

WEST BENGAL :ACCELERATED DEVELOPMENT
OF MINOR IRRIGATION PROJECT

PROJECT IMPLEMENTATION PLAN

16 JANUARY 2015

DEPARTMENT OF WATER RESOURCES INVESTIGATION AND
DEVELOPMENT
GOVERNMENT OF WEST BENGAL

LIST OF ABBREVIATIONS

CAS	Country Assistance Strategy
DLIC	District Level Implementation Committee
DPMU	District Project Management Unit
DPR	Detailed Project Report
DTW	Deep Tube Well
DWRID	Department of Water Resource Investigations and Development
EA	Environmental Assessment
EE	Executive Engineer
EiC	Engineer- in- Chief
EMF	Environmental management
EMP	Environmental Management Plan
FCA	Fisher's Community Association
FIG	Farmer Interest Group
FY	Fiscal Year
FM	Financial Management
GAAP	Governance and Accountability Action Plan
GoI	Government of India
GoWB	Government of West Bengal
IA	Implementing Agency
IBRD	International Bank for Reconstruction and Development
ICB	International Competitive Bidding
ICR	Implementation Completion Report
IDA	International Development Association
IFR	Interim Financial Reports
LA	Loan Agreement
LDP	Livelihood Development Plan
LDTW	Light Duty Deep Tube Well
MDTW	Medium Duty Deep Tube Well
MIS	Management Information System
ML	Monitoring & Learning
M&E	Monitoring & Evaluation
MLE	Monitoring, Learning and Evaluation
NCB	National Competitive Bidding
MOM	Management, operation, and Maintenance
MT	Metric Ton
PAP	Project Affected Person
PD	Project Director
PFMA	Public Financial Management and Accountability
PIM	Participatory Irrigation Management
PIP	Project Implementation Plan
PMU	Project Management Unit

PSC	Project Steering Committee
QA&A	Quality Audit & Assurance
RAP	Resettlement Action Plan
RLI	River Lift Irrigation
RPF	Resettlement Policy Framework
SA	Social Assessment
SDMP	Scheme Development and Management Plan
SBD	Standard Bidding Document
SE	Superintending Engineer
SFAA	State Financial Accountability Assessment
SFMIS	Surface Flow Minor Irrigation Scheme
SO	Support Organization
SPMU	State Project Management Unit
STW	Shallow Tube Well
ToR	Terms of Reference
WBADMI	West Bengal Accelerated Development of Minor Irrigation Project
WUA	Water User Association

WBADMI PROJECT
Project Implementation Plan
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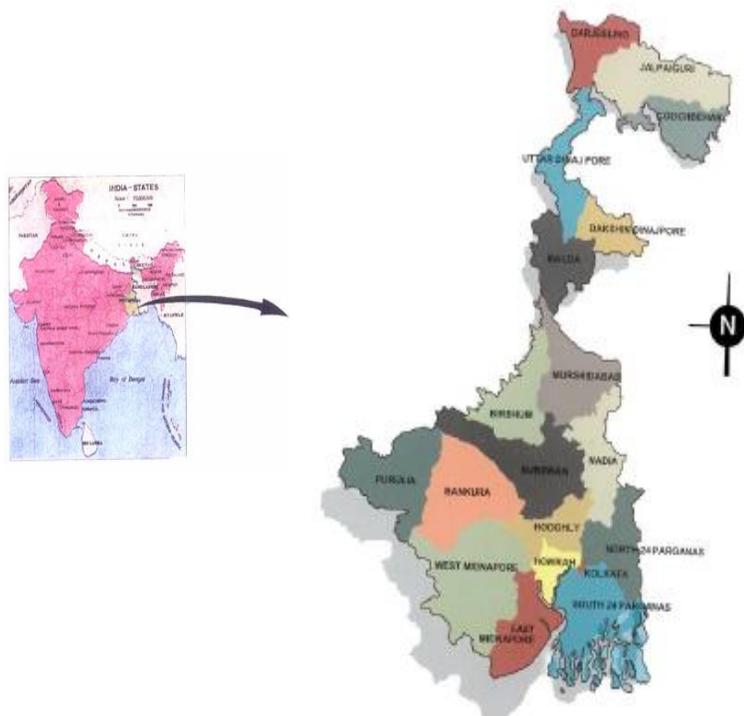
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CHAPTER-01 PROJECT BACKGROUND

West Bengal a Brief Profile

1. West Bengal, one of the eastern states of Indian Union covers a geographical area of 86,849 km², (about 3% of the geographical area of India) and inhabited by 91.34 million people¹ (8% of the total population of India). The state is stretching from the Himalayas in the north to the Bay of Bengal in the south. The State is bound in the north by the countries of Nepal and Bhutan and the State of Sikkim. On the East are the State of Assam and the International border with Bangladesh. On the South-West is the State of Orissa and on the West States of Jharkhand and Bihar. The State is divided into 20 districts including Kolkata. There are 66 sub-districts, 341 development blocks, 3239 Gram Panchayat and 40,782 villages. The map of West Bengal is shown in Figure -1.1.

Figure -1.1 Map of West Bengal



2. **Demographically**, the state has a rural population of 62.2 million which account for 68% of the total population of the state. Who are directly or indirectly dependent upon agriculture? Agriculture employs about 57% of the total workforce of the State. The state has got highest density of population in the country at 1029 per sq.km. The overall literacy percentage is 77.08 with male literacy at 82.67 % and female literacy at 71.16 %. The sex ratio is 947 females, 2000 males.

3. The **Physiography** of West Bengal is divided into four major geographical regions - the Chotonagpur plateau region in its northwestern parts, the Himalaya mountain region, the lower

¹ According to 2011 Census

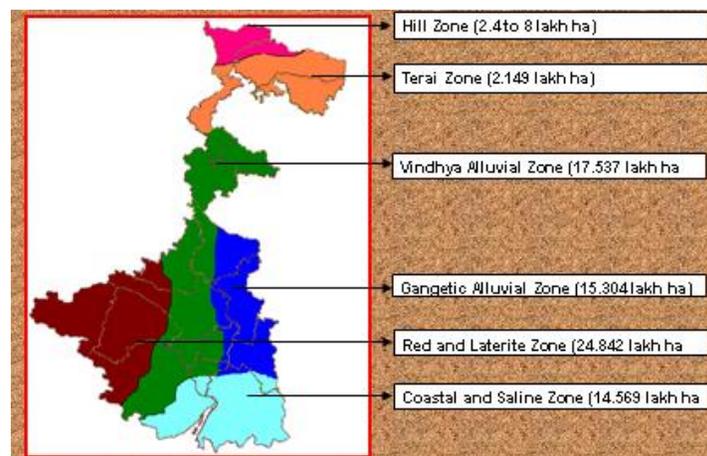
Gangetic plain region and the coastal belt. Ganga, Bhagirathi, Mayurakshi, Damodar, Kangsabati, Teesta, Torsha, Jaldhaka, Mahananda, Subarnarekha and Rupnarayan are the main rivers of the State. There are forest areas in the southern part (Suderban), northern Tarai belt and in the Chotonagpur plateau area of the state.

4. The **climate** of West Bengal varies from moist-tropical in the south-east to dry tropical in the south west and from sub-tropical to temperate in the mountains in the north. The climate is cooler in the northern mountains than in the southern plains. The temperature range is from well below freezing point in the hills during the winter to about 45°C in southern parts during the summer. The winter months are generally pleasant in the southern part of the state. Snowfall is limited to the Himalayan regions. The monsoon season lasts from June to September and brings heavy rain. The monsoon brings respite to the parched plains and means a bountiful harvest but they often cause floods and landslides. The winter months are from October to February. The average annual rainfall in the State is 1750 mm with considerable variations among districts ranging between 1234 mm in Birbhum to 4136 in Jalpaiguri. The map of West Bengal showing the climatic details is given in **Attachment - 1.1**.

Agro-Climatic Zoning of the State

5. Based on rainfall, temperature, soil types and topography of land and agricultural feasibility, West Bengal has been broadly divided into six agro-climatic zones: (i) Northern Hill Zone; (ii) Terai - Teesta Alluvial Zone; (iii) Gangetic Alluvial Zone; (iv) Vindhyan Alluvial Zone; (v) Coastal Saline Zone; and (vi) Undulating Red and Lateritic Zone. A map showing the Geographic dispersion of agro-climatic zones of West Bengal is given in **Figure -1.2**.

Figure - 1.2 Agro Climatic Zones of West Bengal



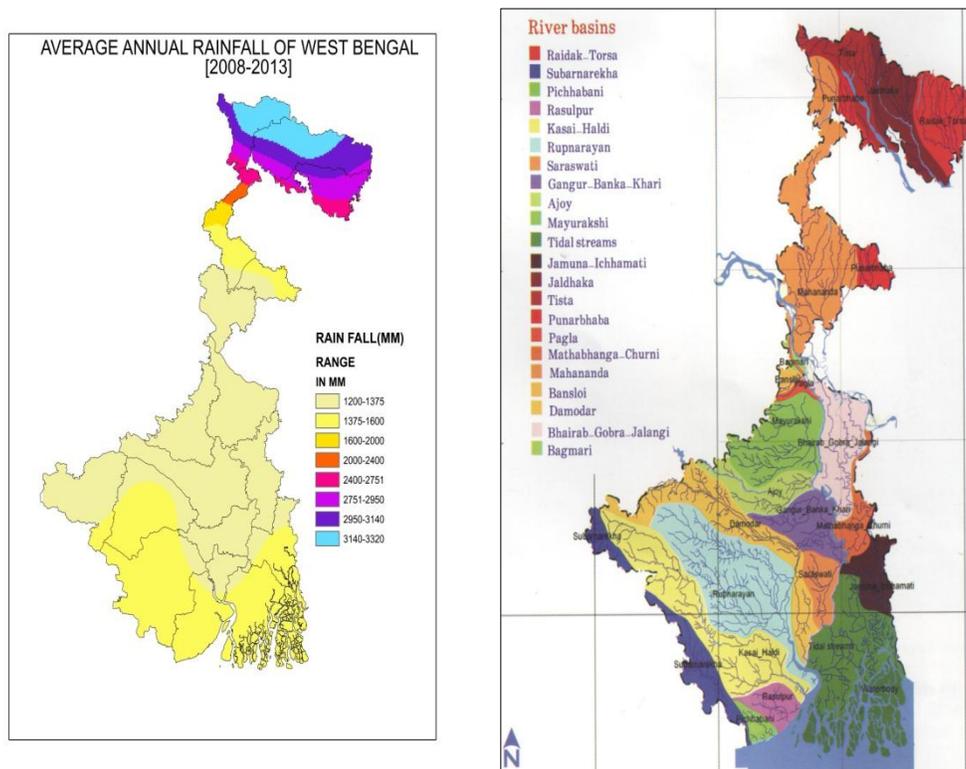
6. The climate soil type and main crops grown/vegetation in different agro-climatic zones are summarized in **Attachment - 1.2**. The physiographic map of West Bengal is given in **Attachment - 1.3**.

Status of Water Resources

7. The **Surface Water** availability in the state is assessed at 132.9² BCM and utilizable Surface Water resources is 53.10 BCM spread over the Ganga (catchment area of 74,439 sq. km.), Brahmaputra (11,860 sq.km.) and Subarnarekha (2,160 sq. km.) The main Basins of Ganga and Brahmaputra constitute two of the biggest rivers in the sub-continent. Drainage in the northern most part of the state passes mostly into Brahmaputra and those of the central, southern and south western parts of the state passes the Ganga Basin. The Basins are further divided into 25 sub basins.

8. The rain fall details and coverage of river basins across the state are given in **Figure – 1.3**.

Figure – 1.3 Surface Water (Rain fall and River Basins) Availability of West Bengal



9. The district wise coverage, water availability and water resource utilization of surface water are given in **Attachment – 1.4**. The drainage map of the state is given in **Attachment – 1.5**.

10. The total **Ground Water** recharge in the state is 3,036 Thousand ham and the net Ground Water availability is 2,746 Thousand ham³. The Ground Water Resource potential, utilization and net availability are summarized in **Table – 1.1**. As seen from water balance figures in Table – 1 there is still 1,538 thousand ham of Ground Water available for irrigation development in the state.

Table – 1.1. Ground Water Potential Utilization and Net Availability in West Bengal as in 2004

² A assessed by a Committee of Experts in Irrigation, 1987

³ Joint estimation by State Water Investigation Directorate (SWID) with Central Ground Water Board as for 2004. Only partial assessment completed (269 out of 341 blocks) in 2009.

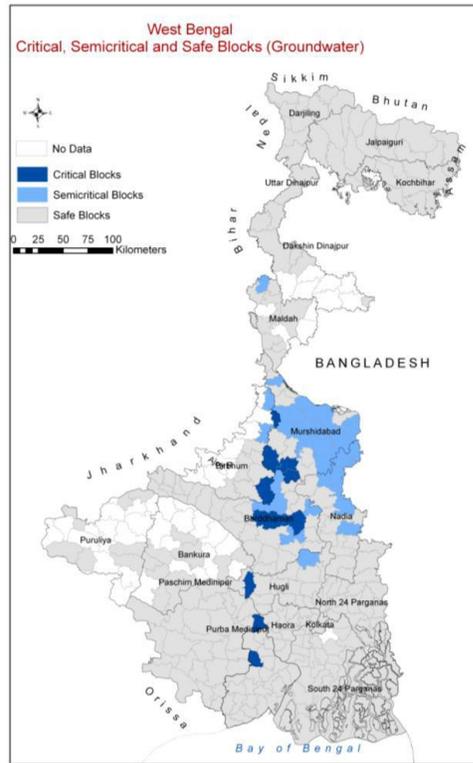
Description	Quantity ('000 ham)
Recharge from rainfall during monsoon season	1787
Recharge from other sources during monsoon season	218
Recharge from rainfall during non-monsoon season	544
Recharge from other sources during non-monsoon season	486
Total Annual Ground Water Recharge	3036
Natural Discharge during non-monsoon season	290
Net Annual Ground Water Availability	2746
Gross ground water draft for all uses (as on March, 2004)	1165
i. Current annual ground water draft for irrigation	1084
ii. Current annual ground water draft for domestic and industrial uses	81
Annual allocation of ground water for domestic and industrial water supply for next 25 years from April 2004	124
Net ground water availability for 'future irrigation use' beyond March 2004.	1538
Stage of ground water development (%)	42.42(%)

Source: SWID

11. The district wise analysis of net Ground Water resource potential, net availability utilization and status both from confined and unconfined aquifers shows that the status of groundwater development varies from as low as 4.4% in Jalpaiguri and 5.3% in Darjeeling to as high as 88.5% in Murshidabad and Nadia district. However, as many as eleven districts show groundwater development status below 50%. Hence, while groundwater development is fairly high in some of the districts in the State, there are still many districts, where ground water can be withdrawn without any deleterious effect on the water table, particularly in the northern districts of the State, where the stage of development is low and there is large scope of ground water withdrawal. The district wise details are summarized in **Attachment - 1.7**. The hydrological map of West Bengal is given in **Attachment - 1.8**.

