Contents (IWMP II)

Annexures

CHAPTER-I

METHODOLOGY

INTRODUCTION

The Government of India (GOI) adopted watershed management as a strategy to address the sustainable agricultural productivity in the rainfed areas since the last three decades. Further, GOI has adopted watershed management as a national policy since 2003. Several studies have highlighted that appropriate rain water management and utilization results in enhanced agricultural productivity. To achieve food security, minimize the water conflicts and reduce poverty, it has become essential to increase productivity of rainfed systems by harnessing the existing potential.

In Haryana, watershed activities were undertaken by Department of Agriculture (Soil Conservation), Forest Department and Rural Development Department. The existing scheme of watershed, like DPAP, DDP & IWDP were brought under one umbrella in the name of Integrated Watershed Management Programme in the year 2008. The scheme is basically for rainfed area, Common Guidelines were framed by National Rainfed Area Authority. Rural Development Department is the Nodal Department for implementation of IWMP through State Level Nodal Agency.

To implement watershed area program systematically the survey has been conducted for knowing the potentiality of the village. With this view baseline survey was conducted in four micro- watersheds **Tikri Micro Watershed** (6D2D5y1)**, Beriser Micro Watershed (6D2D5y3), Ghati Micro Watershed (6D2D5w5), Chaplana Micro Watershed (6D2D5w8).** The survey will serve as a bench mark against which the results of project could be compared at the end of the implementation. It would also helpful in guiding watershed programme to plan its goal in identifiable terms for future

reference. PRA techniques and transect walk were conducted with the Gram Sabha members and beneficiaries for building confidence for participation during project planning.

1.1 SCIENTIFIC PLANNING

1.1.1 Cluster Approach

This envisages a broader vision of Geo- hydrological unit which involves treating the cluster of 5 micro watersheds namely **Tikri** (6D2D5y1), **Beriser** (6D2D5y3), **Ghati** (6D2D5w5), and **Chaplana** (6D2D5w8) with their respective codes. This watershed is in continuation to with other watershed projects namely Morni Watershed (IWMP II).

1.1.2 Base Line Survey

Bench mark survey was conducted for collection of base line data on various bio-physical and socio-economic aspects initiated by the following methods.

1.1.3 Collection of Primary Data

Though the project was sanctioned by the September, 2011 but the preparatory phase started in 2012.Initially, a meeting was arranged with officials of concerned departments and technical experts located at Tikri, Beriser, Ghati & Chaplana micro- watersheds. During this meeting, preliminary details of the proposed project including location of villages and criteria of selection and PPR were discussed.

In order to have first hand information, a joint visit in the project area was made along with PRI members. In this survey, physical location of the watershed, important villages, drain system, main land use and other problems related to the area

were assessed. Sarpanches and local people were involved in the discussions and a note of the local needs and scope of watershed works was taken up.

The survey of India toposheets of the area available on the 1:50000 scales were procured of the project area and all assigned villages were marked on the copies of the toposheets as well as on the maps prepared by Soil and Land Use Survey of India (SLUSI).

The primary data was also compiled from revenue records, Anganwari workers and statistical officers of the district. Rainfall data was collected from rain gauge station located in the Sub division/district headquarter of the project area.

1.1.4 Collection of Secondary data

The data with regard to Demographic, socio-economic, infrastructure, land use, primary and secondary occupation, major crops grown and the yield level of fruits and vegetable crops, marketing facilities, fodder production, agro-forestry crops, live stock and milk production, status of self help groups, previous watershed schemes and works undertaken under MGNREGA etc. was gathered with the help of a specially designed Performa by social development associates. Additional information w were gathered by group and individual discussions with women groups, landless and other poor sections of the society. The issues concerning water availability, use of common property resources, fuel and fodder availability, wage employment opportunity and other major concerns were discussed, debated and recorded.

1.2 PARTICIPATORY RURAL APPRAISAL

The due process of participatory Appraisal was followed in which village committees were sensitized about project activities. An appraisal of land resources, water resources, forest and pasture land resources, common property

resources, production system and livestock resources was carried out by collecting data from primary and secondary sources. Group meeting were organized at common places and problem and possible solution were debated, discussed and efforts were made to reach agreement on activities required under the projects. This was followed by transit walks across the entire area of the village and spots indicated by the community. The Technical possibilities were discussed and measurements were recorded for jointly agreed activities. Similarly, discussions were held about entry point activities and items of work were finalized keeping in view the availability of funds in the project. Through discussion were held on production activities and new innovative techniques of improving crop, fruit and milk production. The women groups were sensitized about income generating activities and skill improvement by various types of trainings. The department field staff facilitated the process of participation at the planning stage. The department officials simultaneously stated the process of forming watershed committees for each village. The roles and responsibilities of all stake holders as per guidelines , the mechanism of fund flows, cost sharing arrangement in different components , and operational mechanism of the projects was thoroughly discussed with the community and to the Watershed Committees (WC) in detail.

1.2.1 Participatory Net Planning

The action plan was formulated based on the PRA, Geo-hydrological condition, Drainage pattern, Soil class, Soil erosion, forest and agriculture land. The project proposals were deliberated in the Gram Sabha meetings which were approved with required amendments.

Based on the experience of the experts working in the area and catchment area characteristics each structures like Sub Surface Dam, Crate Wire Structures, Cement Stone Masonry Structures/ Drop Structures/ Retaining wall, Dry Stone Check Dams etc. were recommended to conserve and store water used for life saving additional irrigation potential in the rain fed area and to avoid degradation of the land.

1.2.2 Community Participants in Social Mapping

The village communities were apprised about project activities. Group meetings were organized at common places, problems and possible solutions were debated, discussed and efforts were made to reach agreement on activities required under the project. Social mapping involving local community was prepared. Infrastructure services and other village resources such as ponds, wells, agriculture land etc. were mapped.

1.2.3 Transect Walk

Reconnaissance survey was carried out through transect walk in order to identify the needs, treatments required and worksites. The sites were marked on the maps and different treatment measures required were recommended.




Transect walk and site visit

1.2.4 Focus Group Discussions

Focus group discussions (FGD) were conducted in order to obtain communities' approval on various identified needs. It was helpful in complementing the assessment emerged from PRA and to derive the opinion of the communities on various issues.




Gram Sabha member's participation in group discussion

1.3 USE OF GIS TECHNOLOGY FOR PLANNING

Use of high scientific tools has been promoted at various stages of watershed development planning.
Geographical Information System (GIS) has been used in planning. Various layer maps were created likes Base map, Present Land Use, Geo-hydrological, Micro Watershed, Drainage, Contours, Soil Classification, Land Capability Classification, Ground Water, Proposed and existing Activities or works. All Watershed maps (micro- watershed wise) have been prepared according to watershed maps issued by Soil and Land use Survey of India (SLUSI) with coding.

1.3.1 Prioritization

With the assistance of Geographical Information System (GIS), various layers were created like Topography (slope), Drainage and contour, Groundwater conditions, Slope, soil and Land Capability classes. All these parameters were given weight age as per the guidelines issued by Govt. of India. This has helped in prioritization of various watershed areas.

1.3.2 Planning

Based on the land use and hydrology maps in addition to social maps (PRA) prepared by the participants, analysis was carried out for the planning in micro- watersheds. The action plan was formulated based on Geo-hydrological condition, Drainage pattern, Soil class, Soil erosion, forest and agriculture land. The project proposals were deliberated in the Gram Sabha meetings which were approved with required amendments.

Based on the experience of the experts working in the area and catchment area characteristics each structure like Sub Surface Dam, Crate Wire Structures, Cement Stone Masonry Structures/ Drop Structures/ Retaining wall, Dry Stone Check Dams etc. were provided.

1.3.3 Hydrological modeling

The relevant hydrological parameters were used for delineation of micro- watersheds as per the existing drainage system. The works/ activities under drainage line treatment are proposed as per stream orders and site condition, stream flow, stream width and length, stream diversions, run- off and topography in consultation with WC. These maps were generated as per SLUSI coding system. The maps are produced by developing different layers using GIS technology.

Table 1. Detail of scientific planning and inputs in IWMP projects

S. No.	Scientific Criteria/input used	Whether Scientific Criteria was used
A	**Planning**	
	Cluster approach	Yes
	Hydro-geological survey	Yes
	Contour Mapping	Yes
	Participatory net planning (PNP)	Yes
	Remote sensing data-especially soil/crop/run off cover	Yes
	Ridge to valley treatment	Yes
	Online IT connectivity between	Yes
	1. Project and DRDA cell/ZP	Yes
	2. DRDA and SLNA	Yes
	3. SLNA and DoLR	Yes
	Availability of GIS layers	Yes

S. No.	Scientific Criteria/input used	Whether Scientific Criteria was used
	1. Survey of india map/imagery /SLUSI map	Yes
	2. Micro- Watershed Boundary	Yes
	3. Drainage pattern	Yes
	4. Soil (soil fertility status)	Yes
	5. Land use	Yes
	6. Ground water status	Yes
	7. Watershed boundaries	Yes
	8. Activities	Yes
	Crop simulation model	NA
	Integrated coupled analyzer/near infrared visible spectroscopy/medium/high	-
	Normalize difference vegetation index(NDVI)#	-
	Weather station	-
B	Inputs	-
	Bio pesticides	Yes
	Organic manure	Yes
	Vermin- compost	Yes
	Bio Fertilizer	Yes
	Water saving devices	Yes
	Mechanical tools	Yes

S. No.	Scientific Criteria/input used	Whether Scientific Criteria was used
	Bio fencing	No
	Nutrient Budgeting	No
	Automatic water level recorder & sedimentation samplers	No

1.4 PREPARATION OF ACTION PLAN AND APPROVAL

Based on the need and problems in watershed area; a draft action plan was prepared and placed before the concerned watershed development committee as per schedule circulated by Additional Deputy Commissioner for approval of the Watershed Committees. After detailed deliberation and incorporation of relevant suggestions into the plan, the action plan was approved in the meeting of Gram Sabha. The resolution of each village falling in the watershed has been received. The record is available with the PIA and WAPCOS.

CHAPTER - 2

PROJECT BACKGROUND

2.1 PROJECT BACKGROUND

Morni watershed (IWMP- II) project is located in Morni block, Panchkula district of Haryana state. The project is a cluster of four micro- watersheds with being their respective codes **Tikri** (6D2D5y1), **Beriser** (6D2D5y3), **Ghati** (6D2D5w5), and **Chaplana** (6D2D5w8). The total geographical area of the watershed is about 6593 ha out of which 4752 ha has been undertaken to be treated under (IWMP-II) starting year 2011-2012. The project is divided into four micro watersheds. The Base map is shown in Annexure I.

Table 1. BASIC PROJECT INFORMATION

S. No.	Name of the Sub-Watershed	Name of the micro watershed	Code No.	Name of the villages	Block	District	Geographical Area	Area proposed to be treated(ha)	Total Project cost (Rs lacs)	PIA
1	Morni Watershed (IWMP II)	Tikri	6D2D5y1	Bhoj Nagal(part) Bhoj Kothi	Morni	Panchkula	6593	1315	157.80	DFO Morni (Pinjore)
2	Morni Watershed (IWMP II)	Beriser	6D2D5y3	Bhoj Koti Bhoj Dharti(part)	Morni	Panchkula		1284	154.08	DFO Morni (Pinjore)
3	Morni Watershed (IWMP II)	Ghati	6D2D5w5	Bhoj Dharti(part) Bhoj Naita(part)	Morni	Panchkula		1243	149.16	DFO Morni (Pinjore)
4	Morni Watershed	Chaplana	6D2D5w8	Bhoj Tipra Bhoj	Morni	Panchkula		910	109.20	DFO Morni (Pinjore)

S. No.	Name of the Sub-Watershed	Name of the micro watershed	Code No.	Name of the villages	Block	District	Geographical Area	Area proposed to be treated(ha)	Total Project cost (Rs lacs)	PIA
	(IWMP II)			Dharti(part) Bhoj Naita(part) Bhoj Darrara						
Grand Total							**6593**	**4752**	**570.24**	

2.2 NEED OF WATERSHED DEVELOPMENT PROGRAMME

Watershed development programme is prioritized on the basis of thirteen parameters namely;

i. poverty index,
ii. percentage of SC,
iii. actual wages,
iv. percentage of small and marginal farmers,
v. ground water status,
vi. moisture index,
vii. area under rain fed agriculture,
viii. drinking water situation in the area ,
ix. percentage of degraded land,
x. productivity potential of land,
xi. continuity of any other watershed already developed/treated,
xii. cluster approach for plain terrain,
xiii. cluster approach for hilly terrain,

The criteria and weight age of each of the parameters has been given in **Table 2**.

Table 2. Criteria and Weightage for selection of watershed

S. No.	Criteria	Maximum Score	Ranges and Scores			
i.	Poverty index (% of poor to population)	10	Above 80 % (10)	80 to 50 % (7.5)	50 to 20 % (5)	Below 20% (2.5)
ii.	% of SC/ST population	10	More than 40 % (10)	20 to 40 % (3)		
iii.	Actual wages	5	Actual wages are significantly lower than minimum wages (5)	Actual wages are equal to or higher than minimum wages (0)		
iv.	% of small and marginal farmers	10	More than 80 % (10)	50 to 80 % (5)		
v.	Ground water status	5	Over exploited (5)	Critical (3)	Sub Critical (2)	Safe (0)
vi.	Moisture index/ DPAP/DDP block	15	-66.7 & below (15) DDP block	-33.3 to -66.6 (10) DPAP Block	0 to -33.2 (0) Non DPAP/DDP Block	
vii	Area under rainfed agriculture	15	More than 90 % (15)	80 to 90 % (10)	70 to 80 % (5)	Above 70 % (Reject)
viii	Drinking water	10	No source (10)	Problematic village (7.5)	Partially covered (5)	Fully covered (0)
ix	Degraded land	15	High-above 20 % (15)	Medium-10 to 20 % (10)	Low-less than 10 % of TGA (5)	

S. No.	Criteria	Maximum Score	Ranges and Scores			
x	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)	
xi	Contiguity to another watershed that has already been developed/treated	10	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)	
xii	Cluster approach in the plains (More than one contiguous micro-watersheds in the project)	15	Above 6 micro-watersheds in cluster (15)	4 to 6 micro-watersheds in cluster (10)	2 to 4 micro-watersheds in cluster (5)	
xiii	Cluster approach in the plains (More than one contiguous micro-watersheds in the project)	15	Above 5 micro-watersheds in cluster (15)	3 to 5 micro-watersheds in cluster (10)	2 to 3 micro-watersheds in cluster (5)	
	Total	**150**	**150**	**91**	**37**	**2.5**

Based on above criteria and weight age of 88.5 concerning these thirteen parameters, a composite ranking was given to Morni Watershed (IWMP II) project as given in Table- 3.

The total numbers of families under BPL are less than the total number of households in the village. Hence a score of 5 was allotted. Rain fed agriculture is more and more than 80 percent of the farmers are small and marginal. So the scoring was done as 5 and 2 respectively. So accordingly, scoring was done like project area comes under Shivalik hills of Haryana, and has no canal network, erratic rainfall, deep and poor ground water discharge aquifer conditions; hence the ground water status score is 3. The percentage of schedule castes in this watershed is about 30 percent of the total population, hence 3 score was allotted. Due to high percentage of the poor population i.e. about 70 percent thus the scope of poverty index is 7.5. More than 60 percent of the farmers are small and marginal by nature and the actual wages earned by them are less than the minimum wages. Hence a composite rank of 5 is allotted. With all the parameters taken together gives the watershed score to be 88.5.

Table 3: Weight-age of the Project

1	2	3	4	5		6	7	8													
S. No.	**District**	**Name of the project**	**No. of micro-water-sheds proposed to be covered**	**Geographical area (ha)**	**Proposed Area for Development**	**Type of project (Hilly/ Desert/ Others)**	**Proposed cost (Rs. In Lakh)**	**Weightage under the criteria#**													
								i	**ii**	**iii**	**iv**	**v**	**vi**	**vii**	**viii**	**ix**	**x**	**xi**	**xii**	**xiii**	**Total**
1.	Panchkula	Morni Watershed (IWMP II)	4	6593	4752	Hilly and Sub Hilly	570.24	7.5	3	5	5	3	0	10	5	10	15	10	0	15	88.5

Table 4. Watershed Information

Name of the Project	No. of Watershed to be Treated	Watershed code	Watershed regime/type/order
Morni Watershed (IWMP II)		6D2D5y1, 6D2D5y3, 6D2D5w5, and 6D2D5w8	Hilly / Sub-Hilly

2.3 OTHER ONGOING DEVELOPMENT PROJECTS / SCHEMES IN THE PROJECT VILLAGES

4

These villages being backward have been on top priority of a number of development projects. These programmes are Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), Total Sanitation Campaign (TSC), Swarnajaynti Gram Swarojgar Yogna (SGSY) and Indira Awas Yojana (IAY), NWDPRA and FPR (Ghaggar). The programmes running are tabulated in **Table 5.**

Table 5. Ongoing Development Programs in the Project Area

Sr. No	Name of the Program/project	Name of Micro watersheds	Sponsoring agency	Objective	Estimated number of beneficiaries
1	MGNREGA	Tikri	DRDA, Panchkula	To provide assured employment of 100 days in a year to unskilled labour and development of village.	173
2	MGNREGA	Bariser	DRDA, Panchkula	To provide assured employment of 100 days in a year to unskilled labour and development of village.	234
3	MGNREGA	Ghati	DRDA,	To provide assured employment of	104

Sr. No	Name of the Program/project	Name of Micro watersheds	Sponsoring agency	Objective	Estimated number of beneficiaries
			Panchkula	100 days in a year to unskilled labour and development of village.	
4	MGNREGA	Chaplana	DRDA, Panchkula	To provide assured employment of 100 days in a year to unskilled labour and development of village.	216

Source: DRDA, Panchkula

The District Rural Development Agency has undertaken various schemes under watershed development programme and the status is presented in

Table 6.

Table 6: Previous Watershed Programme in the Project Area (if any)

Watershed Area Development Treated/Sanctioned											
1	2	3		4						5	
Sr. No	Names of District	Total micro watersheds in the District		Deptt. of Land Resources Pre- IWMP projects		Other Ministries/ Deptts. Any other watershed include settlement etc. project		Total watersheds covered		Net watersheds to be covered	
		No	Area (ha)	No	Area (ha)	No	Area (ha)	No	Area (ha)	No	Area (ha)
1	Panchkula	128	85348	12	7640	36	21757	48	29397	80	55951

The district is spread over an area of 88037 hectare out of which 2689 falls under Panchkula City.

CHAPTER – 3

BASIC INFORMATION OF THE PROJECT

GEOGRAPHY AND GEO-HYDROLOGY

The Morni Watershed (IWMP II) falls in Morni Block, District Panchkula. Physiographically the area is divided into two parts i.e. Shivalik hills and piedmont plains The area of watershed lies in between 30˚30'0''to 30˚40'0'' N Latitude & 77˚0'0'' to 77˚10'0'' east longitude with general elevation varies between 750 to 1300 m (MSL) above mean sea level. Area experiences the highest rainfall in the state i.e. 1200mm, about 80 percent of its annual rainfall is received in the month of June to September. Despite heavy rainfall in this area, water retention is very low. It is due to high surface run off and water is drained through the seasonal streams namely Ghaggar Nadi which flows to the west. The Drainage and Contour map is presented in Annexure II.

3.1 Land use pattern

The village wise land use pattern is tabulated in **Table-1.** Land use map is shown in Annexure-III.

Table. 1 Land use pattern of Morni Watershed (IWMP II)

S. No.	Name of the micro-watershed with code	Include Villages with code	Geographical area of micro water shed in (Ha)	Area of the micro watershed (ha) available for treatment	Forest Area (ha) (including reserve forest)	Land under agricultural use (ha)	Rain-fed area (ha)	Permanent pastures (ha)	Wasteland	
									Cultivable (ha)	Non-cultivable(ha)
1	Tikri (6D2D5y1)	Bhoj Nagal (part)(00019100), Bhoj Kothi	1775	1315	1029	186	186	Nil	41	9
2	Bariser (6D2D5y3)	Bhoj Koti, Bhoj Dharti(part)	1749	1284	991	206	206	Nil	14	73
3	Ghati (6D2D5w5)	Bhoj Dharti(part), Bhoj Naita(part)	1708	1243	1076	121	121	Nil	Nil	46
4	Chaplana (6D2D5w8)	Bhoj Tipra , Bhoj Dharti(part), Bhoj Darrara Bhoj Naita(part)	1361	910	604	247	247	Nil	3	56
	Total		**6593**	**4752**	**3750**	**760**	**760**	**Nil**	**58**	**184**

(Source – District Census 2001 Panchkula)

3.2 SOIL AND TOPOGRAPHY

The soils of the Morni Watershed are shallow to deep, coarse loamy skeletal and typic ustorthents and deep to very deep or same, coarse loamy typic ustorthents. The topography of the area ranges from gentle sloping to very steep, hilly slopes. Soils are subject to susceptible severe to very severe water erosion. The slope ranges from 10 to 50% and above

ranges from - 750 (MSL) Lower to 1300 (MSL) Higher and most of the areas of micro watershed fall under sloppy hilly zone. Slope map is presented in Annexure IV.

Table 2. Soil type and Topography

S.no	Name of Micro Watershed	Code	Area in ha Geographical area of villages	Major Soil types	Topography
				Type	
1	Tikri	6D2D5y1	6593	Sandy loam skeletal to loam skeletal with gravels, cobbles, pebbles & boulders	Undulated and hilly Mostly agriculture fields are terraces
2	Bariser	6D2D5y3		-do-	-do-
3	Ghati	6D2D5w5		-do-	-do-
4	Chaplana	6D2D5w8		-do-	-do-
			6593		

Source: - Department of Agriculture, Haryana

3.2.1 Flood and Drought Condition

There has been incidence of flood and drought as well in watershed villages. There have been instances of flood on an average 6-7 times and 4-5 times in last 10 years. With the result, crop yield is very low.

Table 3. Flood and Drought condition

S. no	Micro Watershed	Flood Incidence	Drought Incidence
1	Tikri	7 times in 10 years	5 times in 10 years
2	Bariser	7 times in 10 years	5 times in 10 years
3	Ghati	7 times in 10 years	5 times in 10 years
4	Chaplana	7 times in 10 years	5 times in 10 years

3.3 SOILS

3.3.1 SOIL EROSION

In all 4 micro watersheds, it is observed that due to heavy rains, heavy loss of soil has occurred. This results in degradation of agricultural land, deforestation and low organic matter contents. The erosion materials brought by the chaos are deposited in the sloping piedmont and are deposited around the rivulets make recent alluvium plains. The repeated deposition of course sediments render these areas comparatively low in agriculture production. Average annual rainfall of the area falling under these watersheds gets washed away in the form of runoff which also carries valuable top soil (sheet). Soil erosion in respect of sheet is quite high. Majority of the watershed Community are dependent on agriculture. Agriculture suffers due to area being rain fed and due to excess rains in the region, resulting in further deterioration of socio economic conditions of community. On an average soil loss is estimated 25/30 tonnes /ha/year.

Table 4. Soil Erosion

Cause	Types of erosion	Area affected (ha)	Run off (mm/year)	Average soil loss (Tonnes/ha/year)
Water erosion				
Morni Watershed (IWMP II)			55 - 60% as 780 mm/year	25-30 tonnes per ha/year
A	Sheet	1235		
B	Rill	2423		
C	Gully	1094		
	Sub Total	**4752**		

3.3.2 Soil Salinity/Alkalinity (Salinity ingress)

There is no soil salinity in the Project and pH is normal and within the limits of 7.1 to 7.8.

Table 5. Soil pH and Salinity

Sr. no.	Micro watershed	Soil pH	Salinity & Alkalinity
1	Tikri	7.1 to 7.8	Nil
2	Bariser	7.1 to 7.8	Nil
3	Ghati	7.1 to 7.8	Nil
4	Chaplana	7.1 to 7.8	Nil

3.3.3 Soils Classification

Major soils associations' fall in the watershed are three soil associations unit. The detail description of all soil associations are given below. The Soil map is presented in Annexure V.

