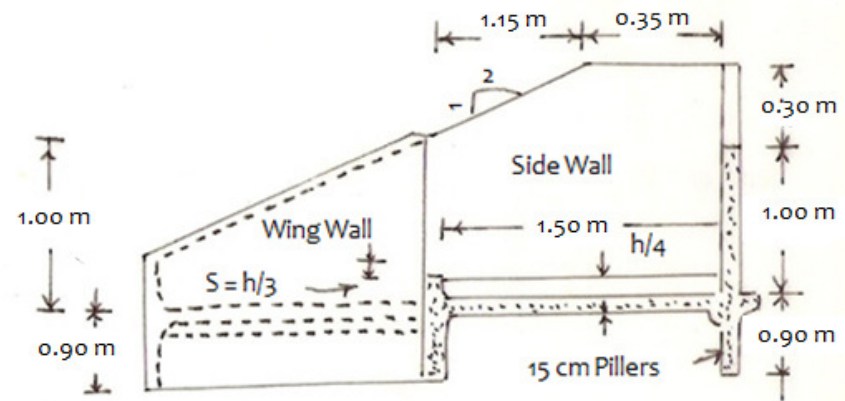
Technical Specifaction of water harvesting Bundhi

Particular	Value	Unit
Top Width	2.50	m
Side Slop	2:1	-
Height	2.75	m
Bottom width	13.50	m
Cross section	22.00	m ²
Cost/ metre	1085.92	Rs.

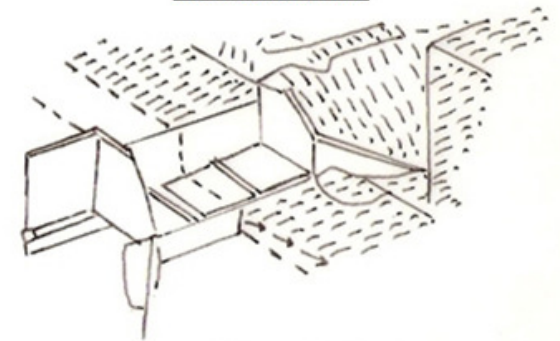
DRAWING OF SPILLWAY OF CREST LENGTH 0.5 m



Not to



SECTION ON A-A'



PERSPECTIVE VIEW

Design of Drop Spillway for 1.00 ha Catchment Area

Design of Drop Spillway to be constructed at a place in a gully having width of 1.0 m and catchment area 1.00 ha and net drop 0.50 m Taking rainfall intensity for duration equal to time of concentration of watershed and design return period of 25 years , as 120mm/hr. The coefficient of runoff for the watershed is 0.3.

1. Hydrologic design- The design peak runoff rate (m^3/s) for the watershed from Rational formula is

given as:

$$Q = \frac{C.I.A.}{360} = \frac{0.3 \times 120 \times 1.00}{360} = 36/360 = 0.10 \text{ cum/second}$$

2. Hydraulic design- The maximum discharge capacity of the rectangular weir given by

$$Q = \frac{1.711 L H^{3/2}}{(1.1 + 0.01 F)}$$

To find suitable value of L & H

Let us assume $L = 0.50 \text{ m}$ (since width of gulley is 1.00 m)

$$0.10 = \frac{1.711 L H^{3/2}}{(1.10 + 0.01 \times 0.5)} = \frac{1.711 L H^{3/2}}{(1.105)}$$

$$L H^{3/2} = \frac{1.105 \times 0.10}{1.711} = \frac{0.1105}{1.711} = 0.064$$

$$H^{3/2} = \frac{0.064}{0.50} = 0.128$$

$$H = (0.128)^{2/3} = 0.25 \text{ m}$$

$$\text{Test: } L/h = \frac{0.50}{0.25} = 2.0 \geq 2.0 \text{ hence O.K.}$$

$$h/f = \frac{0.25}{0.50} = 0.50 \leq 0.5 \text{ hence O.K.}$$

3. Structural design –

1- Minimum headwall extension, $E = (3h + 0.6)$ or $1.5 f$ whichever is greater

$$E = 3 \times 0.5 + 0.6 \quad \text{or} \quad 1.5 \times 0.50$$

$$E = 2.10 \text{ m} \quad \text{or} \quad 0.75 \text{ m}$$

Adopted 2.10 m

$$\begin{aligned} \text{2- Length of apron basin } L_B &= f (2.28 h/f + 0.54) = 0.50 (2.20 \times \frac{0.5}{0.5} + 0.54) \\ & \qquad \qquad \qquad 0.5 \end{aligned}$$

$$= 0.50 \times 2.74 = 1.37 \text{ m says } 1.40 \text{ m}$$

$$\begin{aligned} \text{3- Height of end sill, } S &= \frac{h}{3} = \frac{0.50}{3} = 0.16 \text{ m says } 0.20 \text{ m} \\ & \qquad \qquad \qquad 3 \quad 3 \end{aligned}$$

4- Height of wing wall and side wall at Junction :

$$\begin{aligned} J &= 2h \text{ or } [f + h + S - (L_B + 0.10)/2] \text{ whichever is greater} \\ &= 2 \times 0.50 \text{ or } [0.50 + 0.50 + 0.16 - (1.37 + 0.10)/2] \\ &= 1.0 \text{ or } [1.16 - 0.735] \\ &= 1.0 \text{ or } 0.425 \end{aligned}$$

adopt $J = 1.00 \text{ m}$

$$\text{5- } M = 2 (f + 1.33 h - J) = 2 (0.50 + 1.33 \times 0.25 - 1.00)$$

$$= 2 \times (-0.167) = -0.335 \text{ m}$$

$$6- \quad K = (L_B + 0.1) - M = (1.37 + 0.1) - 0.335$$

$$= 1.47 - 0.335$$

$$= 1.135 \text{ m}$$

Toe and cut off walls

$$\begin{aligned} \text{Normal scour depth (N S D)} &= 0.473 \times (Q/f)^{1/3} \\ &= 0.473 \times (0.1/1)^{1/3} \\ &= 0.473 \times 0.464 \\ &= 0.219 \end{aligned}$$

$$\begin{aligned} \text{Maximum Scour depth (M S D)} &= 1.5 \times \text{N S D} \\ &= 1.5 \times 0.219 \\ &= 0.328 \text{ m} \\ &\text{says } 0.35 \text{ m} \end{aligned}$$

Depth of cutoff /Toe wall = 0.35 m

Apron thickness : For an over fall of 0.5 m. The Apron thickness in concrete construction is 0.20 m since the structure is constructed in masonry, the Apron thickness will be $0.20 \times 1.50 = 0.30$ m

Wall thickness: The thickness of different wall of the structure (masonry construction) is given below:

Description	Thickness of wall	
	Top width	Bottom width
Head wall	0.40	1.00
Side wall	0.30	0.80
Wing wall and head wall extension	0.30	0.60

CONSUMPTION OF MATERIALS

S.No.	Particulars	Quantity	Cement (Bags)	Coarse Sand (cum)	Khanda (cum)	G.S.B 25-40 mm (cum)	G.S. Grit 10-20 mm (cum)
1.	Sand laying	0.995 cum	-	0.995	-	-	-
2.	C.C.W. 1:3:6	1.492 cum	6.41	0.671	-	1.342-	-
3.	R/R Stone Masonry	16.360 cum	39.26	5.562	16.36	-	-
4.	C.C.W. 1:2:4	0.130 cum	0.79	0.054	-	-	0.110
5.	Raised Pointing 1:3	9.62 m ²	0.44	0.045	-	-	-
Total			46.90	7.327	16.36	1.342	0.110
Say			47 Bags				

COST OF MATERIALS

S.No	Name of materials	Quantity	Rate	Amount
1.	Cement	47 Bags	255.00/bag	11985.00
2.	Coarse sand	7.327 cum	910.00/cum	6667.57
3.	Stone Khanda	16.36 cum	1025.00/cum	16769.00
4.	G.S.B. 25-40 mm	1.342 cum	855.00/cum	1147.41
5.	Grit 10-20 mm	0.110 cum	1250.00/cum	137.50
Total				Rs. 36,706.48