12. In addition, the partial estimate done in 2009 completed for 269 blocks, shows that 231 blocks of have been categorized as "Safe", 37 blocks as "Semi-Critical" and 1 block as "Critical". 72 blocks are yet to be assessed. These include 59 coastal blocks in North & South 24 Parganas, Howrah and East Medinipur, 8 mountainous blocks of Darjeeling and 5 sub-mountainous blocks in Jalpaiguri district. The ground water status of the state is given in **Figure - 1.4**.

Figure - 1.4 Ground Water Status of West Bengal

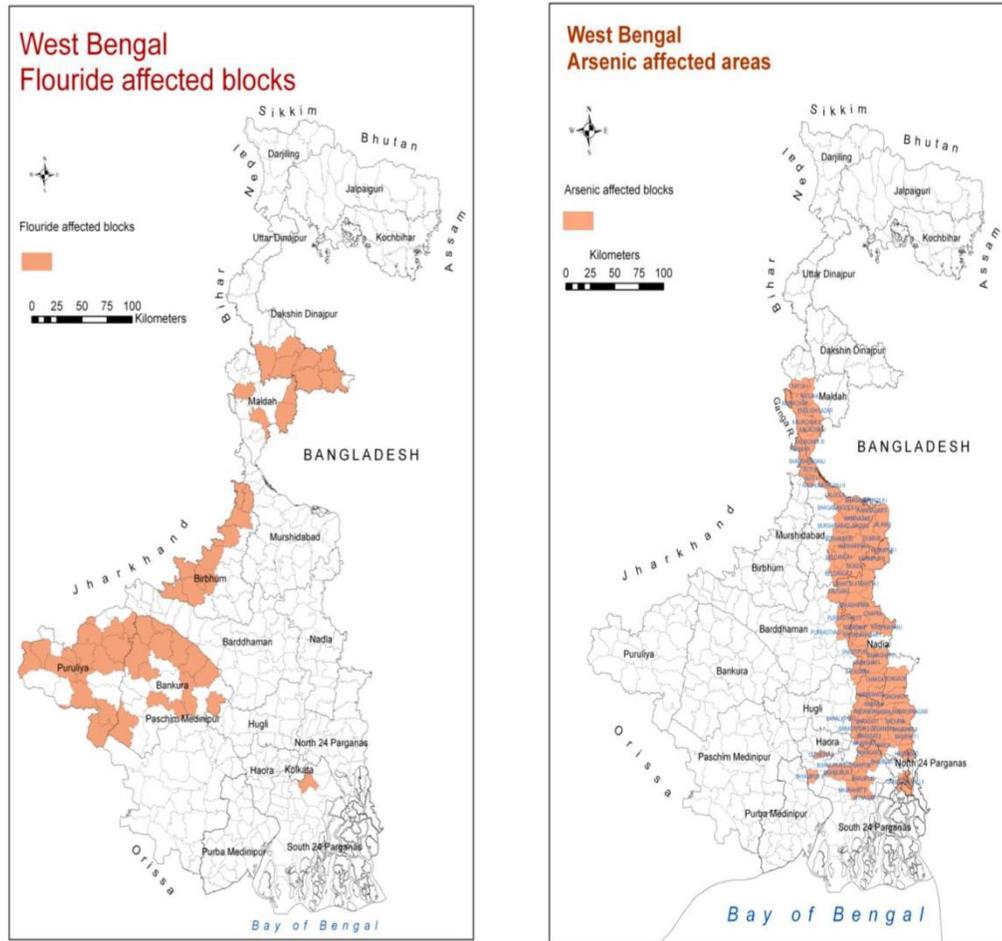


The Issue of Ground Water Quality

13. Water quality is a matter of concern in the state. There are already number of pockets were surface water to some extent and ground water aquifers in general have been contaminated by various natural and artificial process.

14. The Ground Water quality reveals occurrence of toxic levels of Arsenic in 81 blocks and fluoride in 48 blocks. Construction of Ground Water structures is prohibited in these blocks as a preventive measure. The Ground Water quality map of West Bengal showing fluoride and arsenic affected areas are shown in **Figure - 1.5** and the overall picture is given in **Attachment - 1.9**.

Figure – 1.5 Fluoride and Arsenic Affected Areas



Preferential Policy on Surface Water

15. It has been the policy of the state Government to restrict the use of ground water to only 44.49% of the proposed area and residual 55.51% of the additional coverage has been plan to be developed using surface water resources.

Characteristics of Agriculture Sector

16. West Bengal is predominantly an agrarian State with a large rural base, both in terms of demography and land resource use. Agriculture contributes about 23.30% of the Gross State Domestic Product (GSDP) in 2011-12. Agriculture is the primary occupation of 62.7% of the rural work force in the state and 70% of the rural population depends on agriculture for their livelihood. Agriculture growth rate over the past two decades was on an average around 3% per annum.

17. **Land Holding Pattern:** As per the agricultural census 2000-01 there are 6,789,991 operational holdings in the state and the details on size class are given in **Table – 1.2**.

Table - 1.2. Details of Operational Holdings

Size Class	No. of Operational Holdings	Area in ha.
Below 1.00 ha.	5,462,089 (80.4%)	2,758,843 (49.7%)
1.00 to 2.00 ha	1,009,328 (40.9%)	1,606,688 (29.1%)
2.00 to 4.00 ha	282,992 (4.2%)	783,773 (14.1%)
Above 4.00 ha	4,282 (0.5%)	397,274 (7.1)

18. About 90% of the holdings are in the hands of small and marginal farmers who till 68% of the total cultivated area. The average per capita land holding is less than 1 ha. (0.64 ha.). There are about 30 lakh landless families who earned the right to cultivate the grow crops their own land after enactment of Operation Barga System.

19. The net area sown is about 5.3 million ha which is about 61% of the geographical area of the state, compared to the National average of 46%. The cropping intensity is 182% with gross cropped area exceeding 9.6 million ha. 5.42 million Ha (56%) is the total irrigated area The land use statistics is given in **Table - 2** and the district wise details are given in **Attachment - 1.10** and the land use and cropping map of the state is given in **Attachment - 1.11**.

Table - 1.3. West Bengal Land Use Statistics (2010-11)

Land Use Category	Area (ha)	Area (%)
Geographical Area	8,684,951	100.00
Forest Area	1,174,970	13.53
Area Under Non-agricultural Use	1,728,470	19.90
Barren and Un-cultivable Land	24,851	0.29
Permanent Pasture and Other Grazing Land	5,540	0.06
Land Under Misc. Tree Crops and Groves	63,695	0.73
Culturable Waste Land	42,590	0.49
Fallow Land Other Than Current Fallow	29,590	0.34
Current Fallow	319,240	3.68
Net Area Sown	5,296,005	60.98
Gross Cropped Area	9,634,535	
Cropping Intensity		182%
Irrigation Potential under Major & Medium Irrigation	1,596,000	
Irrigation Potential under Minor Irrigation	3,825,770	
Total Irrigated Area	5,421,770	56.3%

Source: Department of Agriculture, DWRID & Irrigation & Waterways Directorate, GoWB

20. The state cultivates a range of crops of both food grain, non-food grain and other crops ranging from cereals, pulses, oilseeds, fibers, vegetables and fruits, tobacco, tea and sugarcane. Rice occupies over two thirds of the total cultivated area across the cropping seasons and other crops that occupy more than 5% of the total cultivated area are mustard, Jute and potato. The area production and yield of principal crops are summarized in **Table - 1.4**.

Table - 1.4. Area Production and Yield of Principal Crops in West Bengal

Sl. No.	Crops	2010-11				
		Area ('000 ha)	%age of Total Crop Area	Production ('000 Tons)	%age of Total Crop Production	Yield (Ton/ha)
Food Grain: Cereals						
1.	Rice	4,944.1	67.16	13389.6	5.02	2.7
2.	Wheat	316.8	4.30	874.4	0.33	2.8
3.	Barley	2.0	0.03	3.0	0.00	1.5
4.	Maize	88.6	1.20	352.3	0.13	4.0
5.	Other Cereals	13.4	0.18	15.1	0.01	1.1
	Total Cereals	5,364.9	72.87	14634.3	5.49	2.7
Food Grain: Pulses						
6.	Gram	22.1	0.30	23.7	0.01	1.1
7.	Tur (Arhar)	1.6	0.02	2.2	0.00	1.4
8.	Mung	17.6	0.24	12.2	0.00	0.7
9.	Masur	57.4	0.78	53.4	0.02	0.9
10.	Khesari	25.8	0.35	30.2	0.01	1.2
11.	Other Pulses	72.6	0.99	54.9	0.02	0.8
	Total Pulses	197.1	2.68	176.6	0.07	0.9
	Total Food Grains	5,562.0	75.55	14810.9	5.56	2.7
Non-Food Grains: Oilseeds						
12.	Rapeseed/ Mustard	410.8	5.58	419.6	0.16	1.0
13.	Linseed	4.1	0.06	1.4	0.00	0.3
14.	Sesame(Til)	182.8	2.48	168.6	0.06	0.9
15.	Sunflower	6.6	0.09	7.4	0.00	1.1
16.	Other Oilseeds	66.5	0.90	106.3	0.04	1.6
	Total Oilseeds	670.8	9.11	703.3	0.26	1.0
Non-Food Grains: Fibers						
17.	Jute	568.5	7.72	8137.5	3.05	14.3
18.	Mesta	6.3	0.09	76.8	0.03	12.2
19.	Other Fibers	1.3	0.02	5.2	0.00	4.0
	Total Fibers	576.1	7.83	8219.5	3.08	14.3
Other Crops						
20.	Sugarcane	15	0.20	1134.1	0.43	75.6
21.	Potato	408.8	5.55	13421.0	5.03	32.8
22.	Tobacco	14.3	0.19	21.3	0.01	1.5
23.	Tea	115.1	1.56	228305.0	85.63	1,983.5
	Total Other Crops	553.2	7.51	242881.4	91.10	
	Total Crops	7,362.1	100.00	266615.1	100.00	

Source: Economic Review 2011-12, GoWB

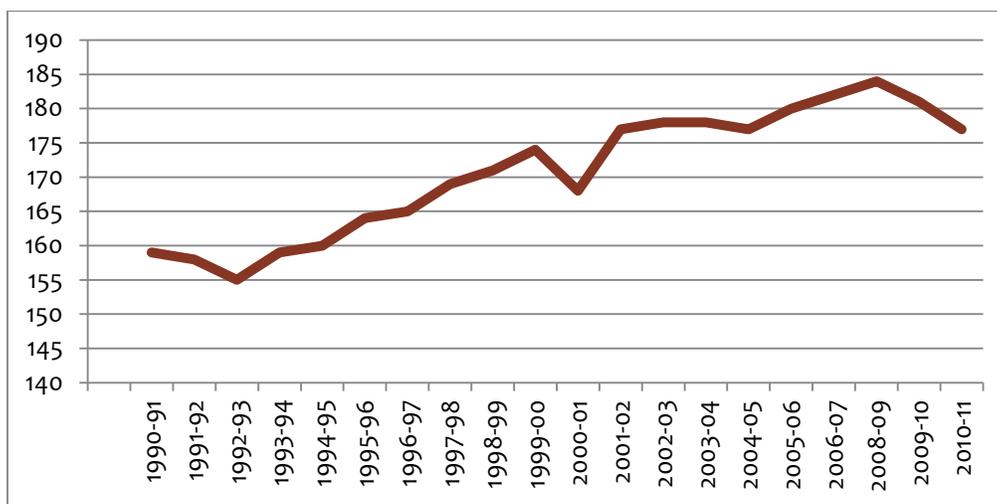
21. The West Bengal has the highest population density (1029 per sq km) in the country. Consequently, the per capita cultivable land holding is under a steady process of fragmentation. Increase in the price of agricultural inputs, fragmentation of land holding, uncertain prices of perishable agricultural produces, inadequate market infrastructure, distress sale of produce by small and marginal farmers etc, are some of the problems being confronted by the farmers of the state. Though the productivity of many crops is better compared to national average, but requires

substantial improvement when compared to the best figures in India. Similarly, due to lack of proper marketing and processing facilities and for high price of feeds and fodder for farm animal, management of the traditional family mixed farming system in the rural areas has become more difficult than ever before.

Cropping Intensity

22. The cropping intensity of the state present a not encouraging trend over 1990-91 to 2010-11 which is presented in **Figure - 1.6**.

Figure - 1.6 Cropping Intensity (%) in West Bengal (1990-1991 to 2010-11)



23. About 20 lakh ha. are single cropped areas with only Kharif crop which is about 37% of the cropped area in the state. The district wise cropping intensity and district wise distribution of Kharif cropped areas are shown in **Figure - 1.7 and 1.8** respectively.