Soil Mapping Unit- 8 (Morni- Thanesar Soil Association)

The Morni soil series is dominated in this soil association and associated soil series 1st is Thanesar soil series. The dominant soil series is well to excessively drained, Loamy-skeletal Mixed hyperthermic Typic Ustorthents, 1st associate soil series is well drained, Loamy-skeletal Mixed hyperthermic Typic Ustorthents. Morni soil series is Sandy clay loam in texture, violent calcareous, deep, pH 6.30-6.48, dark grayish brown to dark brown in colour (10YR 4/2- 10YR 3/3) developed on Very steeply sloping hill side slopes with Stones and boulders in Cr horizon, Thanesar soil series is Sandy clay loam in texture, non calcareous, deep, pH 5.8, dark brown in colour (10YR 3/3) developed on Very steep and more hillside slopes with Stones, Pebbles and boulders Cr1 & Cr12 horizons.

Soil Mapping Unit- 9 (Bidhana- Jala Soil Association)

The Bidhana soil series is dominated in this soil association and associated soil series 1st is Jala soil series. The dominant soil series is well drained, Clayey Mixed hyperthermic Typic Ustorthents, 1st associate soil series is well drained, Loamy Mixed hyperthermic Typic Ustorthents. Bidhana soil series is Silt clay loam to Clay loam in texture, violent calcareous, deep, pH 8.10-8.20, reddish brown in colour (5YR 4/3-5YR 4/4) developed on Moderate steep to Steep sloping/Hill side slopes with Stones about 70-80% and less than 20% in clayey matrices in Cr horizon, Jala soil series is Sandy clay loam in texture, non calcareous, deep, pH 6.89, dark brown in colour (7.5YR 4/3) developed on Moderate steep to Steep sloping/Hill side slopes with Semi weathered and weathered materials of sandstone Cr1 & Cr2 horizons.

Soil Mapping Unit- 11 (Mirpur- Taharpur- Nadnah Soil Association)

The Mirpur soil series is dominated in this soil association and associated soil series 1st is Taharpur soil series and 2nd Nadnah soil series. The dominant soil series is well to excessive drained, Coarse Loamy Mixed hyperthermic Typic Ustorthents, 1st associate soil series is well drained, Fine Loamy Mixed hyperthermic Dystric Haplustepts and 2nd associated soil series is well drained, Fine loamy Mixed hyperthermic Typic Haplustepts. Mirpur soil series is sandy loam in texture, non- calcareous, very deep, pH 6.90-7.68, reddish brown in colour (5YR 4/3-5YR 4/4) developed on River sediments/Moderate to Strongly sloping denuded mounds, Taharpur soil series is Sandy clay loam to sandy Loam in texture, Slight to Strong calcareous, very deep, pH 6.56-7.40, very dark brown to dark yellowish brown in colour (10YR 2/2- 10YR 4/4) developed on Moderate to strong sloping foot hill slopes/Piedmonts over Alluvio-colluvial with Stones, Gravels and boulders with some soil in clayey matrix in C- horizon and Nadnah soil series is Clay loam to Silt clay loam to Silt clay in texture, violent calcareous, deep, pH 8.18-8.81, yellowish brown in colour(10YR 5/6) developed on Denuded foot slopes with slope/Lower Shiwalik rolling with Few fine calcium concretions in B21& Cr horizons.

(Source: Received from HARSAC on 1: 50000 scale)

3.3.4 Land Capability Classification

It is an interpretative grouping of soils based on inherent soil characteristics, external land features and environmental factors that limit the use of land. As per land capability classification, class 1 to class IV land is suited to agriculture. Classes V to VIII are not suitable for agriculture. These are used for pastures, forestry, and wildlife and recreation purposes and other industrial and township. Depending upon the degree of limitation and the kind of problems involved in management of soils, the land capability sub classes were indicated by adding the following limitation symbols to the capability classes:

1. Erosion and runoff (e) including risk of erosion and great erosion damage.
2. Excess of water (w) including wetness, high water table, and problem of drainage.
3. Root zone limitation (s) including shallow depth, low water holding capacity, salinity or alkalinity/rockiness.
4. Climate limitation (c).

The soils of the selected watersheds have been grouped into two land capability subclasses. A brief description of each capability sub class is given as under and the **Land capability map is exhibited in Annexure-VI.**

Land capability subclass VI es

These soils are deep, gravely/ boulder light to medium textured soils on gently to steeply sloping severely eroded lands. The water holding capacity is very poor and the water erosion hazard is severe. It includes total area 1243 Ha of the watershed.

Following recommendations are suggested for the economic use of this sub-class:

1. Specific and special soil conservation measures should be adopted to check water erosion and gully control; soils should be provided permanent vegetation (Aforestation) cover to check further deterioration of soils.
2. Soils would be suitable for pasture development; forestation, recreation activity and other major water conservation structures (Water harvesting structure, silt detention dam, etc).

Land capability subclass VII es

These soils are shallow to deep, gravely/ bouldry/ rocky, light to medium textured soils on steep to very steep slopping hilly tracks. The water holding/ retention are poor to negligible and the water erosion hazard is severe to highly severe. It includes total area 3509. Ha of the watershed.

Following recommendations are suggested for the economic use of this sub-class:

1. Specific and special soil conservation measures should be adopted to check water erosion and gully control; soils should be provided permanent vegetation (Aforestation) cover to check further deterioration of soils.
2. Soils would be suitable for forestation; recreation activity and other major water conservation structures (Water harvesting structure, silt detention dam, etc).

3.3.5 Climatic Conditions

The average rainfall of this area is 1114 mm (from the past 11 year's data). The highest rainfall is 1441 mm during the year 2010. The uneven rainfall distribution is leading to run off soil every year to the steams, rivulets and depressed area of the Morni Watershed (IWMP II). The year wise rainfall and Temperature range from 2000 to 2010 is presented in **Table.6**

Table 6. Climatic Conditions

Sr. No	Year	Rainfall (in mm)	Temperature (˚C)	
			Max.	Min.
1	2000	1376	43.0	0.5
2	2001	1386	43.0	-0.3
3	2002	950	44.6	1.6
4	2003	1686	44.8	0.1

Sr. No	Year	Rainfall (in mm)	Temperature (˚C)	
			Max.	Min.
5	2004	968	43.7	2.9
6	2005	810	45.0	1.3
7	2006	788	43.4	0.7
8	2007	962	45.5	- 0.9
9	2008	1176	43.5	- 1.1
10	2009	713.6	44.8	0.8
11	2010	1441	44	1.2

(Source: Central Soil and Water Research and Training Institute)

3.3.6 Physiography and Reliefs

Physiographically, the area is divided into two parts from North to West. The general Elevation in the area falls under Morni hills. Area experiences highest rainfall and water is drained through seasonal streams namely: Ghaggar River, Barun River and these tributaries. Area is badly dissected by these drainage dissect. The elevation range and percentage slope distribution has been presented in **Table 7.**

Table 7. Physiography and relief

Project Name	Elevation (MSL)	Slope Range (%)	Major Streams
Morni Watershed (IWMP II)	750m-1300m (MSL)	>10% (1315 ha) 10- 25% (1243 ha) < 25% (2194 ha)	**1.** Ghaggar river 2. Barun river

3.4 LAND AND AGRICULTURE

Lack of perennial surface water and deep ground water being deep having thin and mixed aquifer have limited irrigation prospects. The surfaces run off during storms, causing soil erosion.

The land holding pattern of the villages under Morni Watershed shores that the majority of the land holding is below 3.0 ha. The lack of irrigation source has forced the majority of the farmers to migrate from village to ensure their livelihood. The nearest Industrial Area is Panchkula and Chandigarh. This affects directly the demographic profile of the village.

The major crops maize, green fodder, kulath and pulses in Kharif under rain fed conditions and paddy, ginger, tomato, spices and seasonal vegetables in the small area where irrigation potential exists. The major crops during Rabi wheat, green fodder & seasonal vegetables, gram, oilseed in rain fed and irrigated conditions. The soil & water conservation measures such as Engineering like small check dam, crate wire structures, drop structures, Sub surface dams, silt detention dam, augmentation of springs, and roof rain water harvesting. In the area will help the farmers to take crop production which will enhance the net production value of farmers. The following plants are commonly observed in the Project Area. The natural vegetation in the project area is exhibited in **Table 8.**

Table 8. Natural Vegetation

Trees	Fruits	Grasses and Shurbs
Khair	Mango	Bhabher
Black Siris	Ber	Lantana
Simbal	Lemon	Sarala
Jingan	Galgal	Karonda
Safeda	Kinnow	Kasmalo
Toon	Amla	Mandher
Chhal	Harad	

3.4.1 Land Ownership Detail

Table 9: Land Ownership detail

S.no	Name of Micro Watershed	Total owned land in ha			
		General	OBC/BC	SC	ST
1	Tikri	120.73	-	38.00	-
2	Bariser	86.00	4.05	29.30	-
3	Ghati	117.00	15.30	14.35	-
4	Chaplana	125.30	-	18.70	-
	Total	**449.03**	**19.35**	**100.35**	**-**

3.4.2 Agriculture/Pattern

Table 10. Agriculture/ Pattern:

S.No.	Name of Micro Watersheds	Net Sown area ha	
		One time	Two times
1	Tikri	115	45
2	Bari Ser	150	70
3	Ghati	75	20
4	Chaplana	150	55

3.4.3 Irrigation

Lack of Assured Irrigation Facilities

The state of Haryana has more than 84% of its sown area as irrigated, with canals and tube wells being the primary sources. In Morni Watershed the irrigation source is check dams/ Khool/ pond. The present source of irrigation in the watershed has been tabulated in **Table 11.**

Table 11. Irrigation Pattern.

S.no	Name of Micro Watershed	Source 1: Canal		Source 2: Check Dam/ pond/Khool		Source 3: Well		Source 4: Groundwater/Tubewells	
		Availability months	Net area	Availability months	Net area	Availability months	Net area	Availability months	Net area
1	Tikri	-	-	Jul- Mar	74	-	-	-	-
2	Bariser	-	-	Jul- Mar	98	-	-	-	-
3	Ghati	-	-	Jul- Mar	33	-	-	-	-
4	Chaplana	-	-	Jul- Feb	102	-	-	-	-
	Grand Total				**307**				

3.4.4 Cropping Pattern (crop details)

Cropping Pattern

The micro- watershed wise area production and productivity of each crop is tabulated in **Table 12 A and 12 B** (Rabi and Kharif)**.**

Table 12A. Crop Details(Rabi)

S.No.	Name of micro watershed	Rabi (Winter) Major crops				
		Crops	Area ha	Production (000' kg)	Productivity (kg/ha) Average	Use of fertilizers
1	Tikri	Wheat	25	30000	1200	Yes
		Oilseeds	10	4350	435	No
		Gram/ Pulses	5	2500	500	No
2	Bariser	Wheat	45	54000	1200	Yes
		Oilseeds	10	4650	465	No
		Gram/ Pulses	4	2400	600	No
3	Ghati	Wheat	15	18000	1200	Yes
		Oilseeds	4	1560	390	No
		Gram/ Pulses	4	2488	622	-
4	Chaplana	Wheat	45	54000	1200	Yes
		Oilseeds	15	7800	520	No
		Gram/ Pulses	4	1864	466	No

Table No. 12 B: Crop details

S. No.	Name of micro watershed	Kharif (Monsoon) Major crops				
		Crops	Area ha	Production (000' kg)	Productivity (kg/ha) Average	Use of fertilizers
1	Tikri	Maize	65	91325	1405	Yes
		Jawar/ Fodder	2	380	190	No
		Pulses	2	250	125	No
		Paddy	8	12040	1505	Yes
2	Bariser	Maize	92	129260	1405	Yes
		Jawar/ Fodder	3	750	250	No
		Pulses	4	4700	1175	No
		Paddy	12	18060	1505	Yes
3	Ghati	Maize	50	70250	1405	Yes
		Jawar/ Fodder	2	400	200	No
		Pulses	2	280	140	No
		Paddy	5	7525	1505	Yes
4	Chaplana	Maize	87	122235	1405	Yes
		Jawar/ Fodder	3	414	138	No
		Pulses	3	405	135	No
		Paddy	5	7525	1505	Yes

3.4.5 Livestock

Farmers in these villages have already been keeping the milch animals; mostly buffalos. The milk production of these animals (local breeds) is low (**Table 13)**. There is a need for the improvement of the local breed through artificial insemination, proper vaccination and nutritive feed. Introduction of cross breed cows and murrah buffalo with better milk

production will popularize dairy farming in the area. Also, the farmyard manure procured from these animals will help improve the soil health.

Table 13. Milk Production in Morni Watershed (IWMP II)

S. No.	Name of micro watershed	Buffalo(Lit/per day/annum) for 6 months	Cow(lit/per day/annum) for 6 months	Sheep	Goat	Camel
1	Tikri	194/388/69840 (Lit/Annum)	619/1238/222840 (Lit/Annum)	-	180	-
2	Bariser	429/1287/231660 (Lit/Annum)	816/2448/440640 (Lit/Annum)	-	104	-
3	Ghati	266/798/143640 (Lit/Annum)	408/816/146880 (Lit/Annum)	-	122	-
4	Chaplana	411/1644/295920 (Lit/Annum)	1059/2118/381240 (Lit/Annum)	-	127	-

3.4.6 Ground Water Concern

a) Depth to Water

The study of ground water hydrology focuses the occurrence and distribution of movement of water below the surface. The ground water characteristics of the small streams falling in the watershed reveal both influent and effluent behavior within the watershed.

The depth to water table of the villages falling in Morni Watershed **(IWMP II)** has been collected from the Ground Water Cell data where the water levels of hydro- graph stations are observed during pre and post monsoon period. The depth to water table of the villages have been observed during the survey from time to time. The water level data of the villages falling under Watershed has been tabulated in **Table 14.**

Table 14. Depth to Water Level of Morni Watershed (IWMP II)

S. no.	Name of Micro Watersheds	Average Water (m) Table June 2007-12
1	Tikri	More than 35
2	Bariser	More than 35
3	Ghati	More than 35
4	Chaplana	More than 35

Depth to water level map has been prepared and presented in the Annexure VII. A comparison of five year average depth (2007-12) which reveals that the area is under falling water table conditions. The present depth to water table ranges from more than 35 m except near water bodies like stream the water table ranges from 10- 15 m.

The source of drinking water supply is through the tube wells installed in absence of canal network in the area. There is adequate availability of drinking water in the villages. Public Health Engineering Services is doing good job in providing potable water to watershed villages. Availability of potable water is almost throughout the year except scarcity during May and June.

a) Water table fluctuation

The seasonal fluctuation i.e. Pre and Post monsoon period is 1- 1.5m. The pattern of ground water depletion is almost uniform in the project area.

b) Rain water harvesting and Recharging

The rapid growth of Rural and Urban population leads to escalation of water demand. Conservation of ground water is important because it takes years to be replenished. In areas where ground water is used, care must be taken to replenish with rainwater.

It has been proposed to make rainwater-harvesting by construction of water harvesting structures. The provision of this has been provided in the project proposal.

The Modern Methods

The modern methods of rainwater harvesting can be broadly categorized under two -

(a) Collection and storage of rainwater for direct use, and

(b) Groundwater recharging.

The combination of the above two methods would be implemented. The run off generated from the projected villages will not be allowed to run away. The rain water harvesting will involve three components (i) treatment of catchment area (ii) collection system (iii) the utilization.

The project proposals on rainwater harvesting/ recharging by utilizing existing ponds/ depressions and proposed water harvesting and recharging structures.

3.4.7 DETAILS OF COMMON PROPERTY RESOURCES: The department of panchayats has maintained the record of common property resources of area under various institutions. The data has been taken has been collected DDPO, Panchkula. The details of common property resource in Morni Watershed **(IWMP II)** are tabulated in **Table 15.**

Table 15. Detail of Common Property Resources

Name of the Project	CPR Particulars	Total Area, ha (Area owned / in possession of)				Area available for treatment (ha)			
Morni Watershed (IWMP II)		Person	Govt.	PRI	Any Other	Pvt. Person	Govt.	PRI	Any Other
	Waste land	108	-	-	-	108	-	-	-
	Pasture	-	-	-	-	-	-	-	-
	Orchards Pvt.	2 ha	-	-	-	-	-	-	-
	Village wood lot	-	-	-	-	-	-	-	-
	Forest	56	6424			4644			
	Village ponds, lake	-	-	-	-	-	-	-	-
	Community Buildings	-	-	-	-	-	-	-	-
	Weekly Mkts	-	-	-	-	-	-	-	-
	Permanent Mkts	-	-	-	-	-	-	-	-
	Temples/place of worship	3	-	-	-	-	-	-	-
	others	-	-	-	-	-	-	-	-

3.5 SOCIO ECONOMIC AND LITERACY PROFILE

Small and Scattered land holdings: The area under the project is cultivated by small and marginal farmers. Almost 70 percent of the farmers fall under this category. Furthermore, these small land holdings are scattered over 2-3 smaller pieces of land.

Poor economic conditions of farmers: The general economic condition of the farmers in this area is quite poor. They cannot use necessary agriculture inputs in a timely fashion due to financial constraints which adversely affects the crop yield.

Village wise household, total population and schedule caste population has been worked out from the census book and is tabulated in **table 16.** The literacy rate of micro watershed wise distribution is also exhibited in Table 17.

3.5.1 Demographic Status

Table 16. Demographic Status/ Population Pattern

S.no	Name of Micro Watershed	Total no of houses	Total Population			SC			
			Male	Female	Total	Male	Female	Total	%age
1	Tikri	197	571	501	1072	198	162	360	34%
2	Bariser	274	859	783	1642	123	93	216	13%
3	Ghati	135	437	385	822	39	31	70	9%
4	Chaplana	276	893	775	1668	23	12	35	2%
		882	**2760**	**2444**	**5204**	**383**	**298**	**681**	

Source: Census 2001

Table17. Literacy Rate in Morni Watershed (IWMP II)

S. no.	Name of Micro Watershed	Total population	Literacy					
			Total Literates	% age	Male	% age	Female	% age
1	Tikri	1072	645	60%	410	64%	235	36%
2	Bariser	1642	911	55%	596	65%	315	35%
3	Ghati	822	459	56%	303	66%	156	34%
4	Chaplana	1668	959	57%	624	65%	335	35%

Source: Census 2001

Table 18. EMPLOYMENT STATUS

S.No.	Name of Micro Watersheds	Name of villages	Schedule caste		Cultivators		Agricultural labourers		Household industry workers		Other workers	
			Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
1	Tikri	12.Bhoj Nagal(part)	125	109	203	124	10	1	1		26	87
		13.Bhoj Kothi	123	97	69	53	-		-	-	6	
2	Bari ser	14.Bhoj Koti	54	43	107	80	18	1	2	-	21	1
		15.Bhoj Dharti(part)	21	18	71	9	-	-	1	- 1	32	- 2
3	Ghati	Bhoj Dharti(part)	20	18	70	9	-	-	1	0	32	1
		16.Bhoj Naita(part)	8	4	60		-		1		3	

- - -

S.No.	Name of Micro Watersheds	Name of villages	Schedule caste		Cultivators		Agricultural labourers		Household industry workers		Other workers	
			Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
4	Chaplana	17.Bhoj Tipra	-	-	140	151	1		1		10	2
		Bhoj Dharti(part)	20	18	70	8	-	-	1	0	32	1
		Bhoj Naita(part)	7	4	59	65	-	-	0	-	3	-
		18.Bhoj Darrara	-	-	42	8	-		-		4	1

Source: Census 2001

3.5.2 Migration Pattern

The major reason for migration is lack of employment opportunities, small uneconomical holding, and lack of fodder availability in summer etc. The village wise migration, period, reason for migration and probe able income generation has been compiled and shown in **Table 19.**

S.no	Name of Micro Watershed	Total Population	Migration			Migration by months			Main reason for migration	Income during migration/month
			Male	Female	Total	0-3 months	3-6 months	More than 6 months		
1	Tikri	1072	15	-	15	3	6	10	Due to lack of fodder	2000
2	Bariser	1642	20	-	20	5	12	15	Due to lack of fodder	2500
3	Ghati	822	10	2	12	10	15	20	Due to lack of fodder	2000
4	Chaplana	1668	12	3	15	5	8	12	Due to lack of fodder	1500

Table 19. Migration Pattern in Morni Watershed (IWMP II)

Source: Based on Sample Survey

POVERTY: Most of the residents are very poor; having poverty had been mostly accepted as inevitable as traditional modes of production were insufficient to give an entire population a comfortable standard of living. The distribution of the BPL and their percentage is presented in table 20.

Table 20. BPL Pattern

S.no	Name of micro watershed	Total houses	Total Household-BPL	% of BPL HH	Total Land less HH	% of Landless HH
1	Tikri	186	64	34.40	26	13.97
2	Bariser	159	48	30.18	31	19.49
3	Ghati	136	38	27.94	32	23.52
4	Chaplana	172	42	24.41	34	19.76
		882	**192**			

(Source: District Administration Panchkula, Haryana)

INFRASTRUCTURE DETAILS

All the villages are well connected by pucca road and primary or middle school exists in all villages. Health facility is available in villages or nearby Health Centers. The village wise details of infrastructure are shown in **Table 21** and the facilities/ household assets in the villages under watershed is shown in Table 22.

Table 21: Village Infrastructure

S. no.	Village	Bank Y/N	Post office Y/N	School Primary/High/Sr.Sec	Milk Collection Centre Y/N	Pucca Road to Village Y/N	Health Facility Govt/Private Y/N	Veterinary facility Y/N
1	Tikri	N	Y	High School	N	N	Y	N
2	Bariser	N	Y	High School	N	Y	Y	N
3	Ghati	N	N	Primary School	N	N	N	N
4	Chaplana	N	N	Primary/ High School	N	Y	N	N

FACILITIES/ HOUSEHOLD ASSETS

Table No. 22 Facilities/ Household assets

S.no	Name of Micro watershed	Total no. of Houses	HHs with Safe latrines	HHs with phones		HHs with vehicles		HHs with TV sets	HHs with cooking gas	HHs with drinking water	HHs with fridge
				Landline	Mobile	2 wheelers	4 wheelers				
1	Tikri	186	141	32	261	53	19	16	2	186	18
2	Bariser	159	156	51	118	32	6	14	1	159	15
3	Ghati	136	112	29	130	27	4	12	2	136	11
4	Chaplana	172	144	21	234	24	8	15	3	172	12

3.5.3 LIVELIHOOD PATTERN: The livelihood from agriculture, animal husbandry, casual labour and others in the micro watershed (village wise) is shown in table 23.There is no major income from the common property resource to the individuals.

Table 23. Per capita (Household) income Morni Watershed (IWMP II)

Sr. No	Name of Micro watershed	Agriculture in Rs. P.A	Animal Husbandry in Rs. P.A	Casual labour in Rs. P.A	Others in Rs. P.A	Total in Rs.
1	Tikri	4000	2600	18000	2200	26800
2	Bariser	2880	3190	18200	2000	26270
3	Ghati	3770	3100	18500	2000	27370
4	Chaplana	4200	3050	18500	2600	28350

3.5.4 Comparative Status of crop Productivity

Three major crops namely Wheat, Maize and Paddy are sown in Watershed villages. Though main crops grown in the area are wheat and maize, Paddy is also cultivated in some of the villages where irrigation facilities are available through the privately owned tube wells. Compared to rest of the district and the state, the average yield of these crops is quite low. Table 24 exhibits the average yield of major crops in the watershed and comparisons have been made at block, district, and state and India level.