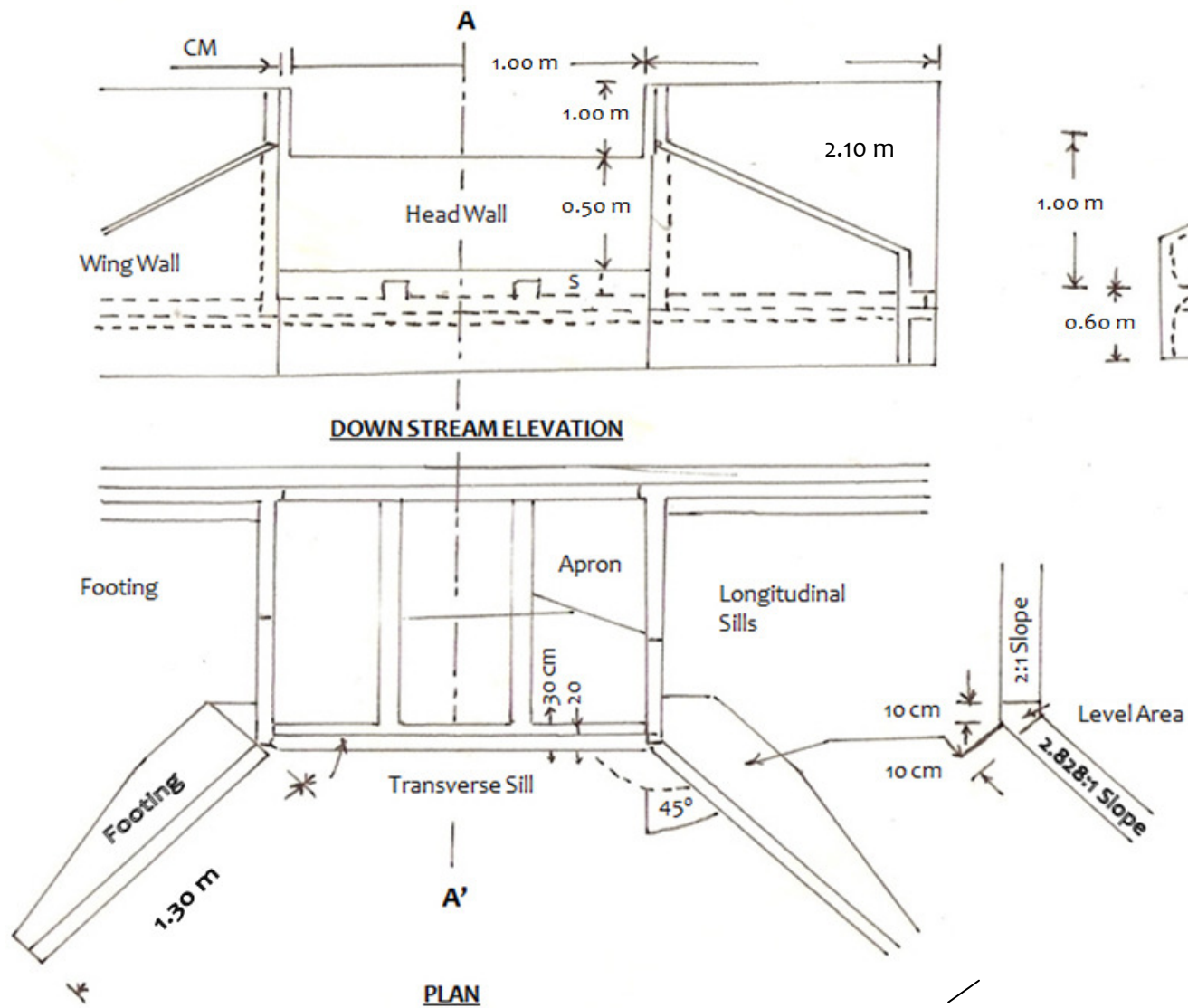
LABOUR CHARGE

S.No.	Particulars	Quantity	Rate	Amount
1.	Earth Work	13.23 cum	36.66/cum	485.01
2.	Sand Laying	0.995 cum	33.33/cum	33.16
3.	C.C.W. 1:3:6	1.492 cum	494/cum	737.04

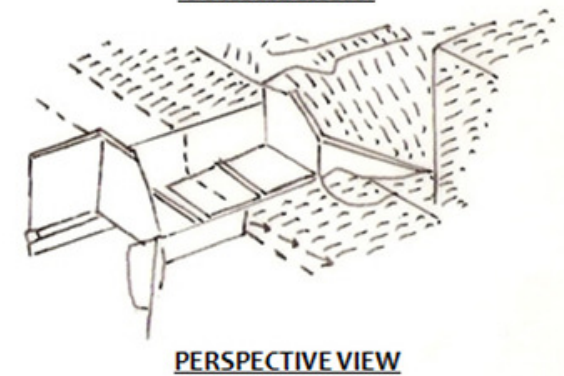
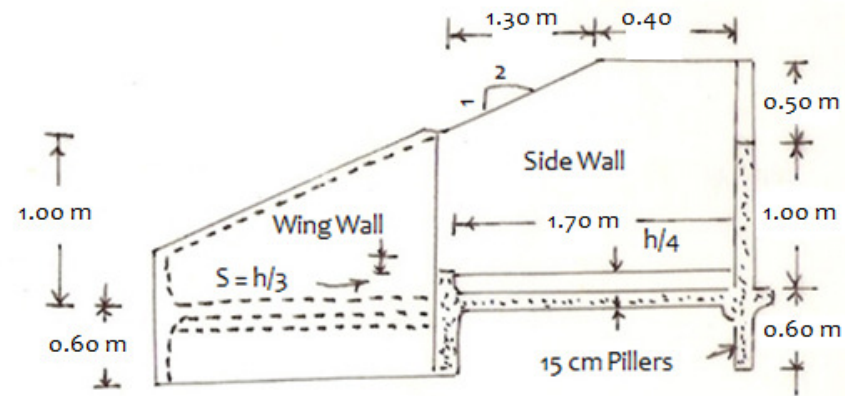
4.	Stone masonry	16.36 cum	370/cum	6053.20
5.	C.C.W. 1:2:4	0.130 cum	494/cum	64.22
6.	Raised Pointing	9.62 m ²	51.61/m ²	496.48
7.	Curing	16.36 cum	25.00/cum	409.00
8.	Chowkidar	6 Man Days	100.00/Man Day	600.00
9.	Head load & local transportation cost 10% cost of material	-	-	3670.64
	Total			Rs. 12,548.75

Total Expenditure	
1. Cost of materials	36706.48
2. Labour Charges	12548.75
Total	Rs. 49,255.23
Say Rs. 49,300.00 only	

DRAWING OF SPILLWAY OF CREST LENGTH 1.0 m



Not to



DESIGN OF DROP SPILLWAY FOR 5.00 HA CATCHMENT AREA

Design of Spillway to be constructed at a place in a gully having width of 2.0 m and catchment area 5.0 ha net drop 1.0m. Taking rainfall intensity for duration equal to time of concentration of watershed and design return period of 25 years, as 120mm/hr. The coefficient of runoff for the watershed is 0.3.

3. **Hydrologic design-** The design peak runoff rate (m^3/s) for the watershed Formula is given as :

$$Q = \frac{C.I.A.}{360} = \frac{0.3 \times 120 \times 5.0}{360} = 0.50 \text{ m}^3/\text{s}$$

2. **Hydraulic design-** The maximum discharge capacity of the rectangular weir given by

$$Q = \frac{1.711 L H^{3/2}}{(1.1 + 0.01 F)}$$

To find suitable value of L & H

Let us assume $L = 1.0 \text{ m}$ (since width of gulley is 2.00 m)

$$0.50 = \frac{1.711 L H^{3/2}}{(1.1+0.01 \times 0.5)} = \frac{1.711 L H^{3/2}}{(1.2)}$$

$$L H^{3/2} = \frac{1.20 \times 0.5}{1.711} = 0.350$$

$$H^{3/2} = \frac{0.375}{1.711 \times 4} = 0.35$$

$$H = (0.350)^{2/3} = 0.49 \text{ m says } 0.50 \text{ m}$$

$$\text{Test: } L/h = \frac{1.00}{0.50} = 2.00 \geq 2.0 \text{ hence O.K.}$$

$$0.50$$

$$h/f = \frac{0.50}{1.00} = 0.5 \leq 5 \text{ hence O.K.}$$

$$1.00$$

Hence the designed hydraulic dimensions of the Spillway are:

$$\text{Crest Length (L)} = 1.00 \text{ m}$$

$$\text{Weir depth (h)} = 0.50 \text{ m}$$

3. Structural design –

1- Minimum headwall extension , $E = (3h + 0.6)$ or $1.5 f$ whichever is greater

$$E = 3 \times 0.50 + 0.6 \quad \text{or} \quad 1.5 \times 1$$

$$E = (1.5 + 0.60) \quad \text{or} \quad 21.50 \text{ m}$$

$$= 2.10 \quad \text{or} \quad 1.50$$

$$\text{Adopted} = 2.10 \text{ m}$$

2- Length of apron basin $L_B = f (2.28 h/f + 0.54) = 1 (2.28 \times \underline{0.50} + 0.54)$

$$1.0$$

$$= 1.14 + 0.54 = 1.68 \text{ m}$$

3- Height of end sill , $S = \frac{h}{3} = \frac{0.50}{3} = 0.16 \text{ m}$

$$\frac{3}{3}$$

4- Height of wing wall and side wall at Junction :

$$J = 2h \text{ or } [f + h + S - (L_B + 0.10)/2] \text{ whichever is greater}$$

$$= 2 \times 0.50 \text{ or } [1.0 + 0.50 + 0.16 - (1.68 + 0.10)/2]$$

$$= 1.0 \text{ or } [1.66 - 0.89]$$

$$= 1.00 \text{ or } 0.77$$

adopt $J = 1.00 \text{ m}$

$$5- \quad M = 2(f + 1.33 h - J) = 2(1.0 + 1.33 \times 0.50 - 1.00) = 2(1.665 - 1.00)$$

$$= 1.33 \text{ m}$$

$$6- \quad K = (L_B + 0.1) - M = (1.68 + 0.1) - 1.33$$

$$= 0.45 \text{ m}$$

Toe and cut off walls

$$\text{Normal scour depth (N S D)} = 0.473 \times (Q/f)^{1/3}$$

$$= 0.473 \times (0.5/1.0)^{1/3} \quad \text{taking } f = 1$$

$$= 0.473 \times (0.5)^{1/3} = 0.473 \times 0.793 = 0.375 \text{ m}$$

$$\text{Maximum Scour depth (M S D)} = 1.5 \times \text{N S D}$$

$$= 1.5 \times 0.375$$

$$= 0.56 \text{ m}$$

$$\text{Depth of cutoff /Toe wall} = 0.56 \text{ m} \text{ Say } \mathbf{0.60 \text{ M}}$$