Figure - 1.7 District Wise Cropping intensity (%) in 2006-07

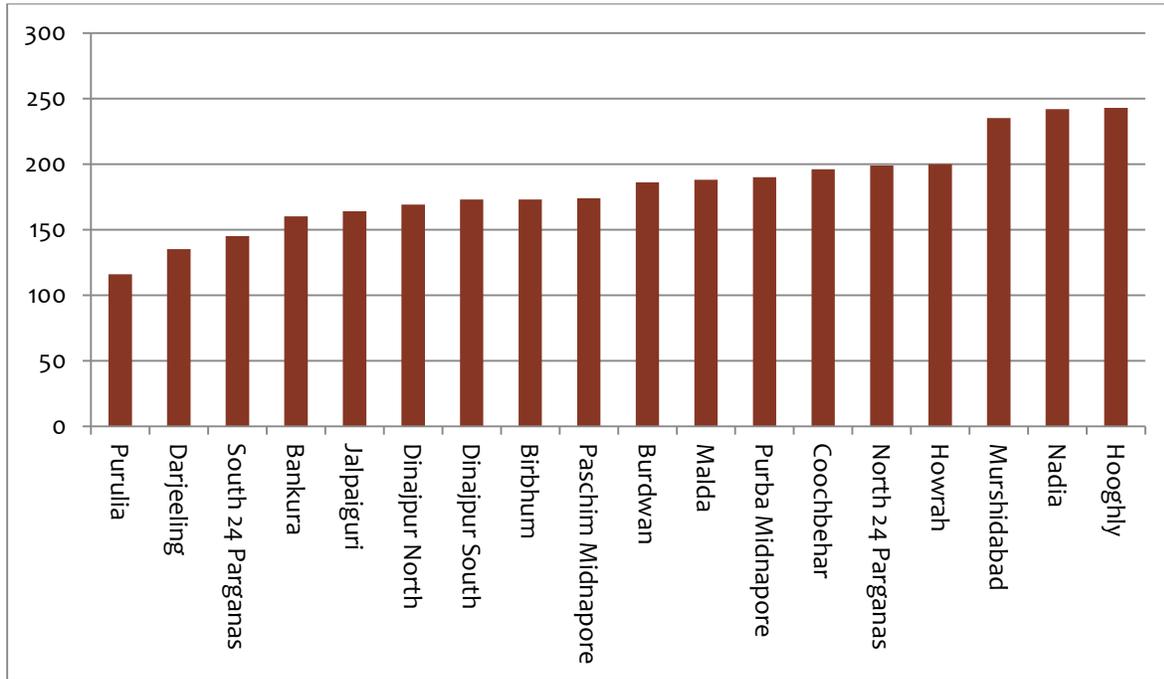
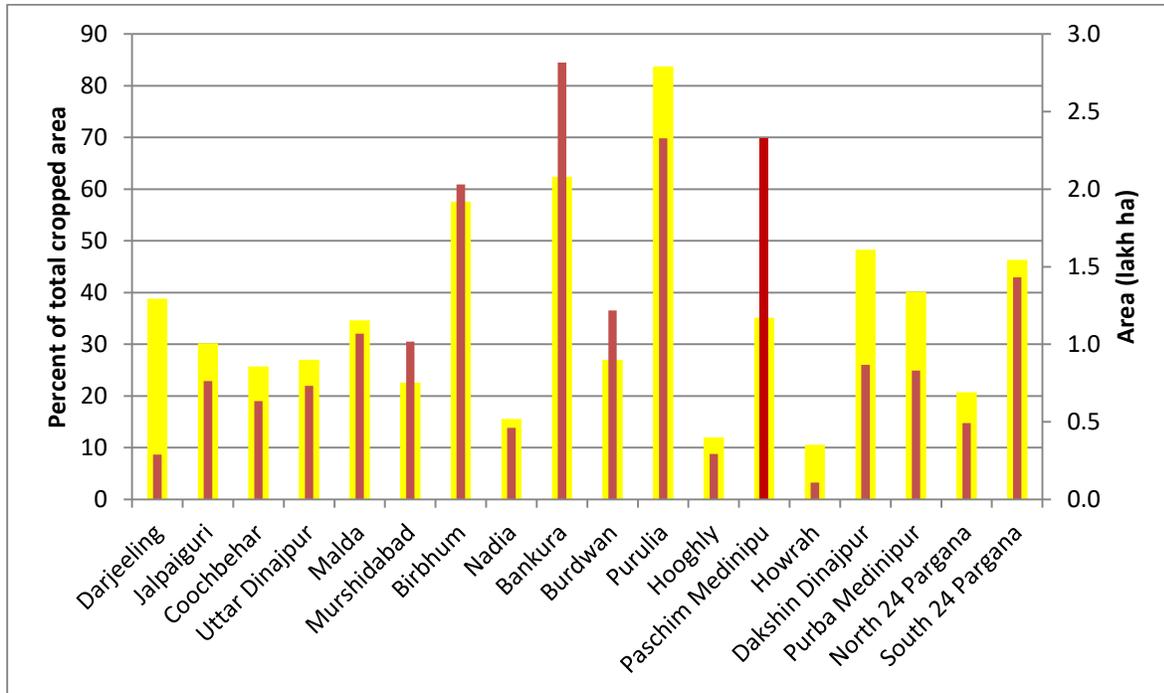


Figure - 1.8 District Wise Distribution of only Kharif Cropped Area



24. As seen from the cropping intensity analysis, status of development of water resources, especially surface water, it is evident that there are 5 districts in the state having cropping intensity close to or less than 150%. The distribution of area above 1 lakh ha. of only Kharif crop is falling in 10 districts.

Irrigation Status

25. The total irrigation potential created in West Bengal up to 2009-10 is 5.42 million ha, out of which 3.82 million ha is under ground water and surface water minor irrigation and 1.59 million ha under major and medium irrigation. The irrigation potential created and utilized for the year 2009-10 in the State is given in **Table - 1.5**.

Table - 1.5. Total Irrigation Potential Creation in West Bengal

Source	Type of Irrigation Scheme	Ultimate Irrigation Potential Estimated (million ha)	Estimated IP Created 2009-10 (million ha)	Estimated IP Utilized 2009-10 (million ha)	% age Utilization to Creation
SW + GW	Minor Irrigation	4.62	3.82 ⁴	3.32	86.9%
SW	Major & Medium	2.3	1.60	1.12	70%
SW + GW	Total MMI + MI	6.92	5.42	4.44	81.9%

Source: CWC, GoI, DWRID & Irrigation & Waterways Directorate GoWB

26. It is worth mentioning that in 2009 - 10 irrigation coverage in terms of IP utilization was only 46.1% of the gross cropped area while in terms of IP created irrigation coverage was about 56%. The state agriculture continues to be dependent on Monsoon for cultivation in many districts. In about 5 districts 70% of net areas sown are single cropped areas. The district wise cultivable area and net irrigated area through different sources are given in **Attachment - 1.11**.

Minor Irrigation

27. At present, 208 million ha. is under MI sector in the state. The minor irrigation sector is dominant over major and medium irrigation with an untapped potential to harness another 1.5 million ha under it. The district wise status of existing ground water and surface water minor irrigation development is given in **Attachment - 1.12**. Though irrigation schemes having Culturable Command Area (CCA) up to 2000 ha. are classified under MI sector, following the GOWB policy to promote smaller schemes, Department of Water Resources Investigation and Development (DWRID) has been setting up smaller schemes having CCA up to 200 ha.

Operation and Maintenance of MI Schemes

28. Except for some pilot projects in the 1980s, all minor irrigation schemes developed until 1990 were and are still maintained by the government through pump operators employed by the DWRID. The pump operators operate and maintain the MI scheme and provide irrigation service to the farmers as per need. The farmers pay an irrigation fee to the government calculated on the basis of the type of crop grown and area cropped in ha for a cropping season. The irrigation fee is deposited by the farmer in the Block headquarters in the Block Development Officers office. Currently, DWRID

⁴ The 4th MI Census in 2006-07 reported the IP created under minor irrigation schemes as 3.62 million ha. However, the Economic Survey, 2011-12 reported the IP created under MI in 2009-10 as 3.82 million ha.

is responsible for the operational maintenance of 9781 MI schemes out of which about 6417 are Ground Water based and remaining 3364 are river lift irrigation schemes operated by diesel or electricity. Out of the MI schemes operated and maintained by DWRID about 2351 schemes have become permanently defunct and 836 schemes have become temporarily broken down. The district wise details of MI Schemes operated by DWRID are given in **Attachment – 1.13**.

Community Maintenance and Operation of MI Schemes

29. MI schemes that were developed by DWRID after 1990 have been transferred for operation and management to the users under a MI Scheme Management Committee registered as a Cooperative Society under the State Cooperative Societies Act (and now under the State Societies Registration Act for the ADMI project). The primary farmers' organization for participatory management of minor irrigation schemes in the State is thus the MI Scheme Management Committee. The procedure for MI Scheme Management Committee formation, the procedure for handover of MI scheme and the post hand over activities are notified by GoWB in the GO No. 1710-MI/2R-3)2004 dated 16th August 2011. As per the GO, when a MI schemes is ready to supply irrigation the concerned Assistant Engineer (AE) of DWRID facilitates the formation of a MI Scheme Management Committee among the beneficiary farmers and hands over the scheme to it. The MI Scheme Management Committee is now responsible for management, operation, and maintenance, as well as mobilizing future capital investments from the beneficiary farmers. The farmer's body is expected to prepare cropping program and regulate use of irrigation water. The Committee has the right to charge irrigation service fee from the beneficiary farmers that it can keep and use for the operation and maintenance of the MI scheme. The irrigation fee needs to cover all operation and maintenance cost of the MI scheme including the full fuel charges, whether diesel or electric as the government does not provide any funds for operation and maintenance of these MI scheme. After the handing over, DWRID staff may provide technical advice, training to the MI Scheme Management Committee, and are barred from interfering in the day today management of the scheme. As on March 2013, the total number of MI schemes handed over to MI schemes management committees is 42,127 out of which 30,824 are ground water schemes and 11,303 are surface water schemes. The district wise details of MI schemes operated and maintained by scheme management committee are given in **Attachment – 1.14**. The GO No. 1710-MI/2R-3)2004 dated 16th August 2011 is reproduced as **Attachment – 1.15**.

Lessons from World Bank supported Minor Irrigation Project 1985 – 94

30. The West Bengal Minor Irrigation Project (WBMIP – Project ID: P 105311) was to complement ongoing groundwater development in the private sector. With respect to surface water development, the project was to provide electrical Energisation of pumps and buried pipe distribution systems for selected existing river lift irrigation schemes (RLIs) with the objective of improving their operation and management capabilities. A further objective was institution building to ensure that project works were effectively implemented and that completed works were properly operated and maintained in order to sustain predicted benefit generation.

31. The overall responsibility for project implementation was with the Secretary, Department of Minor Irrigation with the Agricultural Engineering Department as the main implementing agency. The West Bengal State Electricity Board was responsible for the construction and O&M of power transmission and transformation under the project. The Department of Agriculture was responsible for the agricultural extension component and for the agricultural development activities after the commissioning of minor irrigation works. The West Bengal State Water Investigation Directorate was in charge of assessing surface and groundwater resources and for technical clearance of any groundwater development. Finally, the Department of Panchayats through village Panchayats was involved in the project as management agents for the Agricultural Engineering Department. Though

the total project cost at appraisal was estimated at US\$ 141.8 million (equivalent to Rs. 1,560 million) out of which IDA credit constituted of SDR 101 million (equivalent to US\$ 99.0 million) and despite the extension of the project period by 3 years, the credit amount was reduced to SDR 46.4 million, of which only SDR 40.2 million was finally disbursed.

32. In spite of slower implementation pace and targets under achieved, the project was successful in terms of achieving higher irrigation intensities and yields than initially anticipated; entrusting O&M to Panchayats; and establishing economically viable tube well irrigation systems. Other achievements included:

- The development of incremental net irrigated area at full development of 59,500 ha (43% of the 139,000 ha estimated at appraisal); and
- Yearly estimated incremental food grain production at full development of 177,000 tons (48% of SAR estimates) which was primarily Boro paddy at 131,000 tons (74% of total);
- Yearly estimated incremental potato/vegetables production at full development of 335,000 tons (66% of SAR estimate);
- Yearly estimated incremental mustard production at full development of 7,000 tons; and
- Yearly estimated incremental jute and sesame production at full development of 5,000 tons and 900 tons respectively

33. An unexpected achievement of the project was that it developed the legal and procedural framework for the complete handing over of irrigation wells to beneficiaries for O&M and that it succeeded in getting 1,800 tube wells handed over within a time frame of only about two years. The process was continuing after project closure and further successes are envisaged.

34. **The key lessons⁵ documented from project implementation are:**

- **Site Selection:** GOWB's strategy to involve beneficiaries in the site selection and initial design process has had a positive impact.
- **Operation and Maintenance:** Beneficiaries involvement in Operation and Management was easier and excellent in the case of STWs and LDTWs the including cost recovery twice the normal government rates. In addition, Irrigation channel improvements including lining where undertaken without government assistance.
- **Operation and Maintenance Cost and Capital Recovery:** Though the water rate set by the state government was Rs. 5 per acre inch of water the actual costs ranged between Rs. 410 to Rs. 940 per year per acre depending upon the type of irrigation and a capital recovery cost varied between Rs. 1,220 to Rs. 2,410. The Project demonstrated that once efficient Irrigation facilities were established farmers became financially capable and were willing to pay economic water rates to fully recover O and M cause.
- **Sustainability of Schemes:** Better sustainability for the LTWs and LDTWs where achieved as they were fully managed by beneficiary committees. Technical and financial sustainability of these schemes were also ensured due to appropriate technology, correct sitting and spacing of the wells as well as recovery of O and M charges with enough savings for future repairs.
- **Monitoring and evaluation:** Monitoring including community monitoring for planning, construction supervision and performance of schemes were conspicuously absent and could be attributed as one of the main reasons for the under achievement of the project targets.

⁵ Based on findings from Project Completion Report 1995

- **Size and scope of Schemes:** The project has demonstrated that smaller tube wells with command areas of about 6 ha, benefitting some 15 to 20 farmers, are highly suited to localize O&M through Panchayats. Larger tube wells on the other hand require a higher degree of technical know-how and operational skill than can generally be found at Panchayats level. It also turned out to be more difficult to identify suitable contiguous command areas for 40 ha tube wells. Consequently, future tube well development in areas where small farmers prevail should aim at the smaller units, even against possibly higher investment expenditure per unit service area, since this may be more than compensated through the avoidance of new O&M liabilities to government.
- **Type of Schemes:** Given feasibility based on local hydrology and geomorphology surface water based MI structures are preferred to ground water based schemes.
- **Integrated Approach:** Installation and development of physical MI Infrastructure alone without integrating promotion of irrigated agriculture, horticulture and fisheries through strengthen extension services failed to deliver anticipated results.
- **Development of User Institutions:** Adequate attention need to be provided in mobilizing and developing Water Users Association; their involvement in water management, O&M and sustainable cost recovery; participatory planning and monitoring of project execution; and sustainability of the of the MI system through well designed training and capacity building programs are essential ingredients for success.