Table 24. Average yield (kg/hectare) of crops in Morni watershed (IWMP II)

Name of the Crop	India	State	District	Block	Watershed Villages
Wheat	4307	4614	2140	1225	1200
Maize	3519	2154	1663	1425	1405
Paddy	3990	2724	2325	1525	1505

(Source: Department of Agriculture, Haryana)

The Project area has low productivity because of the following reasons

- Full dependence of monsoon.
- Low use of fertilizer per unit cropped area.
- Lack of finances for farmers.
- Lack of good quality of seeds and fertilizer.
- Lack of other facilities such as storage and marketing

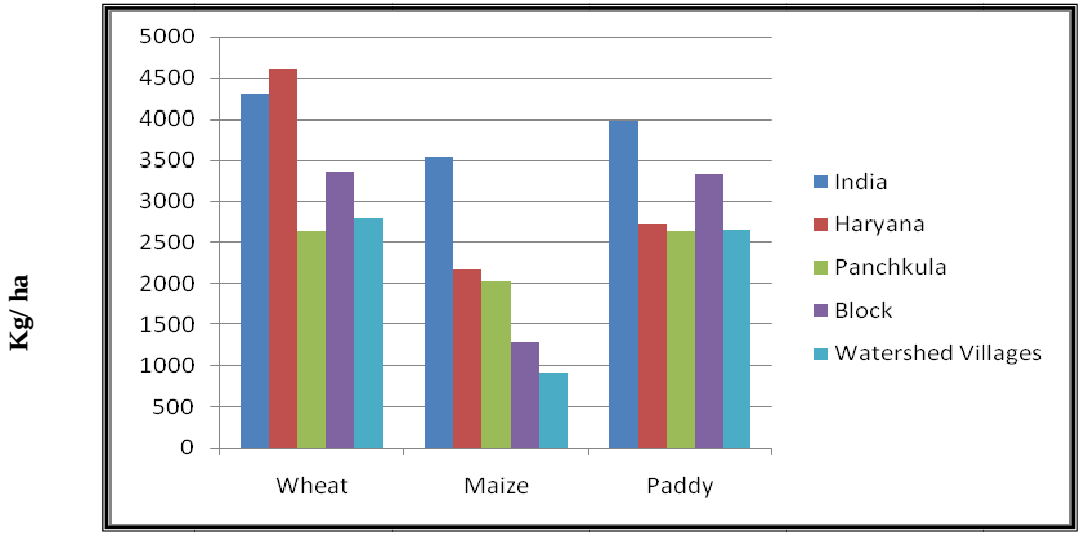


Fig. 1 Average yield of major crops

3.6 REASON FOR LOW PRODUCTIVITY

- Moderate to severe erosion hazard
- Physical properties of the soils are light in texture and with boulders here and there.
- Low water holding capacity.
- Moderate to rapid permeability.
- Low organic carbon.
- Poor phosphorous and medium potash nutrients.
- Lack of assured irrigation facility.

- Acceptance of hybrid/ high yielding varieties are nil to negligible.
- Irregular and erratic rainfall: there is long span between two subsequent rainfalls in the area.
- Sudden change in climate of the area.
- Essential micro- nutrient deficiency in the soil.

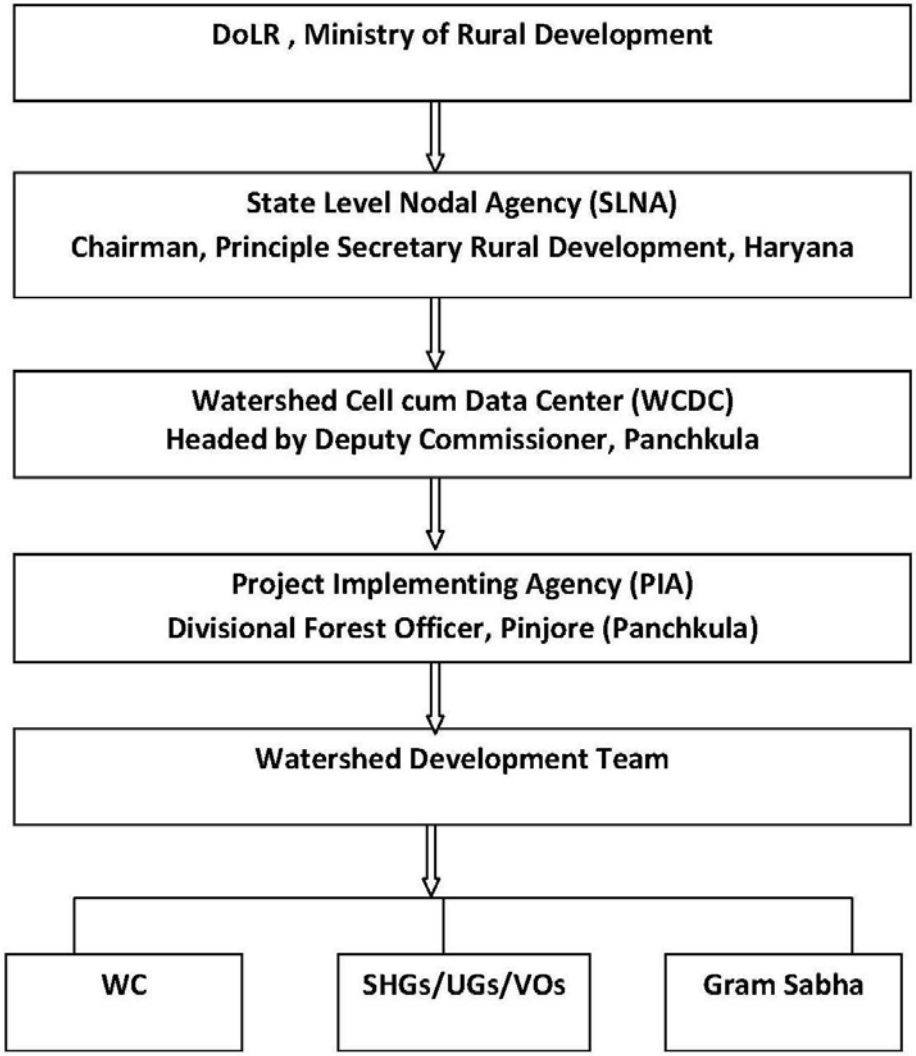
CHAPTER-4

PROJECT MANAGEMENT AGENCIES

4.1 INSTITUTIONAL ARRANGEMENT

Institutions play a major role in managing the projects. Realizing the importance of Community Participation, Decentralized Participatory Approach has been adopted for Watershed Management. Following decentralization and to achieve the objectives, there is a dire need for establishment of Institutional set up from National to Village Level (Micro Watershed Level), including cluster (Watershed Level) and district level. These institutions need to be oriented from time to time and also empowered so that they take up the assigned tasks and work as per their responsibilities from the start of the program to effective management of Project. Considering the prevalent circumstances, these institutions should take decisions at their respective level. The involvement and participation of beneficiaries and other stakeholders is desired to be encouraged right from the planning stage.

The institutional set up is given below:


DoLR , Ministry of Rural Development
State Level Nodal Agency (SLNA)
Chairman, Principle Secretary Rural Development, Haryana
Watershed Cell cum Data Center (WCDC)
Headed by Deputy Commissioner, Panchkula
Project Implementing Agency (PIA)
Divisional Forest Officer, Pinjore (Panchkula)
Watershed Development Team
WC
SHGs/UGs/VOs
Gram Sabha

4.2 STATE LEVEL NODAL AGENCY, HARYANA

State Level Nodal Agency (SLNA) is headed by Chief Executive Officer and supported by Technical Experts is fully functional. The regular meetings with PIA and other stake holders are held to provide necessary guidance to them as per the revised, common guidelines, 2011. The main functions of SLNA are:

- To implement the approved perspective and strategy plan of watershed development for the state.
- Acts as Nodal Agency at State Level for appraisal and clearance.
- To establish and maintain a State Level data cell from the funds sanctioned to the State and connect it online with the National Level Data Centre.
- To provide technical support to Watershed Cell cum Data Centre throughout the state.
- To approve a list of independent institutions for capacity building of various stakeholders within the state and work out the overall capacity building strategy in consultation with NRAA/Nodal Ministry.
- To approve project implementing agencies identified/selected by WCDC/District Level Committee by adopting appropriate objective selection criteria and transparent systems.
- To establish monitoring, evaluation and learning systems at various levels (Internal and external/independent system).
- To ensure regular and quality online monitoring of watershed projects in the State in association with Nodal Agency at the Central Level and securing feedback by developing partnerships with independent and capable agencies.

4.3 WATERSHED CELL CUM DATA CENTRE, PANCHKULA

WCDC has been notified by SLNA and the same has been constituted. The team comprises of 3 to 4 subject matter specialists on Agriculture, Water Management, Social Mobilization and Management & Accounts. WCDC is be headed by

Deputy Commissioner and Additional Deputy Commissioner has been designated as Project Manager under IWMP. The WCDC members comprise of Technical Expert, Computer Operator and Accountant. As per guideline 3 to 6 full time staff (3 in district with less than 25000 ha project area and 6 in districts with more than 25000 ha project area) would assist the Project Manager. The Project Manager will prepare well defined annual goals against which the performance will be monitored. The WCDC will be financially supported by the DoLR after review of available staff, infrastructure and actual requirement.

Organization of WCDC and its Objective

The primary objective is successful implementation of watershed programme. The organization bears the responsibility to assist and facilitate PIA from time to time. The broad functions of WCDC are as under:

- Providing technical support in planning and implementation of the project.
- Facilitation in preparation of Annual Action Plan.
- Monitoring and of project activities.
- Co-ordination with allied departments.
- Submission of various reports to SLNA.

4.4 PROJECT IMPLEMENTATION AGENCY

The project Implementing Agencies (PIA), DFO, Morni (Pinjore) is selected by the State Level Nodal Agency (SLNA) for Integrated Watershed Management Programme (IWMP) in Haryana. In the district Panchkula, where the area of development is 26020 ha, a separate dedicated unit, called the Watershed Cell cum Data Centre has been established which will oversee the implementation of watershed programme. The PIA is responsible for implementation of watershed

project. Divisional Forest Officer, Morni (Pinjore). He has a vast experience in implementing various watershed development Projects.

PIA will put dedicated watershed development team and will provide necessary technical guidance to the Gram Sabha /Watershed Committee for implementation of development plans for the watershed projects through Participatory Rural Appraisal Exercise.

PIA will also undertake:

a) Community Organization,
b) Trainings for the village communities,
c) Supervise Watershed Development Activities,
d) Inspect & authenticate project accounts,
e) Monitor & review the overall project implementation,
f) Set up institutional arrangements for post project operations and
g) Maintenance and further development of the assets created during the project period.

Table 1. PIA/ Project Implementing Agency

S.no.	**Name of the Project**	**Details of PIA**	
1	Morni Watershed (IWMP II)	i) Type of organization	District Level Nodal Agency
		ii) Name of organization	DWDU, Panchkula
		iii) Designation & Address	DFO, Morni
		iv) Telephone	0172-2571771
		v) Fax	0172-2571771
		vi) E-mail	adcpkl@hry.nic.in

The PIA is well competent to effectively manage this project and has a good rapport with the village community. The watershed committee members are giving them positive response in the preparatory phase. The overall responsibility of the PIA would be to oversee the project progresses well and to provide technical knowhow as when required. PIA has qualified and highly experienced staff to accomplish this task and take this project forward for its logical conclusion. PIA will be assisted by the Watershed Development Team.

4.4.1 Monitoring Level Staff at PIA Head Office

The highly experienced staff is engaged in the monitoring the project. The technical guidance to field staff from time to time is being provided. Meetings are being periodically held by head office with officials from the Panchkula district to apprise themselves of the status of ongoing project.

4.5 Watershed Development Team

The watershed development team (WDT) is an integral part of the PIA. WDT would consist of subject specialists such as Agriculture, Animal Husbandry, Horticulture, Soil & Water Management and Forest. One woman member with experience in Social mobilization is also included in WDT. Divisional Forest Officer would be team leader of the WDTs. Team Leader will coordinate with other WDT members for smooth implementation of the project. One member of the WDT will be departmental official of the rank ADO (Soil Conservation)/ ADO (Agriculture)/ Range Officer who will also be responsible for disbursement of funds along with Secretary Watershed Committee.

WDT will guide the watershed committee in the formulation of watershed action plan. An indicative list of the roles and responsibilities of the WDT would include among others, the following:

a) Constitution of Watershed Committee and its functioning,
b) Organizing and strengthening User groups, Self Help Groups,
c) Mobilizing women to ensure that the perspectives and interests of women are adequately reflected in the watershed action plan
d) Conducting Training and Capacity Building,
e) Common property resource management and equitable sharing
f) Preparing detailed resource development plan including Soil & Water Conservation,
g) Undertake engineering surveys,
h) Prepare engineering drawings and cost estimate for structures to be built.
i) Monitoring, checking, assessing, undertaking physical verification and measurements of the 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.

4.6 WATERSHED COMMITTEE DETAILS

The process of formation of watershed committees of all villages has been completed and watershed committees have been formed in all villages. The representation on these committees consists of members from- SC, landless, women and members from self help groups and user groups. The committees would be imparted training for smooth management of the activities related to watershed.

Their representation of various groups is as under:

- Minimum of 50% members from SHGs and UGs, SCs, women and landless.
- One member from Watershed Development Team, especially women member (subject matter specialist in Social Science).

The Govt. of Haryana vide department memo No. PO (IWMP)-2012/1479 dated 05.03.2012 has decided to include the following members as members of the Watershed Committees.

- All alive ex-Sarpanches of concerned Gram Panchayats,
- Concerned member of Panchayat Samiti,
- Concerned member of Zila Parishad,

One of the members of Watershed Committees is nominated as Watershed Secretary to perform the following duties:

- Convening meetings of Watershed Committee, Gram Sabha,
- Maintaining all records and proceedings of the meetings.
- Follow up action on all decisions taken in the meetings.
- Ensuring people's participation.

4.6.1 Formation of Watershed Committees (WC)

The watershed committee has been constituted as per the guidelines para 6.3 (44) after convening a meeting of Gram Sabha. The schedule of the meeting was circulated by the Additional Deputy Commissioner well in advance. The watershed committees were constituted in each village as detailed below:

Table 2. Watershed Committees (WC) Details

Name of Micro Watershed	Name of Villages	Name of President	Name of Secretary	Name of Members
Raji Tikri	Bhoj Nagal(part), Bhoj Kothi	Birender Singh	Harish Singh	Lata Devi, Yoginder, Fate Singh(Ex-Sarpanch), Mulak Ram, Dahram Pal, Mira Devi, Premi Devi, Hira Singh, Kushal Singh, Baldev Singh, Chandel Singh, Prem Singh, Tek Singh
Ghati	Bhoj Dharti(part), Bhoj Naita(part)	Devender Singh	Manjit Singh	Raghuveer Singh, Diwan Singh, Krishna Devi, Baljit Singh, Mahender Singh, Ram Pyari, Parwati, Kamal Singh, Paramjit Singh, Kashiram (Nambardar), Jayawati, Ranjit Singh (Ex-Sarpanch), Kaushalya Devi (Sarpanch),
Chaplana	Bhoj Tipra, Bhoj Dharti(part), Bhoj Naita(part), Bhoj Darrara	Gulab Singh	Din Dayal	Shyam Lal, Dharam Chand, Kishan Singh, Harparkash, Lazza Ram, Sarvati, Jaywant, Dharmi Devi, Raksha Devi, Dharm Singh (Lambardar), Ranvir Singh (Sarpanch), Prem Singh (Sarpanch), Narata ram (Ex- Sarpanch)
	Deora	Rajender Pal	Subhash Chand	Charan Kumar, Sita Devi, Ritu Rani, Lata Devi, Madubala, Raksha Devi, Prem Chand, Bhim
Bariser	Bhoj Koti, Bhoj Dharti(part)	Ishwar Dutt	Naresh Kumar	Mohan Singh, Balwant Singh, Permeshwar, Madan Pal, Uday Pal, Kiran Devi, Nirmla Devi, Krishna Devi,

The Secretary of the Watershed Committee has been appointed by the Watershed Committee in the meeting of Gram Sabha. The Secretary will be paid honorarium and would be independent from the functioning of Panchayat Secretary. The secretary would be dedicated in the project activities and would take care of the watershed supervision and would be fully responsible for organizing the meeting and maintenance of records. The main responsibilities of secretary are as under:

- Convening the meeting and recording the minutes of WC meeting and will be responsible for follow up the decision taken by the WC Committee.
- The secretary will be responsible for financial transactions of the project and will sign the cheques with WDT nominee on the behalf of WC.
- He will motivate the villagers for voluntary contribution and ensure equitable distribution of resources.

4.7 INSTITUTIONAL SETUP AT WATERSHED LEVEL

4.7.1 Self Help Groups

The formation of the self help group is all the villages is underway. It is proposed to form at least 2 self help group in each village. In each village Self Help Groups consisting of 10 to 15 members having common goal are being formed. The members of SHGs would be drawn from very poor families, BPL families, SC families, Land less families, Small and Marginal farmers SHG would be homogeneous in nature and would work together for their socio-economic up-liftment. SHGs need to be imparted. Under the project, each SHGs would be given revolving fund Rs. 25000 each after 6 months of the date of formation. The income generating activities would be identified. For adopting economic activities would depend upon the decision of Self Help Group. Accordingly the Orientation and Trainings for their skill up gradation would be arranged in the project as activity. It is the responsibility of Watershed Committee to form SHGs in their respective villages under the guidance of Watershed Development Team and Project Implementing Agency.

4.7.2 User Groups

The Watershed Committee will constitute user group in the watershed area with the help of the WDT. In each Watershed village, user groups are also being formed. Members of these groups would be the beneficiaries of the Watershed project. User group are formed to manage the activities and also asset created under the programme on the long term basis. These groups would also be homogeneous in nature. User groups shall be given technical support as and when required by Watershed Committee and Watershed Development Team. During the preparatory stage while discussing with the Gram Sabha member it was decided that each group would formulate certain internal rules and have a feeling of ownership with community spirit. The members would be from various categories like landless, small farmer, marginal farmer and large farmer.

CHAPTER- 5

BUDGETING & PHASING

MICRO WATERSHED WISE/COMPONENT WISE PHASING

YEAR WISE BUDGET PHASING UNDER IWMP

IWMP-II Morni Watershed

5.1 BUDGETING

The State Level Nodal Agency will distribute funds to WCDC keeping in view the detailed annual action plan of each micro- watershed. The expenditure under the various component of the project will be carried out as per the guidelines. The activity wise allocations of funds as per the provision of budget components have been work out and exhibited in table. 1. The first step in the budgeting is dividing the cost of project into various components as detailed in the revised common guidelines. It would help the PIA in further identifying activities under different components and allocate appropriate funds.

MICRO WATERSHED WISE / COMPONENT WISE PHASING
YEAR WISE BUDGET PHASING UNDER IWMP-II

Table 1. Activity wise allocation of funds for Project Village

Funds in Rs. Area in Hectares and

(BUDGET AT A GLANCE)

Name of the project	Project Area	Effective Area	Funds Available	Name of activity	1st Year	2nd Year	3rd Year	4th Year	5th Year	Total
Morni Watershed (IWMP II)	6593	4752	57024000	Administrative costs	570240	570240	1710720	1710720	1140480	5702400
				Monitoring	0	0	0	570240	0	570240
				Evaluation	0	0	0	0	570240	570240
				Entry point activities	2280960	0	0	0	0	2280960
				Institution and capacity building	0	2851200	0	0	0	2851200
				Detailed project report	570240	0	0	0	0	570240
				Watershed development works	0	4561920	9123840	9694080	8553600	31933440
				Livelihood activities for the asset less persons	0	0	1710720	2851200	570240	5132160
				Production system and micro enterprises	0		1710720	2280960	1710720	5702400
				Consolidation phase	0	0	0	0	1710720	1710720
				Total	**3421440**	**7983360**	**14256000**	**17107200**	**14256000**	**57024000**
				Percentage of total cost	**6%**	**14%**	**25%**	**30%**	**25%**	**100%**

MICRO WATERSHED WISE/COMPONENT WISE PHASING
YEAR WISE BUDGET PHASING UNDER IWMP

Area in Hectares and
Funds in Rs.

Table 2. PHASING YEAR WISE (Name of the Micro Watershed: Tikri)

(BUDGET AT A GLANCE)

Effective Area	Funds Available	Name of Activity	1st Year	2nd Year	3rd Year	4th Year	5th Year	Total
1315	15780000	Administrative costs	157800	157800	473400	473400	315600	1578000
		Monitoring	0	0	0	157800	0	157800
		Evaluation	0	0	0	0	157800	157800
		Entry point activities	631200	0	0	0	0	631200
		Institution and capacity building	0	789000	0	0	0	789000
		Detailed project report	157800	0	0	0	0	157800
		Watershed development works	0	1262400	2524800	2682600	2367000	8836800
		Livelihood activities for the asset less persons	0	0	473400	789000	157800	1420200
		Production system and micro enterprises	0	0	473400	631200	473400	1578000
		Consolidation phase	0	0	0	0	473400	473400
		Total	**946800**	**2209200**	**3945000**	**4734000**	**3945000**	**15780000**
		Percentage of total cost	**6%**	**14%**	**25%**	**30%**	**25%**	**100%**

MICRO WATERSHED WISE/COMPONENT WISE PHASING

YEAR WISE BUDGET PHASING UNDER IWMP

Area in Hectares and Funds in Rs.

Table 3. PHASING YEAR WISE (Name of the Micro Watershed: Bariser)

Effective Area	Funds Available	Name of Activity	1st Year	2nd Year	3rd Year	4th Year	5th Year	Total
1284	15408000	Administrative costs	154080	154080	462240	462240	308160	1540800
		Monitoring	0	0	0	154080	0	154080
		Evaluation	0	0	0	0	154080	154080
		Entry point activities	616320	0	0	0	0	616320
		Institution and capacity building	0	770400	0	0	0	770400
		Detailed project report	154080	0	0	0	0	154080
		Watershed development works	0	1232640	2465280	2619360	2311200	8628480
		Livelihood activities for the asset less persons	0	0	462240	770400	154080	1386720
		Production system and micro enterprises	0	0	462240	616320	462240	1540800
		Consolidation phase	0	0	0	0	462240	462240
		Total	**924480**	**2157120**	**3852000**	**4622400**	**3852000**	**15408000**
		Percentage of total cost	**6%**	**14%**	**25%**	**30%**	**25%**	**100%**

MICRO WATERSHED WISE/COMPONENT WISE PHASING
YEAR WISE BUDGET PHASING UNDER IWMP

Area in Hectares and
Funds in Rs.

Table 4. PHASING YEAR WISE (Name of the Micro Watershed: Ghati)

Effective Area	Funds Available	Name of Activity	1st Year	2nd Year	3rd Year	4th Year	5th Year	Total
1243	14916000	Administrative costs	149160	149160	447480	447480	298320	1491600
		Monitoring	0	0	0	149160	0	149160
		Evaluation	0	0	0	0	149160	149160
		Entry point activities	596640	0	0	0	0	596640
		Institution and capacity building	0	745800	0	0	0	745800
		Detailed project report	149160	0	0	0	0	149160
		Watershed development works	0	1193280	2386560	2535720	2237400	8352960
		Livelihood activities for the asset less persons	0	0	447480	745800	149160	1342440
		Production system and micro enterprises	0	0	447480	596640	447480	1491600
		Consolidation phase	0	0	0	0	447480	447480
		Total	**894960**	**2088240**	**3729000**	**4474800**	**3729000**	**14916000**
		Percentage of total cost	**6%**	**14%**	**25%**	**30%**	**25%**	**100%**

MICRO WATERSHED WISE/COMPONENT WISE PHASING
YEAR WISE BUDGET PHASING UNDER IWMP

Area in Hectares and
Funds in Rs.