Apron thickness: For an over fall of 1.0 m. The Apron thickness in concrete construction is 0.30 m since the structure is constructed in masonry, the Apron thickness will be $0.30 \times 1.50 = 0.45 \text{ m}$

Wall thickness: The thickness of different wall of the structure (masonry construction) are given below:

Description	Thickness of wall	
	Top width	Bottom width
Head wall	0.45	1.00
Side wall	0.30	0.80
Wing wall and head wall extension	0.30	0.60

CONSUMPTION OF MATERIALS

S.No.	Particulars	Quantity	Cement (Bags)	Sand (cum)	Khanda (cum)	G.S. Grit 25-40 mm (cum)	Grit 10-20 mm (cum)
1	Sand laying	1.580 cum	-	1.580	-	-	-
2	C.C.W. 1:3:6	2.164 cum	9.95	0.973	-	1.947	-
3	R/R Stone masonry	17.145 cum	41.14	5.829	17.145	-	-
4	C.C.W. 1:2:4	0.166 cum	1.01	0.069	-	-	0.141
5	Raised Pointing 1:3	12.13 m ²	0.55	0.057	-	-	-
	Total		52.65	8.508	17.145	1.947	0.141
	Say		53 Bags	8.51 cum	17.15 cum	1.95 cum	0.14 cum

COST OF MATERIALS

S.No	Name of materials	Quantity	Rate	Amount
1	Cement	53 Bags	255.00	13515.00
2	Course sand	8.51 cum	910.00	7744.10
3	Khanda	17.51 cum	1025.00	17578.75
4	G.S.B. 25-40 mm	1.95 cum	855.00	1667.25
5	G.S.Grit 10-20 mm	0.14 cum	1250.00	175.00
Total				Rs. 40,680.10

LABOUR CHARGE

S.No.	Particulars	Quantity	Rate	Amount
1.	Earth work	15.60 cum	36.66/cum	571.89
2.	Sand Laying	1.580 cum	33.33/cum	52.66
3.	C.C.W. 1:3:6	2.164 cum	494/ cum	1069.01
4.	C.C.W. 1:2:4	0.166 cum	494/ cum	82.00
5.	Stone Masonry	17.145 cum	370/ cum	6343.65
6.	Raised Pointing	12.13 m ²	51.61/m ²	626.02
7.	Curing	17.145 cum	25.00/ cum	428.62
8.	Chowkidar	6 Man Days	100.00/Man Day	600.00
9.	Head Load & local transportation 10% cost of materials			4068.00
	Total			Rs. 13,841.85

Total Expenditure	
1. Cost of Materials	40680.10
2. Labour Charges	13841.85
Total	Rs. 54,521.95
Say Rs. 54,550.00	

DESIGN OF DROP SPILLWAY FOR 20.00 HA CATCHMENT AREA

Design of Drop Spillway to be constructed at a place in a gully having width of 3.0 m and catchment area 20.00 ha net drop 1.5 m Taking rainfall intensity for duration equal to time of concentration of watershed and design return period of 25 years , as 120mm/hr. The coefficient of runoff for the watershed is 0.3.

1. Hydrologic design - The design peak runoff rate (m^3/s) for the watershed from Rational formula is

given as:

$$Q = \frac{C.I.A.}{360} = \frac{0.3 \times 120 \times 20.0}{360} = 2.0 \text{ m}^3/\text{second}$$

2. Hydraulic design- The maximum discharge capacity of the rectangular weir given by

$$Q = \frac{1.711 L H^{3/2}}{(1.1 + 0.01 F)}$$

To find suitable value of L & H

Let us assume $L = 2.0$ m (since width of gulley is 3.00 m)

$$2.00 = \frac{1.711 L H^{3/2}}{(1.1+0.1 \times 0.5)} = \frac{1.711 L H^{3/2}}{(1.10 + 1.15)}$$

$$L H^{3/2} = \frac{2.0 \times 1.115}{1.711}$$

$$H^{3/2} = \frac{2.23}{1.711 \times 2.0} = 0.65$$

$$H = (0.65)^{2/3} = 0.75 \text{ m}$$

$$\text{Test: } L/h = \frac{2.00}{0.75} = 2.666 \geq 2.0 \text{ hence O.K.}$$

$$h/f = \frac{0.75}{1.50} = 0.50 \leq 0.50 \text{ hence O.K.}$$

$$1.50$$

Hence the designed hydraulic dimensions of the Spillway are:

$$\text{Crest Length (L)} = 2.00 \text{ m}$$

$$\text{Weir depth (h)} = 0.81 \text{ m}$$

3. Structural design –

1-Minimum headwall extension , $E = (3h + 0.6)$ or $1.5 f$ whichever is greater

$$E = 3 \times 0.81 + 0.6 \quad \text{or} \quad 1.5 \times 1.50$$

$$E = 3.03 \text{ m} \quad \text{or} \quad 2.25 \text{ m}$$

Adopted 3.03 m

$$\begin{aligned} 2- \text{Length of apron basin } L_B &= f (2.28 h/f + 0.54) = 1.5 (2.28 \times \underline{0.8} + 0.54) \\ & \qquad \qquad \qquad 1.5 \end{aligned}$$

$$= 1.50 (1.20 + 0.54) = 2.61 \text{ m}$$

$$\begin{aligned} 3- \text{Height of end sill ,} \quad S &= \frac{h}{3} = \frac{0.81}{3} = 0.27 \text{ m} \\ & \qquad \qquad \qquad 3 \quad 3 \end{aligned}$$

4- Height of wing wall and side wall at Junction :

$$\begin{aligned} J &= 2h \text{ or } [f + h + S - (L_B + 0.10)/2] \text{ whichever is greater} \\ &= 2 \times 0.81 \text{ or } [1.50 + 0.81 + 0.27 - (2.61 + 0.10)/2] \\ &= 1.62 \text{ or } [2.58 - 1.35] \end{aligned}$$

$$= 1.62 \text{ or } 0.123$$

adopt $J = 1.62 \text{ m}$

$$\begin{aligned} 5- \quad M &= 2 (f + 1.33 h - J) = 2 (1.50 + 1.33 \times 0.81 - 1.62) \\ &= 1.90 \text{ m} \end{aligned}$$

$$\begin{aligned} 6- \quad K &= (L_B + 0.1) - M = (2.61 + 0.1) - 1.90 \\ &= 0.81 \text{ m} \end{aligned}$$

Toe and cut off walls

$$\begin{aligned} \text{Normal scour depth (N S D)} &= 0.473 \times (Q/f)^{1/3} \\ &= 0.473 \times (2/1)^{1/3} \\ &= 0.473 \times 1.259 \\ &= 0.595 \text{ m} \end{aligned}$$

$$\begin{aligned} \text{Maximum Scour depth (M S D)} &= 1.5 \times \text{N S D} \\ &= 1.5 \times 0.595 \\ &= 0.89 \text{ m} \end{aligned}$$

$$\text{Depth of cutoff /Toe wall} = 0.89 \text{ m}$$

Apron thickness: For as over fall of 1.50 m is concrete construction is 0.30 m since the structure is constructed in masonry, the Apron thickness will be $0.30 \times 1.50 = 0.45$ m

Wall thickness: The thickness of different wall of the structure (masonry construction) is given below:

Description	Thickness of wall	
	Top width	Bottom width
Head wall	0.45	1.33
Side wall	0.30	1.10
Wing wall and head wall extension	0.30	0.80