Justification for Project

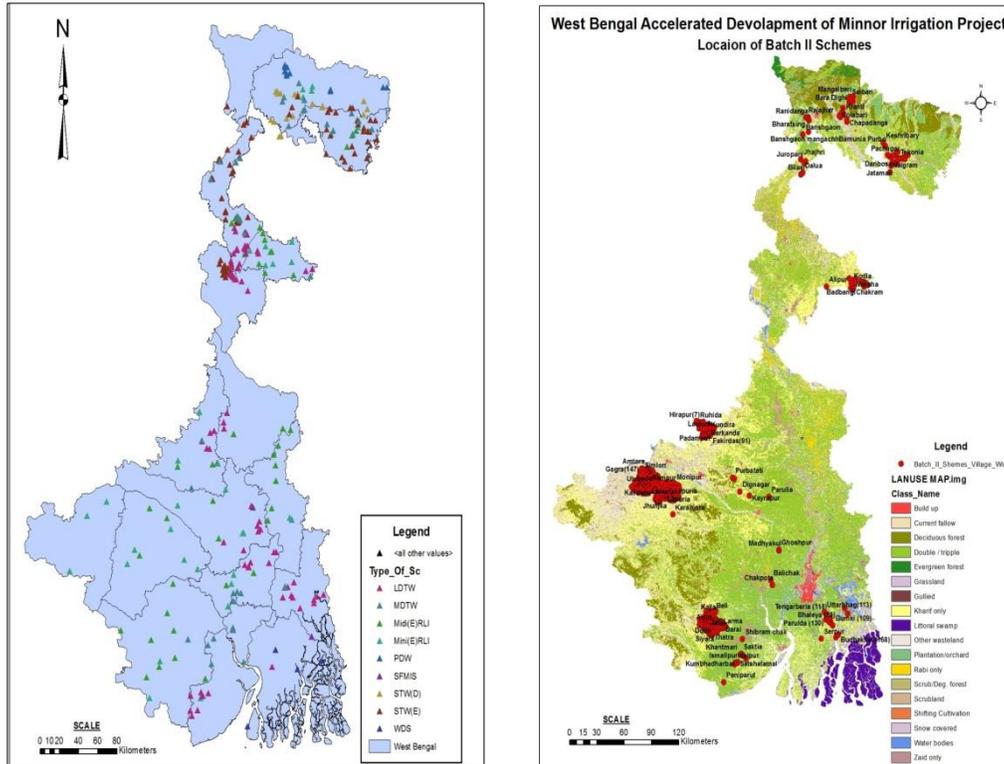
35. West Bengal being an agrarian state with diverse agro-climatic zones offers huge potential for improving production, productivity and crop diversification opportunities. The main drivers emerging from the forgoing discussions are increasing availability and efficiency of irrigation, water, availability of appropriate technology and other inputs in addition to empowering farmer organizations for better price realization of produce. The key justifications for the project are:

- **Untapped Potential:** At the state level there is still about 1,538 thousand ha of ground water available for development of irrigation potential. There are many districts where ground water can be drawn safely. In addition the utilizable surface water resource is 53.10 BCM.
- **Productivity Enhancement:** Differential productivity levels between irrigated and non-irrigated crops are more pronounced for grains and high value crops. 47% of the gross rice area in the state is still rain fed with substantially low productivity levels.
- **Improving Cropping Intensity:** Due to limitation in the land availability for agriculture, the scope for increasing area under crop cultivation is limited. The average cropping intensity is still lower at 182% with scope for enhancing only under availability of irrigation water.
- **Targeted Investment for Small and Marginal Farmers:** 97.7% of farm holdings are still held by small and marginal farmers whose capacity for private capital investment for irrigation development is still poor seriously restricting graduation from sustenance agriculture to commercial agriculture leading to economic empowerment.
- **Diversification of Crops:** Transition from sustenance to commercial agriculture requires introduction of crops and crop varieties for the market. Introducing high value crops and high yielding varieties calls for ensuring availability of inputs, technical facilitation as well as investments in small equipments and machinery.

Spatial Targeting of Project MI Schemes

36. The geographic dispersion of MI schemes under implementation in Batch – I and those proposed under Batch – II are given in **Figure – 1.9**.

Figure – 1.9 Geographic Dispersion of Project Schemes



CHAPTER – 02 PROJECT DESCRIPTION

Key Project Principles

37. The West Bengal Agriculture Development and Minor Irrigation Project aims to accelerate the development of MI Schemes that promote farmer involvement in selecting, designing, implementing and continued use and maintenance of small scale Irrigation Infra Structure coupled with support services for improvement of agriculture based livelihoods targeting on marginal and small farmers of the state. The focus of the program is a concerted effort to maximize the benefits of irrigation water through sustainable growth in agriculture leading to poverty reduction.

38. Hence the key principles underlining the project design are:

- A decentralized setting where the main beneficiaries play an active role in planning, managing, and sustaining project interventions;
- The scheme design and implementation activities meet technical quality and safety standards, and pay adequate attention to social, environmental, and fiduciary considerations; and
- Access to improved agricultural technologies and practices for agricultural producers is as important as improving access to water for improving agricultural production and farmer incomes.

Project Development Objectives

39. The project development objective is to enhance agricultural production of small and marginal farmers in the project area. This would be achieved through accelerated development of minor irrigation schemes, strengthening community-based irrigation management, operation and maintenance and support to agricultural development, including provision of agricultural services, encouraging crop diversification and use of new technologies, and creating income generating opportunities.

Key Outcome and Results Indicators

40. The key results indicators to measure the achievement of project objectives are:

- Operational Water Users Associations created and or strengthened. (measured in number)
- Number of Water Users provided with new/ improved irrigation and drainage services.
- Number of female water users provided with new/ improved irrigation and drainage services.
- Percentage of small and marginal farmers provided with new/ improved irrigation and drainage services.
- Percentage of tribal farmers provided with new/ improved irrigation and drainage services.
- Increase in yield of main agricultural crops – rice, oil seeds like mustard, sesame and vegetables like brinjal, tomato, cauli flower and onion. (measured in MT/ha);

Key Project Approaches and Strategies

41. In order to achieve increase the agriculture production and improve use of water resources the project will make use of following strategies:

- **Scientific targeting of project areas:** The Project areas will be selected through targeting

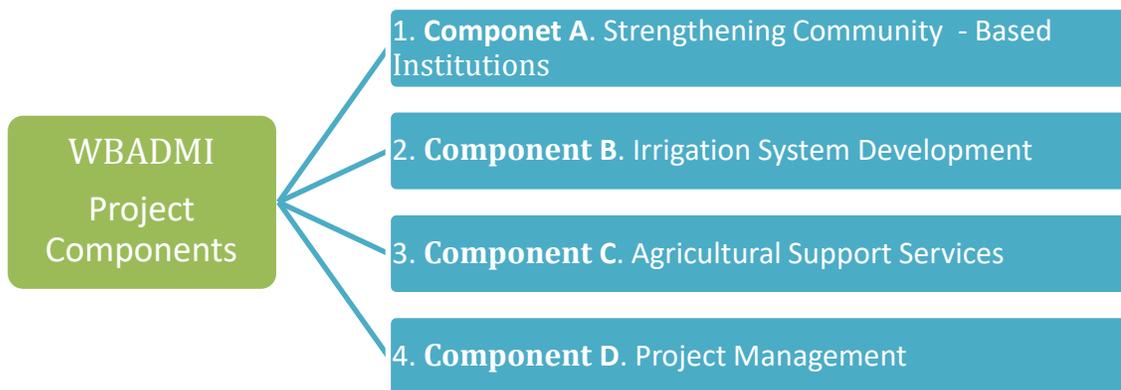
using multiple criteria: (i) Hydro-geological parameters to identify problem areas; (ii) Agro-climatic considerations of rain fed areas with low cropping intensity and areas with substantial concentration of small and marginal farmers.

- **Smaller schemes for easy management and better sustainability:** Micro and small hydraulic facilities primarily based on surface water with effective distribution system will be primarily promoted to help optimum use of water, minimizing losses during application, sustainable use of water resources, and ease in management and maintenance;
- **Farmer institution building for demand responsive planning, cost effective implementation and sustainable operation and maintenance:** Farmer Institutions of small and marginal farmers will be mobilized and strengthened as water users associations. The management and maintenance of Hydraulic Infra Structure will be vested with small and marginal farmers in the command area.
- **Commercializing agriculture for efficient water use:** In addition to supporting farmers in the command area of new schemes, target farmers benefiting from existing schemes will be supported with institutional strengthening and agriculture technology support activities. The livelihood focus of agriculture technology support is intended to transform sustenance agriculture to producing for the market, focusing more on high value crops, enterprise farming etc.
- **Farmer focused and coordinated involvement of line departments:** In order to provide single window services to farmers the involvement of Department of Agriculture, Department of Food Processing and Horticulture and Department of Fisheries with overall support from State Agricultural Universities will be harnessed to provide technology, advisory and training support to farmers;

Project Components

42. The project has four components around which project activities will be implemented and project resources channeled, as shown in **Figure – 2.1**.

Figure – 2.1: Overall Project Components



Component A. Strengthening Community – Based Institutions

43. The **objective** of the component is to mobilize and strengthen farmer institutions (WUA) to assume responsibilities for management operation and maintenance of minor irrigation schemes including enhancement of water use efficiency by adopting suitable agricultural technologies for production and post-harvest management.

44. The Main activities under the component are:

- Providing social and institutional facilitation support to farmers in the command areas to mobilize and form WUA;
- Providing organizational development assistance and facilitation for strengthening WUA to help them carry out the intended roles;
- Providing technical facilitation to WUA in identifying and prioritizing irrigation development needs and selection of appropriate technology for addressing the needs including the participatory preparation of Scheme Development and Management Plan;
- Providing technical and capacity building services to WUA in accessing and adopting agricultural technology packages;
- Building capacity of WUA in management operation and maintenance of minor irrigation infrastructure;
- Facilitate preparation of manuals for: (i) organization development of WUA including by laws; (ii) management and operation maintenance of irrigation infra-structure; and (iii) training manual etc.;
- Providing facilitation support to women farmers and ensuring their active participation in project activities;
- Providing capacity building support;
- Facilitating participatory monitoring learning and knowledge sharing activities within and among WUA; and
- Facilitating preparation and implementation of water use planning, production planning, marketing plans and produce etc.

45. The implementation arrangement consists of: (i) hiring and providing the services of a support Organization (SO) to carry out all mobilization and organization development activities including capacity building and assistance in plan preparations; and (ii) the state Project Management Unit (SPMU) and District Project Management Unit (DPMU) are equipped with specialists staff to batch stop SO services. It is anticipated that once the WUA is fully formed and capacity built, most of the project activities will be undertaken by the office bearers.

Component B. Irrigation System Development

46. The **objective** of the component is to improve availability of water for agriculture and fisheries by developing new minor surface and ground water irrigation schemes on areas that are currently cultivated under rain fed conditions.

47. The **main activities** under the component are:

- Providing facilitation support to WUA in preparing SDMP based on participatory need identification and technology choice;
- Providing technical assistance for designing of irrigation schemes and its approval by the WUA;
- Constructing the irrigation infrastructure as per the plans and utilizing community

- procurement methodologies wherever feasible;
- Providing technical assistance for community supervision and quality assurance of the construction activities;
- Building capacity of WUA in management operation and maintenance of schemes;
- Collecting water use fees and operating the irrigation facilities;
- Managing sustainable use of water resources by WUA through the introduction of water saving technologies and water quality monitoring programs; and
- Implementing pilot zone water harvesting.

48. The **implementation arrangement** consists of: (i) the technical guidelines, design standards, technical manuals and technical training programs will be done by the core staff deputed to the SPMU from the DWRID; (ii) the SO staff and DPMU technical staff will help participatory preparation of demand responsive SDMPs; and (iii) the DWRID technical staff at the district and regional level will provide technical assistance and backstopping support for implementation.

Component C. Agricultural Support Services

49. Provision of irrigation services increase demand for Technology Support Services in agriculture, horticulture and fisheries. The **objective** of the component is to enhance agriculture based rural livelihood by increasing production of agriculture, horticulture and fisheries. The component will help the line departments to focus and scale up their activities on a command area based approach and improve the income of farmers in the command area of MI systems established under the project. The component activities are expected to increase cropping intensity, diversification of cropping system and promote collective activities in input supply and marketing of produce. The component will have three sub components namely: (i) agriculture; (ii) horticulture; and (iii) fisheries.

50. The **main activities** carried out under the component are:

- Supporting Crop Production Plans and Irrigation Plans by Water Users Association;
- Demonstrations – of agronomic productivity interventions;
- Organizing Farmer Field Schools for wider adoption of demonstrated technologies;
- Community based investment for small scale equipments and implements;
- Community based seed production;
- Farmer capacity building and exposure visit;
- Capacity Building of implementing staff;
- Streamlining Farmer Advisory System through Para-Professionals and Project Program Promoters; and
- Promoting and Strengthening Farmer Producer Companies for value chain integration and market linkages.

51. The **implementation arrangement** for the component consists of: (i) Provision of specialist staff at SPMU and DPMU level for overall planning and monitoring implementation of the component; (ii) Identifying and promoting Community Service Providers /Para professionals from among farmers as village level extension workers; (iii) The project will also hire agriculture graduates as Project Program Promoters (PPP) at the sub divisional level as facilitators for agriculture support system; (iv) The support organization will also field one Agriculture Specialists; and (iv) The overall

monitoring and technical backstopping will be done by the agriculture, horticulture and fisheries departments through a state level and district level coordinator.

Component D. Project Management

52. The **objective** of the component is to provide enabling and facilitating support for the overall coordination planning, implementation and monitoring including learning sharing of the project at state, district and scheme level.

53. The **main activities** under project management are:

- Carrying out strategic communication at state and district level including advocacy and learning sharing including knowledge management;
- Bringing about coordination and orchestrated performance of SPMU and DPMU with DWRID, Department of Agriculture, Department of Food Processing Industries and Horticulture and Department of Fisheries;
- Preparing and disseminating implementation guidelines, manuals and training modules;
- Providing Human Resource Development for Project Implementation including staff capacity building, performance appraisal and performance based incentive system;
- Carrying out fiduciary management responsibilities including project accounting and procurement;
- Implementing social and environmental safe guard measures;
- Designing and establishing Project Management Information System;
- Setting up and implementing project monitoring evaluation and learning activities; and
- Documenting and disseminating project learning among wider development communities.

54. The **implementation arrangement** consists of: (i) Establishing an SPMU headed by a Project Director appointed by Government of West Bengal who is assisted by a core team of engineering and financial specialists from DWRID and a support team consisting of a multi-disciplinary team including institutional, monitoring etc. through a SPMU consultancy; (ii) The drawing and disbursement officer for the SPMU will be supported by Senior Divisional Accountant; (iii) Nodal Officers of the three line agencies will be provided by the government; and (iv) establishing a DPMU decentralizing project management function at the district level, headed by a dedicated Executive Engineer, assisted by engineering staff from DWRID and a support team through consultancy.

Project Scope

55. The project will be implemented in eighteen districts of the state. About 1600 minor irrigation schemes will be set up out of which about 700 will be minor surface flow irrigation systems having command area varying from 5 to 50 ha with an average expected CCA of 62.5 ha. The ground water irrigation schemes of about 900, will also be minor having command area of CCA 87.5 ha and shall consist of pump dug wells, shallow tube wells and light duty tube wells. The total area to be developed under the project is estimated to be 98,000 ha. Benefiting about 117,000 farm families. The map of West Bengal showing project districts is given in **Attachment – 2.1**.