Table 5. PHASING YEAR WISE (Name of the Micro Watershed: Chaplana)

Effective Area	**Funds Available**	**Name of Activity**	**1st Year**	**2nd Year**	**3rd Year**	**4th Year**	**5th Year**	**Total**
910	10920000	Administrative costs	109200	109200	327600	327600	218400	1092000
		Monitoring	0	0	0	109200	0	109200
		Evaluation	0	0	0	0	109200	109200
		Entry point activities	436800	0	0	0	0	436800
		Institution and capacity building	0	546000	0	0	0	546000
		Detailed project report	109200	0	0	0	0	109200
		Watershed development works	0	873600	1747200	1856400	1638000	6115200
		Livelihood activities for the asset less persons	0	0	327600	546000	109200	982800
		Production system and micro enterprises	0	0	327600	436800	327600	1092000
		Consolidation phase	0	0	0	0	327600	327600
		Total	**655200**	**1528800**	**2730000**	**3276000**	**2730000**	**10920000**
		Percentage of total cost	**6%**	**14%**	**25%**	**30%**	**25%**	**100%**

CHAPTER – 6

PREPARATORY PHASE

The Preparatory Phase of the project will be the first year of the project. The major objective of this phase is to build appropriate mechanism for adoption of participatory approach and empowerment of local institutions (WC, SHG, and UG). WDT will assume the role of facilitator during this phase. In this phase, the main activities will include:

6.1 AWARENESS GENERATION AND MOTIVATION FOR PARTICIPATION

Fortunately, due to the implementation of earlier watershed management projects and operation of various ongoing soil and water conservation schemes, there has been regular interaction of the departmental staff with the community. Because of positive result of earlier projects, people are responsive and are looking forward for projects intervention. The need for the soil and water conservation works have emerged due to persistent draught, which the area is facing. However, production system need lot of improvement and hence the need of awareness generation and motivation for collective efforts to face the malady of recurrent floods and draught.

6.1.1 Collection of Base Line Data and Hydrological Data

As explained earlier, baseline data from all possible sources is collected for the purpose of not only future impact assessment but also to design project intervention. Most of this was done at the PPR and DPR stages, which forms integral part of the preparatory phase. In addition, data on rain fall amount and distribution, weather conditions and frequency of floods and drought was compiled at DPR stage.

6.1.2 Formation of Village Level Institutions

It has been decided by the state that project activities shall be implemented throughout the watershed committees (WCs). In collaboration with the department, the village level WCs were formed by holding well-attended meeting in which all settlement and section of the society were represented. Due representation was given to women, landless and BPL families as per norms issued by DoLR.

The self- Help Groups were formed during earlier projects but most of them are inactive and non – functional. Those groups will be revived and new ones were formed depending upon willingness of the interest groups. The type of activities these groups want pursue and their capacity building requirements were noted.

6.1.3 Preparation of DPR

PRA exercise and comprehensive data base have been carried out for DPR preparation. Meetings were held at district, micro- watershed wise and village wise with the lined departments and members of Gram Sabha on this aspect**.** The Draft Project Report was prepared on the basic information generated from primary and secondary sources. This also includes the outcome of participatory rural appraisal and outcome of transect walk and stakeholders' discussions. A list of scope of works that finally emerged was prepared. Based on the technical survey, detailed cost estimates were prepared for components including resource management, entry point activities and production system. A broad frame work for capacity building at all levels as per the guidelines of DoLR was prepared. The livelihood opportunities which emerged from local product and market facility were analyzed and outlines of the same were included. Since the financial provisions were decided according to the area proposed to be covered, these provisions were distributed across project activities. The project activities are sequenced into three phase's namely preparatory phase, work phase, consolidation and withdrawal phase. So, the activities were segregated in the sequence and explained in detail. Finally the details about

budget and its spilt up into annual action plan were also attempted. Since the DPR will be part of MIS from which details are arranged on two various layers on GIS. All the works proposed in the DPR are location specific and are as per the local demand and socio- economic conditions of the watersheds.

Strength, Weakness, Opportunities, Threat (SWOT) analysis of IWMP

A critical analysis of main strength of the proposed project, evident weaknesses, opportunities available for successful implementation and scope of achieving set objectives was made. Attention is also paid to possible threat against which sufficient inbuilt safeguards are provided. Such an analysis was done for the project in hand and summaries of observations were made and are mentioned below for the all Seven Sub- watersheds in Panchkula district.

Strengths

- ❖ Good Rain fall
- ❖ Strong linkage with national and state level institutes and KGK for capacity building and technical guidance.
- ❖ Favorable environment for raising fruits, vegetables and medicinal plants.
- ❖ Most families are engaged in animal husbandry activities.
- ❖ Availability of drinking water.
- ❖ Good response to earlier watershed management programmes.
- ❖ Local residents are active in micro enterprises.

Weaknesses

- ❖ Erratic rainfall
- ❖ Lack of good quality fodder.
- ❖ Lack of advanced cattle breed.
- ❖ Low level of milk production.

- Lack of knowledge base regarding scientific cattle management.
- Prevalence of soil erosion
- No organized micro enterprises activities.
- Lack of technical skills.

Opportunities

- Rain Water harvesting for production.
- Promotion of organic farming.
- Promotion of horticultural activities (dry land plants).
- Provide training on dairy farming and other income generating activities.
- Promotion of nursery raising and pasture development.
- There would be horizontal integration and convergence of development programmes being organized and run by govt.

Threats

There are few negative issues that may have adverse effect

- Unreliable rainfall.
- Absence of assured irrigation.
- Lack of cooperation and contribution from local residents.
- Low literacy rate in the project area.
- Rapid climate change affecting crops.
- Lack of awareness of Dairy farming as a commercial activity.
- Frequent droughts.
- Poor avenues for employment.
- Wild life menance.

INSTITUTION AND CAPACITY BUILDING-5%

Institution and Capacity Building = Rs. 28, 51,200 /-

6.2 CAPACITY BUILDING

1. Introduction

Watershed development is conceived as a strategy for protecting livelihoods of people inhabiting fragile ecosystems, which over period of time have become subject to multidimensional land degradation. Main stress has been to ensure availability of water for drinking and irrigation to support agro-horti-forestry operation vis-à-vis raise income level and provide adequate employment opportunities for communities living in such areas of concerns. As an intervention Integrated Wasteland Development is nearly 20 years old. The initiatives have been subject to periodic reviews by expert committees with a broader view to improve upon its strategy and components as well as match with the growing socio-ecological requirements

Para 9.VIII of common guidelines necessitate capacity building and trai ning of all functionaries and stakeholders involved watershed programme on a war footing with definite action plan, requisite professionalism and all round competence.

2. Vision

A sincere effort to provide required professionalism and competence to the stakeholders associated with planning and implementation of IWMP in the state. This would include organisation development, human resource development, cooperation and network development and institutional development, all seen as a continuous process enabling functionaries to enhance their knowledge and skills and to develop the required orientation and perspectives thereby becoming more effective in discharging their roles and responsibilities.

3. Need

The term Capacity Development is understood as the development of peoples, organizations and societies' capability to manage resources effectively and efficiently in order to realize their own goals on a sustainable basis. In this context, four dimensions have to be distinguished:

- The development of the human resource or personnel development.
- The strengthening of the effectiveness and efficiency of organization or organizational development.
- The strengthening of cooperation between organizations and network development.
- The promotion of institutional frameworks for development.

Further, already 47 projects sanctioned in 2011-2012 in the state covering around 248 micro watersheds measuring 179531 hectares of area. The implementation of these new projects under the umbrella of common guidelines is reported to be in the initial stage under preparatory phase. The establishment of desired institutional setup at all levels, required level of awareness for ensuring effectiveness of all institutions and community participation is therefore necessitated for conclusive participation by all.

This also necessitates a comprehensive package to provide appropriate knowledge for speedy implementation of the projects in the state particularly in the districts.

4. Rationale

Para 81 of common guidelines for watershed development lays special emphasis on the following key elements of Capacity building strategy.

- Dedicated & decentralized institutional support & delivery mechanism
- Annual Action Plan for Capacity Building

- Pool of resource persons
- Well prepared training modules and reading materials
- Mechanism for effective monitoring and follow-up.

Keeping in firsthand experience of the state in launching 47 projects under IWMP and current state of planning and implementation under preparatory phase the current action plan is primarily prepared to build the capacity of different principal stakeholders of projects to speed up further implementation and also lay a strong foundation for subsequent phases.

5. Objectives

The main objectives of the current action plan for ongoing 47 projects are outlined as follows:-

- Create common understanding on different features and provisions of common guidelines as well as instructions directions issued from time to time by Central and State Governmental agencies.
- Develop proper conceptual understanding about integrated participatory watershed management including other issues such as equity, environmental and social sustainability among all implementing agencies at project and village levels, PRIs and local communities (**KNOWLEDGE**).
- Build necessary and required skills and managerial competence of all stakeholders about planning, implementation and management of various project activities using participatory approach (**SKILLS**).
- Help institutional growth of watershed committees at GP level.
- Strengthening community participation, ensuring positive involvement of communities and improvement of socio economic conditions in watershed areas (**ATTITUDES**).

Table 1. Statement of Targets under Proposed Training Action Plan at Micro Watershed Level to be conducted by WDT members of Panchkula District

Sl. No.	Title of Training Programme and Duration	Level of Participants	Total persons	Trainees Per Programme	Number of Programmes
01	District Level Sensitisation Workshop for Watershed Committees. **One Day**				
	Panchkula District	Members of Watershed Committees @ 10 per committee would also include accompanying WDT Members.	750	300-350	2
02	Block Level Functional Programmes for Secretaries of Watershed Committees. **Two Days**				
	Panchkula District	Secretaries of Village Watershed Committees	75	35-40	2
03	Project Level Sensitisation Camps for WC **One Days**				
	Panchkula District	Members of Watershed Committees @ 10 Persons (Tentative) per WC	750	50	15
04	Village Level Awareness Camps on IWMP at Micro Watershed Level for User Groups **One Day**				
	Panchkula District	Approximately 50 prospective user groups per micro watershed.	1800	50	34
05	Block Level Functional Programmes for SHGs (Leader, Secretary and Treasurer) under IWMP **One Day**				
	Panchkula District	Three persons (Leader, Secretary and Treasurer) per Self Help Group @ around one SHG per village.	225	50	4

Note: Training programmes under Sl. No. 01 are proposed to be conducted by HIRD in collaboration with SLNA and WCDCs.

6. Training Methods

A group of selected Watershed Development Team members would be trained on various methods to ensure that they are able to conduct the proposed interventions effectively with the help of some of the following methods.

- Interactive learning.
- Experience Sharing.
- Experimental Learning.
- Presentation of case studies.
- Classroom deliberations.
- Group [structured] exercises and discussions.

7. Tools

- Projectors
- Flip Charts
- Electronic films
- Print Material
- Other IEC material.

8. Resource persons

8.1. Internal

Around two persons per WDT identified from the initial training activities by HIRD, Nilokheri would be trained on various aspects for designing and conducting the training programmes. It is expected that each WDT members would be required to function as a internal resource person for the proposed training programmes. Technical experts from each WCDC and PIA would also function as facilitators in the proposed training activities.

1.1. External

Further, in order to make the proposed interventions meaningful for achieving the broader objectives efforts would be made to liaison with various experts from district level line departments, agencies and state level institutions including HIRD as per the need of the programme.

2. Fund Requirement

The **approved revised norms for training for PRIs and RD functionaries" by MoRD, GoI in 2010** have been strictly used [for fixed and variable costs].

Table: 2: Statement showing funds Requirement for training on IWMP in Haryana (Preparatory Phase – District Level)

Sr. No.	Training Programmes for SLNA, WDT, PIA , Field Functionary , WDC member's , SHG & UG organize by HIRD	Total Funds
1	District Level Sensitization Workshop(s) for Watershed Committees	69271
2	Block Level Functional Programmes for Secretaries of Watershed Committees. Two Days	11853
3	Village Level Sensitisation Camps for WC One Days	46981
4	Village Level Awareness Camps on IWMP at Micro Watershed Level for Prospective User Groups One Day	53035
5	Block Level Functional Programmes for SHGs [Leader, Secretary and Treasurer] under IWMP One Day	18774
	Total	**199914**

Table 3. Micro Watershed Wise Exposure cum training Visit for SLNA, WDT, PIA , Field Functionary , WDC, SHG & UG Members of IWMP II (Panchkula)

S. No.	Target Group	Training Topics	No. of days	Budget per camp	No. of Camps	No. of Participants per camp	Cost for all participants per day	Cost per participant/ per day	Cost per person	Total Budget
1	Self Help Groups- 2 SHGs- village level	Orientation on IWMP, SHGs cum Exposure Visit	3	42000	5	20	14000	700	2100	210000
2	User groups from each village	NRM, Post Project Management etc. – Exposure Visit	3	42000	5	20	14000	700	2100	210000
3	Watershed Level- WDT Members	Part II-Module I to V- Exposure Visit Outside State- Conceptual, Technical, Social, Management of Finance, Monitoring and Evaluation.	4	72000	5	12	18000	1500	6000	360000

S. No.	Target Group	Training Topics	No. of days	Budget per camp	No. of Camps	No. of Participants per camp	Cost for all participants per day	Cost per participant/ per day	Cost per person	Total Budget
4	Watershed Level- PIA	Exposure Visit- Within and outside State. Fundamentals of Watershed, Finance Management, Final Report on WDP etc.	4	72000	5	12	18000	1500	6000	360000
5	District Level-WDC	Exposure visit to successful watershed, University.	3	42000	5	20	14000	700	2100	210000
6	District Level-Line Deptt., WDC	Exposure visit to successful watersheds within state.	3	42000	5	20	14000	700	2100	210000
7	District Level trainers/Resource Persons	Exposure visit to successful watersheds outside state	4	72000	5	12	18000	1500	6000	360000
	Total									**1920000**

Table 4:-Farmer's / Beneficiaries training camps with Extension Programmes of IWMP II (Panchkula)

S. No.	District	No. Micro watershed	No. of Camps/ Year/ Micro watershed	Total No. of camp per Year	Total No. of camps for 5 Years	Amount of per Camp	Amount per Micro watershed	Total Budget
1	Farmer Training Camp in each season	4	2	8	40	12000	120000	480000
2	Propaganda & Documentation (Puppet show, documentary movies show, videography, Photography, wall Painting, Display Board, pamphlets, leaf lets. Etc)	4	2	8	40	5000	50000	200000
3	Contingency charges							51286
			Total					**731286**

i) **Training Programmes for SLNA, WDT, PIA , Field Functionary , WDC member's , SHG & UG organize by HIRD = Rs. 199914/-**

ii) **Micro Watershed Wise Exposure cum training Visit For SLNA, WDT, PIA , Field Functionary , WDC, SHG & UG Members**
= Rs. 1920000/-

iii) **Farmer's / Beneficiaries training camps with Extension Program's = Rs. 731286/-**

Grand Total = Rs. 28,51,200/-

6.2.1 Expected Outcome of Capacity Building

- All principal stakeholders would be covered under proposed training interventions by March, 2013.
- The knowledge level of different stakeholders on various provisions of Common Guidelines will increase to a significant level.
- The skill level of the principal stakeholders will be improved in managing watershed projects in consonance with the provisions of common guidelines and state government instructions.
- The programmes will help in ensuring that all stakeholders/agencies/institutions work with positive attitudes in order to utilize the benefit of the projects in fulfilling the objectives set forth.
- Programmes will create a sense of responsible partnership amongst various stakeholders.
- The programmes will also help in further identifying areas for future interventions.
- Improved participation of different stakeholders leading to speedy implementation of watershed development work phase.
- Experiences would help in consolidating other gaps for better planning and management of Capacity Building and Training interventions under new projects in future.

6.3 ENTRY POINT ACTIVITIES 4%

EPA activities are taken up under the watershed to build rapport with village community at the beginning of the project, generally certain important works which are in urgent demand of the local community are taken up. Group discussions were conducted in the Gram Sabha meeting/watershed committees regarding EPA activities. It was conveyed to the Gram Sabha that an amount of Rs. 22,80,960/- was provided for EPA. The stake holders discussed the various activities which they felt were important. After the discussion the following activities were finalized. The convergence with the other project can also be undertaken.

Table 5. Entry Point Activities in Morni Watershed (IWMP II)

Sr. No.	Name of Project	No. of EPA Targeted / Identified	Name/ Nature of EPA	Location	Estimated Cost
1	2	3	4	5	6
	Morni Watershed IWMP-II	4	Retaining walls	Deora	6.312
			Retaining walls	Bari Sher	6.163
			Retaining walls	Ghati	5.966
			RRC street	Chaplana	4.368
	Total				**22.809**

CHAPTER 7

WORK PHASE

7.1 WATERSHED DEVELOPMENT WORKS - 56%

All the Works under the project have been identified after detailed survey of the Project Area and discussions held with team of experts consisted of DSCO, DFO, Hydrologist from Haryana supported by Livelihood expert, Agriculture and Horticulture expert and expert in Animal Husbandry. Participatory approach has been adopted to identify the activities under the project. The detailed discussions were held with watershed committees and works identified along with villagers after making visits to affected sites. The works mainly relate to soil moisture conservation activities, renovation of ponds, structures for protecting fields etc. The proposed project proposals were presented in the Gram Sabha meeting as per the schedule and were approved with certain changes. The works thus identified are given in the attached sheets along with estimates – micro watershed wise.

A. Drainage line Treatment

7.1.1 Dry stone check dams/ Dry stone Masonry Structure reinforced by vegetation

Present Status: The network of small first and second order streams/ rills is extending and spreading in all possible directions and converting flatter slopes to nala beds adjoining ridges of Watershed.

Proposed Treatment: This requires the construction of series of stone check dams/ Dry stone Masonry Structure in small streams/ rills having height about one meter. These shall be supported by vegetative reinforcement.

7.1.2 Crate Wire Structures (Gabian type and Spur): Where ever local stones are available in prescribe size in the drainage lines, crate wire structures (Gabian type) have been proposed. The height of such structure has 1 to 1.2 meters of each step. Simultaneously in seasonal torrents have high velocity due to steep slope and meander quite often. In this process, lands located along banks are eroded and converted to stony gully beds. The infrastructure like local paths, culverts, buildings are also damaged and threatened by flash floods.

Proposed system: There is pertinent need to afforest the area and reduce runoff. The crate wire (Gabian type)/woven spurs supported by live hedges are proposed to protect the land. Incidentally stones of suitable size are available in some khads. This type of work has already been done under different schemes by agriculture, forest and drainage wing of irrigation department and is quite successful but lot more needs to be done.

7.1.3 Drop Structures/ Cement stone Masonry Structure

Present Status: The rainwater from upper lands located at hill slopes passes through the farm lands and forms a network of shallow and deep gullies which keep on widening and deepening. These gullies not only damage the lands located along their banks but are source of debris which is carried down and deposited in gully beds and cause meandering patterns, again a cause of bank erosion source.

Proposed Activity: Drop Structures/ Cement stone Masonry Structure in series are proposed to break the velocity and safe disposal of rain water and induce deposition of sediment in nala beds and terraces also. Such structures planned as per size of the gully and discharge carried by them. Number of check dams is requested by the farmers to save the land. Such check dams have already been constructed under Kandi Project and State Soil Conservation schemes of agriculture and forest department but many more are needed at strategic locations.

A check dam constructed under Kandi Project in many villages of hills and foothills of Shivalik area has saved the houses from under cutting by the gully.

7.1.4 Construction of Retaining Walls for Bank Protection

Existing System: The whole project area is infested with large network of gullies which are damaging the farm lands/ habitation located along the banks of nalas and rivers. The land holdings are small and any loss of land and its conversion to a Nala badly affects the economy of the family. Under, the Kandi Project stone masonry retaining walls were constructed at strategic locations which saved the land of the farmers and banks of village ponds.

Proposed System: Run-off from upper area shall be reduced and flood peaks moderated by afforestation and rain water harvesting structures. Then as per need, retaining walls are proposed at strategic locations to protect the farm lands, bank of ponds, habitation and infrastructure.

B. Water Resources Development

7.2.1 Repair, renovation and capacity enhancement of village Ponds

Existing System: There is an acute scarcity of water for livestock as village ponds dry out in summer months. Most ponds are silted up and need desiltation. Some are leaking from sides and water is lost quickly. Most of ponds do not have proper inlets and out lets and ramps for water disposal and animal entry. There is genuine demand for repair, renovation and capacity enhancement of village ponds in the area.

Proposed Activity: Repair, renovation, capacity increase and construction of inlet, outlet, ramp and retaining walls are the major need based demand by project stakeholders. In some village, the construction of new ponds is proposed

subject to availability of funds. Since buffaloes are the main source of milk and selling milk is a major source of income, but scarcity of water impacts of milk yield of buffaloes. In summer months, it is widely held that buffaloes must spend 3 to 4 hours in pond for cooling which save the animal from heat stress. Hence, there was much demand of ponds renovation and repairs. Ponds as such are the best source of rainwater conservation and ground water recharge.

Gram Panchayats spend some money on repair and renovation under different schemes but due to paucity of funds, works are taken up in piece meal and main work of retaining wall is ignored. The villagers gave high priority for the construction of retaining walls as lot of water was leaking from sides and cutting of banks by waves and animal intervention to reduce capacity of pond. In most villages, the first priority of the entire community is the construction of retaining walls of the ponds as these are considered sacred due to the presence of historic village temples nearby. Some of the works would also be covered under entry point activities. It is also stressed to use the labor component from MGNREGA and material from the IWMP so that maximum amount of rainwater is harvested.

7.2.2 Sub Surface Dam / Water Conveyance System Water Harvesting Structure/ Percolation Dam

Present Status: Rain-fed agriculture is gambling with rains. There is no assured irrigation facility available in the project area to stabilize crop production through limited supplemented irrigation. There are sites where water harvesting structures can be constructed but people do not get organize for common cause. Moreover, they are unable to spend money from their own resources. Only few harvesting dams were constructed earlier under Kandi project and state schemes but demand was always more than supply.

Suggested Interventions: In quite a number of villages, sites have been identified for Water Harvesting Structures, Earthen Gully Plug, Silt Detention Dam, Earthen Embankment, Guide Bandh and Percolation tank etc. but GPs are interested to get the dams constructed from other schemes of the Department. In some watershed village paths have

converted in nalas due to erosion to be strengthened by construction of earthen embankments. As such no earthen dam for water harvesting was planned in this project.

This phase would start after the preparatory phase is by and large complete. It was considered as the heart of the program in which the DPR proposals shall be implemented in participatory mode. In this watershed management program, it was planned to rehabilitate the degraded watersheds by the control of runoff and soil loss by biological and mechanical conservation measures adopting ridge to valley approach. The protective vegetation cover would be regenerated in forest and common lands. The drainage lines treatment is proposed after afforestation of hill slopes. This includes vegetative barriers, shall scale dry stone, crate wire and stone masonry check dams and silt detention structures. In this water stressed project area, rainwater harvesting to reduce soil erosion, recharge ground water, improve moisture regime and use of harvesting water for human and livestock use and in some case for irrigation was given very high priority. This was coupled with land development, production improvement, and promotion of subsidiary occupations for improved livelihoods. Many village ponds are silted, several are filled with filth and sewage water and giving foul smell. Repair renovation and retaining walls of village ponds has emerged as an important activity. The scope of integrated watershed regeneration/rehabilitation works which emerged from the PRA is now presented.

Sample estimates are as follows:

Activities under NRM (56%) Micro Watershed Wise (IWMP II Panchkula) is given below and The Existing location of works and Proposed Action/ Treatment Plan map shown in Annexure VIII and IX.