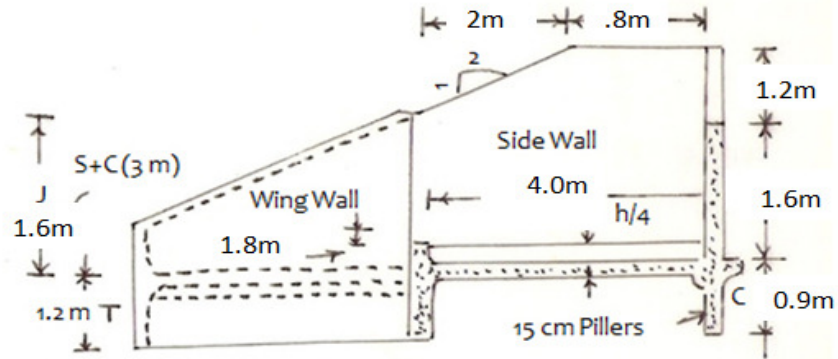
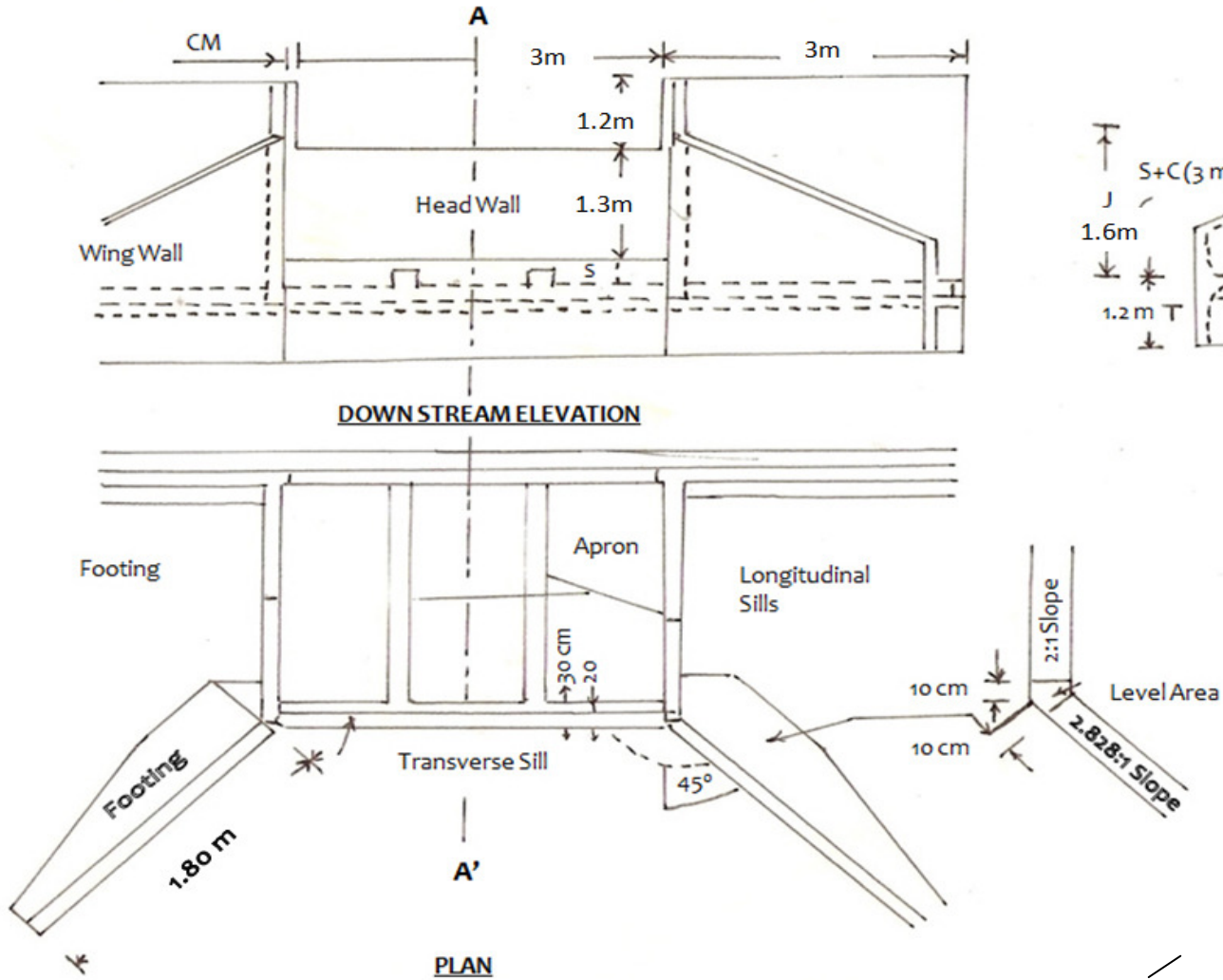
CONSUMPTION OF MATERIALS

S.No.	Particulars	Quantity	Cement (Bags)	Coarse Sand (cum)	Khanda (cum)	G.S.B 25-40 mm (cum)	G.S. Grit 10-20 mm (cum)
1.	Sand laying	2.627 cum	-	2.627	-	-	-
2.	C.C.W. 1:3:6	3.939 cum	16.93	1.772	-	3.545	-
3.	R/R Stone Masonry 1:4	51.806 cum	124.33	17.614	51.806	-	-
4.	C.C.W. 1:2:4	0.294 cum	1.79	0.123	-	-	0.249
5.	Raised Pointing 1:3	22.84 m ²	1.05	0.107	-	-	-
Total			144.10	22.243	51.806	3.545	0.249
Say			144 Bags	22.243 cum	51.80 cum	3.55 cum	0.250 cum

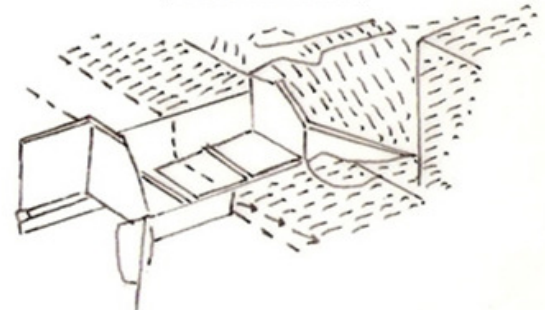
LABOUR CHARGE

S.No.	Particulars	Quantity	Rate	Amount
1.	Earth Work	38.95 cum	36.66/cum	1427.90
2.	Sand Laying	2.627 cum	33.33/cum	87.55
3.	C.C.W. 1:3:6	3.939 cum	494/cum	1945.86
4.	C.C.W. 1:2:4	0.2939 cum	494/cum	145.18
5.	R/R Stone masonry	51.806 cum	370/cum	19168.22
6.	Raised Pointing	22.84 m ²	51.61/m ²	1178.77
7.	Curing	51.806 cum	25.00/cum	1295.15
8.	Chowkidar	13 Man Days	100.00/Man Day	1300.00
9.	Head load & local transportation cost 10% cost of material	-	-	11340.03
	Total			Rs. 37,888.66
Total Expenditure				
1. Cost of materials		113403.88		
2. Labour Charges		37888.66		
Total		Rs. 1,51,292.54		

DRAWING OF SPILLWAY OF CREST LENGTH 3.0 m



SECTION ON A-A'



PERSPECTIVE VIEW

DESIGN OF DROP SPILLWAY FOR 30.00 HA CATCHMENT AREA

Design of Drop Spillway to be constructed at a place in a gully having width of 4.0 m and catchment area 30 ha net drop 1.5 m Taking rainfall intensity for duration equal to time of concentration of watershed and design return period of 25 years , as 120mm/hr. The coefficient of runoff for the watershed is 0.3.

1. Hydrologic design- The design peak runoff rate (m^3/s) for the watershed from Rational formula is

given as:

$$Q = \frac{C.I.A.}{360} = \frac{0.3 \times 120 \times 30.0}{360} = 3.0 \text{ m}^3/\text{s}$$

2. Hydraulic design- The maximum discharge capacity of the rectangular weir given by

$$Q = \frac{1.711 L H^{3/2}}{(1.1 + 0.01 F)}$$

To find suitable value of L & H

Let us assume $L = 3.0 \text{ m}$ (since width of gulley is 4.00 m)

$$3.0 = \frac{1.711 L H^{3/2}}{(1.1+0.01 \times 1.5)} = \frac{1.711 L H^{3/2}}{(1.1+0.15)}$$

$$L H^{3/2} = \frac{3.00 \times 1.25}{1.711}$$

$$H^{3/2} = \frac{3.75}{1.711 \times 3} = 0.73$$

$$H = (0.73)^{2/3} = 0.80 \text{ m}$$

Test: $L/h = 3.00/0.80 = 3.75 \geq 2.0$ hence O.K.

$h/f = \frac{0.80}{1.50} = 0.53 \leq$ which is approximately 0.50. Hence, O.K.

1.50

Hence the designed hydraulic dimensions of the Spillway are:

Crest Length (L) = 3.00 m

Weir depth (h) = 0.80 m

3. Structural design –

1-Minimum headwall extension, $E = (3h + 0.6)$ or $1.5 f$ whichever is greater

$$E = 3 \times 0.80 + 0.6 \quad \text{or} \quad 1.5 \times 1.50$$

$$E = 3.0 \text{ m} \quad \text{or} \quad 2.25 \text{ m}$$

$$\text{Head wall extension} = 3.0 \text{ m}$$

2- Length of apron basin $L_B = f (2.28 h/f + 0.54) = 1.5 (2.28 \times \underline{0.8} + 0.54)$

$$1.5$$

$$= 1.50 (1.216 + 0.54) = 1.5 \times 1.756$$

$$= 2.634 \text{ m says } 2.63 \text{ m}$$

3- Height of end sill, $S = \frac{h}{3} = \frac{0.80}{3} = 0.26 \text{ m}$

$$\frac{3}{3}$$

4- Height of wing wall and side wall at Junction :

$$J = 2h \text{ or } [f + h + S - (L_B + 0.10)/2] \text{ whichever is greater}$$

$$= 2 \times 0.80 \text{ or } [1.50 + 0.80 + 0.26 - (2.63 + 0.10)/2]$$

$$= 1.6 \text{ or } [2.56 - 1.365]$$

$$= 1.6 \text{ or } 1.195$$

adopt $J = 1.60 \text{ m}$

$$5- \quad M = 2(f + 1.33 h - J) = 2(1.50 + 1.33 \times 0.80 - 1.60) = 2(2.564 - 1.60)$$

$$= 1.928 \text{ m}$$

$$6- \quad K = (L_B + 0.1) - M = (2.63 + 0.1) - 1.93$$

$$= 0.80 \text{ m}$$

Toe and cut off walls

$$\text{Normal scour depth (N S D)} = 0.473 \times (Q/f)^{1/3}$$

$$= 0.473 \times (3/1)^{1/3}$$

$$= 0.473 \times 1.442$$

$$= 0.68 \text{ m}$$

$$\text{Maximum Scour depth (M S D)} = 1.5 \times \text{N S D}$$

$$= 1.5 \times 0.68$$

$$= 1.02 \text{ m}$$

$$\text{Depth of cutoff /Toe wall} = 1.02 \text{ m}$$

Apron thickness: For an over fall of 1.50 m. The Apron thickness in concrete construction is 0.30 m since the structure is constructed in masonry, the Apron thickness will be $0.30 \times 1.50 = 0.45 \text{ m}$

Wall thickness: The thickness of different wall of the structure (masonry construction) is given below:

Description	Thickness of wall	
	Top width	Bottom width
Head wall	0.45	1.33
Side wall	0.30	1.10
Wing wall and head wall extension	0.30	0.80