Project Area Selection

56. **Focus Districts:** The current status of irrigation development and potential diversities existing in the project districts prompted the project to adopt a segmentation approach rather than 'one model fits for all'. The 19 project districts have been segmented into two broad categories:

- (i) The Focused Districts consisting of predominantly rain fed areas, low cropping intensity, low ground water potential and characterized by seasonal flowing rivers where it is proposed to introduce 70% of the project schemes. The five focused districts are Purulia, Bankura, Birbhum, West Midnapur and South 24 Paraganas.
- (ii) The remaining 13 districts with predominantly irrigated areas the project interventions will mainly focus on efficient water management through introduction of sprinkler/drip irrigation system and support to develop agri-business investments

57. Polygon/watershed Selection: In order to prevent inefficiency and to ensure success of the schemes, the implementation will be done in focused clusters/polygons/watershed in each district which may cover around 1-2 blocks at a time. The delineated project areas are call polygon. The polygon shall comprise of predominantly rain fed areas and preferably single Kharif crop only which has no source of irrigation. Once the implementation is complete in one polygon, the project will move to next polygon/watershed with the district.

58. Since the cropping practices vary with respect to rainfall pattern and other hydro-geological characteristics in the various regions of the state, the identification of rain fed areas (without any irrigation) in various regions of the state will be done using following procedures: Priority area (Western Region): Majority of rain fed crops are Single cropped Kharif area in this region. Therefore the priority will be given to single cropped Kharif area. The remote sensing based land use and field verification will be used as guideline to identify the polygons. The rain fed areas in Northern Region may have two crops including pre-Kharif crop and Kharif crops but without any irrigation source. These areas and practice will be verified by the field team while also supplementing with the latest remote sensing images. In the Southern region, the rain fed areas may have double cropped with a second crop grown using residual soil moisture but without any irrigation source. The project area will be selected upon the recommendations of the Department of Agriculture combined with reconnaissance survey by DPMU and using latest remote sensing images.

59. Village Selection: The villages in which the schemes will be proposed for selection shall fall within the polygon created including number of mini watersheds (10 sqkm-25sqkm) based on remote sensing based land use, site reconnaissance survey by DPMU, and social baseline (based on census information). Within the polygon the scheme shall be provided to rain fed areas only.

60. The actual area for scheme development are selected within the identified polygons using remote sensing and GIS based information. The specific selection will also include site verification for assessing water availability and considering water quality issues. This will prevent failure of schemes due to non-availability of seasonal streams or wrong physical location. The site selected shall form contiguous area in adjacent villages. A typical village should have a rain fed area of 80-100 ha however it may vary in small villages. While selecting the villages, priority shall be given to tribal dominated & backward villages. In the Villages under tribal development plan, the need is to ensure more than 60% beneficiaries belong to tribal community. At least 13% of the project fund will be used for sub projects in Tribal dominated area further within the polygon, the watershed project area is recommended to be taken on priority for convergence to ensure much better results. A buffer area of about 10% of the polygon will be permitted to help cover an entire village or to include beneficiaries from the same village partially falling outside the polygon.

61. Scheme Selection will also follow water shed approach to harness the maximum irrigation potential. Watershed approach need to be followed to harness the maximum irrigation potential before the actual site selection, preliminary selection of potential sites/ areas should be planned out

of remote sensing based water resource, cropping pattern, agricultural statistics data and field verification by support staff. The final selection would be done after receiving the mass petition from the villagers showing willingness to form WUA and carrying out operation and maintenance of their own and verification by the DPMU engineers and specialists both technically, socially and environmentally through Technical Feasibility Report (TFR). During final selection of schemes, SWID clearance will be necessary (for all kind of schemes) and it will be submitted along with the Technical Feasibility Report. In the villages under tribal development plan, the need is to ensure more than 60% beneficiaries are tribal.

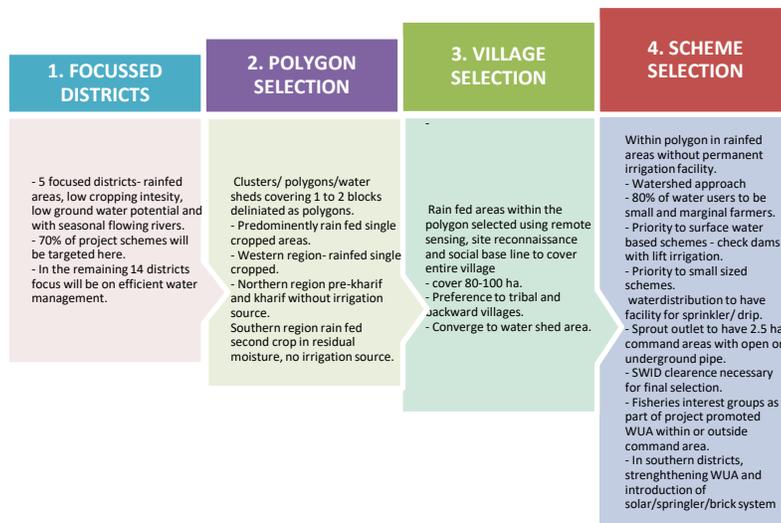
62. Areas without permanent irrigation facility alone are eligible. The selected schemes shall be technically and environmentally feasible. Preferably minimum 80% of the proposed water users are to be small and marginal farmers. Potential beneficiaries Farmers are to be ready to form WUA and agreeable for the Operation and Maintenance (OMM) of schemes. Priority need to be given to Women farmers to be the beneficiaries and also the representative of WUA management committee and subcommittee. Further, fishery activity may be taken /proposed in the proposed villages within/outside command area and fishery Interest group will be formed separately but must be part of the any ongoing project promoted WUA.

63. **State Water Investigation Department** is maintaining data base on availability, quality of data etc. As SWID is the main planning unit all schemes will be verified by them. In addition, the SWID data base will be used for filtering as well as match water availability, water quality etc.

64. **In Developed Districts** with maximum area under assured double crop like southern districts proposals for strengthening the WUA in existing government or community managed schemes may be submitted for consideration. Solar/Sprinkler/Drip system may also be introduced as individual/group activity and WUA may be formed with all the proposed/potential beneficiaries for promoting Agriculture/Horticulture/Fishery activities. Support Organizations will submit the list of identified schemes to DPMUs in the specified format and facilitate the Scheme selection process. DPMU will do the technical feasibility assessment and place the proposal for selection of these schemes to the DLIC for their approval.

65. The key aspects of the project area selection are summarized in Figure - 2.2 and the detailed guidelines are given in **Attachment - 2.2**.

Figure - 2.2. Project Area Selection



Project Cost

66. The total project costs are estimated at US\$300 million, including a base cost of US\$248.5 million and physical and price contingencies of US\$51.5 million. The physical contingencies of are included only in the cost of schemes while the price contingencies of are based on the current inflation rates in India and have been applied to all works, goods, equipment and services. The component wise cost including financing plan is given in **Table - 2.1**.

Table - 2.1. Component Wise Project Costs

S.No.	Component	Amount		Percentage
		(INR Million)	US \$ Million	
A	Strengthening Community Based Institutions	372	8.1	2.7
B	Irrigation System Development	10,808	235	78.3
C	Agricultural Support Services	1,015	22.1	7.4
D	Project Management	1,605	34.9	11.6
Total		13,800	300	100

Project Financing Plan				
S.No.	Sources of Finance	INR (Million)	US \$ Million	Percentage
1	Government of West Bengal	2270	50	16.66
2	IBRD	5765	125	41.67
3	IDA	5765	125	41.67
Total		13,800	300	100

67. The government share will be for the component irrigation system development and the bank financing will be restricted to 79%. All other components will be financed 100% by the Bank.

CHAPTER –03 COMPONENT A – STRENGTHENING COMMUNITY BASED INSTITUTIONS

68. Experience from other states in India and elsewhere have successfully demonstrated the capacity of farmers, especially small and marginal farmers when mobilized into inclusive and accountable farmer institutions, in prioritizing their needs, managing resources, demanding better services and operating and maintaining various common infra-structure including minor irrigations structures. The institutional platform help member farmer’s access technology and information, agricultural inputs including credit and better market the produces by substantially improving their negotiating skills and bargaining power. The empowered local institutions of farmers are able to drive their priorities and oversee investments effectively within their farms as well at the community level like minor irrigation investments. The component provide enabling conducive environment and technical assistance including facilitation, hand holding, mentoring and other capacity building services to farming communities in the command area with special focus on small and marginal farmers. The intended outcomes are efficiently performing WUA fully empowered for group action including creating a demand pull on the agriculture technology dissemination system, establish links with public and private operators for input supplies, output marketing and seize opportunities for value addition including prevention of post-harvest loses.

Main Approaches

69. The component will design and implement activities building on the following principles: (i) full participation of small and marginal farmers; (ii) inclusion in decision making and equity of benefits to all member farmers; (iii) inter-institutional linkages among primary farmer organizations for building second generation institutions of farmer companies; (iv) inclusion of women headed farm households and other women in the institutional activities; (v) inclusion of tribal farmers in decision making positions and (vi) public and private partnerships for establishing linkages for farmer advantage.

Objectives

70. The objective of the component is to establish, train and strengthen Water Users’ Association (WUA) to assume responsibility for sustainable operation, maintenance and management (MOM) of their respective MI schemes and improving irrigation based livelihood options.

Expected Outcomes

71. The expected outcome under this component is improved effectiveness and financial viability of irrigation water management by WUAs measured in terms of: (i) Number of Water Users Associations created and or strengthened (ii) Percentage of Water Users Association graded A or B and (iii) Percentage of Female Water Users Association executive committee members.

Main Activities

72. The main activities leading to the formation and strengthening of WUA supported under the component are:

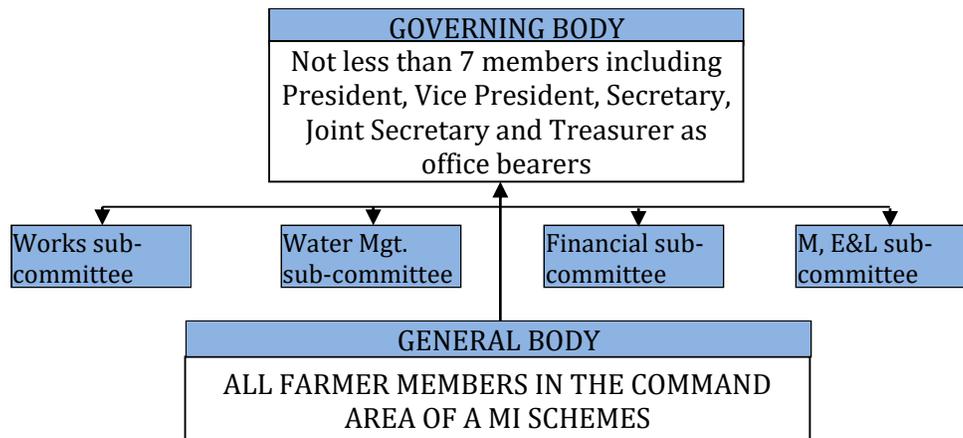
- Social intermediation and farmer mobilization support services through the provision of Support Organization;
- Capacity building of farmer organization (WUA) through workshops, exposure visits, training programs;

Water User Association (WUA)

73. WUA is an organization of farmers who practice agriculture as their main livelihood in the command area of minor irrigation schemes promoted under the project. It is a society registered under the West Bengal Societies Registration Act. All key decision making powers for project implementation at the scheme level including allocation of water resources, fixing water fees, crop planning etc. are vested with the WUA. The model memorandum and articles of association of the WUA is given in **Attachment 3.1**. WUA is considered as the project implementation agency at the schemes/village level.

74. The **composition and structure** of WUA consists of: (i) General Body of all farmer members; (ii) a Governing body of not less than 7 members including President, Vice President, Secretary, Joint Secretary and Treasurer as office bearers; (iii) for sub committees namely (a) works sub- committee, (b) water management sub-committee, (c) financial sub-committee and (d) monitoring and evaluation sub-committee.

Figure - 3.1 Structures and Composition of WUA



Steps in Formation of WUA

75. The formation of WUA consists mainly of a 5 step process: (i) step-1: IEC Campaign; (ii) step-2: self-selection of villages; (iii) step-3: formation of WUA; (iv) step-4: organization developments and registration of WUA; and (v) Step-5: capacity building of WUA as shown in **Figure - 3.2**. The steps usually follow the same order, but there will be concurrent and over lapping steps as well in the field depending upon field conditions.

Figure - 3.2 Step wise Formation of Water Users Association



IEC Campaign

76. Immediately upon selection of polygon based on rain fed areas and cropping intensity as described in Chapter – 04. Irrigation System Development, the project through the support organization carry out an information and outreach campaign among potential villages and sites. The campaign will focus on key project principles, rules for participation as well as farmer responsibilities of operation and maintenance.

Selection of Villages/Schemes Sites

77. In line with the community driven approach of the project the potential schemes sites/villages are selected based on farmer willingness to follow the messages given out during the IEC campaign. Their readiness is to be demonstrated through a farmer meeting and resolution to apply for joining the project. If the community shows interest and readiness to take up scheme related responsibilities as per the norms of the project, then only will the SO, with the assistance of the DPMU and line departments, take up primary level environmental, technical and social screening of the locality to assess feasibility of taking up a scheme there. Scheme sites identified on the basis of such a screening will be submitted to the DLIC for approval. Once DLIC confers its approval for a scheme site, the process of formation of Water User Association and preparation of a Scheme Development and Management Plan (SDMP) for that scheme will commence.

Formation of Water User Association

78. The SO will carry out various participatory tools to delineate the command area and identify the potential farmers who will benefit from the proposed schemes. The main participatory tools used are: seasonal crop calendar; transect analysis; spatial mapping of farm fields, ponds and residences as well as a participatory targeting exercise to identify and list small and marginal farmers who forms the main target beneficiaries of the project. After a clear understanding on WUA is created among the potential WUA members, the SO will conduct a second meeting with them to prepare a formal list of members of the WUA. This will be followed with the constitution of the WUA General Body. During the meeting the draft Memorandum of Association (MoA) of the WUA will be presented to the General Body for discussion and approval. On approval, a formal resolution will be passed by the WUA General Body adopting the MoA, which all the present members will sign.

79. Absentee farmers who are cultivating irrigated land within the command area can nominate a representative to attend general body meetings without voting rights. This will help the absentee farmer to get all information about the activities of WUA. Tenant farmers and share croppers can also attend general body meeting without voting rights but can receive benefits.