Table 1. Project Proposals of Morni Watershed Activities (physical & financial targets)

Sr. No.	Activities	Unit	Unit Cost (Rs. In lacs)	Name of the Micro Watersheds								Total (Rs. In Lacs)	Remarks
				Tikri		Bariser		Ghati		Chaplana			
				Phy.	Fin. (Rs. In lacs)	Phy.	Fin. (Rs. In lacs)	Phy.	Fin. (Rs. In lacs)	Phy.	Fin. (Rs. In lacs)		
1	Sub Surface Dam / Water Conveyance System Water Harvesting Structure/ Percolation Dam	No.	25	5 No. Small	25	1 No.	25	5 N0. Small	25	5 N0. Small	25	100.00	After Consultation with the Gram Sabha & other stake holders & as per site suitability these works are found feasible.
2	Crate Wire Structures	cum	0.0228	865.8	19.74	765.8	17.46	765.8	17.46	465.8	10.62	65.28	do
3	Agro Forestry/ Afforestation	Ha											These works are not found feasible & Crate Wire Structures will be made against the amount in this activity.
4	Cement Stone Masonry Structures/ Drop Structures/ Retaining wall	cum	0.0326	900	29.34	900	29.34	800	26.08	550	17.93	102.69	After Consultation with the Gram Sabha & other stake holders & as per site suitability these works are found feasible.
5	Rainfed Horticulture	Ha	0.4	2.5	1.00	2.5	1.00	2.5	1.00	2.5	1.00	4.00	do

Sr. No.	Activities	Unit	Unit Cost (Rs. In lacs)	Name of the Micro Watersheds								Total (Rs. In Lacs)	Remarks
				Tikri		Bariser		Ghati		Chaplana			
				Phy.	Fin. (Rs. In lacs)	Phy.	Fin. (Rs. In lacs)	Phy.	Fin. (Rs. In lacs)	Phy.	Fin. (Rs. In lacs)		
6	Dry Stone Check Dams	cum	0.01285	450	5.78	450	5.78	450	5.78	200	2.57	19.92	do
7	Village Pond /Tank (small)	No.	2	5	10.00	5	10.00	5	10.00	3	6.00	36.00	do
	Total				**90.86**		**88.58**		**85.32**		**63.12**	**327.89**	

Cost Sharing: During the PRA exercise and meeting with the stake holders from time to time, the beneficiaries agreed to contribute in form of material, labour and cash to 10% of structure cost. The watershed development funds and pattern of utilization would be decided by the UGs/ WDT and PIA during implementation programme.

Table.2 Detailed Estimate of Infiltration Gallery for Sub-Surface Dam

S.No.	Particulars	No.	Length (mts)	Breadth (mts)	Height (mts)	Content (cums)
1	Gravel work in excavation with occasional use of picks with lead up to 15 meters with percentage of gravel or kanker exceeding 60% but up to 80% extra for additional leads 4 No. extra for work under flowing water & extra for dressing work H.S.R. 6.5 (b), (d), (g) & (h) Infiltration gallery and Key/Core wall	1	20.00	(1.90+14.20)/2 = 8.05	4.10	660.10
	Wing Walls	2	20.00	(1.90+14.20)/2 = 8.05	4.10	660.10
	Toe Walls	1	20.00	1.30	2.00	52.00
	Drain	1	123.00	(1.0 + 3.05)/2 = 2.025	(4.10 + 0)/2 = 2.05	510.60

S.No.	Particulars	No.	Length (mts)	Breadth (mts)	Height (mts)	Content (cums)
				Total =		**1882.80**
2	Cement concrete work 1:4:8 with 20 mm aggregates in the foundation and plinth H.S.R. 10.38 Infiltration gallery	1	20.00	(2.05 +1.15) = 3.20	0.30	19.20
	Wing Wall	2	20.00	1.30	0.30	15.60
	Toe Wall	1	20.00	1.30	0.30	7.80
	Apron	1	20.00	4.50	0.30	27.00
	Key/Core wall	1	20.00	1.30	0.30	7.80
				Total =		77.40
3	Cement concrete 1:15:3 with stone aggregates 20 mm for RCC work but excluding steel reinforcement but including the centering and shuttering in foundation.					
	Infiltration Gallery	1	20.00	1.60	0.30	9.60
	Wing Walls	2	20.00	1.00	(0.20+0.30)/2 = 0.25	10.00
	Toe Wall	1	20.00	1.00	(0.20+0.30)/2 = 0.25	5.00
	Apron	1	20.00	4.50	0.30	27.00
	Key/Core wall	1	20.00	(0.70 +1.00) = 1.70	(0.20+0.30)/2 = 0.25	8.50
				Total =		60.10
4	Cement concrete 1:15:3 with stone aggregates 20 mm for RCC work for walls exceeding 20 cm thickness excluding the steel reinforcement but including the centering and shuttering etc. H.S.R. 10.86					
	Key/Core wall	1	20.00	0.30	1.50	9.00
	Side Walls	2	1.00	0.30	1.20	0.72
	Downstream wall & up steam wall	2	20.00	0.30	1.20	14.40
	Wing Walls	2	20.00	0.30	3.80	45.60
	Toe Wall	1	20.00	0.30	1.60	9.60
	Parapet Wall	1	20.00	0.30	0.30	1.80
	Deduction for pipe in D/S wall	22/7 x (0.09 x 0.09)/4 x 4 rows x 40 No. x 0.30 m each				(-) 0.30
	Deduction for pipe in D/S wall	22/7 x (0.2 x 0.2)/4 x 0.20 m				(-) 0.01

S.No.	Particulars	No.	Length (mts)	Breadth (mts)	Height (mts)	Content (cums)
				Total =		**80.81**
5	Cement concrete 1:15:3 for reinforcement concrete work in slabs excluding steel reinforcement but including centering and shuttering etc.					
	H.S.R. 10.82					
	Slab on the Infiltration gallery	1	20.00	1.60	0.20	6.40
	Deduction for pipes in slab	22/7 x (0.09 x 0.09)/4 x 3 rows x 20 No. x 0.30 m each				(-) 0.08
				Total =		**6.32**
	Work including bending, binding & placing in position complete H.S.R. 18.22	Quintel of RCC work at item No. 3,4 and 5 (60.10 + 80.81 + 6.32) = 147.23 cums				
				Total =		**147.23 quintel**
6	Laying, jointing and fixing of P.V.C. Pipes 80 mm diameter H.S.R. 28.19					
	In upstream wall		4 rows x 20 No. x 0.30 m each			24.00
	In Slab		3 rows x 16 No. x 0.20 m each			12.00
				Total =		**36.00 meters**
7	Re handling of earthwork and gravel work:- around the infiltration gallery & excavated drain after completion of work. Note-II Chapter 6 of H.S.R. Original earth work as Item No. 1					
	Deduction for Item No. 1					1882.80
	Deduction for Item No. 2,3, 4 and 5 i.e.	(77.40 + 60.10 + 80.81 + 6.32) = (-)				224.63
				Total =		**1658.17**

Table. 3. Material Statement

Sr. No.	Item of Work	Quantity (cum)	Cement (bags)	Sand (cum)	PVC Pipes 80 mm dia. (m)	Bajri (cum)	S.Boulders (cum)
1	CC work 1:4:8	77.40	263.16	37.15		74.30	---
2	RCC work 1:15:3 Item No. 3,4 and 5 (60.10 + 80.81 + 6.32) =	147.23	1185.20	61.84		123.67	147.23 Quintel Steel
3	PVC pipes 80 mm dia	36.00 m			36.00		
	Total =			98.99	36.00	197.98	147.23
	Rates of materials		245.00 Per bag	950.00 Per cum	150.00 Per meter	985.00 Per cum	4500.00 Per Quintel
	Cost	148.36	**354849**	**94039**	**5400**	**195008**	**662535**

Total cost of materials = Rs. 1311830/-

Table. 4. Abstract Cost of Sub- Surface Dam (Infiltration Gallery) = 40m length and 2.5m deep

S. No.	Item of Work	Quantity	Rate	Unit	Amount
1	Gravel work in excavation with occasional use of picks with lead up to 15 meters with percentage of gravel or kanker exceeding 60% but upto 80% extra for additional leads 2 No. and extra for wet work, above sub soil level HSR 6.5 (b), (d) & (e)	3538.50 cum	[1038.80 + (2 No. x 30.45) + 244.45] – 15% + 350% C. Prem. = 5141.37	100 cum	181927.38
2	Cement concrete work 1:4:8 in the foundation and plinthHSR 10.38	5.00 cum	64.95 – 15% + 370% C.Prem. = 259.48	cum	1297.40
3	Square rubble stone masonry course 1:5 foundation & plinth HSR 12.23	12.29 cum	(160.35 + 26.00) - 15% + 200% Pre. = 475.19	cum	5839.13
4	Cement concrete work 1:2:4 in the foundation and plinth	1.68	64.95 – 15% +		434.63

S. No.	Item of Work	Quantity	Rate	Unit	Amount
	HSR 10.41	cum	370% C. Prem. = 259.48		
5	Cement plastering work 1:45 on the stone walls HSR 15.5	46.40 sqm	5.50 – 15% + 340% C. Prem. = 20.57		
6	Cold twisted deformed steel bars for RCC work including bending, binding & placing in position complete HSR 18.22	0.70 quintel	49.55 – 15% + 450% C. Prem. = 231.65	Quintel 954.45	162.16
7	Laying, jointing and fixing of P.V.C. Pipes of 160 mm diameter. HSR 28.19 (i)	200.00 meters	4.15 – 15% + 250% C. Prem . = 12.35	meter	2469.25
8	Cost of materials as per detail attached				**480560.00**
	Total =				**6736440.40**
					Or say Rs. 673644/-.

Table. 5 Abstract Estimate of Conveyance System (uPVC pipe line) for Sub-Surface Dam of 1560m length, 160mm dia with man holes and protection measures

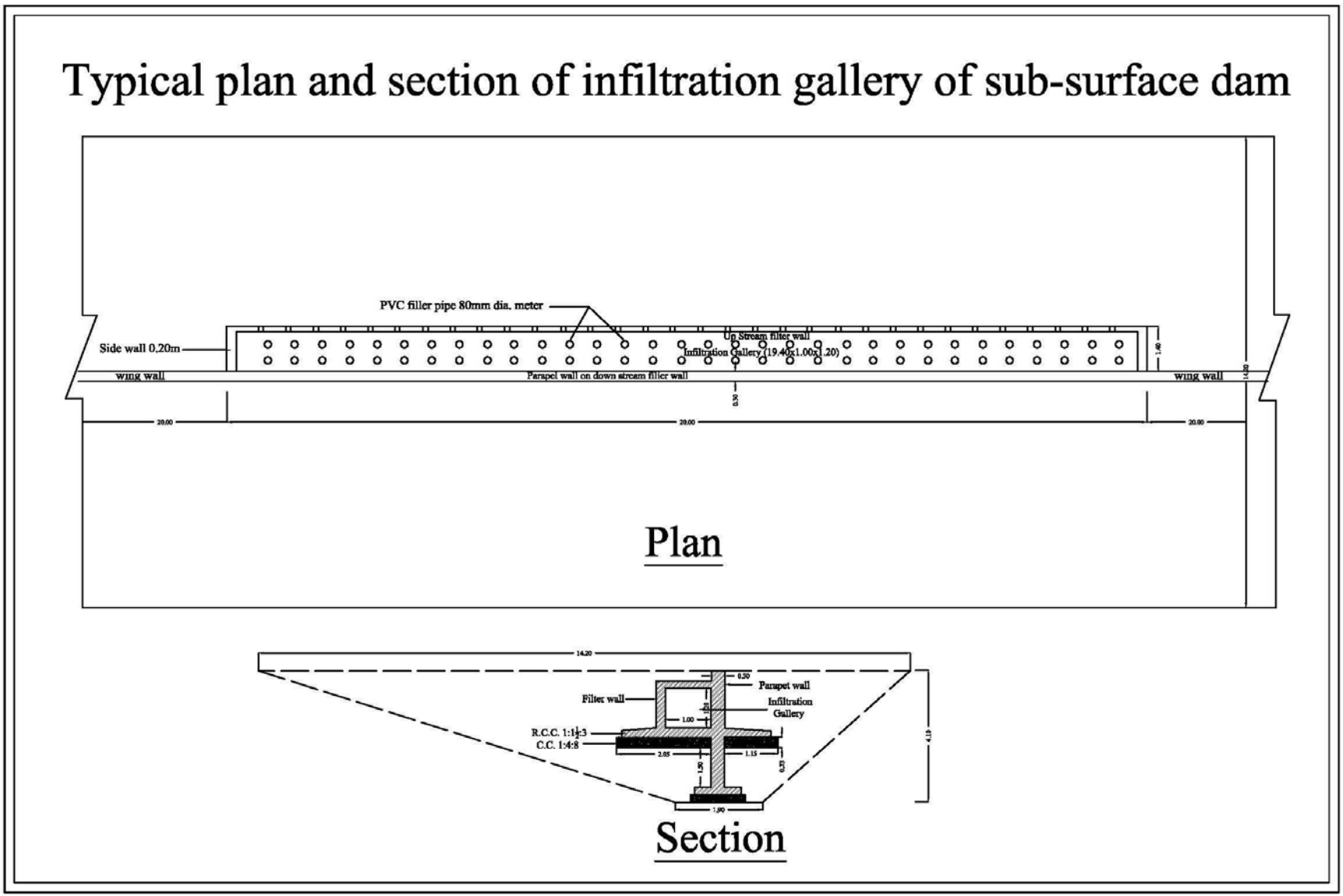
Sr. No.	Particulars	No.	Length (mts)	Breadth (mts)	Height (mts)	Content (cums)
1	Gravel work in excavation with occasional use of picks with lead upto 15 meters with percentage of gravel or kanker exceeding 60% but upto 80% extra for additional leads 2 No. and extra for wet work, above subsoil level H.S.R. 6.5 (b), (d) & (e) for pipe line R.D. 0 to RD 480	1	480.00	(3.0 + 1.0) = 2.00	(3.0 + 1.5) = 1.75	1680.00
	For pipe line RD 480 to RD 1020	1	540.00	(2.0 + 1.0) = 1.50	(1.5 + 1.0) = 1.25	1012.50

Sr. No.	Particulars	No.	Length (mts)	Breadth (mts)	Height (mts)	Content (cums)
	For pipe line RD 1020 to RD 1560	1	540.00	(2.0 + 1.0) = 1.50	1.00	810.00
	Ho-dies	4	3.00	3.00	1.00	36.00
				Total =		**3538.50**
2	Labor for laying, jointing, fixing and testing PVC/Pipeline & specials in trenches (i) 160 mm internal diameter H.S.R. 28.19	1	1560.00	--	--	1560.00
3	Cement concrete work 1:4:8 for ho-dies in the foundation and plinth H.S.R. 28.19	4	2.50	2.50	0.20	5.00
				Total =		**5.00**
4	Square rubble stone masonry course 1:5 in foundation H.S.R. 12.23 Long walls	8	2.20	0.60	0.80	8.45
	Short walls	8	1.00	0.60	0.80	3.84
				Total =		**12.29**
5	Square rubble stone masonry course 1:5 A.G.L. H.S.R. 12.23 & 12.31 Long walls	8	2.00	0.50	0.70	5.60
	Short walls	8	1.00	0.50	0.70	2.80
				Total =		**8.40**
6	Cement concrete work 1:2:4 in the foundation and plinth H.S.R. 10.41 On the top of Long walls	8	2.00	0.50	0.05	0.40
	On the top of Short walls	8	1.00	0.50	0.05	0.20
	In the bed of ho-dies	4	1.00	1.00	0.10	0.40
	Slabs on the ho-dies	12	1.50	0.50	0.075	0.68
				Total =		**1.68**
7	Cement plastering work 1:4 on the stone walls H.S.R. 15.5 Inner walls of hodies	16	1.00	--	1.50	24.00

Sr. No.	Particulars	No.	Length (mts)	Breadth (mts)	Height (mts)	Content (cums)
	Upstream wall	16	2.00	--	0.70	22.40
				Total =		**46.40**

Table. 6. Material Statement

Sr. No.	Item of Work	Quantity (cum)	Cement (bags)	Sand (cum)	S. blast (cum)	Bajri (cum)	S. Boulders (cum)
1	CC work 1:4:8	5.00	17.00	2.40	4.80		
2	Sq. stone masonry work 1:5 in foundation (12.29 + 8.40 = 20.69)	20.69	35.50	6.21			22.76
3	CC work 1:2:4	1.68	10.55	0.74	--	1.47	--
4	C. plastering work 1:2:4	46.20 sqm	5.10	0.70	--	--	--
	Total		**68.24 bags**	**10.04 cum**	**4.80 cum**	**1.47 cum**	**22.76 cum**
		Also can say	68 bags	354.59 cft	169.54 cft	52.06 cft	803.77 cft
		Or say	68 bags	360.00 cft	170.00 cft	55.00 cft	800.00 cft
		Rates of material	245.00 Per bag	23.50 per cft	21.00 per cft	24.00 per cft	18.00 per cft
	Cost of materials		**16660**	**8460**	**3570**	**1320**	**14400**
	Cost of steel bars 12 mm dia for 70 kgs @ Rs. 45/- per kg						3150
	Cost of PVC pipes 160 mm dia 4 kg/sq. cm for 1560 meters @ Rs. 275/- meter						429000
	Cost of solvent cement 10 liters @ Rs. 400/- per liter						4000
	Total cost of Materials				**= Rs.**		**480560/-**

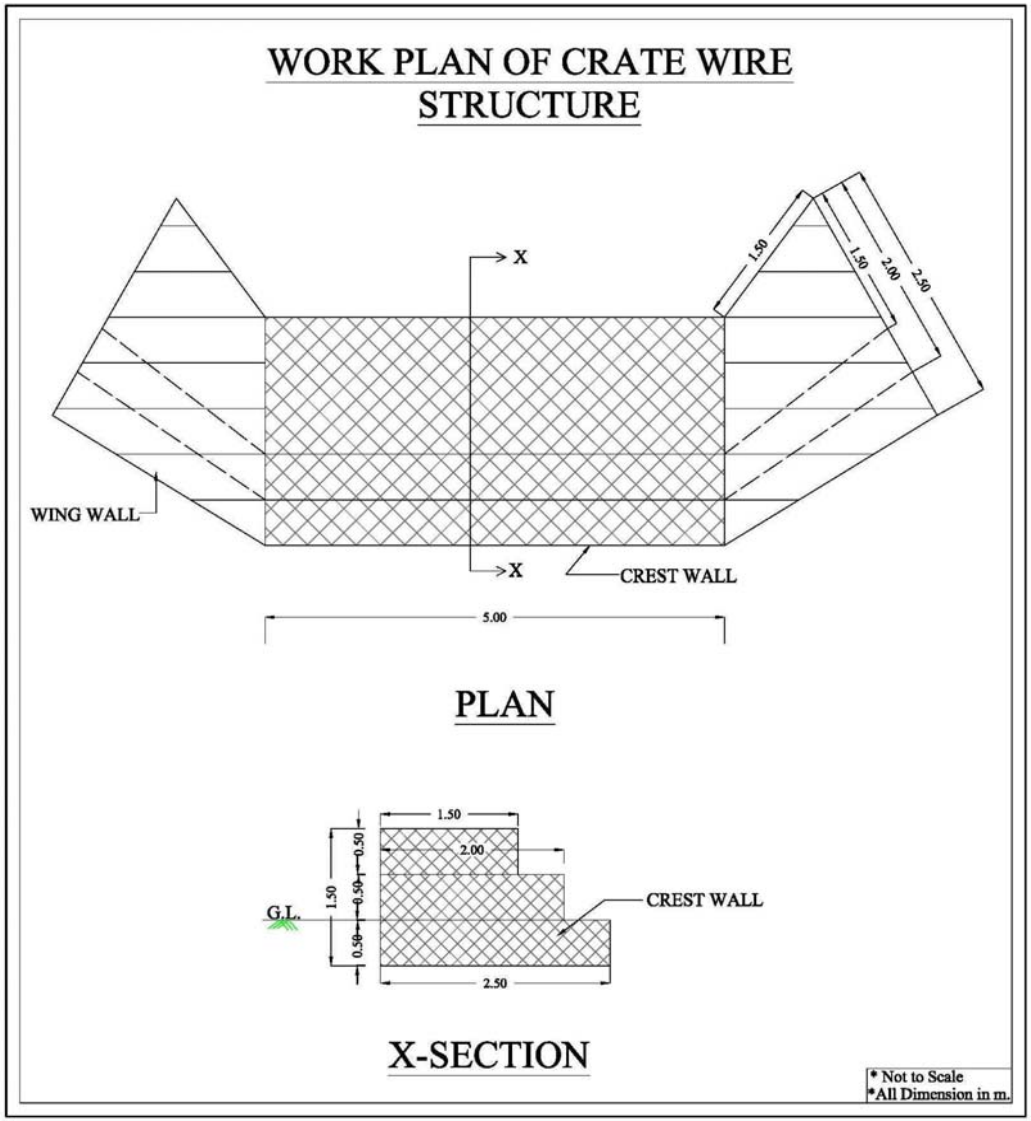


Typical Plan and Section of Infiltration Gallery of Sub- Surface Dam.

Table. 7. DETAIL ESTIMATE OF CRATE WIRE STRUCTURE

S.No.	Particulars	No.	Length (Mts)	Breadth (Mts)	Height/ Depth(M)	Content (Cums)
1	Excavation of Earthwork in foundation H.S.R. 6.6					
	C.W.S.	1	5.00	3.00	0.50	7.50
	Wing walls	1	1.50	3.00	1.50	6.75
					Total	**14.25**
2	Weaving of wire knitting 15 cm x 15 cm H.S.R.23.29					
	C.W.S first step					
	Top And Bottom	2	5.00	2.50		25.00
	Sides	2	5.00		0.50	5.00
	Edges	2		2.50	0.50	2.50
	Second step					
	Top	1	5.00	2.00		10.00
	Sides	2	5.00		0.50	5.00
	Edges	2		2.00	0.50	2.00
	Third step					
	Top	1	5.00	1.50		7.50
	Sides	2	5.00		0.50	5.00
	Edges	2		2.00	0.50	2.00
	Wing walls					
	Top	2	1.50	1.50		4.50
	Sides	4	1.50		0.50	3.00
	Edges	4		1.50	0.50	3.00
					Total	**74.50**
Quantity of G.I wire 4 mm dia for 88.50 Sq.m @ 2.31kg per Sqaremetre =					**172**	**kilograms**
3	Stone Filling in to wire crates HSR23.32					
	C.W.S. First step	1	5.00	2.50	0.50	6.25
	C.W.S. Second step	1	5.00	2.00	0.50	5.00
	C.W.S. Third step	1	5.00	1.50	0.50	3.75
	Wing walls	2	1.50	1.50	0.50	2.25
					Total	**17.25**
4	Earth work in bund filling for making	2	3.00	(4.0+1.0)/2=2.50	1.50	**22.50**

S.No.	Particulars	No.	Length (Mts)	Breadth (Mts)	Height/ Depth(M)	Content (Cums)
ABSTRACT OF COST						
S No.	**Particulars**	**Qty**	**Rates**		**Unit**	**Amount**
1	Excavation of Earthwork in foundation H.S.R.6.6	14.25 cums	1108.10 + 350% Prem. =4986.45		100 cums	710.57
2	Weaving of wire knitting 15 cm x 15 cm H.S.R.23.29	74.50 sqm	3.50 + 400% Prem. =17.5		sqm	1303.75
3	Hammer dressing of stone boulders for face work H.S.R. 12.56	74.50 sqm	14.25 + 250% Prem. =49.88		sqm	3716.06
4	Stone Filling in to the wire crates H.S.R.23.32	17.25 cums	15.35 + 300% Prem. =61.4		cum	1059.15
5	Tipping of the wire crates H.S.R.23.33	17.25 cums	11.10 + 300% Prem. =44.4		cum	765.90
6	Earth work in bund filling for making embankment. H.S.R. 6.2 (b)	22.50 cum	586.60 +350 % C. Prem. =2639.7		100 cum	593.93
	stone boulders manually locally @ 0.50	17.25 cums	Rupees	945.00	cum	16301.25
7	Cost of G.I wire 4 mm dia hot dip 8 No.	172.00 kgs	Rupees	80.00	Kg	13760.00
					Total =	**38210.61**
					Add contingency at the rate of 3%	1146.32
					Grand Total =	**39356.93**
	Per cum Rate = 39356.93 /17.25 = 2281.56or say Rs.2280- only					



Work plan of crate wire structure

Table. 8. Detail Estimate of Cement Stone Masonry Structure

S.No.	Description	No.	Length (mts)	Breadth (mts)	Height (mts)	Content (cums)
1	**Excavation of earthwork in foundation And plinth**				**6.6**	
	Crest wall with extensions	1	8.00	2.00 **H.S.R**	1.20	19.20
	Side walls	2	1.50	1.00	1.20	3.60
	Wing walls	2	2.00	1.00	1.20	4.80
	Toe wall with extensions	1	6.00	1.00	1.20	7.20
	Appron	1	4.00	1.50	0.30	1.80
				Total =		**36.60**
2	**Cement concrete work 1 : 4 : 8 in the Foundation and plinth**				**10.39**	
	Crest wall with extensions	1	8.00	1.70 **H.S.R**	0.20	2.72
	Side walls	2	1.50	0.70	0.20	0.42
	Wing walls	2	2.00	0.70	0.20	0.56
	Toe wall with extensions	1	6.00	0.70	0.20	0.84
	Appron	1	4.00	1.50	0.20	1.20
				Total =		**5.74**
3	**Square rubble stone masonry course1: 5 in foundation and plinth H.S.R 12.23**					
	Crest wall with extensions	1	8.00	(1.5+1.0)/2= 1.25	1.00	**10.00**
	Side walls	2	1.50	0.50	1.00	**1.50**
	Wing walls	2	2.00	0.50	1.00	**2.00**
	Toe wall with extensions	1	6.00	0.50	1.00	**3.00**
				Total =		**16.50**
4	**Square rubble stone masonry course1: 5 above G.L. H.S.R 12.23 and 12.31**					
	Crest wall with extensions	1	8.00	(1.0+0.5)/2= 0.75	1.20	7.20
	Side walls	2	(1.5+2.0)/2= 1.75	0.50	(1.7+0.5)/2= 1.1	1.93
	Wing walls	2	2.00	0.50	1.70	3.40
	Toe wall with extensions	1	6.00	0.50	0.20	0.60

S.No.	Description	No.	Length (mts)	Breadth (mts)	Height (mts)	Content (cums)
	Toe wall extensions	1	1.00	0.50	0.50	0.25
				Total =		**13.38**
5	**Cement concrete work 1 : 2 : 4 in the Foundation and plinth**					**10.41**
	On the top of crest wall	1	4.00	(1.0+0.5)/2= 0.75	0.05	0.15
	On the top of crest wall extensions	2	2.00	0.50	0.05	0.10
	On the top of side walls	2	1.50	0.50	0.05	0.08
	On the top of wing walls	2	2.00	0.50	0.05	0.10
	Toe wall with extensions	1	6.00	0.50	0.05	0.15
	Apron	1	4.00	1.50	0.10	0.60
				Total =		**1.18**
6	**Cement plastering work 1:4 on the**					
	Crest wall both side	2	4.00	_	1.20	9.60
	Crest wall extensions	2 x 2	2.00	_	0.50	4.00
	Side walls	2	(1.5+2.0)/2= 1.75	_	(1.7+0.5)/2= 1.1	3.85
	Wing walls	2	2.00	_	1.70	6.80
	Toe wall with extensions	1	6.00	_	0.20	1.20
	Toe wall extensions	2 x 2	1.00	_	0.50	2.00
				Total =		**27.45**

H.S.R.