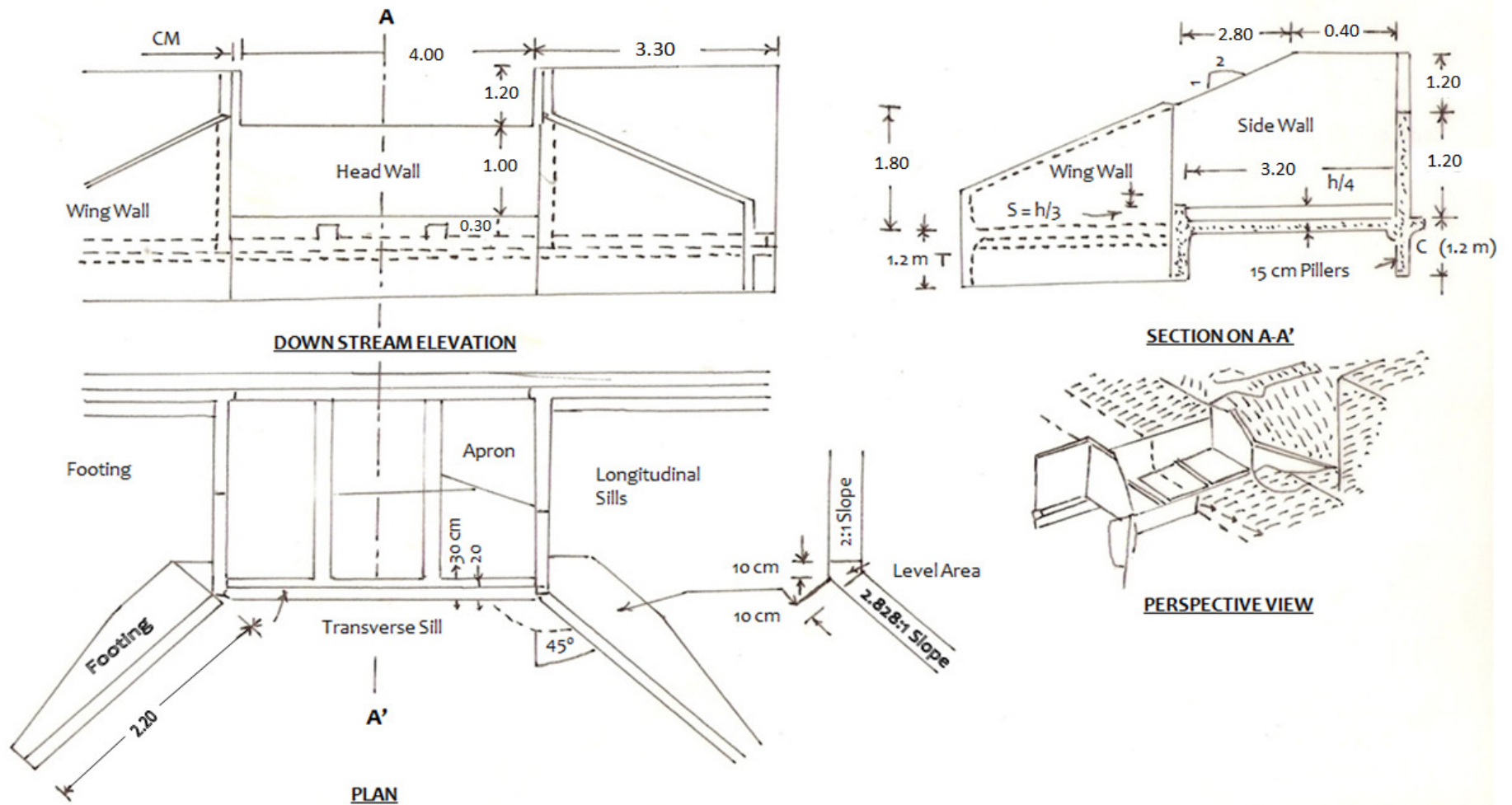
CONSUMPTION OF MATERIALS

S.No.	Particulars	Quantity	Cement (Bags)	Sand (cum)	Khanda (cum)	G.S.B 25-40 mm (cum)	G.S. Grit 10-20 mm (cum)
1	Sand laying	3.155 cum	-	3.155	-	-	-
2	C.C.W. 1:3:6	4.732 cum	20.34	2.129	-	4.258	-
3	C.C.W. 1:2:4	0.441 cum	2.69	0.185	-	-	0.374
4	S/M 1:4	53.689 cum	128.85	18.254	53.689	-	-
5	Raised Pointing 1:3	39.86 m ²	1.83	0.187	-	-	-
Total			153.71	23.910	53.689	4.258	0.374
Say			154	23.910	53.68	4.26	0.374

COST OF MATERIALS

S.No	Name of materials	Quantity	Rate	Amount
1	Cement	154 Bags	255.00	39270.00
2	Coarse sand	23.91	910.00	21758.10
3	Khanda	53.68	1025.00	55022.00
4	G.S.B. 25-40 mm	4.26	855.00	3633.75
5	Grit 10-20 mm	0.374	1250.00	467.50
Total				12,0151.25

DRAWING OF SPILLWAY OF CREST LENGTH 4.0 m



DESIGN OF DROP SPILLWAY FOR 50.00 HA CATCHMENT AREA

Design of Drop Spillway to be constructed at a place in a gully having width of 5.0 m and catchment area 50.00 ha and net drop 2.0m Taking rainfall intensity for duration equal to time of concentration of watershed and design return period of 25 years, as 120mm/hr. The coefficient of runoff for the watershed is 0.3.

1. **Hydrologic design**- The design peak runoff rate (m^3/s) for the watershed from Rational formula is

given as:

$$Q = \frac{C.I.A.}{360} = \frac{0.3 \times 120 \times 50}{360} = 5.00 \text{ m}^3/\text{second}$$

2. **Hydraulic design**- The maximum discharge capacity of the rectangular weir given by

$$Q = \frac{1.711 L h^{3/2}}{(1.1 + 0.01 F)}$$

To find suitable value of land L and H

Let us assume $L = 4.0 \text{ m}$ (since width of gulley is 5.0 m)

$$5 = \frac{1.711 \times 4.0 \times h^{3/2}}{(1.10 + 0.01 \times 2)}$$

$$(1.10 + 0.01 \times 2)$$

$$h^{3/2} = \frac{5.0 \times 1.12}{6.844} = \frac{5.60}{6.844} = 0.818$$

$$6.844$$

$$h = (0.818)^{2/3}$$

$$= 0.874 \text{ m says } 0.90 \text{ m.}$$

Test: $L / h = 4 / 0.9 = 4.44 \geq 2.0$ hence, O.K.

$$h / f = 0.9 / 2.0 = 0.45 \leq 0.5 \text{ hence, O.K}$$

Hence the designed hydraulic dimensions of the Spillway are:

$$\text{Crest Length (L)} = 4.0 \text{ m}$$

$$\text{Weir depth (h)} = 0.90 \text{ m}$$

3. Structural design –

1- Minimum headwall extension , $E = (3h + 0.6)$ or $1.5 f$ which ever is greater

$$E = 3 \times 0.9 + 0.6 = 3.3 \text{ or } 1.5 \times 2 = 3.00 \text{ m}$$

$$E = 3.30 \text{ m}$$

$$\begin{aligned} 2\text{- Length of apron basin } L_B &= f(2.28 h/f + 0.54) = 2(2.20 \times 0.9/2.0 + 0.54) \\ &= 2(0.99 + 0.54) = 2 \times 1.53 = 3.06 \text{ m Says } 3.10 \end{aligned}$$

$$3\text{- Height of end sill, } S = \frac{h}{3} = 0.9/3 = 0.3 \text{ m}$$

4- Height of wing wall and side wall at Junction :

$$\begin{aligned} J &= 2h \text{ or } [f + h + s - (L_B + 0.10)/2] \text{ whichever is greater} \\ &= 2 \times 0.9 \text{ or } [2 + 0.9 + 0.30 - (3.06 + 0.10)/2] \\ &= 1.8 \text{ or } [3.20 - 1.58] \\ &= 1.8 \text{ or } 1.62 \text{ hence adopt } J = 1.8 \text{ m} \end{aligned}$$

$$\begin{aligned} 5\text{- } M &= 2(f + 1.33 h - J) = 2(2 + 1.33 \times 0.9 - 1.8) \\ &= 2 \times 1.397 = 2.794 \text{ Says } 2.80 \text{ m} \end{aligned}$$

$$\begin{aligned} 6\text{- } K &= (L_B + 0.1) - M = (3.06 + 0.1) - 2.80 \\ &= 0.36 \text{ m} \end{aligned}$$

Toe and cut off walls

$$\begin{aligned}\text{Normal scour depth (N S D)} &= 0.473 \times (Q/f)^{1/3} \\ &= 0.473 \times (5/1)^{1/3} \\ &= 0.473 \times 1.7099 \\ &= 0.808\end{aligned}$$

$$\begin{aligned}\text{Maximum Scour depth (M S D)} &= 1.5 \times \text{N S D} \\ &= 1.5 \times 0.808 \\ &= 1.212 \text{ says } 1.21 \text{ m}\end{aligned}$$

$$\text{Depth of cutoff /Toe wall} = 1.21 \text{ m}$$

Apron Thickness : For an over fall of 2.0 m in concrete construction is 0.3 m, since the structure is constructed in masonry , the Apron thickness will be $1.5 \times 0.30 = 0.45 \text{ m}$