80. As a sub set of the general body of the WUA, the Fisheries Interest Group (FIG) consisting of 5 to 10 members will be identified. The FIGs will have own office bearers and bank accounts but will sent one representative to executive committee of the WUA. The FIGs will act as a management committee for undertaking fish farming activities, fisheries related training, community based fingerlings production. The FIGs will adopt a general rules of business outlining activities during lean periods, benefit sharing, relationship with WUA including sharing of financial profits, resolving conflicts, etc.

Organization Development and Registration

81. After adoption of the MoA, the SO will announce a notification for the constitution of the WUA Governing Body (Management Committee) and officer bearers such as the President/Chairman, Vice President/Chairman, Secretary, Joint Secretary and Treasurer in the meeting. In case the Governing Body members and the officer bearers are unanimously elected, they will be constituted during the same meeting and a formal General Body resolution passed listing the names of the Governing Body members and the office bearers. However, if there is a need to hold elections, the WUA General Body will fix a date for conducting it. Also the General Body members desirous to stand for Governing Body or officer bearer positions will need to inform about it during the meeting so that their nomination and the position for which they wish to stand can be formally recorded and announced in the WUA General Body.

82. The SO will facilitate conduct of the election for the Governing Body (Management Committee) and officer bearers on the date fixed for this purpose. Election may be conducted using raise of hands or ballot papers depending on the wishes of the General Body members. All General Body members will have one vote, which they may exercise only in person. The counting of the votes will be carried out by the SO immediately after the voting and the results announced thereafter. Once the election results are declared, a formal General Body resolution constituting the Governing Body and the officer bearers will be passed listing the names of the Governing Body members and the office bearers. While constituting the WUA Governing Body and officer bearers, whether unanimously or through election, the legal and project provisions of women and SC / ST representation will need to be adhered to. Apart from Governing Body, a WUA will also form four Sub committees under project requirement, namely, i) the Works Sub-committee, ii) the Water Management Sub-committee, iii) the Financial Sub-committee and iv) the Monitoring & Evaluation Sub-committee. These sub-committees will also be formed during a WUA General Body meeting and may follow a similar procedure as described for the Governing Body.

83. After the completion of the process of formation of the WUA, the Governing Body will prepare and submit an application to office of the Registrar of Societies office for formal registration of the WUA under the West Bengal Society Registration Act, 1961. The application needs to make along with the WUA MoA, a list of members of the Governing Body and officer bearers and copies of the General Body resolutions related to this. The SO and the DPMU will assist the WUA in submitting their application for registration as a society.

84. The WUA will open its bank account in a nearby nationalized or cooperative bank branch. To facilitate opening of a WUA bank account, the General Body will need to pass a resolution to this effect. The WUA will then make an application to the bank to open its account with a filled up account opening form, deposit slip, duly signed copy of resolution, copy of WUA MoA, 2 copies of passport size photograph of the President/Chairman, Secretary and Treasurer along with photocopies of their voter ID card / ration card. These three officer bearers of the WUA will be authorized by the WUA General Body through a resolution to operate the bank account in its favor. Two more documents will be required to be submitted to the bank to open a WUA account, namely: (i) Certificate issued by the Panchayat Pradhan that all members of the WUA are living in the village / panchayat and are personally known to him; (ii) Certificate from SO / DPMU that the WUA is being formed under a GoWB project of ADMIP. The SO will assist the WUA in making the application to the bank.

Capacity Building of Water Users Association

85. The farming community particularly, marginal farmers face several challenges in managing minor irrigation sub project, such as inequitable water distribution, deprivation at the tail end point, poor performance of irrigation facility due to deferred maintenance, below optimum yield from farm because of not planning cropping pattern on the basis of availability of water etc. Institutional strengthening of WUA through training and other capacity building means can enable the water users to cope with these challenges. The institutional strengthening of WUAs under the project will be achieved through various training and support activities. The purposes of training are: (i) to strengthen the institutional functioning with well-defined role of WUA sub-committees; (ii) to facilitate water and land resource management; and (iii) to improve the productive potential of the command area in terms of agriculture, horticulture, fisheries.

86. The Project will impart initially training to the WUA through six training modules has detailed below and described in **Attachment – 3.2.**

- i. Module 1: About ADMI Project
- ii. Module 2: Roles and Responsibilities of WUA
- iii. Module 3: Supervision and Monitoring of MI Schemes
- iv. Module 4: Operation and Maintenance of MI Schemes
- v. Module 5: WUA Accounts and Book Keeping
- vi. Module 6: Agriculture based Livelihood Options (see Chapter 4 on ALSS)

87. The SOs, DPMUs and the Line department staff will impart training to the WUA. Module 1 to Module 5 will be covered in 12 training days for each WUA during the Project Implementation stage. During the Post Implementation Stage, refresher training of 2 days duration will be conducted as per requirement. The SO will prepare training plan for each WUA along with the budget on the basis of the modules and submit it to the DPMU on a quarterly basis for approval. Based on the training plan the DPMU will release the necessary fund to SO to conduct the trainings. Trainings will be conducted at the WUA level as well as cluster level. Each cluster will include 7 to 15 WUAs. Module 1 deals with more general topic and all members of the WUA will get training on it. A part of Module 2 and Module 3, which deals with building general awareness on role and responsibilities of the members, supervision during construction phase will also be provided to all WUA members. These trainings will be conducted at each WUA level. The remaining Modules (2 to 5) cover majorly specific technical topics. Hence, only specifically responsible members of a WUA will receive these training. These trainings will be arranged at cluster level. 2 to 3 representatives from each WUA will take part at the cluster level training. Total number of participants per training event will not be more than 40.

88. A Training Manual covering on all the topics of module 1 to 5 will be prepared by the SPMU in simple Bengali language and distributed to each WUA for ready reference. The Manual will also guide the resource person in conducting the training. In addition to formal training the following activities are undertaken as part of capacity support: (i) Training Need Assessment - TNA for WUA will be performed regularly by SO and DPMU and based on the assessment training modules will be re-designed, if necessary: (ii) Exposure Visit - Apart from training, exposure visit will be organized for the WUA to nearby best practice sub projects which can act as hands on training. Even during training representatives of successful WUA will share their experiences. Failure cases will also be shared during training as a part of practical training (iii) Hand Holding - SOs and DPMU will provide hand holding support to WUA for three consecutive years after sanctioning of SDMP by DLIC. Post handing over of the scheme, they will receive hand holding support from the SO and DPMU and whenever necessary from line department for about 1 year. During that period refresher training will be arranged: (iv) IEC Material - Various Information, Education and Communication (IEC) materials, such as leaflet, posters, flip charts, video film will be developed to disseminate key information related to ADMI project to the WUAs and farmers. It would also enhance the visibility of the project

to larger community; (v) Case Documentation - Successful and innovative cases will be documented by the SO and DPMU team. The cases will act as training / awareness material, not only for WUA but also for other the stakeholders of the project.

Roles and Responsibilities of WUA

89. The min **roles** of the WUA cover the following areas: (i) Planning, monitoring implementation and management of Irrigation infrastructure –To carryout timely maintenance of the irrigation systems –To improve the system for efficient and economical use of available water; (ii) Water management – To prepare the schedules of water deliveries –To supply water to all members in the command area –To avoid and prevent misuse and wastage of water –To use water economically; and (iii) Agriculture Development–Preparation of crop plan –To inspect water utilization –To educate farmers on agricultural aspects.

90. The specific responsibilities of WUA are:

- Preparing and implementing Water distribution Schedule for every irrigation season
- operational plan has to be prepared based upon the entitlement area, soil and cropping pattern
- Preparing O&M plan for the irrigation system at the end of each crop season and its implementation as accepted by the GB of WUA
- Carry out the maintenance works of feeder channels and field drains with the O&M funds from time to time
- Ensure judicious use of as per the approved water distribution schedule
- To promote economy in the use of water
- Prepare demand and collection of water charges
- Monitoring the flow of water for irrigation
- Resolving the disputes if any in between the water users in the area of operation
- Raising the local and community resources
- Maintaining the records for annual audit and for transparency
- To encourage avenue plantation on canal bunds and waste lands
- Water budgeting and enabling Social audit and complying with social audit recommendations.
- Organizing the general body meetings
- Financial audit to be done to maintain the transparency
- Operating the drainage
- Protecting the assets of WUA
- Protecting the irrigation canals and other constructions and repairs

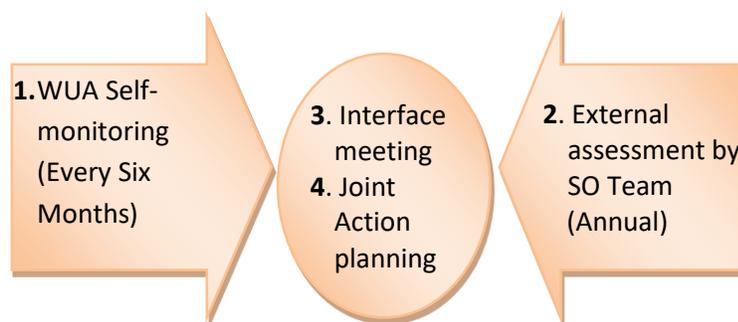
91. The detailed tasks and responsibilities are elaborated in **Attachment 3.3**

WUA Self Rating Tool

92. The efficiency of performance of WUA and its sustainability depends on how the performances of the WUA are monitored by its own members. The main farmer monitoring tools are: WUA, books and records; score card on performance. The self-rating score card exercise is undertaken by the M & E sub-committee of WUA on a six monthly basis. This farmer level exercise will be supplemented by an annual exercise using the same score card by the SO staff. There will be an interface meeting between WUA and SO staff to discuss the self-rating results with the outside rating results. The interface meeting is expected to come up with an action plan for improving

performance as well as rectifying the deficiencies brought out during the grading as detailed in **Figure - 3.3**.

Figure - 3.3 WUA Self Rating Steps



93. The purpose of rating is to identify areas of deficiencies and improvement in the working of WUA and to work out an action plan for maintaining / improving grading. The main purpose of grading of WUA during planning stage is with the main purpose of triggering the bidding process for implementation. Hence in all cases where the WUA rating is C or D grade the procurement process will not be initiated.
94. There are two sets of grading criteria for WUAs: (i) for those WUAs which are in the planning and implementation; and (ii) for those WUAs who are in operation and maintenance of schemes. The criteria to be focused during planning are mainly: extent of participation in the planning process, mobilization of capital contribution and readiness conditions to start the procurement process for implementation. The criteria for post implementation include: equity of benefits to small and marginal farmers, women and tribal farmers; crop planning and water use planning, collection of user fees, building up of corpus fund for maintenance and repairs, agriculture development activities including market linkages. The grading criteria for the two types of rating are included in **Attachment 3.4**.

CHAPTER -04 COMPONENT B – IRRIGATION SYSTEM DEVELOPMENT

95. Maintaining Agricultural Growth Rate in the state is principally constrained by very limited scope for increasing cultivable area and very small land holding size. Absence of assured irrigation facilities constitute the main inhibiting factor for enhancing productivity levels, especially in the predominantly rain fed areas of the state. Expanding irrigation facilities for the state is more significant not only for maintaining reasonable agricultural growth but also providing sustainable rural employment and optimal utilization of available water resources. Hence, Component – B Irrigation System Development intends to improve availability of water for agriculture and fisheries by developing new minor surface and ground water irrigation schemes in areas currently cultivated under rain fed conditions.

Objectives

96. The objective of the components is to improve availability of water for agriculture and where feasible for fisheries by developing new minor surface and ground water irrigation schemes. The component will also introduce water saving technologies and expand on ground water monitoring programs.

Main Principles

97. Provision of irrigation services under the project will be guided by the following main principles.
- Development of new facilities will be targeted in rain fed areas where there are no permanent and functioning irrigation facilities as well as low cropping intensity.
 - The proposed schemes have to benefit economically poor small and marginal holders (80% holders in CCA).
 - Small scale minor surface water schemes and gravity fed schemes will be preferred to ground water based schemes.
 - Selection of type of scheme will not only be based on hydrological and technical consideration but also take into consideration farmer demand and preferences relating to their participation in planning, implementation and post-implementation management.
 - Strengthened and inclusive Water User Association functioning accountable to all small and marginal farmers in the command area will be empowered to take decisions on sustainable investments and judicious use of resources including post project management of the scheme.
 - Diesel energy will be used only in remote areas without access to electricity (generally within a distance of 2.5 km. Solar energy and wind power will be used as alternate energy wherever feasible.

Expected Farmer Coverage Menu of Technology Options

98. The project proposes to promote construction of 8 different types of irrigations schemes. About 1600 minor irrigation schemes will be installed to irrigate a total command area of about 32,000 ha., in 19 out of the 20 districts in the state. The total number of farm families expected to be benefited is estimated to be 117,000 farm households.

99. The project does not propose any ground water structure in the areas bordering with Bangladesh. The surface water structures especially in the northern district will also consider externalities resulting from impact on down stream flows particularly after considering the effects of return flows. The location of the schemes will also follow the requirements of various safe guard policies of the World Bank.

100. The project has simplified a farmer-friendly menu of technology options by clubbing various categories and unifying the procedures for installation. The details of main types and technologies of irrigation schemes proposed for construction under the project are summarized in **Table – 4.1.**

Table – 4.1. Menu of Technology Options for Schemes and Farmer Coverage

Sl. No.	Technology Type	Description	CCA	Average farmer benefited (No/unit)	Approximate Unit Cost (Rs. Lakhs)
1	Tube Well (TW)	Uniform 150 dia. PVC tube well tapping GW from deeper aquifer at 30 cum/hr. discharge with help of electric operated submersible pump in a cluster of 3-8 no tube well. Water to be distributed with raised tank and suitable pipes.	6 Ha each	18	8 lakh each
2	Lift irrigation (LI)	Water from rivers, canals, beels and check dam, SFMIS etc. is lifted by electric operated centrifugal pumps sets each capable of varying discharge ranging from 25- 100 cubic meter per hour with pressurized pipe system and ready for sprinkler operation.	5-25 ha	15-75	10-35 lakh
3	Small Earthen Dams	Low height earthen dam across a sloping ground or small river taken up within catchment areas of natural streams by using gravity flow system with spillways to pass flood waters, and outlets for providing irrigation supplies.	30-50 ha	90-150	30-200 lakh
4	New Tanks	Small over flow weir across streams for storing surface water runoff and base flow of the stream and lifting arrangements with electric or solar operated pump set and water distribution system with pipe-spout or drip or sprinkler where feasible.	5-30 ha	15-19	25-200 lakh
5	Renovated Tanks	Construction of new WHT or re-excavation of old filled up tanks to store surface run off and lifting arrangement with electric or solar operated pump. Drip / sprinkler system may be incorporated where feasible.	5-20 ha	15-60	10-50 lakh
6	Pump Dug Well (PDW)	Open masonry wells having low discharges tapping low aquifer within 20m and diameters of open wells may vary from 2 to 9 m and they are generally less than 20 m in depth. lifting arrangement with electric or solar operated pump. Drip / sprinkler system may be incorporated where feasible.	2-5 ha each	6-15	5-10 lakh
7	Drip/sprinkler system	Where water source is already created drip and sprinkler system operated with electric or solar energy source to be taken up.	1-10 ha	3-30	1-5 lakh
8	Hydrum	This is a pumping device which uses the momentum of the moving column of water to lift a small part of the same water to a height above its original supply head. Drip / sprinkler system may be incorporated where feasible.	2-10 ha	6-30	2-4 lakh

101. The selection and design of new schemes involve more customized designs resulting from repeated consultations with farmers. Such as iterative and participatory process would ensure more ownership with the farmers thereby leading to success and sustainability. The area to be irrigated by a scheme normally ranges from 1 to 40 ha. with an average CCA of 30 ha. The number of farmers benefited per scheme range from 20 to 200 farmers. Thus the membership in a WUA also will be 20

to 200 farmers. The most preferred technology option will be surface water, using lift irrigation. The Water Distribution System will consist of above ground or underground pressurized pipe systems for sprinkler operation. Wherever feasible pipe sprouts will be provided. Hydraulic pumping devices will be used to lift water. As the selection of the type of scheme will be based on hydrological, technical and user demands the actual numbers at the end of the project may tend to differ from the above. As explained above the details of the revised and simplified options of technology types are given in **Attachment 4.1**.