Table. 9. MATERIAL STATEMENT AND COST OF MATERIAL

S.No.	Item of workQuantity	Cement	Sand	Stone blast	Bajri 20 mm	Stone boulders
		(bags)	(cum)	(cum)	(cum)	(cum)
1	C.C work 1 : 4 : 8 5.74	19.516	2.7552	5.5104	_	_
2	Sq. stone masonry work (cum) 16.50	28.38	4.95	_	_	18.15

	1: 5 in foundation.					
3	Sq. stone masonry work	23.005	4.0125	_	_	14.7125
	1: 4 above ground level. 13.38					
4	C.C work 1 : 2 : 4 1.18	7.4025	0.517	_	1.034	_
5	C. plastering work 1 : 4 27.45 sqm	3.02	0.41	_	_	_
	Total =	**81.323**	**12.64645**	**5.5104**	**1.034**	**32.8625**
	Rates of material	245.00 per bag	950.00 per cum	965.00 per cum	985.00 per cum	945.00 per cum
	Cost of Materials	**19924**	**12014**	**5318**	**1018**	**31055**
	Total Cost of Materials =	**Rupees**	**69329**	**/-only**		

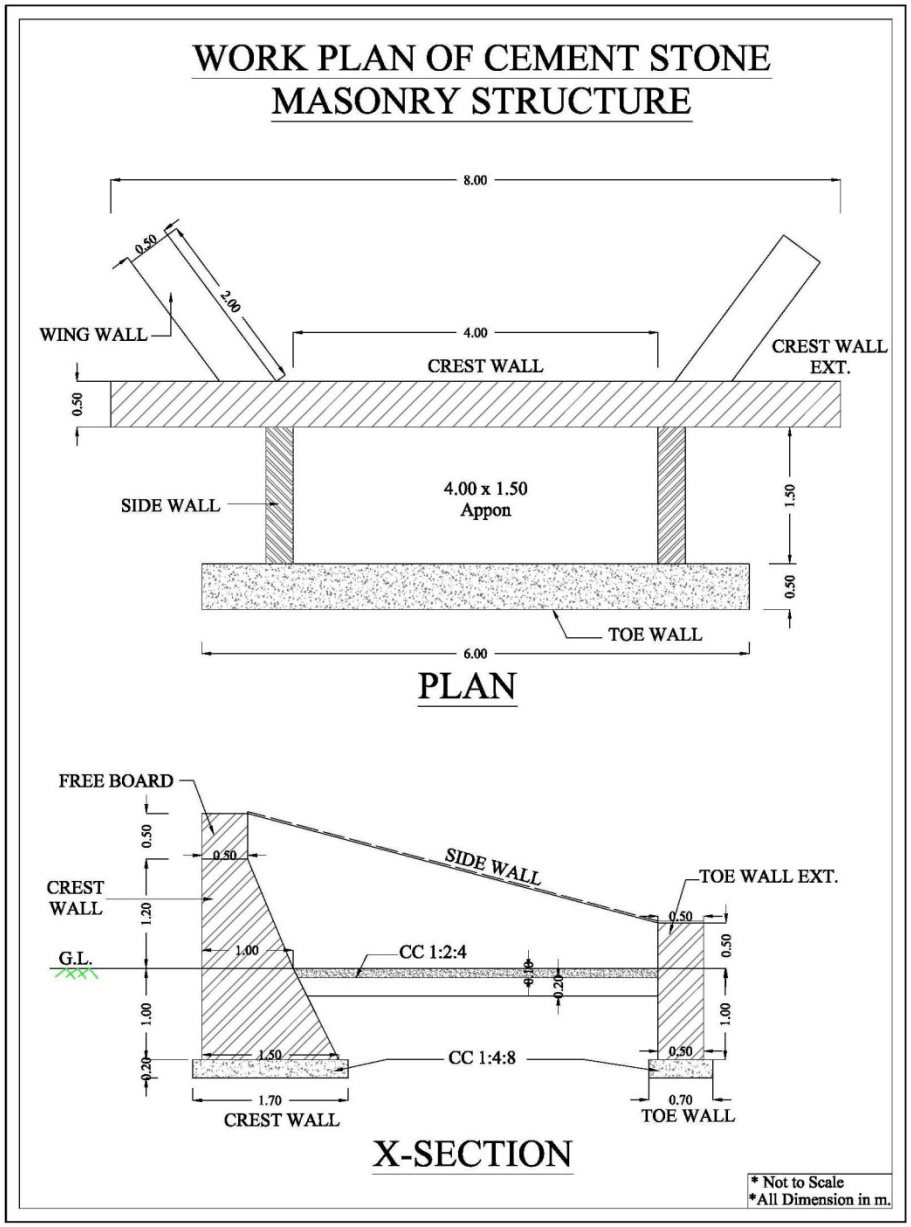
Table. 10. LABOUR COST

S.No.	Item of work Quantity		Rate	Unit	Amount
1	Excavation of earthwork in foundation and plinth H.S.R 6.6	36.60 cum	1108.10 +350% C. Prem. =4986.45	100 cum	**1825.04**
2	Cement concrete work 1 : 8 : 16 in the Foundation and plinth H.S.R 10.39	5.74 cum	64.95 +370% C. Prem. =305.27	cum	**1752.25**
3	Square rubble stone masonry course1: 5 in foundation and plinth H.S.R 12.23	16.50 cum	(160.35+26.00) +250% C. Prem. =652.22	cum	**10761.63**
4	Square rubble stone masonry course1: 5 above G.L. H.S.R 12.23 and 12.31	13.38 cum	(160.35+26.00+27.20) +200% Prem.= 747.42	cum	**9996.74**
5	Cement concrete work 1 : 2 : 4 in the Foundation and plinth H.S.R 10.41	1.18 cum	64.95 +370% C. Prem. =305.27	cum	**358.69**
6	Cement plastering work 1:4 on the stone walls	27.45 sqm	5.50 +340 % C. Prem. =24.2	cum	**664.29**
	Total = H.S.R 15.5	29.875			**25358.64525**

S.No.	Item of work Quantity		Rate		Unit	Amount
		cum				
					or say Rs.25359/- only	

Table. 11. ABSTRACT OF COST

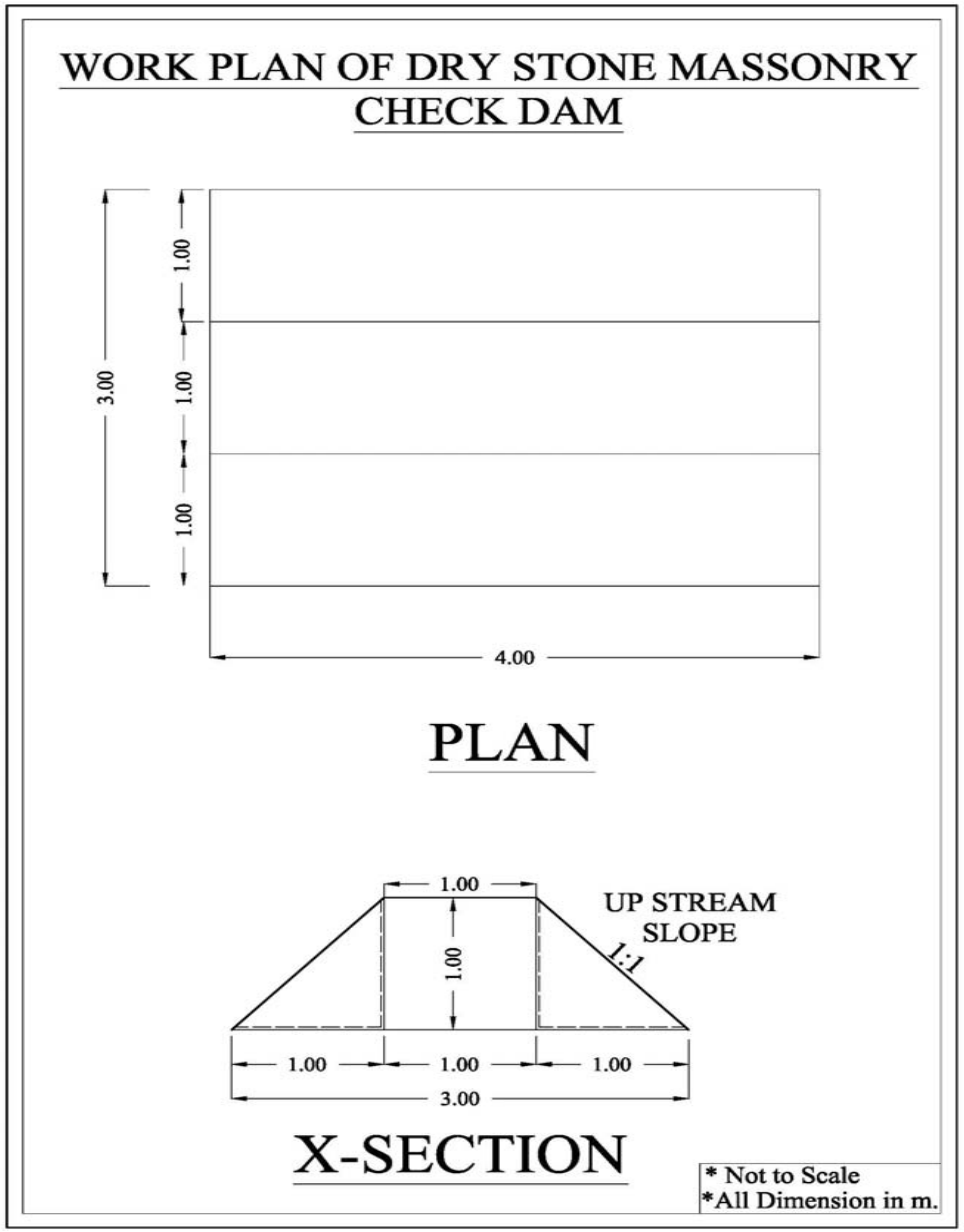
Labour cost	25359.00
Cost of Materials as per detail attached	69329.00
Total =	**94688.00**
Add contingency at the rate of 3%	2841.00
Grand Total =	**97529.00**
Per cum Rate = 97529 /29.88 = 3264.02 or say Rs.3260/- only	



X-section of Masonry Structure

Table. 12. Detail Estimate of Dry Stone Masonry Check Dam

S No.	Particulars	No.	Length (mts)	Breadth (mts)	D/H (mts)	Content (cums)
1	Earth work in excavation of foundation in all type of soils. H.S.R. 6.6	1	4.00	3.00	(1.0+0.3+1.0)/3=0.77	9.24
2	Dry Stones Masonry work for purely temporary nature. H.S.R. 12.57	1	4.00	(3.0 +1.0) / 2 =2.00	1.00	8.00
	ABSTRACT OF COST					
S No.	**Particulars**	**Qty**	**Rates**		**Unit**	**Amount**
1	Earth work in excavation of foundation in all type of soils. H.S.R. 6.6	9.24 cum	1108.10 +350% C. Prem. =4986.45		100 cum	460.75
2	Rough Hammer dressing of S. boulders H.S.R. 12.55 ©	8.00 cum	35.00 + 250% C. Prem. =122.5		cum	980.00
3	Dry Stones Masonry work for purely temporary nature. H.S.R. 12.57	8.00 cum	35.30 + 250% C. Prem. =123.55		cum	988.40
4	Cost of Stone boulders stone boulders - 102 -anually locally @ 0.50 per person per day for 164.00 cum.	8.00 cum	945.00		P/day	7560.00
					Total =	**9989.15**
Add contingency at the rate of 3%						299.67
					Grand Total =	**10288.82**
Per cum Rate = 10288.82 /8.00 = 1286.10 or say Rs.1285/- only						



Work Plan of Dry Stone Masonry Check Dam

Table. 13. Detailed estimate of Pond

Detail Estimate of village Pond						
	Volume of Pond	=	A+AB+C x D			
			6			
		=	(50x50)+4(41x41)+(32x32)		X 3.00	
			6			
		=	5124 cum			
	Volume of Stone Pitching	=	Area X Depth/ Height			
		=	3824 X 0.15			
		=	423.60 cum			
			or say - 1461.55 cft.			
Leads Statement						
	Horizontal Leads	=	(length/2) +(cross section area/2 x 0.60)			
		=	80/2 + {(16.50 + 3)/2 x 2.25}/2 x0.60			
		=	61.94 mtr.			
	Vertical Leads	=	(Depth + Height) x 0.4 x 10			
		=	21.00 mtr.			
	Total Leads	=	{(61.94 + 21.00) - 15.00}/7.5			
		=	9 Leads			

Table. 14. Abstract of cost of estimate for Digging Village Pond

S.No.	Particulars	H.S.R. No.	Quantity	Rates	Unit	Amount
1	Excavation of earth work for digging of the vill. Pond	6.2 (b)	5124.00	2243.75	100 cum	114969.75
2	Extra for every 7.50 mtr. Additional lead upto 60 mtr. For 6 No. leads	6.2 (c')(i)	5124.00	496.29	100 cum	25429.90
3	Extra for admixture of shingle or Kanker upto 30%-40%		5124.00	1218.45	100 cum	62433.38
4	Extra for compaction in 25 cm layers but excluding rolling	6.2 (g_(i)	5124.00	260.48	100 cum	13347.00
5	Extra for watering in 25 cm layers as per specifications for compaction	6.2 (g_(ii)	5124.00	286.88	100 cum	14699.73
6	Extra for rolling in 25 cm layers as per specifications by sheep foot roller	6.2 (g)(v)	5124.00	401.62	100 cum	20579.01
					Total	**251458.76**
					Add. Contingency @2%	**5029.1753**
					Grand Total	**256487.94**
					Or say `	**2.60 Lac**

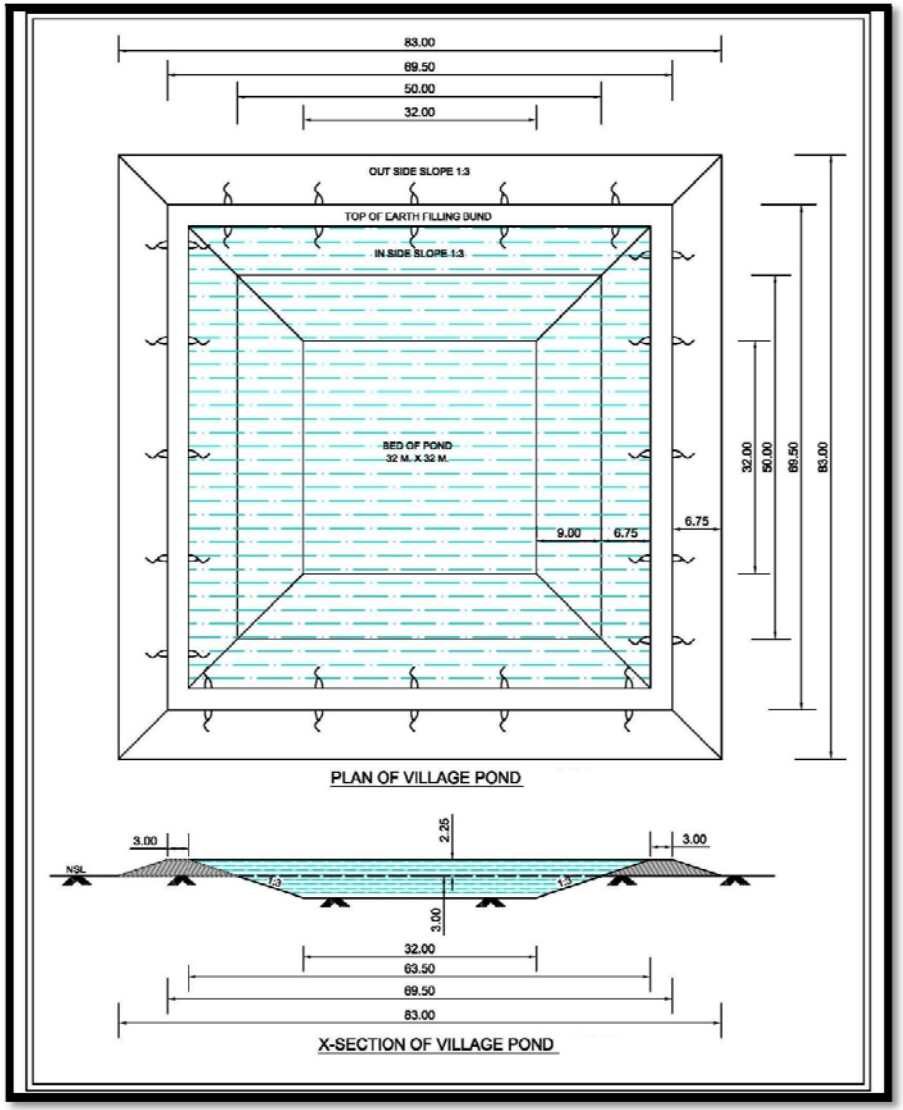

83.00
69.50
50.00
32.00
OUT SIDE SLOPE 1:3
TOP OF EARTH FILLING BUND
IN SIDE SLOPE 1:3
BED OF POND
32 M. X 32 M.
9.00
6.75
6.75
32.00
50.00
69.50
83.00
PLAN OF VILLAGE POND
3.00
2.25
3.00
NSL
1:3
1:3
3.00
32.00
63.50
69.50
83.00
X-SECTION OF VILLAGE POND

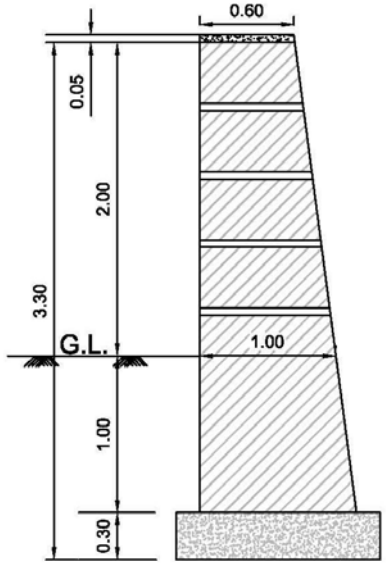
Table. 15. Work Detail Estimate For Retaining Wall

Sr. No.	Particulars	No.	L	B	D	Contents	Unit
1	Earth Work Excavation for R/wall	1	8.00	1.00	1.30	10.40	cum.
2	C.C. 1:3:6 in foundation	1	8.00	1.00	0.30	2.40	cum.
3	Sq. Rubble Masonry work 1:4 For R/wall	1	8.00	0.80	3.00	19.20	cum.
4	C.C. 1:2:4	1	8.00	1.00	0.05	0.40	cum.
5	20 mm Thick plaster 1:3						
i	R/wall outer side	1	8.00	--	3.00	24.00	sqm.
Material Statement							
Sr. No.	**Particulars**	**Qty.**	**Cement**	**Sand**	**Concrete**	**Gatka**	**Stone**
1	C.C. 1:3:6 in foundation	240	10.56	1.10	--	2.20	--
2	Masonry work in 1:4	19.2	41.28	5.76	--	--	21.12
3	C.C. 1:2:4	0.24	1.51	0.10	0.20	--	--
4	20 mm Thick Plaster in 1:3	24.00 Sqm.	6.00	0.36	--	--	--
	Total		**59.35**	**7.32**	**0.20**	**2.20**	**21.12**
	Rate		340/- P/bag	1400/- P/cum	1500/- Per cum.	1450/- Per cum.	
	Total		**21539.00**	**10248.00**	**300.00**	**3190.00**	
	Grand Total		**35298.12**				

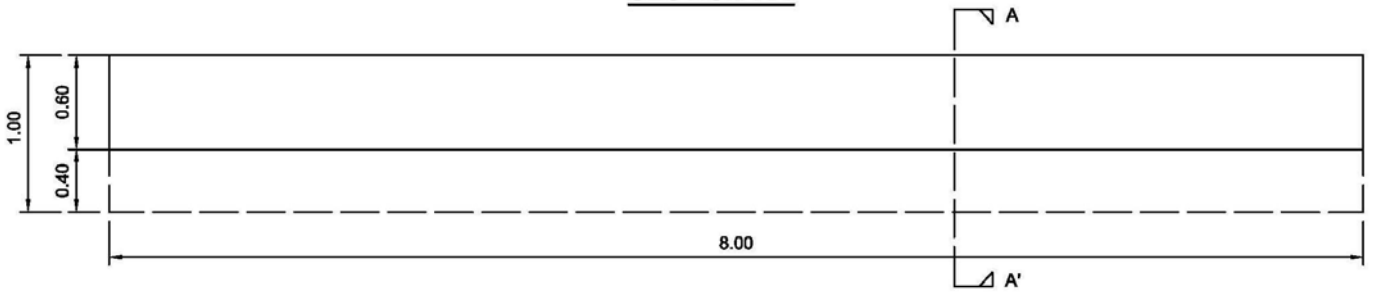
Table. 16. Abstract Cost of Retaining Wall