Wall Thickness : The thickness of different wall of the structure (masonry construction) is given below:

Description	Thickness of wall	
	Top width	Bottom width
Head wall	0.45	1.33
Side wall	0.30	1.10
Wing wall and head wall extension	0.30	0.80

CONSUMPTION OF MATERIALS

S.No.	Particulars	Quantity	Cement (Bags)	Coarse Sand (cum)	Khanda (cum)	G.S.B 25-40 mm (cum)	G.S. Grit 10-20 mm (cum)
1.	Sand laying	4.262 cum	-	4.262	-	-	-
2.	C.C.W. 1:3:6	6.393 cum	27.48	2.876	-	5.75	-
3.	C.C.W. 1:2:4	0.445 cum	2.71	0.186	-	-	0.378
4.	R/R Stone Masonry 1:4	59.045 cum	141.70	20.075	59.045	-	-
5.	Raised Pointing 1:3	35.120 m ²	1.61	0.165	-	-	-
Total			193.50	27.5640	59.045	5.75	0.378
Say			194 Bags	27.5640 cum	59.04 cum	5.75 cum	0.38 cum

COST OF MATERIALS

S.No	Name of materials	Quantity	Rate	Amount
1.	Cement	194 Bags	255.00/bag	59470.00
2.	Coarse sand	27.564 cum	910.00/cum	25083.24
3.	Khanda	59.04 cum	1025.00/cum	60516.00
4.	G.S.B. 25-40 mm	5.75 cum	855.00/cum	4916.25
5.	G.S.Grit 10-20 mm	0.38 cum	1250.00/cum	475.00
Total				Rs. 1,40,460.49

LABOUR CHARGE

S.No.	Particulars	Quantity	Rate	Amount
1.	Earth Work	54.08 cum	36.66/cum	1982.57
2.	Sand Laying	4.262 cum	33.33/cum	142.05
3.	C.C.W. 1:3:6	6.393 cum	494/cum	3158.14
4.	C.C.W. 1:2:4	0.445 cum	494/cum	219.83
5.	Stone masonry	59.045 cum	370/cum	21846.65
6.	Raised Pointing	35.12 m ²	51.61/m ²	1812.54
7.	Curing	59.045 cum	25.00/cum	1476.12
8.	Chowkidar	13 Man Days	100.00/Man Day	1300.00
9.	Head load & local transportation cost 10% cost of material	-	-	14046.60
	Total			Rs. 45,984.50

Total Expenditure	
1. Cost of materials	140460.49
2. Labour Charges	45984.50
Total	Rs. 1,86,444.99
Say Rs. 1,86,500.00 only	

Estimate of Orchard Development in the Watersheds Per Hectare (Without Fencing)

S.No.	Particulars	Quantity	Rate	Amount	Remarks
A. Horticulture					
1.	Soil working 1m x 1m x 1m size pits (270nos.) including cost of refilling	270.00 cum	36.66/cum	9898.20	Since, the project is to be operated in a participatory mode, contribution in the form of labour input for pit digging, FYM and its applications, weeding and hoeing are to be provided by the participating farmers, hence the costs are not included in the estimates.
2.	Application of Farmyard Manure, including cost		L.S.	450.00	
3.	Cost of NPK mixture, neemicide @ 250 gm/plant		L.S.	400.00	
4.	Cost of plants (including 15% etc. for mortality) including transportation and planting	310 nos.	15.00/Plant	4650.00	
5.	Casualty replacement @ 10% of item No. 4 & 5			465.00	
6.	Cost of 2 weedings and hoeing		1.00/Plant	540	
7.	Contingency and unforeseen (3%)			492.00	
	Total			Rs. 6,007.00	
	Say			Rs. 6,000.00	
	Maintenance cost 2 nd year onwards – 15 % of 1 st year cost			900.00	
	For next 5 years i.e., Rs. 900 x 5			4500.00	
	Total Cost			Rs. 10,500.00	
	Say			Rs. 10,500.00	
B. Agro-Horticulture (cost per ha)					
1.	Cost of raising 270 plants up to 5 years @ Rs. 10,000.00			10500.00	The remarks mentioned under Horticulture are also applicable for Agro-Horticulture.
2.	Cost of raising agricultural crops @ Rs. 5,000 per hectare per year			5000.00	
	Total			Rs. 15,500.00	

Estimate of Orchard Development in the Watersheds Per Hectare (With Fencing)

S.No.	Particulars	Quantity	Rate	Amount	Remarks
A. Horticulture					
1.	Soil working 1m x 1m x 1m size pits (270nos.) including cost of refilling	270.00 cum	36.66/cum	9898.20	Since, the project is to be operated in a participatory mode, contribution in the form of labour input for pit digging, FYM and its applications, weeding and hoeing are to be provided by the participating farmers, hence the costs are not included in the estimates.
2.	Application of Farmyard Manure, including cost		L.S.	450.00	
3.	Cost of NPK mixture, neemicide @ 250 gm/plant		L.S.	400.00	
4.	Cost of plants (including 15% etc. for mortality) including transportation and planting	310 nos.	15.00/Plant	4650.00	
5.	Casualty replacement @ 10% of item No. 4 & 5			465.00	
6.	Cost of 2 weedings and hoeing		1.00/Plant	540	
7.	Contingency and unforeseen (3%)			492.00	
	Total			Rs. 6,007.00	
	Say			Rs. 6,000.00	
	Maintenance cost 2 nd year onwards – 15 % of 1 st year cost			900.00	
	For next 5 years i.e., Rs. 900 x 5			4500.00	
	Total Cost			Rs. 10,500.00	
	Say			Rs. 10,500.00	
B. Agro-Horticulture (cost per ha)					
1.	Cost of raising 270 plants up to 5 years @ Rs. 10,000.00			10500.00	The remarks mentioned under Horticulture are also applicable for Agro-Horticulture.
2.	Cost of raising agricultural crops @ Rs. 5,000 per hectare per year			5000.00	
3.	Fencing			45300.00	
	Total			Rs. 60,800.00	

COST IN PLANTING ONE PLANT WITH DIGGING, FILLING MIXED WITH FYM AND COST OF PLANT

S.No.	Particular	No.	L	B	D/H	Quantity	Rate	Amount
1	Earth work in digging	1	1.0	1.0	1.00	1.00	36.66	36.66
2	Cost of FYM, in Kg/pit	1	-	-	-	10Kg	8.00	80.00
3	Filling of pits mixed with FYM and soil	1	1.0	1.0	1.0	1.00	36.66	36.66
4	Cost of plants	1	-	-	-	1	18.00	18.00
Total								171.32
Say								Rs. 172.00

ESTIMATE FOR SILVI-PASTORAL SYSTEM (RS. ha⁻¹) PLANTATIONS (800 PLANTS ha¹)

Sl. No.	Particulars of work	Rate (Rs.)	Cost (Rs.)	Remarks
1-	Clear felling or bush clearance of area protected Infected with <i>Lantana</i> etc. including Cost of burning	LS	550.00	The area is to be through biofencing
2-	Soil working –earth work, digging of Pits/holes 60 cm deep, 30cm dia -800 Nos. Including cost of refilling and trenching (400 trenches/ha)	LS	6085.00	
3-	Cost of seedlings for 900 nos. and grass seeding /legumes seeds and planning/sowing	-	2050.00	Rs.2.00 per
4-	Weeding and hoeing (2 Nos.)	LS	300.00	
Total			8985	
Maintenance 2 nd year 15% of the 1 st year expenditure including being up of 1 st year failure				
Grand total			10,335.00	
Say			10,350.00	

CHAPTER – 5

BUDGETING

PHASING OF WORK (FINANCIAL & PHYSICAL)

1. Financial Outlays.

S.No.	Component	Unit	Quantity	Unit Cost (Lakhs)	1 st Year (Lakhs)	2 nd Year (Lakhs)	3 rd Year (Lakhs)	4 th Year (Lakhs)	Total (Lakhs)
A.	MANAGEMENT COSTS								
	Administrative cost- TD & DA, POL/ Hiring of vehicles/ Office and payment of electricity and phone bill, etc. computer, stationary and office consumable and contingency				10.9872	13.734	19.2276	10.9872	54.936
	Expert for monitoring and evaluation.	Nos	NA	NA	5.4936	2.7468	2.7468	-	10.9872
	Sub Total				16.4808	16.4808	21.9744	10.9872	65.9232
B.	PREPARATORY PHASES								
	(1.) Entry point Activities								
	a. Panchvati	nos	6	0.824	4.944	-	-	-	4.944
	b- Well repairing	nos	21	0.20	4.20	-	-	-	4.2000
	c. Bathroom Cum Cloth Changing room for Female use near Well, Hand Pump, Pond, River, etc.	nos	2	0.42310	0.8462	-	-	-	0.8462
	d. Soaking Pit	nos	30	0.03845	1.1535	-	-	-	1.1535

	e. Repairing of primary & Junior School	nos	-	-	1.820	-	-	-	1.820
	f. Hand Pump	nos	10	0.42600	4.26	-	-	-	4.260
	g. Krishak Vikas Manch	nos	6	0.71200	4.272	-	-	-	4.272
	h. Tree Planting with Brick Guard	nos	7	-	0.4787	-	-	-	0.4787
	Sub Total				21.9744	-	-	-	21.9744
	(2.) Institutional and Capacity Building		NA	-	10.9872	10.9872	5.4936	-	27.468
	(3.) Detail Project Report				5.4936	-	-	-	5.4936
	Sub Total				38.4552	10.9872	5.4936	-	54.936
C.	WATERSHED WORKS								
	(1.) Watershed Development Works								
	a. Construction of Bunds (Field Bund, Contour Bund, Submergence Bund, Marginal Bund and Peripheral Bund)	ha	3418.00	0.04206	-	71.8805	71.8805	-	143.761
	b. Renovation of the Existing Bund for <i>insitu</i> soil Moisture Conservation	ha	478.00	0.04500	-	10.755	10.755	-	21.510
	c. Rainfed Horticulture with Fencing	ha	10.40	0.60800	-	3.1616	3.1616	-	6.3232
	Rainfed Horticulture without Fencing	ha	240.60	0.15050	-	18.1051	18.1052	-	36.2103
	Total of Rainfed Horticulture	ha	251.10	-	-	21.2668	21.2667	-	42.53345
	d. Construction of Recharge Filter	nos	16	0.15670	-	1.2536	1.2536	-	2.5072
	e. New and Renovation of Existing Water	ha	405.00	0.1200	-	24.3603	24.3603	-	48.7206