A Comparison with Traditional Approach

102. Compared to the traditional irrigation projects, WB Admi brought in several improvements in the planning, design and implementation of irrigation service delivery to farmers. The main improvements in the technical aspects of the project are summarized in **Table - 4.2**.

Table - 4.2. Improved Project Approaches – A comparison with Traditional Approach

Characteristics	Traditional Approach	Improved Project Approach
Prioritizing regions	All districts equal priority	A segmentation approach to have suitable strategies considering stage of development of districts
Site Selection	Random considerations	Hydrological, Geographical, Agricultural and Social factors systematically considered through a three stage process
Funding Proposal	Mainly consists of DPR covering mostly technical aspects	A more comprehensive document – SDMP covering technical, social, environmental, financial, farmer institution related aspects
Planning and designing	Mostly done by technical staff	Follow a participatory process by involving farmers to make it more demand responsive
Menu of technology options	Mostly consists of tube wells and traditional options. Water distribution through comparatively inefficient sprouts.	More site specific solutions consisting of surface water schemes. Ground water will be the last option. Traditional Solutions also considered Water distribution through efficient piped system with option for drip or sprinkler wherever feasible.
Payment to Contractors	After technical Certification	WUA certifies OK card containing Social and operational Check list
Focus of investments	Mostly to construct new schemes	Existing investments are also studied for re-vitalization.
Energisation	Mostly electrical with the next best option as diesel engine.	Renewable energy sources like solar will be scaled up.

Main Component Activities

103. To achieve the objectives and following the main principles of the project will finance the following main activities:

- Assessment of availability of irrigation water for surface flow and river lift irrigation schemes

- as well as that for ground water based irrigation schemes to be developed under the project;
- Construction and installation of proposed irrigation infrastructure, including electro-mechanical components;
- Procurement of survey and quality control equipment for scheme preparation and implementation;
- District level third party quality assurance consultants to monitor construction quality standard;
- Contractual staff to bridge technical man power shortage, if found necessary;
- A well-qualified and adequately staffed Technical Unit attached to the SPMU for review of design and supervision of construction of key irrigation infrastructure to ensure adequate safety and performance quality;
- Piloting introduction of water saving irrigation with drip and sprinkler;
- Water quality labs to monitor ground water level and ground water quality; and
- Development of state wide GIS based minor irrigation data base to enable DWRID plan future investments following lessons learned from the project.

Targeting Rain Fed Areas

104. The agriculture in the state continues to depend predominantly on rain fall and hence the cropping intensity remains low at 182 percent. The irrigation coverage in terms of IP created remains low at 46 percent. In about five districts 70 percent of net area zone are single cropped areas while in many districts there are still extensive mosaics of rain fed areas. Most of the single cropped areas fall in the Western Plato districts which receives average annual rain fall of about 1400 mm., of which 90 percent is received during the main monsoon months of June to September. Surface Flow Minor Irrigation Schemes are most preferred in these areas and would ensure supplementary irrigation to Kharif crops and full irrigation to at least 40 percent of Rabi crops wherever possible the reservoirs of SFMIS would also help raise short duration fish farming.

105. In order to have major impacts on production and productivity of crops, it is important that the new schemes proposed under the project are clearly targeted and located in the rain fed areas of the state. The implementation process has been streamlined to achieve maximum coverage of rain fed areas of the state. In areas where MI schemes have already been built, the project will focus on institutional development aimed at mobilizing WUA for these schemes with the aim of farmer based operation, maintenance and management of the schemes. In addition the agriculture development activities will be strengthened in these command areas to fully utilize the irrigation potential created.

Untapped Minor Irrigation Potential

106. The minor irrigation census figures and the Water Data Book of Ministry of Water Resources Government of India indicate that, there is a huge gap between the irrigation potential assessed and irrigation potential created. There are still variations in irrigation potential utilized and gross irrigated areas clearly indicating the need for remedial measures. The minor irrigation census data clearly indicate that there is huge scope and expressed demand for development of minor irrigation in the state.

107. **Ground Water Development** of the state will be an important consideration in designing irrigation system. A map showing the ground water table quality as given in **Attachment 4.2** will be the basic reference point decision making in all technical aspects of project activities.

Technology Preferences

108. As the project focuses on setting up community managed irrigation systems and sustainable and judicious use of water resources, the technology or types of minor irrigation schemes need to have a strong preference towards smaller schemes which are sustainable and easy to manage. The state has rich annual usable surface water, with limited creation of storage and the potential to create major storage is limited. The utilizable surface water is estimated to be 5.31 m.ham while that of ground water is 1.46 m.ham. Hence surface water based schemes wherever feasible will be given preference. Only in cases where such options are not available ground water based schemes will be a choice. Even while developing ground water, pumped dug wells (PDW) will be the first option to be explored.

109. **Pumped Dug well:** Dug wells with pump sets for lifting water will be a preferred option to tap shallow water table aquifers. Dug wells are constructed by excavation with lining either with concrete rings or brick masonry depending upon soil conditions. The normal depth varies between 20 meters. The diameter of open wells may vary from 2 to 9 meters.

110. **Tube Well:** High yielding confined aquifers which are deeper will be tapped using tube wells with a uniform 150 dia. PVC tubes. The lifting of water will be done through submersible electric operated pumps. A cluster of 3 to 8 tube wells will be provided. The water distribution will be with raised tank and suitable pipes.

111. **Lift Irrigation:** Water from rivers, canals and other water bodies will be lifted by electric operated centrifugal pump sets of varying capacities depending upon source characteristics. Water will be distributed through pressurized pipe system for sprinkler operation.

112. **Small earthen Dams:** Low heights earth and dams across a sloping ground or within the catchment areas of natural streams or small rivers will impound water. The distribution will be using gravity flow systems with outlets for providing irrigation water.

113. **New Tanks:** Small over-flow weirs constructed across streams, store, surface water run-off and base flows. The impounded water will be lifted using electric or solar operated pump set. The distribution system consists of pipe-sprouts, drip or sprinkler systems wherever feasible.

114. **Renovation of Existing Tanks:** Construction of new water holding tanks or re-excavation of filled up tanks will be undertaken to store surface run off. The water will be lifted using electric or solar operated pumps. Drip and sprinkler systems will be incorporated wherever feasible.

115. **Drip/Sprinkler System:** Drip irrigation involves laying out of a network of pipes upto laterals and fitting with emitters to directly irrigated route zones of cultivated plants. Sprinklers are to discharge water under pressure in the air through a set of nozzles. High density distribution pipes are used. Drip/sprinkler system will be used to increase

116. The project prepared guidelines for **Lift Irrigation with Sprinkler**. The salient aspects for implementing Lift Irrigation Schemes with Sprinkler are:

- The pressurized type irrigation distribution system shall be used.

- The design of the system shall include the provision of sprinkler system so that the beneficiaries may avail the facility of the sprinkler type of irrigation along with the conventional type as per their requirement.
- The centrifugal electromotor pump set shall be energy efficient monoblock type. The total head of the pump shall cover the static head, dynamic losses and the head required to operate the sprinkler system.
- The pump shall be designed to serve maximum command of 7-10 Ha for approximate discharge of 14 lps.
- Class II UPVC pipes of 140 mm/110 mm dia. with branch / loop arrangement shall be used in the distribution system.
- The outlet shall comprise of 110 mm riser pipe connected to 100/ 90 mm dia. PVC ball/gate/globe valve by 110 mm 90 degree bend /elbow located 300 mm above ground level. There shall be provision for connection of the outlet with lay flat hose pipe as well as sprinkler set.
- There shall be no provision of any spout chamber. The riser shall be jacketed by bigger dia. PVC pipe for its protection.
- Each outlet shall serve a command of 1 Ha.
- The hydro cyclone separator is not required in the system. However the Pressure Relief Valve shall be used to prevent water hammer in the system.
- Each pump set shall be provided with a minimum of two numbers of sprinkler sets commanding area of around 1-2 Ha each.
- If there are any difficulties, they will be addressed even after the implementation including additional provision of funds.

Broader Project Area Identification/ Polygon Based Approach For

117. Community based minor irrigation services and management is aimed at bringing in sustainable utilization of water resources, judicious water management practices for improving efficiency and community based self-monitoring and learning to enhance effectiveness of the systems. A polygon is a basic hydrologic unit demarcated as a contiguous geographic area covering few mini water shed and may extent to 10 km² to 25 km². Remote sensing data and already available statistical data interlaid with GIS information are used to identify and map polygons. In addition to water resources data and land use data, using remote sensing, site reconnaissance survey and social baseline census will also be used.

118. The approach departs from the traditional build and operates stand-alone random schemes scattered over large geographic areas. Instead, the project propose to utilize a polygon based model to arrive at informed as well as participatory decisions about water resources, water budgeting and balancing, collective action in land management and use of other natural resources. The polygon based approach provides for a bottom up and farmer driven planning and implementation process leading to development and strengthening of farmer institutions (WUA) and wider adoption of improved agricultural practices leading to enhanced farm incomes. The minor irrigation investments form the institutional platform for strengthening farmer institutions and social capital in addition to becoming the economic platform for enhanced farm incomes.

119. The selected polygons for project implementation are predominantly rain fed areas with single cropped Kharif cultivation and without permanent irrigation systems currently functioning.

The rain fed areas within the polygon will be clustered in different batches to take up implementation in each year. Within the polygon the schemes shall be provided to rain fed areas only. Typically a cluster of schemes or single schemes could cover a rain fed area of 80 to 100 ha, which can be smaller villages. In order to cover an entire village even if a part of it fall outside the polygon, a 10 percent buffer along the periphery of the polygon is allowed. Also, if potential beneficiaries of a proposed scheme fall close to the periphery of a polygon but belong to a nearby village could also be included as beneficiaries. As the rain fed villages within a polygon are fully covered in different years another polygon will be identified.

Scheme Selection Process

120. As already elaborated polygon approach will be followed to harness maximum irrigation potential. A preliminary list of potential site/areas is identified using remote sensing based data on water resource, cropping pattern as well as agriculture statistics data. This will be supplemented by field verification. The submission of mass petition by potentially benefiting farmers will be verified by DPMU engineers. They prepare a Technical Feasibility Report (TFR) covering technical, social and environmental feasibility of the location and scheme. The final selection of scheme will be done by SWID based on TFR.

Scheme Selection Criteria

121. The project is promoting farmer managed operation and maintenance of schemes and hence the following criteria are used to select schemes.

- Areas without permanent irrigation facility/rain fed are only eligible.
- Minimum of 80 percent of direct beneficiaries of the scheme shall be small and marginal farmers and at least 60 percent beneficiaries are tribal in villages under tribal development plan.
- Small sized schemes with manageable membership size of WUA and simplified system to operate and maintain. Mid-size surface and ground water scheme are discouraged.
- Surface water based schemes have priority and the most preferred technology types are: (i) Water Detention Structures (WDS/Tank); (ii) River Lift Irrigation (RLI); (iii) Gated Check Dams; (iv) Surface Flow Minor Irrigation Structure (SFMIS); and (v) Hydrum.
- Wherever surface water scheme is limited then only ground water structure is to be considered but to be judiciously combined with surface water schemes. For example PDW schemes considered along with surface schemes in clusters.
- The water distribution system should have facility to upgrade with sprinkler/drip irrigation wherever feasible.
- The proposed schemes are technically feasible without significant environmental impacts.
- The direct beneficiaries farmers are ready to form WUA and willing to carry out operation and maintenance of scheme.
- Preference will be given to schemes benefiting women farmers with women representatives in the WUA management committee and sub committees.
- Fishery activity will be undertaken within our outside the command area by mobilizing separate Fisheries Interest Groups.