Sr. No.	Particular	Qty.	Rate	Unit	Amount
1	Earth work excavation in foundation and trench with pick and jumper HSR 7.2	10.40 cum	1745+400% = 8725	Per 100 cum	907.40
2	C.C. 1:3:6 in foundation per HSR 10.40	2.40 cum	64.85+550% = 422.18	per cum	1013.23
3	Sq. Rubble masonry work in 1:4 HSR 12.23+12.31	19.20 cum	(160.35+27.20)+300% = 750.20	per cum	14403.84
4	C.C. 1:2:4 on top as per HSR 10.41	0.24 cum	64.95+550% = 422.18	per cum	101.32
5	20mm. Thick plaster work in 1:3 as HSR 10.41	40 sqm.	8.15 + 500% = 48.90	Per sq.m.	1956.00
6	Collection the stone by donkey load upto 1 qtl. 'and distance upto 10 km excluding donkey man HSR. 5.3(a)	21.12 x 23.20 = 489.00	8.00 + 200% = 24.00	each	11736.00
7	Donkeies as HSR. 5.3 (b)	489.98/6	20.52+200% = 61.56	each	5027.19
8	Tipping work of Crate as HSR. 23.33	7.20 cum	11.10+450% = 61.05	Per cum	439.56
				Total	**35584.55**
				Cost of material as per detail attached	**35494.00**
				G. Total	**71078.55**
				or Say Rs. =	**71100.00**

RETAINING WALL



SECTION-AA'



PLAN

Table. 17. Estimate of Orchard Development in the Watersheds Per Hectare (Lemon, Lichi, &Kinnoo)

A. Horticulture

Sr. No.	Particulars	Quantity	Unit	Rate	Amount
1	Soil working 1m x 1m x 1m size pits (390 Nos.) including cost of refilling(At the distance 15'x15')	390.00	cum	36.66	14297.40
2	Application of Farmyard Manure, including cost			L.S.	750.00
3	Cost of fertiliser/ pesticide @250gm/plant			L.S.	750.00
4	Cost of plants (including 15% etc. for mortality) including transportation and planting	450.00	Nos.	15/Plant	6750.00
5	Casualty replacement @ 10% of item No. 4 & 5				465.00
6	Cost of 2 weedings and hoeing			1.00/Pant	540.00
7	Contingency and unforeseen (3%)				492.00
				Total	**24044.40**
				Say `	**24000.00**
	Maintenance cost 2nd year			**L.S.**	**1000.00**
	For next 5 years i.e. , ` 1000 x 5				**5000.00**
				Total	**30000.00**
				Say `	**30000.00**

Estimate of Orchard Development in the Watersheds Per Hectare (Guava ,Amla & Ber)

A. Horticulture

Sr. No.	Particulars	Quantity	Unit	Rate	Amount
1	Soil working 1m x 1m x 1m size pits (225 Nos.) including cost of refilling(At the distance 20'x20')	225.00	cum	36.66	8248.50
2	Application of Farmyard Manure, including cost			L.S.	450.00
3	Cost of fertiliser/ pesticide @250gm/plant			L.S.	450.00
4	Cost of plants (including 15% etc. for mortality) including transportation and planting	260.00	Nos.	30/Plant	7800.00
5	Casualty replacement @ 10% of item No. 4 & 5				465.00
6	Cost of 2 weedings and hoeing			1.00/Pant	540.00
7	Contingency and unforeseen (3%)				492.00
				Total	**18445.50**
				Say `	**18500.00**
8	Maintenance cost 2nd year			L.S.	**1000.00**
	For next 5 years i.e. , ` 1000 x 5				**5000.00**
				Total	**24500.00**
				Say `	**24500.00**

Estimate of Orchard Development in the Watersheds Per Hectare (Mango, Chikoo & Lichi)

A. Horticulture

Sr. No.	Particulars	Quantity	Unit	Rate	Amount
1	Soil working 1m x 1m x 1m size pits (105 Nos.) including cost of refilling(At the distance 30'x30')	105.00	cum	36.66	3849.30
2	Application of Farmyard Manure, including cost			L.S.	250.00
3	Cost of fertiliser/ pesticide @250gm/plant			L.S.	250.00

4	Cost of plants (including 15% etc. for mortality) including transportation and planting	121.00	Nos.	30/Plant	3630.00
5	Casualty replacement @ 10% of item No. 4 & 5				465.00
6	Cost of 2 weedings and hoeing			1.00/Pant	540.00
7	Contingency and unforeseen (3%)				492.00
				Total	**9476.30**
				Say `	**9500.00**
	Maintenance cost 2nd year			L.S.	**800.00**
	For next 5 years i.e. , ` 800 x 5				**4000.00**
				Total	**14300.00**
				Say `	**14300.00**

PRODUCTION SYSTEM 10%

7.3 PRODUCTION SYSTEM

7.3.1 Crop Production

Present Status: Agriculture is the mainstay of the inhabitants of the project area which is mainly rain-fed and people gamble with the uncertain rains. Rain-fed Wheat and Maize are the main crops. Due to frequent droughts, crop failures are common, and yield levels are low. Farmers maintain fodder plants on the field bunds. Because of extensive damage by wildlife, farmers are gradually shifting towards tree farming and dairy farming. But there is acute shortage of green and dry fodder. Still traditional farm practices are followed such as manual weeding and hoeing, use of desi ploughs and bullock power in tillage operations. The use of chemical fertilizer is limited to urea upto 50 Kg/acre in maize and wheat. Pulses are not raised due to the fear of wildlife damage. Soil testing has never been done. Only farm yard manure is added to maintain yield levels. Food grains are hardly sufficient for 6 to 8 months with small farmers. Post-harvest gain storage, food processing and value addition techniques are not prevalent.

Scope of Improvement: There appears tremendous scope in improving production systems of the project area. The following practices are suggested for better harvests.

- Conservation farming concept based on getting highest yield per drop of water shall be introduced.
- This would also include better tillage practices for in-situ rain water conservation.
- Weather elated contingent crop planning shall be introduced to reduce the impact of droughts.
- The varieties of wheat are old and shall be replaced with latest varieties.
- There is a good scope of introducing hybrid varieties of maize. Intercropping of Rajmah is suggested with maize.
- The application of fertilizers on soil test basis and minimum use of chemicals for weed and disease control shall be promoted.
- Farmers would be linked to farm advisory services and Krishi Vigyan Kendras.

- The concept of precision farming and non-monetary inputs shall be introduced.
- Agro-forestry by integrating Eucalyptus, Drake and Popular would be promoted on large scale.
- Leguminous crops mainly Moong and mash short duration varieties needs to be introduced

7.3.2 Horticulture

Existing System: Desi mango and guava are the most preferred fruit crop of the farmers and scattered plants of local galgal are seen in farm lands. The main problem in mango is the alternate year bearing and shedding of fruit during wind storms in the month of March. Some farmers have started raising Guava and Kinnow where irrigation facilities are available. Lemon and galgal are also raised but mostly for domestic use. There is no well organized marketing system in fruit plants. In case of mango for example; the produce is sold to the local traders. During the month of May, Mango contractors visit these villages and buy the standing crop. The fruit is plucked in a bit raw form and transported to market.

Proposed System: The annual rainfall is 911 in the project area. All the areas are well connected by road and the economic condition of the locals can be improved by introducing improved cultural practices of fruit plants coupled with rain water harvesting and efficient use. Large number of farmers are interested to increase area under Guava and Kinnow and requested for supply of good quality nursery raised plants. Several families have shown interest in raising Citrus Lemon, Kinnou, Galgal, Chikkoo. The following activities are proposed to promote horticulture in the area.

- Supply of quality seedlings arranged from approved nurseries as per choice of farmers.
- Soil testing up to a depth of 90 cm depth to ensure suitability of soil for fruit plants.
- Proper back up technical support on orchard management by involving HAU Farm Advisory Service and department of horticulture.
- Appropriate safeguards from wildlife damage, frost damage and wind breaks.
- Arrangements for limited irrigation at least for first few years.
- Proper planning for raising filler plants like Papaya, pomegranate and shade loving crops like turmeric and ginger.

- Organizing SHGs around horticulture and joint purchase of inputs and marketing

7.3.3 Vegetable cultivation

Present status: Vegetable cultivation as such for market purpose is not followed mainly because of the limitation of irrigation facilities. Most farmers raise vegetable crops in back yards for domestic use. Rain-fed tomato was seen in some villages. Some poly houses have come up in the area with financial support from Horticulture Mission and have started commercial cultivation of off season vegetables.

7.3.4 Promotion of Farm Forestry and Agro-forestry

Most of the privately owned non-arable the area is under mix of trees and bushes. Lantana and parthenium, the most obnoxious weeds have invaded such area. Palatable grasses and commercial grass like Bhabar (Eulaliopsis binate) are getting eliminated.

The following interventions are proposed to popularize agro-forestry as an alternate source of income.

- Raising of improved cultivars of Bamboo in moist drainage lines for soil conservation and income generation.
- Planting of improved cultivars of Eucalyptus, Drake and Poplars in the project both as single rows on field bunds and also as blocks.

7.3.5 Livestock Improvement Including Fodder Production

Livestock rearing is the most important subsidiary occupation of the project villagers. In addition to selling milk for regular daily income, farm yard manure is most needed to maintain fertility and moisture retention of soils. Even landless families also maintain few numbers of animals. The animal breed improvement work was initiated in these villages under Kandi project and it is a regular program of the Animal Husbandry Department. However, the

availability of animal health services at the door step is grossly lacking. The programs proposed under the project for livestock improvement include:

- In order to promote animal health care camps shall be organized and medicines for de-worming, mineral mixture shall be supplied in addition to awareness generation about prevention of animal diseases.
- Provision of quality seed of fodder crops and demos.
- Rising of protein rich fodder plants by promoting Napier Bajra Hybrid and Leucaena hedge rows on field bunds.

7.3.6 Marketing Arrangements and Proposal for Improvement

There is no organized system of marketing although market surplus is limited. The marketing of wheat and paddy is not a problem because of fixed prices and government controlled procurement system. There is no organized system of marketing of mango and milk though both are source of income with many families.

The efforts through the project are directed towards diversification of agriculture to include fruit and vegetable crops and dairy development. The transfer of area to these high value crops would depend on development of irrigation facilities, facilitation in input supplies, transfer of production technology, easy credit and market linkages. Efforts have been made to reactivate the non-functional SHGs and UGs. New watershed committees have been formed in each village. Farmers have shown interest in joint management of resources and join hands for processing, value addition and marketing.

Fortunately, the involvement of Rural Development Department means regular interaction with the district administration whose good offices would be used to involve rural banking institutions in funding support for SHGs, User Groups and other interest groups.

7.3.7 Detail of production system to be promoted

Based on the discussions during PRA, the scope of production systems was worked out and as per the provision of funds @ 10% of the budget, the following activities were finalized.

Table No. 18: Detail of Production system proposed to be promoted in the project village

S. No.	Particulars	Contents	No. of micro watershed	No. of beneficiaries per micro watershed	No. of total beneficiaries	Cost per beneficiaries	Total
1	Animal Husbandry	Problems being faced due to some diseases in the animals and low yield of milk. Production of free life saving medicines for animals – the provision for 80 farmers of each micro watershed/year @ Rs.225 has been provided.	4	320	1600	225	360000
	Animal Husbandry	Livestock Management supply of feed supplements to improve health of cattle's. The provision to benefit 80 farmers of each micro watershed/year @ Rs.225 has been kept in the project proposals.	4	320	1600	225	360000
	Animal Husbandry	Supply of mini- kits of high yielding variety green fodder seeds to 30 farmers in each micro watershed/year @ Rs.200/- mini kits.	4	120(farmers)	600 Seeds of mini kit	200 per mini kit of seeds	120000
2	Agriculture	To introduce Summer Moong or Mash or Daincha as a third crop in Rice-wheat rotation. Supply of mini- kits to 80 farmers of each micro watershed/year @ Rs.200/ kit as assistance is provided.	4	320(farmers)	1600 (mini kits)	200 per mini kits	320000
	Agriculture	Application of farm inputs like Zinc Sulphate or Sulhpur or weedicides or pesticides 80 farmer of each micro watershed/ year @ Rs.200/ kits as assistance is provided.	4	320(farmers)	1600 (mini kits)	200 per mini kits	320000
	Agriculture	Supplying of Agriculture implements –30 farmers (average) per micro watershed @ Rs. 1000/ units' as assistance is provided.	4	120(farmers)	600	1000	600000

S. No.	Particulars	Contents	No. of micro watershed	No. of beneficiaries per micro watershed	No. of total beneficiaries	Cost per beneficiaries	Total
	Agriculture	Agro Forestry: Poplar/ Eucalyptus/ daik on 50% subsidy @ Rs. 10/ plant as assistance are provided.	4	4000(plants)	20000 plants	Rs. 10 per plant	200000
3	Horticulture	Potential for Horticulture plants. Supply of plants at 50 % cost share for cultivation of fruits like Citrus (Lemon, kinnon, galgal), Guava, Amla, Chikoo, Ber/mango), floriculture and vegetables (especially ginger, turmeric, garlic and tomato)	4	400 plants	2000 plants	Rs.40 per plant	80000
	Horticulture	Kitchen gardening Packets distributed to 120 farmers in each micro watershed/ year @ Rs.25/ packet.	4	480	2400	Rs. 25 Per packet	60000
	Horticulture	Seven units of Bee keeping in each micro watershed @ 3000/ unit as assistance are provided.	4	28	140	3000	420000
	Horticulture	Four units of Vermi compost in each micro watershed per year @ Rs. 10000 per unit as assistance is provided.	4	16	80	10000	800000
	Horticulture	50% Assistance to promote Mushroom cultivation in the area, 100 bag to 20 farmers per micro- watershed/ year @Rs. 30/- per bag	4	80	400	30	1200000
4	Joint camps with Line Departments	Two training camps to beneficiaries on Proven technology in agriculture are provided (during pre kharif and rabi season).	4	8	40	20000	800000
		Contingency					62400

Total: Rs. 5702400/-

Note. The development of Horticulture, Animal Husbandry and Agro forestry has limited scope because of scattered & small land holding, wild life problems and drought conditions. The National Horticulture Mission has already implementing various schemes in the project area. The beneficiaries are taking advantages under their ongoing schemes.

In order to manage the fodder scarcity the latest rain fed varieties of fodder crop will be introduced on the recommendation of experts of Haryana Agriculture University and Central Soil and Water Conservation Research Institute, Chandigarh. Necessary provision for organizing the various training programme / exposure visits has been provided in the Capacity Building activity.

Under Agro forestry, tree species commonly planted are eucalyptus and Poplar. The impacts of such type's plantation have given extra source of income.

7.3.8. Vermin Compost

The vermin compost is one of the very useful organic manure. The vermin compost prepared by induction of various types worms (Earth Worm), to de compost and converted from raw animal dung to well de compost highly nutritive organic manure.

One of the important occupations of villagers is the animal husbandry. At present, the animal wastes are not being used by the villagers. This waste can be utilized as vermin- compost on the farm where the productivity and physical condition of the soil can be increased manifold. The animal waste can be used for preparation of vermin- compost. The available nutrients in vermin- compost are higher than country type farmyard manure. As per NHM guideline, the installation cost of structure of 1 vemin compost unit (size) 500 Sq. ft., the total cost of the unit would be is Rs. 60000/-. Out of this the 50% subsidy i.e. Rs.30000/- is met from the ongoing programme of horticulture department. The additional amount i.e. Rs.

10000/- will be born under IWMP Programme. The nutrition value of vermin compost is more than Farm Yard Manure and compost i.e. nitrogen- 1.2 to 1.6%, Phosphorous 1.5 to 1.8%, Potash 1.2 to 2% are just double.

Table 19: Model/ Estimate for a Vermin Compost Unit

Sr. No	Component	Expenditure to be incurred
1	Construction of shed of size 500 Sq. ft.@ Rs. 100 per Sq. ft. with pacca floor, beds and coverings etc.	50000/-
2	Cost on breeding material and purchase of worms etc.	8000/-
3	Tools and equipments etc.	2000/-
		60000/-

Components of Vermin Compost Unit
Total

1. **Shed**

Due to the high temperature in summer, shed structure is needed for vermin compost unit. It can be made by use of bricks/ concrete pillars. While designing the shed adequate room has to be left around the beds for easy movements of labours attending to the filling and harvesting the beds.

2. **Vermin- beds**

Scientific bed side depending upon the provision of filtered for drainage of excess water is prepared of about 75- 90 cm thick. The whole bed should be above the ground, the proper bed width to be not more than 1.5 m to allow easy access to the centre of the bed is constructed.

3. Land

About 125 sq. m. land is required to set up the vermin compost production. It should have 2- 3 sheds each of 180- 200 sq. ft. Good watering arrangement is required as the moisture is very essential for vermin compost production.

4. Seed Stock

This is important because worms multiply at the rate of 350 worms per cubic meter of bed space over a period of six months in a year.

5. Machinery

Farm machinery and implements are required for cutting the raw material in small pieces, conveying shredded raw material to the out sheds, loading, unloading, collection of compost, loosening of beds for aeration, shifting of the compost. Costs of providing necessary implements and the machinery have to be included in the project cost.

LIVELIHOOD ACTIVITIES FOR THE ASSET LESS PERSONS-9%

7.4 LIVELIHOOD SUPPORT TO SHG'S

The key issue of inclusion of this chapter is that about 80% of the population in the proposed villages depends on agriculture and allied activities, but it rarely provides sufficient means of survival to small and marginal farmers. During the base line survey, this aspect was discussed with the existing Self Help Group/ Gram Sabha members. The representative of WAPCOS Ms Manju, Sociologist of the team held comprehensive discussions on the possibilities of livelihood in the rain fed areas. The main objectives of these discussions were:

1. Assure one livelihood option to poor families.
2. Assured livelihood for at least 300 days in a year including MGNREGA.
3. At least one daily job per family mainly SCs/BPL/very poor families.

SHGs would be imparted Skill Training on identified Economic Activities and it is proposed to impart them trainings at Krishi Vigyan Kender (CCSHAU) Panchkula and Haryana Institute of rural development, Nilokheri. Agriculture University, Hisar, Central Soil and Water research and training Institute, Chandigarh and HIRD, Nilokheri. It is proposed to lend revolving fund of Rs. 25000/- to each SHG/individual formed in the watershed villages. Since the members from SHGs/landless are very poor, they do not have resources to start micro enterprises, it is envisaged that they should be assisted and given loan of this amount in the shape of Revolving Fund Assistance (RFP) so that do not get trapped by money lenders. Funds thus given on loan are recoverable from SHGs/individuals in easy installments. It is also proposed to impart skill training to at least 10 unemployed youth from each village and give them trainings of their choice so that they establish some small enterprises. It is further proposed to give them interest free loan of Rs. 12000/- each as Revolving Fund Assistance to meet their urgent needs of funds for establishing micro enterprises. Such funds recovered could either be given back to SHGs/individual or some other SHGs/individuals depending upon assessment of their

respective needs. It is proposed to form 2 SHGs in each village and identify at least 10 youths in each village for imparting training and giving Revolving Fund.

7.4.1 Activities those are likely to be taken up by SHGs/individuals

1. Cutting and Tailoring
2. Embroidery
3. Mushroom cultivation
4. Plumbing
5. Carpentry
6. Bee keeping
7. Animal husbandry
8. Vermi compost
9. Cattle rearing and selling milk
10. Beautician
11. Carpet making
12. Household wiring, Motor winding
13. Pickles, sauces, jam, jelly etc.
14. Backyard poultry
15. Babbar grass and Sarcunda rope.
16. Floriculture

The details of funds proposed to be utilized under this component are as under:

Table 20. Revolving Fund Assistance for SHGs

S.No.	Name of micro watershed	Total SHGs	Amount of RFA per SHG	Total
1	Tikri	6	25000	150000
2	Bariser	6	25000	150000
3	Ghati	6	25000	150000
4	Chaplana	6	25000	150000
	Total	**24**		**600000**

Table 21. Skill Trainings/Skill up gradation for SHGs

S.No.	Name of micro watershed	Total SHGs	Amount of Training per SHG	Total
1	Tikri	6	35000	210000
2	Bariser	6	35000	210000
3	Ghati	6	35000	210000
4	Chaplana	6	35000	210000
	Total	**24**		**840000**

Note: This training cost includes Travel, boarding/lodging, cost of training and faculty support for different discipline e.g. Bakery Product, Soap and detergent making, fisheries, Bee keeping, Vermi Compost, Domestic poultry, Mushroom cultivation, Plumbing, Carpentry, Food Processing, Animal Husbandry, Product Processing etc.

Table No. 22- Computer Training (6 months) for unemployed youth above 12th passed male and female both recommended by Watershed Development Committee:

S. No.	Name of micro watershed	No. of Persons in micro watershed	Amount of Training per trainee for 6 month	Total
1	Tikri	25	10000	250000
2	Bariser	25	10000	250000
3	Ghati	25	10000	250000
4	Chaplana	25	10000	250000
	Total	**100**		**1000000**

Note: The beneficiaries will contribute 10% as cost sharing of the livelihood support programme Rs. 1000000 @ 10% cost sharing.

= 1000000- 100000
= 900000/-

Table No. 23- One time assistance as Revolving Fund to unemployed youth who have successfully completed Computer Training for setting up a computer centre:

S. No.	Name of micro watershed	No. of Persons in micro watershed	Amount of Training per Trainee	Total
1	Tikri	25	20000	500000
2	Bariser	25	20000	500000
3	Ghati	25	20000	500000
	Chaplana	25	20000	500000
	Total	**100**		**2000000**

Note: This training cost includes Travel, boarding/lodging, cost of training and faculty support.

Note: The beneficiaries will contribute 10% as cost sharing of the livelihood support programme Rs. 2000000 @ 10% cost sharing.

= 2000000- 200000
= 1800000/-

Table No. 24. Cutting and Tailoring Centre for female beneficiaries

S.No.	Name of micro watershed	No. of centres	Requirement for sewing machines per village (2 No.)	Payment to trainer per months	Period of training for each centre	Total payment to trainer
1	Tikri	2	4	2000	6	24000
2	Bariser	2	4	2000	6	24000
3	Ghati	2	4	2000	6	24000
4	Chaplana	2	4	2000	6	24000
	Total	**8**	**16**			**96000**

Cost of Sewing
1. Machines Rs. 48000/-

2. Payment to trainers Rs. 96000/-

Table No. 25- Embroidery Centre for female beneficiaries

S.No.	Name of micro watershed	No. of centers	Payment to Trainer per Month	Period months	Payment to trainer for 6 months @ Rs. 2000 p.m	Total trainers	Grand Total
1	Tikri	2	2000	6	12000	2	24000
2	Bariser	2	2000	6	12000	2	24000
3	Ghati	2	2000	6	12000	2	24000
4	Chaplana	2	2000	6	12000	2	24000
	Total	**8**					**96000**

Total Cost:

Payment to trainer: Rs.96000 /-

Table 26. Livelihood Support

S.No.	Name of micro watershed	No. of villages	Revolving fund assistance to individuals unemployed youth/ landless, women	
			Dairy Unit	**Toy/ candle sweet boxes etc.**
1	Tikri	2	4	4
2	Bariser	2	4	4
3	Ghati	2	4	4
4	Chaplana	2	4	4
		8	**20**	**20**
	Rate (Rs)		**25000**	**10000**
Total	**Cost (Lakh Rs)**		**5.00**	**2.00**

Contingency, printing material and other unseen items: Rs. 52160/-

Total funds available under this component are Rs. 5132160/-

In addition to HAU, the following institutions are also identified for imparting trainings:

i. HIRD, Nilokheri
ii. Agriculture, Technology and Extension, Hisar Agriculture University
iii. Central Soil and Water research and training Institute, Chandigarh
iv. Y.S. Parmar Agriculture and Horticulture University, Nauni, Solan
v. Mushroom Training Centre, Sonipat and Solan
vi. NIRD, Hyderabad
vii. Krishi Vigyan Kender (CCSHAU), Panchkula

There appears to be great potential for these activities and these activities are likely to generate income of Rs. 2000/- to Rs. 2500/- per member per month. However no activities would be forced upon on any SHGs and they would be free to decide the activity they would like to opt for their additional income. The PIA can take up the activities as per the need and approval of the Watershed Committee. Based on their choice, Project report for the specified activity would be prepared and revolving fund of Rs. 20000/ Rs. 25000/- per SHG would be given for running their respective micro enterprise. If need arises for more funds for their Income Generation Activities at later stage, they would be assisted in getting loan from banks. SHGs thus formed would be provided all possible assistance to uplift for their Socio- Economic conditions.