	Harvesting Structure/ Gully Plug/ Chek Dam								
	f. Afforestation and Development of Silvi-pastoral System	ha	26	0.10345	-	1.3449	1.3448	-	2.6897
	g. Drainage Line Treatment (Pucca Structure / Gully Plug and Chek Dam)	nos	10	-	-	6.479	6.479	-	12.958
	Sub Total				-	137.34	137.34	-	274.68
	(2.) Livelihood Programme (Community Based)								
	Income Generating Activities through S.H.G.'s for Landless and Marginal Farmers								
	a. Establishment of Nadev-Compost Units	nos	162	0.10400	16.848	-	-	-	16.848
	b. Dairy Work	nos	16	0.50000	8.00	-	-	-	8.000
	c. Goat-keeping	nos	25	0.43950	10.9875	-	-	-	10.9875
	d. General Merchant Shop	nos	10	0.25000	2.500	-	-	-	2.500
	e. Livestock Development Activities	Detail Attached			16.6005	-	-	-	16.6005
	Sub Total				54.936	-	-	-	54.936
	(3.) Production System and Micro-Enterprises								
	a. Crop Production, Diversification of Agriculture	ha	176	0.05975	-	4.0753	4.0753	2.3654	10.516
	b. Introduction of Agro-forestry /	ha	22	2.26820	-	19.1719	19.1719	11.5566	49.9004

	Horticulture								
	c. Demonstration of Green Manuring	ha	1760	625.00	-	4.2208	4.2208	2.5588	11.334
	Sub Total				-	27.468	27.468	16.4808	71.4168
D.	CONSOLIDATION PHASE	-	-	-	-	-	-	27.468	27.468
	GRAND TOTAL				109.872	192.276	192.276	54.936	549.36

Note: Unit costs of different activities are given in annexure.

CHAPTER -6

ECONOMIC ANALYSIS OF THE PROJECT

6. SOCIO-ECONOMIC ANALYSIS OF THE PROJECT

6.1 Sustainability and environment security

In the proposed watershed management plan of watershed, proper blending of bio engineering measures will be applied on 50 % of the total watershed area. Based on the results of studies conducted in this region, it is estimated that more than 50 % of the watershed area will be treated and consequently the soil loss and runoff from the area is expected to be reduced by 70 % and 65 %, respectively. The proposed land use plan will improve the land utilization index and crop diversification index significantly as compared to the existing one. It will help in maintaining ecosystem integrity on sustained basis along with improving the livelihood security of the farming community.

6.2 Economic Analysis

Economic analysis of the project was carried by taking direct benefits and costs considering 25 years project life at 10 per cent discount rate. For this purpose of economic analysis, whole watershed development plan was divided into three sector namely , agriculture, horticulture and forest/Fuel wood plantation. Net Present Value (NPV), Benefit Cost ratio (BC ratio) criteria were employed to judge the economic efficiency of each enterprise and sector.

Table.- 6.2.1 Source of Income.

S. no	Name of Vill.	Income sources/ no. of family						
		Agriculture	Labour	Pri. Sector Service	Govt. sector Service	Shop	Land less labour	other
1	Narhan	36	39	-	-	2	-	
2	Padri	38	31	2	8	1	-	
3	Shekhpur gurha	138	114	4	7	8	-	
4	Kutra	74	69	-	1	2	1	
5	Magraul	773	139	-	18	29	-	
6	Keeratpur	56	42	3	4	4	3	
7	Mainupur	227	174	11	10	4	5	
8	Heerapur	174	133	11	5	5	3	
9	Devkali	263	229	4	8	5	-	
10	Gurha khash	183	73	-	5	6	2	
	Total	1962	1043	35	66	66	14	

6.3 Agriculture

In rainfed agriculture, the development cost can be recovered within one year as the present rainfed agriculture is being done on well maintained field, therefore, does not require much investment. In irrigated agriculture, investment of Rs. 721.00 lacs is proposed to be made. The BC ratio of this sector is 1.6 : 1 with in three years pay back period.

Table 6.3.1 Economics of agriculture sector

S.No.	Sector	Area (ha)	BC ratio
1	Irrigated agriculture	992.60	1.8:1
2	Rainfed agriculture	3731.60	1.4:1
3	Total	4714.20	1.6:1

Agro Horticulture:

Table 6.4. Economic analysis of horticulture plantation in Agri-horti system at Mahewa watershed. Project life is considered to be 25 years and B.C.ratio is 2.9:1

S.N.	Common Name	Scientific name	Area (ha)	B:C Ratio
1	Aonla	Embelica officinalis	15	3.1:1
2	Ber	Zyziphus mauritiana	10	2.9:1
3	Guava		10	2.8:1
	Total		35	2.9:1

Agro Forestry/Fuel wood plantation

Table 6.5. Economic analysis of fuel wood plantation at R.B.Yamuna watershed. Project life is considered to be 25 years and B.C.Ratio is 2.2:1

SN	Common Name	Scientific name	Area (ha)	B:C Ratio
1	Vilayati Babul, Kanji,	Prosopis juliflora	40	2.2:1

6.6 Food sufficiency

Achieving self sufficiency in food production is one of the prime objectives of the project. The status of food requirement and production before and after the project is presented

Status of food requirement and availability per annum in watershed

Sr. No.	Items	Requirement (q/yr)	Before project		Proposed	
			Availability (q/yr)	Deficit or surplus (q/yr)	Availability (q/yr)	Deficit or surplus (q/yr)
1	Cereals	25615	10576	-15039	32540	+6925
2	Pulses	3428	3665	+237	5650	+2222
3	Oil seeds	3576	2824	-752	4580	+1004
4	Vegetable	378	110	-268	550	+172

6.7 Employment Generation

Labour migration in search of gainful employment is one of the major problems in the remote watershed in particular. Causal employment opportunities to the tune of more than 0.47 lacs will be generated during the implementation of the project activities. However, the changes in land use pattern and adoption of other subsidiary enterprises will generate employment opportunities for persons of 2.0 lacs in the watershed.