CONVERGENCE

7.5 INTRODUCTION

The National Rural Employment Guarantee Act (NREGA), notified on September 7, 2005, marked a paradigm shift from the previous wage employment programmes with its rights-based approach that makes the Government legally accountable for providing employment to those who demand it. The act aims at enhancing livelihood security households in rural areas of the country by providing at least one hundred days of guaranteed wage employment in a financial year to every household whose audit members volunteer to do unskilled manual work. Such Inter sectoral convergence becomes instrumental towards.

- Establishing synergy among different government programmes in planning and implementation to optimize use of public investments
- Enhancing economic opportunities
- Strengthening democratic Processes
- Mitigating the effects of Climate Change
- Creating conditions for sustainable development.
- One of the significant areas for convergence is the Watershed Management Programme of the Dept. of Land Resources (DoLR) in the Ministry of Rural Development (MoRD),
- Convergence is an evolving process and while broad principles can be laid out at the centre, the actual contours of convergence will be determined by the resources at the Central, State, District and the project level. Also, to fully identify the possibilities of convergence, it may be necessary to make a beginning with select programmes, so that the experience of implementation may further inform and refine strategies for convergence.

7.5.1 Convergence between MGNREGA and Watershed Programmes

Most of the activities under watershed development are covered under MGNREGA and there is a need for convergence to meet gap in requirement under IWMP. The labour component would be met out of funds made available under MGNREGA. The village wise details of the fund requirement are exhibited below (table. 27)

Detail of Convergence of IWMP and other schemes

Table 27. GAPS IN FUNDS REQUIREMENT – MICRO WATERSHED WISE

Sr.no	Name of micro watershed	Total cost requirement for works	Total funds available under IWMP for works	Gap in funds requirement for works	Convergence with MGNREGA
1	Tikri	90.86	88.37	2.49	2.49
2	Bariser	88.58	86.28	2.30	2.30
3	Ghati	85.32	83.53	1.79	1.79
4	Chaplana	63.12	61.15	1.97	1.97
	Total	**327.88**	**319.33**	**8.55**	**8.55**

- Under NREGA almost all the activities required for watershed development are permitted. Convergence between NREGA and Watershed Programmes of DoLR will be mutually beneficial for rain fed areas.

7.5.2 Non-Negotiable for works executed under MGNREGA

- Only Job Card holders to be employed for MGNREGA component.
- Muster rolls will be maintained on work site, with copies in the Gram Panchayat and to be electronically maintained on nrega.nic.in
- Wage payments will be through no-frills accounts in banks/post offices.

Need for Convergence: Since more than 56% of activities related to Watershed development are covered under MGNREGA, there is need for convergence to meet gap in Funds requirements under IWMP. Detailed survey had been conducted in Watershed villages and it has emerged that there is need for more funds to augment and strengthen the activities under IWMP. All four micro watersheds need more funds to meet the gap. Therefore, some of the works are proposed to be converged with MGNREGA. The labour component would be met out of funds made available under MGNREGA.

7.5.3 Convergence with Forest Department

The unit cost of agro- forestry component for 1 ha area (1100 plant) for plantation and other activity is Rs. 18767/-. The provision of Rs. 15000/- per ha has given in IWMP programme. The rest amount of Rs. 3767/- will be convergent from lined department from departmental schemes or MGNREGA.

7.5.4 Convergence with Horticulture Department

National Horticulture Mission is implementing the horticulture development programme which includes construction of water harvesting structures, drip and sprinkler irrigation activities which would be undertaken in convergence with the horticulture department. Under this activity 10 ha horticulture development programme with the financial assistance of Rs. 4.00 lakh has been provided in the project proposals. This would also be undertaken by convergence with the horticulture department.

7.5.5 Convergence with Agriculture Department

The activities under NRM like masonry structure/ large/ WHS/ Silt detention dam/ Crate wire structures where the machinery and material component is required and the unit cost exceeds for completion exceeds to the project provision, the same will be met in convergence with the similar activities of the agriculture.

7.5.6 Convergence with Animal Husbandry Department

The watershed falls in the water deficit conditions for production of fodder and depends upon the rain. The rainfall pattern is erratic. There is deficiency of green fodder and nutrients for the animals. The provision has been kept for providing mini kits for of life saving medicines/ mineral mixture, concentrate feed and fodder seeds. Since the provision of these kits is less than the required, hence this would be met with the lined department who has a provision under their ongoing programmes.

CHAPTER – 8

QUALITY AND SUSTAINABILITY

8.1 MONITORING AND EVALUATION

8.1.1 Plans for Monitoring and Evaluation

Web based GIS system is being developed for Monitoring and Evaluation at various stages of project under progress and post project. The satellite imageries are also helpful in monitoring all activities of the watershed area (Pre project, during project and post project). All the details relating to Watershed Activities would be available on website. The system is very useful to know the progress of the project at the click of the button. The higher officials would be able to monitor the progress and could generate the desired reports. The system would also help beneficiaries to know the area of importance, already treated area/ area to be treated. The system would serve an aiding tool to the planners and evaluators for judging the efficacy of the project.

8.1.2 Monitoring

Regular Monitoring of the project will have to be carried out at each stage to monitor the progress of the project. Different streams of monitoring are proposed as under:

1. Internal Monitoring by PIA/ WCDC
2. Progress and Process monitoring
3. GIS/ On line Monitoring
4. Sustainability monitoring
5. Self Monitoring by communities
6. Social Audits
7. Independent and external monitoring

Monitoring of watershed related activities will be carried out after completion of each phase. 1% amount of the project is earmarked under this component. Micro Watershed wise details are given below:

Table 1. Micro Watershed wise details

S.no	Name of the Micro Watershed	Effective Area	Total Cost	Monitoring 1%
1	Tikri	1315	15780000	157800
2	Bariser	1284	15408000	154080
3	Ghati	1243	14916000	149160
4	Chaplana	910	10920000	109200

8.2 EVALUATION

Each evaluation will include physical, financial, and social audit of all work done. The objective of evaluation of the project is to assess the status of watershed related interventions in the project. The evaluation will be taken up in three stages of the project. The Evaluation will be done by agencies empanelled on SLNA.

1% amount of the project is earmarked under this component. Micro Watershed wise details were as under:

Table 2. Micro Watershed wise details

S.no	Name of the Project	Effective Area	Total Cost	Evaluation 1%
1	Tikri	1315	15780000	157800
2	Bariser	1284	15408000	154080
3	Ghati	1243	14916000	149160
4	Chaplana	910	10920000	109200

CONSOLIDATION PHASE- 3 %

Consolidation Phase = Rs. 17,10,720/-

8.3 CONSOLIDATION PHASE

This is another important activity under the project. In this phase, the resources augmented and economic plans developed in Phase II are made the foundation to create new nature based, sustainable livelihoods and raise productivity levels. There needs to be some mechanism at Watershed Level for the following crucial Activities as detailed below:

I. Managing/upgrading of all activities taken up under the Project.

II. Preparation of Project completion report and

III. Documentation of success stories

IV. Management of proper utilization of WDF

V. Mechanism for Quality and sustainability issues under the Project.

VI. Mechanism for fixation and collection of User Charges.

VII. Consolidation of works

VIII. Building the capacity of community based organizations to carry out the new agenda – post project period.

IX. Intensification of farm production systems/off farm livelihoods

X. Project Management related aspects

To take up these activities, it is proposed In the DPR as under:

Name of Micro watershed: Tikri

Table 3. Consolidated Phase

Sr. No	Type of activity	Amount earmarked
1	Managing/ upgrading of all activities taken up under the project	0.95
2	Preparation of Project completion report and	0.24
3	Documentation of success stories	0.24
4	Management of proper utilization of WDF	0.70
5	Mechanism for quality and sustainability issues under the Project	0.24
6	Watershed activities	2.36

Total: 4.73 lacs

Name of Micro watershed: Bariser

Table 4. Consolidated Phase

Sr. No	Type of activity	Amount earmarked
1	Managing/ upgrading of all activities taken up under the project	0.92
2	Preparation of Project completion report and	0.23
3	Documentation of success stories	0.23
4	Management of proper utilization of WDF	0.69
5	Mechanism for quality and sustainability issues under the Project	0.23
6	Watershed activities	2.32

Total: 4.62 lacs

Name of Micro watershed: Ghati

Table 5. Consolidated Phase

Sr. No	Type of activity	Amount earmarked
1	Managing/ upgrading of all activities taken up under the project	0.89
2	Preparation of Project completion report and	0.22
3	Documentation of success stories	0.22
4	Management of proper utilization of WDF	0.89
5	Mechanism for quality and sustainability issues under the Project	0.22
6	Watershed activities	2.23

Total: 4.47 lacs

Name of Micro watershed: Chaplana

Table 6. Consolidated Phase

S. No	Type of activity	Amount earmarked
1	Managing/ upgrading of all activities taken up under the project	0.66
2	Preparation of Project completion report and	0.16
3	Documentation of success stories	0.16
4	Management of proper utilization of WDF	0.49
5	Mechanism for quality and sustainability issues under the Project	0.16
6	Watershed activities	1.65

Total: 3.28 lacs

As per the common guideline the management of developed natural resources would involve the following features:

- Improving the sustainability of various structures and equitable distribution. The watershed committee will fix the charges of water and the funds generated would be utilized O& M Structures. These users charges account will be maintained separately.
- Involvement of Gram Panchayat for repair, maintenance and protection of created structures.

CHAPTER-9

EXPECTED OUTCOMES

EXPECTED OUTCOMES

The effective area is 4752 ha and the Project Cost is 570.24 lacs covering micro watersheds. Benefits will be much more than the project cost as detailed below:

With the several interventions under IWMP II project such as Livelihood support, Farm production system, various types of activities relating to soil conservation measures for diversification of crops, Protection to field by constructing the structures etc, it is expected that these Watershed villages will gain a lot. This intervention will have multiple benefits available to communities in terms of employment, check in migration, improvement in water table, more area under agriculture and horticulture, check in soil loss and decrease in Flood and drought incidences, improvement in crop yield, milk yield, check in degradation of land etc. The benefits thus accrued would be short term and long term. With the judicious use of funds available under IWMP and with convergence from MGNREGA and other schemes of Departments, this project of Morni Watershed II will prove to be very beneficial in improving socio – economic status of people residing in Project villages.

Expected outcomes as mentioned above are given in the following tables:

9.1 EMPLOYMENT

Employment has always been a problem in the village. The principal occupations of the people are rain fed agriculture, animal husbandry and casual labour work. However, rainfall being limited and erratic, agriculture suffers, i.e. best they can

take only single crop, which keeps them partially engage 4 to 5 months. Similarly due to lack of fodder animal husbandry does not keep them engage full time. Thus the people mainly depend upon casual labour either in the villages is in Panchkula and Chandigarh Industrial Complex.

Table 1. Expected Employment Generation in the Project area

Name of the project	Wage employment										Self employment				
	No of man days					No. of Beneficiaries					No. of Beneficiaries				
	SC	ST	others	Women	Total	SC	ST	others	Women	Total	SC	ST	others	Women	Total
Morni Watershed (IWMP II)	20000	-	15000	5000	40000	250	-	150	80	480	500	-	500	400	1400

40000 man days would be generated with the implementation of the project in Morni watershed (IWMP- II), which means 40 person for 200 days per year would be employed for the period of five years. In addition to this cropped area/ productivity would be increased and will also generate employment.

9.2 Migration Pattern

Table 2. Pre and Post Migration in Morni Watershed (IWMP II)

S. no	Name of the sub Watershed	No. of persons migrating	No of days per year of migration	Major reasons for migrating	Expected reduction in no. of persons migrating
1	Morni watershed (IWMP II)	130 to 140	100 to 110	Lack of availability of water and fodder for the animals, lack of source of income.	70% to 75% of persons migrating at pre- project level

A comparison of above table with expected migration of table 19 of the Chapter 3 reveals that there will be about 50% reduction in the migration.

9.3 GROUND WATER TABLE (DRINKING WATER)

The Drinking Water supply is managed by Public health Department by Installing Tube well in the area the project is expected to augment the ground water resources with the proposed water harvesting structure

Through the ground water table is depleting over the years and presently stands more than 35 m. It is expected that water table would be at the rate of 20 cm per year during post project period. The expected rise has been computed from the rainfall pattern using 20% conservation component during post project.

Table 3. Detail of average pre- post ground water table depth in the project area (in meters)

Name of Watershed	Sources	Existing pre- project ground water table level (m)	Expected increase during post project (m)	Remarks
Morni Watershed (IWMP II)	Ground water	More than 35	20 cm per year	
	Bore Wells	…….	…….	
	Other (specify)	…….	…….	

9.4 CROPS

Agriculture primary depends upon water, but this is availability of this is lacking without existence of canal network and deeper ground water conditions. All this can change with the integrated land and water management during the watershed project. The planned percolation tanks, sub surface dam etc. can preserve sub moisture in the soil. This will help in

additional area coming under cultivation and increasing productivity too. The crop yield pre project and expected and post project is presented in table 4**.**

Table 4. Increase in Expected Yield

Name of Micro Watershed	Name of crops	Pre project				Expected post project			
		Area (ha)	Average yield Qtl. Per ha	Total production (in kg)	Total value (inRs)	Area (ha)	Average yield Qtl. Per ha	Total production	Total value
Tikri	Maize	80	1405	112400	13.49	88	1546	136048	16.32
	Paddy	8	1505	12040	1.30	9	1656	14904	1.60
	Wheat	25	1200	30000	3.54	28	1320	36960	4.36
Bariser	Maize	92	1405	129260	15.51	101	1546	156146	18.73
	Paddy	12	1505	18060	1.95	13	1656	21528	2.32
	Wheat	45	1200	54000	6.37	50	1320	66000	7.78
Ghati	Maize	50	1405	70250	8.43	55	1546	85030	10.20
	Paddy	5	1505	7525	1.05	6	1656	9936	1.07
	Wheat	15	1200	18000	2.12	17	1320	22440	2.64
Chaplana	Maize	87	1405	122235	14.66	96	1546	148416	17.80
	Paddy	5	1505	7525	0.81	6	1656	9936	1.07
	Wheat	45	1200	54000	6.37	50	1320	66000	7.78
Total		**469**			**75.60**	**519**			**91.67**

(Source: Revenue Department and Agriculture Department, Panchkula Haryana)

9.5 HORTICULTURE

Table 5. Pre and post project area under Horticulture

S.no	Name of Micro Watersheds	Existing area under horticulture (ha)	Additional Area under horticulture proposed to be covered through IWMP	Total area in ha – Post Project
1	Tikri	1	1	2
2	Bariser	1	1	2
3	Ghati	1	1	2
4	Chaplana	2	1	3
	Total	**5**	**4**	**9**

9.6 AFFORESTATION/ VEGETATIVE COVER

Table 6. Pre and post project forest and vegetative cover

S.no	Name of micro watersheds	Existing area under tree covered, ha	Area under tree cover proposed ha	Total
1	Tikri	53	8	63
2	Bariser	56	8	64
3	Ghati	52	8	60
4	Chaplana	54	8	62
	Total	**217**	**32**	**249**

9.7 Expected reduction in Soil loss

Table 7.Pre and post project soil losses

S.No	Name of micro watersheds	Pre Project Soil loss in tonnes	Post Project Soil loss in tonnes
1	Tikri	60- 70	30- 35
2	Bariser	60- 70	30- 35
3	Ghati	60- 75	30- 35
4	Chaplana	60- 70	30- 35

9.8 Livestock

Table 8. Details of livestock in the project area

S.no	Name of micro watershed	Type of Animals	Pre project			Post project			Remarks
			No.	Yield Kg/ day	Income In Rs per day	No.	Yield Kg/ day	Income In Rs per day	
1	Tikri	Buffalo	194	2-3	50-75	223	6-7	168-196	Increase in milk yield and number of animals by approx. 15%
		Cow	619	1-2	22-44	712	3-4	25-50	Increase in milk yield and number of animals by approx. 15%
2	Bariser	Buffalo	429	2-3	50-75	493	6-7	168-196	Increase in milk yield and number of animals by approx. 15%
		Cow	816	1-2	22-44	938	3-4	25-50	Increase in milk yield and number of animals by approx. 15%
3	Ghati	Buffalo	266	2-3	50-75	306	6-7	168-196	Increase in milk yield and number of animals by approx. 15%

		Cow	408	1-2	22-44	469	3-4	25-50	Increase in milk yield and number of animals by approx. 15%
4	Chaplana	Buffalo	411	2-3	50-75	473	6-7	168-196	Increase in milk yield and number of animals by approx. 15%
		Cow	1059	1-2	22-44	1218	3-4	25-50	Increase in milk yield and number of animals by approx. 15%

9.9 LINKAGES

The direct livelihood activities need good forward and backward support system. The activities may fail to deliver the desired results. These linkages would involve credit, machinery, input supply, marketing etc.

The backward forward linkages will involved the extension services which are brought available in the project proposal as capacity building and the provision have been kept. 20 kits of agriculture implement have been provided. Milk and other collection centre would be constituted with increased milk production under the project.

Table 9: Backward-Forward Linkages

Sr. No.	Project	Type of Marketing Facility	Pre-Project (no.)	During the Project (no.)	Post-project (no.)
1	Morni Watershed (IWMP II)	Backward linkages	-	-	-
		Seed certification	Moderate	Extension and Training	Improved
		Seed supply system	Moderate	Extension and Training	Improved
		Fertilizer supply system	Moderate	Extension and Training	Improved
		Pesticide supply system	Moderate	Extension and Training	Improved
		Credit institutions	Banks	Coordinate to lead banks	Bank intensity increased
		Water supply for irrigation	Scarcity	Promote rain water harvesting	Would be promoted

Sr. No.	Project	Type of Marketing Facility	Pre-Project (no.)	During the Project (no.)	Post-project (no.)
		Extension services	KGK& Agriculture deptt.	Extension & Training in village level	Improved
		Nurseries	Horticulture and forest	To be promoted	Improved
		Tools/ machinery suppliers	Subsides	Educate by Extension & Training	Supplies would be improved
		Price support system	Major crops	-	Needs for all crops
		Labour	-	Employment generate through works activities	Migration reduce
		Any other (please specify)	-	-	-
		Road network	Available	Coordinate with lined department	Would be strengthen
		Transport facilities	Moderate	Coordinate with lined department	Would be promoted
		Markets / Mandies	Exists	Coordinate with lined department	Intensity would be increased
		Agro and other industries	-	Coordinate with lined department to establish Cottage industries (Kutir Udyog) for landless and unemployed youth	Would be strengthen
		Milk and other collection centres	Milk collection centre in long distance	Coordinate with lined department	For installation on nearest door steps
		Any other (please specify)	-	-	-
			Vermi-compost unit	Convergence with NHM (Horticulture) department	To be increased
			Mushroom	Convergence with NHM	To be increased

Sr. No.	Project	Type of Marketing Facility	Pre-Project (no.)	During the Project (no.)	Post-project (no.)
			Cultivation	(Horticulture) department	
			Animal vitamins/ Minerals Deficit	Coordinate with lined department, to organize camps in watershed area	Animal vitamins feeds Would be promoted

9.9.1 LOGICAL FRAMEWORK ANALYSIS

Table 10. Logical Framework Analysis

Components	Activities	Outputs	Effect	Impact
Village Institution Formation	Formation of Watershed Community, User Groups	Watershed Committee each village Number of user groups depending on the coverage of particular intervention	Project can be implemented and managed in a democratic and Participatory way ensuring equity.	Unity and prosperity in the village management. People's Participation and positive perception towards the programme.
Strengthening Village operations	Organize training and awareness programme for village institutions. Capacity Building workshops and exposure visits for User Group and Watershed Community Facilitating and monitoring the functioning of UGs and WCs Strengthen	Awareness camps to be organized Trainings and exposure visits UGs and WCs to be held Capacity building workshops to be organized 1 Federations of UGs and WC to be Formed.	Quality of management of common resources improved. Quality of distribution of benefits between people improved Increased awareness amongst women about village resources Women participation enhanced in decision-making of GVCs. Involvement of	

	linkages between UGs and WCs and Panchayat Institutions Gender sensitization of UGs and WCs to increase inclusiveness of shamus decision making Sensitize Village communities to involve children and youth in development		youth and children in village development Increased.	
Fund Management	Improve management and utilization of UGs and WCs Prepare communities to explore other sources of income for UGs and WCs.	UGs and WCs operating bank account and managing resources on	Purpose, frequency and volume of use of the fund enhanced Volume of funds generated for UGs and WCs from other sources of income increased.	
Ecological restoration	Protection, Treatment and regeneration of common and private lands Protection, treatment and regeneration of forest lands Plantation of fruits and forest species Input trainings, conduct meetings and organize exposure visits for communities, village volunteers and	Common and private lands to be brought under new plantations and agro-horti-forestry like Neem, Adussa, prosopis, Banyan and Peepul Forest lands to be brought under new plantations and protection Trainings, exposure visits and meetings to be organized for	Fodder availability from common and private land increased Accessibility to common and forest lands increased with removal of encroachments and resolution of conflicts	Better Ecological order in the area Increase in the proportion of households having more security of fodder. Reduction in drudgery of fodder and fuel collection, especially women

	staff to effectively plan, execute and monitor activities. Identification and promotion of non-timber forest produce based income generation activities	communities, village volunteers and staff. Income generation intervention promoted		
Rainfed Area Development	Treatment of land through improved soil and moisture conservation practices on watershed basis Promotion of good agricultural practices-horticulture, improved crop and vegetable Promotion of organic farming practices Formation of Fodder banks to increase fodder security and promote dairy development among communities Identification and promotion of agri-produce based income generation activities like grading, processing and packaging. Promotion	Land to be brought under improved soil moisture conservation practices. Good agricultural practices to be promoted. Organic farming to be promoted. Fodder banks to be established Agriculture based livelihood income generation activities to be promoted Water harvesting structures to be constructed Drip irrigation facilities to be distributed among farmers Approx 15000 person days of employment to be generated Trainings, exposure visits and meetings to be	Improved productivity of treated land Increased availability of water in cells Increase in annual agricultural production Farmers adopt organic farming practices Fodder security of farmers enhanced. Increase availability of water for 9 to12 months Increased availability of water for livestock Availability of irrigation water established Farmers take two crops in a year. Increase in agricultural productivity of land Availability of drinking water enhanced	Increase in proportion of households having more security of food Increase in contribution of agricultural income to the household income

	of better irrigation practices like drip irrigation Impart trainings, conduct meetings and organize exposure visits of communities, village volunteers and staff to effectively plan, execute and	organized for communities, village volunteers and		
Women's socio-political and economic empowerment	Formation and strengthening of women' SHG groups Capacity building of womenfolk Capacity building of SHG leaders and accountants Linking SHGs with external financial institutions	Women's SHG groups to be formed Federation of Women's SHGs to be formed Trainings to be conducted for preparation of woolen products from sheep and goats	Enhanced capacities of leaders of women's group in taking initiatives to solve problems at different levels. Improved access to credit for livelihood purposes Increased household income	Position of women in household, community, society (politically, socially and economically) as perceived by women and community at large. Performance enhancement of SHGs in terms of participation, decision-making, leadership and fund management. Equality and equity in gender relations at home (decision making, expenditure, children's education, health)

The adoption of soil and water management practices, renovation of village ponds and plantations not only improve productivity but also improve village environment. The investments made in water resources development would ease shortage of water both for domestic use and livestock and also make available water for supplemental irrigation.

The introduction of improved production technologies would stabilize crop production, save crops from adverse impacts of droughts and raise income level of farmers. The increased fodder availability and animal health care, the milk production would increase. There would be increased cash flows from subsidiary occupations. The increased awareness, operations through SHGs and easy availability of finance would make the communities more vibrant and enterprising.