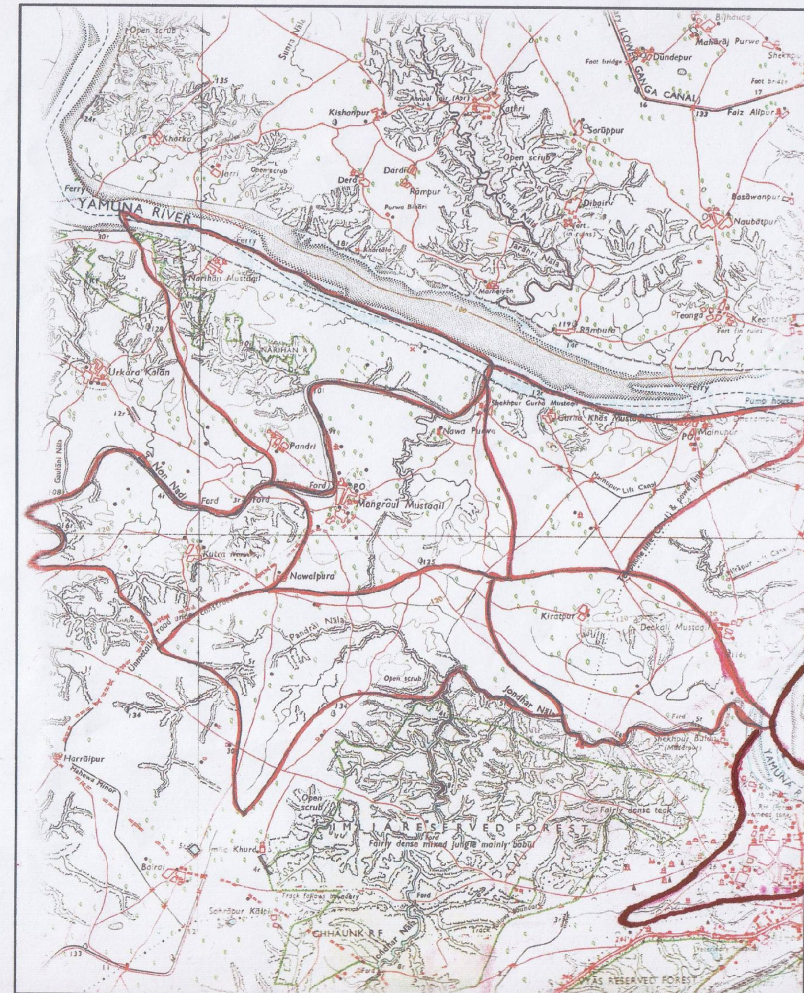
CHAPTER -7

MAPS & PHOTOGRAPHS

**TOPO SHEET WATER SHED WISE
OF I.W.M.P. - V**

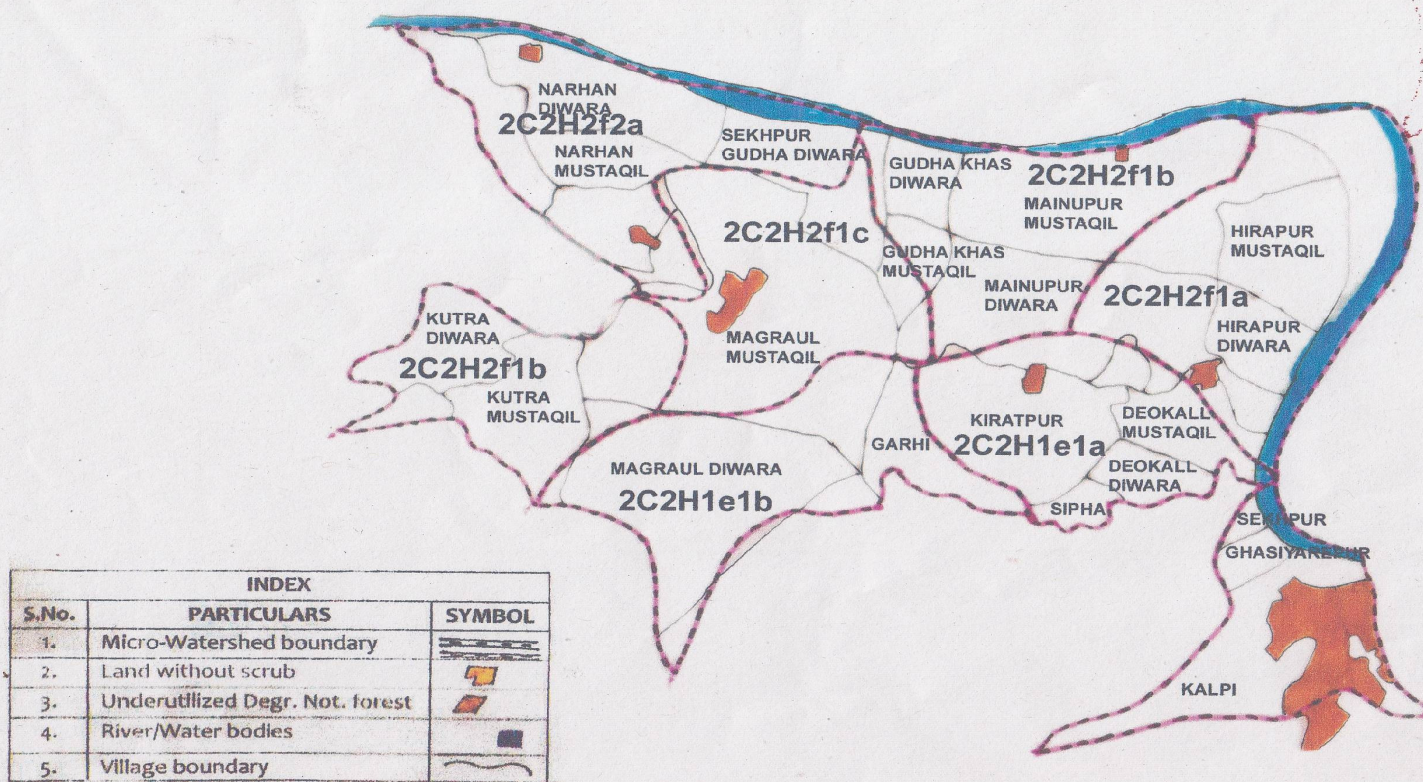
SCALE :- 1:50,000

INDEX		
S.No.	PARTICULARS	SYMBOL
1.	Towns or Villages	
2.	Temple	
3.	Mine	
4.	Tree	
5.	Ponds	
6.	Drains	
7.	River	
8.	Metalled Road	
9.	Unmetalled Road	
10.	Pack Track	
11.	Railway Line	
12.	Contours with SUB features	
13.	Power Line	
14.	Micro-Watershed boundary	



VILLAGE WISE WATERSHED MAP OF I.W.M.P. - V

SCALE :- 1:50,000



ROAD MAP OF VILLAGES IN WATERSHED OF I.W.M.P. - V

The map illustrates the road network connecting the following villages:

- PANDARI** (13.75km from the top left)
- NARHAN SEKHPUR GUDHA** (0.05km from GUDHA KHAS)
- GUDHA KHAS** (1.00km from MAINUPUR)
- KUTRA** (0.5km from MANGRAUL)
- MANGRAUL** (2.00km from JOLHUPUR)
- MAINUPUR** (1.5km from JOLHUPUR)
- KIRATPUR** (1.00km from JOLHUPUR)
- HIRAPUR** (1.00km from DEVKALI)
- DEVKALI** (1.00km from JOLHUPUR)
- JOLHUPUR** (4.00km from KALPI)
- KALPI** (4.00km from JOLHUPUR)
- ORAI** (30.00km from JOLHUPUR)

Distances between villages are marked on the roads:

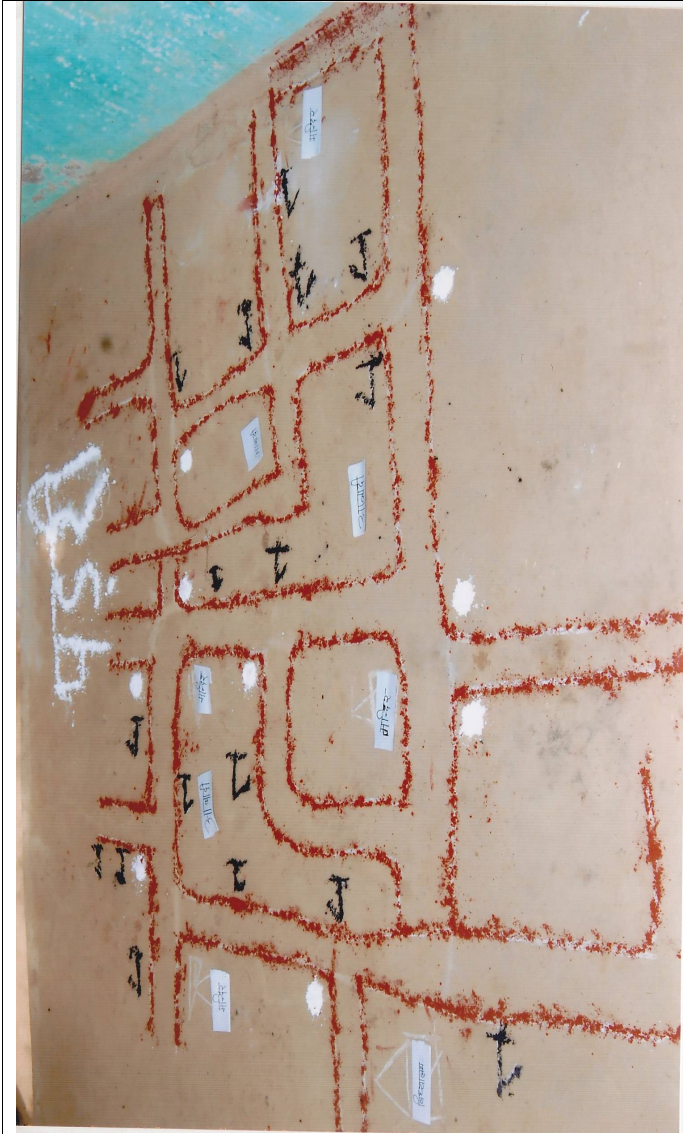
- PANDARI to Narhan Sekhpur Gudha: 13.75km
- Narhan Sekhpur Gudha to Gudha Khas: 0.05km
- Gudha Khas to Mainupur: 1.00km
- Mainupur to Jolhupur: 1.5km
- Jolhupur to Mangraul: 2.00km
- Mangraul to Kutra: 0.5km
- Jolhupur to Kiratpur: 1.00km
- Jolhupur to Devkali: 1.00km
- Jolhupur to Hirapur: 1.00km
- Jolhupur to Kalpi: 4.00km
- Kalpi to Orai: 30.00km



RESOURCES MAP OF VILLAGE HEERAPUR MUSTAKIL



SOCIAL MAP OF VILLAGE HEERAPUR MUSTAKIL



RESOURCES MAP OF VILLAGE PANDRI MUSTAKIL



TRANSECT WALK IN VILLAGE PANDRI MUSTAKIL





SOCIAL MAP OF VILLAGE KUTRA MUSTAKIL



TRANSECT WALK IN VILLAGE KUTRA MUSTAKIL



SOCIAL MAP OF VILLAGE SHEKHAPUR GUDRHA



TRANSECT WALK IN VILLAGE SHEKHUPUR GURHA



RESOURCES MAP OF VILLAGE MAINUPUR MUSTAKIL



TRANSECT WALK IN VILLAGE MAINUPUR MUSTAKIL



RESOURCES MAP OF VILLAGE KERATPUR



TRANSECT WALK IN VILLAGE KEERATPUR



SOCIAL MAP OF VILLAGE MANGALAU MUSTAKIL



TRANSECT WALK IN VILLAGE MANGALAU MUSTAKIL



P.R.A EXERCISE IN PROJECT SHEKHPUR GURHA



TRANSECT WALK IN VILLAGE HEERAPUR MUSTAKIL