Enhancing Effectiveness of Existing Schemes

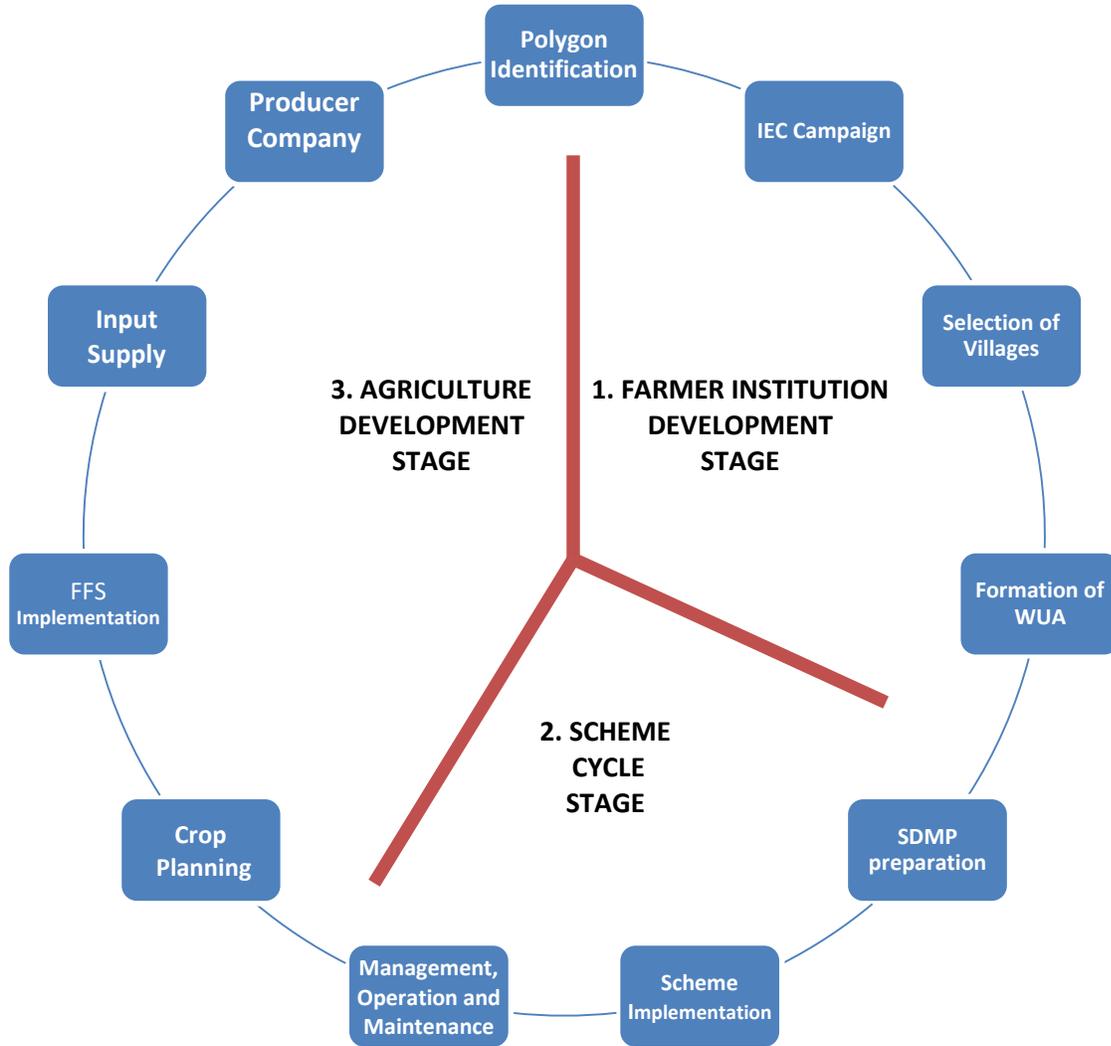
122. In areas where there are existing minor irrigation schemes, to enhance the effective operation and maintenance as well as to improve the efficiency of water use, WUA will be formed and/or strengthened in schemes benefiting more than 80 percent small and marginal farmers as beneficiaries. However such activities will be based on case to case basis and subject to DPMU undertaking technical feasibility and approval by DLIC. The selection of the schemes will follow the general scheme selection process and eligibility criteria. Existing Government or community managed schemes will be considered.

123. Existing schemes will be supported for strengthening WUA and their capacity building. The promotion of agriculture support services to improve agriculture, horticulture and fisheries activities will be undertaken. More over introduction of irrigation water saving devices like sprinkler or drip as well as solar based energy support will be considered on an individual or group activity basis.

Overall Project cycle

124. The project being farmer driven follows a process approach in its implementation. This will help the implementing and facilitating agencies to orchestrate implementation with the full involvement of farmers and also to ensure quality of the processes. Therefore, project implementation progress along a step wise sequenced as well as some parallel activities which make up the Project Implementation Cycle. The project cycle is divided into three main stages: (i) **Farmer Institution Development Stage** (which may last for 6 months); (ii) **Scheme Development Cycle** (which may last for 18 to 30 months depending upon technology and size); and (iii) **Agricultural Development Stage** (which may last for 36 months). For a typical project site the total duration of project activities under the overall project cycle may be 36 to 40 months. The project will have a clear phasing out strategy to fully exist from a project site leaving the management operation and maintenance with the empowered WUA. The overall Project Cycle is shown in **Figure - 4.1**

Figure- 4.1 Overall Project Cycle



125. The project cycle analysis follows work breakdown, following hierarchical sequence of Stages, Steps and then Main Activities. Each of the main stages of project implementation corresponds to project interventions as planned under the main program components of the project. The stages consist of clearly identifiable steps which together help achieve certain milestones of physical achievements. Successful achievement of the milestones, culminate the logical completion of the step and trigger the project process to move on to the next step. The key steps under each of the main stages, the key steps and the milestone triggers to move to the next step are summarized in **Table - 4.3.**

Table – 4.3. Overall Project Cycle Analyses

Main Stages	Phase	Key Steps	Main Milestones/Triggers to move to next steps
Farmer Institution Development Stage – 6 months	Pre-Planning	• Potential Polygon Delineation	A Hydrological Unit comprising of mini water sheds identified in a predominantly rain fed area.
		• IEC Campaign	Key project principles of community based irrigation management disseminated among potential villages.
		• Selection of villages	Mass petition to join the project with community endorsement on project principles including community contribution received
Scheme Cycle Stage – 18 to 30 months	Planning	• Formation, Organization Development of Water User Association and Capacity building of members	Representative WUA with small and marginal farmers in decision making position fully strengthened to take up planning, implementation and continued management of MI schemes.
		• Participatory SDMP preparation	Technically feasible, environmentally and socially acceptable and economically viable scheme designs and estimation (SDMP) finalized
	Implementation	• Implementation of SDMP monitored by WUA.	MI schemes as per SDMP commissioned
Agriculture Development Stage – 12 to 36 months	Post Implementation	• Community Management of operation and maintenance	The commissioned MI schemes are sustainably operated and maintain through the management of WUA
		• Information Support and Crop Planning	Market information based crop calendars and water distribution plans approved and implemented by WUA
		• Farmer Field School Implementation	Promising production technologies adopted by majority of small and marginal farmers.
		• Seeds and other input supply	Access to improved seeds and quality inputs; reduction in cost of production achieved along with productivity improvement.
		• Market linkages	Better price realization for produce
		• Producer company strengthening	Economies of scale and improved bargaining power through collective action.

126. Once potential hydrological units or polygon is selected for implementation, the first stage activities of farmer institution development starts. The stage leads to the identification and mobilization of target small and marginal farmers in the self-selected scheme areas into the lowest level farmer institution, the Water Users Association. The capacity building and hand holding of the Water Users Association to function as a representative and accountable institution of target farmers has been described and provided for in the Component A - Strengthening Community - Based Institutions. The Agriculture Development Stage will start overlapping the scheme cycle stage. As the WUA will be intensively involved in the SDMP preparation and its approval, the initial activities of Agriculture Development Stage would preferably start after this. The description and support of Agriculture Development Stage is described in Component C – Agriculture Support Services. This chapter focuses on the Scheme Cycle Stages describing Component B – Irrigation System Development and the details are described below.

Scheme Cycle Stages

127. Scheme Cycle is the second stage of the project Cycle. The Component B – Irrigation System Development mostly focus on the scheme cycle stages. Scheme Cycle take in the three steps relating to planning, implementation as well as continued operation maintenance and management of the minor irrigation schemes proposed to be implemented. The main steps in implementing scheme cycle stages are: (i) **participatory preparation of SDMP**; (ii) **implementation of SDMP** monitored by WUA; and (iii) **community management of operation and maintenance**. Each of the steps within the stages, are elaborated in terms of the main activities involved and the outputs the activities deliver.

128. **Step-I: Participatory SDMP Preparation:** which is the main scheme planning step leading to the preparation of a comprehensive Scheme Development and Management Plan (SDMP). The SDMP preparation will be lead facilitated by technical support team consisting of engineering and hydro geological expertise. The WUA is a key partner in all activities and the finalized SDMP will be placed in the farmer General Body and approved. The SDMP will be institutionally, environmentally, technically and financially appraised by DPMU. The procurement documents and arrangements for operation and maintenance of the scheme are part of SDMP.

129. The SDMP preparation involves group work with command area farmers, participatory resource and social mapping, focus group discussions, hamlet meetings etc. to generate the general profile and status of the command area. Even though WUA is the focus of all activities, the preparation of SDMP requires skillful technical service provision from DPMU and DWRID. The participatory SDMP preparation also follows a step by step process approach and mainly consists of two step activities: (i) identification of scheme/technology types; and (ii) design and estimation of scheme. The details of participatory SDMP preparation are summarized in **Table – 4.4**.

Table – 4.4. Participatory SDMP Preparation Activities

Main Activity	Activity Description	Key Output/ Deliverable
(i) Identification of Scheme Type		
<ul style="list-style-type: none"> Location study on Demography and Socio Economic Profile 	<i>Participatory Generation of Primary Data on Command Area</i> <ul style="list-style-type: none"> Hamlet meetings Focus Group Discussions including women and tribal groups Participatory Water Resources and Social Mapping 	<ul style="list-style-type: none"> Delineation of command area, demography Identification and listing of small and marginal farmers (target farmers) including women, tribal. Current status of involvement of women in resource management, agriculture based livelihood and their enhance role in community based irrigation services and management.
<ul style="list-style-type: none"> Livelihood and Agriculture Situation Analysis 		<ul style="list-style-type: none"> Existing agriculture situation – cropping pattern, seasonality, productivity, production and marketing issues.
<ul style="list-style-type: none"> Water Resources, Agro-Climatic and Hydro Geology Situation Analysis 	<i>Collection of Secondary Data relating to Agriculture, Fisheries, Water Resources existing Irrigation Services.</i>	<ul style="list-style-type: none"> Existing status of Water Resources and irrigation practices. Surface water resource utilization Ground water resource utilization
<ul style="list-style-type: none"> Comparative Analysis of Technology Options for Scheme Selection 		<ul style="list-style-type: none"> Status of existing Irrigation Schemes Selection of Minor Irrigation Type options preferred by target farmers.

<ul style="list-style-type: none"> • Water Visioning and Commitment on SDMP 		<ul style="list-style-type: none"> • Justification for community based irrigation services and management through a well-articulated irrigation need analysis. • Village vision for expanding area under irrigation, improvement in cropping intensity and percentage improvement of farm income.
(ii) Designs and Estimation of Selected Scheme Type		
<ul style="list-style-type: none"> • Detailed Study of Hydrology and Water Budgeting 	Investigation, Surveying designing and estimating by DPMU/Technical Staff	<ul style="list-style-type: none"> • Hydro-geologic profile of the area • Surface Water Resources • River/Stream Hydrology • Run of Estimation • Overall and monthly Water Budget separately for Kharif and Rabi Crops
<ul style="list-style-type: none"> • Initial Design of proposed schemes 		<ul style="list-style-type: none"> • Proposed scheme, along with available water, command area, season wise area for Irrigation • Estimation of discharge, peak flow, land use and land cover, cropping pattern in scenario
<ul style="list-style-type: none"> • Technical feasibility Assessment 		<ul style="list-style-type: none"> • Technical feasibility report and design principles
<ul style="list-style-type: none"> • Elaborating Sub-Project System Description 		<ul style="list-style-type: none"> • Layout and description of head works pump houses, water distribution systems, pumps and mechanical systems, electrical system and source of energy.
<ul style="list-style-type: none"> • Elaborating Operation Maintenance and Management 	In participation with WUA	<ul style="list-style-type: none"> • Crop Planning and Water Distribution Arrangement including collection of User Fees • Financial Projection of Capital and Operational Expenses including irrigation charge revenue. • Arrangements for Environmental and Social Safeguard Plans
<ul style="list-style-type: none"> • Community Approval of SDMP 	The salient features of SDMP are presented and explained to WUA	<ul style="list-style-type: none"> • The command area farmers endorse the SDMP
<ul style="list-style-type: none"> • Appraising SDMP 	Technical team of DPMU carry out final appraisal and assessment	<ul style="list-style-type: none"> • The SDMP is independently appraised by DPMU and technically and administratively approved by DLIC

130. Step-II: Implementation of Scheme: The implementation of scheme is normally done by outside agencies procured through a transparent bidding process using national shopping or NCB. The Water User Association plays an active role during implementation in the area of community monitoring of implementation. The project will also invest in building capacity of WUA on quality assurance and implementation monitoring. The WUA conduct detailed social audit of the completed schemes using OK card before making final payments to the contractors. The check list for OK Card is given in **Attachment 4.3**. The main activities and description of implementation of SDMP are summarized in **Table - 4.5**.

Table – 4.5. Participatory Implementation of Scheme

Main Activity	Activity Description	Key Output
Implementation of Scheme		
<ul style="list-style-type: none"> • Bid Processing and Contract Management 	<ul style="list-style-type: none"> • Inviting Bids, evaluating and awarding Bids for works and goods 	<ul style="list-style-type: none"> • The executing agency selected
<ul style="list-style-type: none"> • Capacity Building of WUA on Construction Monitoring 	<ul style="list-style-type: none"> • The WUA members are trained on construction supervision 	<ul style="list-style-type: none"> • WUA fully empowered to undertake monitoring of construction.
<ul style="list-style-type: none"> • Construction and Establishment of Electrical and Mechanical Systems 	<ul style="list-style-type: none"> • Sourcing of materials and equipments • Constructing and curing of works • Erecting of equipments and energizing • Regular technical supervision by DPMU • Third party quality assurance consultants carry out periodic monitoring and recommend corrective action. • Energisation of the scheme. 	<ul style="list-style-type: none"> • The schemes are completed as per design for commissioning.
<ul style="list-style-type: none"> • Community Monitoring of Implementation 	<ul style="list-style-type: none"> • WUA meeting to discuss progress • Social Auditing of scheme implementation • WUA certifying payment to contractors 	<ul style="list-style-type: none"> • Display boards and wall paintings • Implementation Progress review using main milestones and timeline • WUA general body endorse quality of implementation • WUA submit OK Card
<ul style="list-style-type: none"> • Commissioning of Scheme 	<ul style="list-style-type: none"> • Trial running of the scheme • WUA approve scheme completion report. • Approving the operation and management arrangement by general body • Signing of MOU between GoWB and WUA. • Starting full operation by WUA 	<ul style="list-style-type: none"> • Water User Association takes charge of fixed assets and fixtures of completed schemes and start operation and maintenance.

131. Step-III: Community Management of Operation and Maintenance: The scheme structures and fixtures will be transferred under the custody and management of the WUA. The terms and conditions, accountability relations as well as roles and responsibilities are outlined in a MoU to be signed between WUA and GoWB. The model agreement is given in **Attachment- 4.4.**

132. The WUA members are trained on operation and maintenance. With the support from the agriculture development component crop plans and water distribution plans are prepared and approved by the WUA general body. The WUA also approves the irrigation water fee. The schemes are operated and maintained by WUA utilizing the revenue generated through fee collection. All financial transactions are recorded and books of accounts kept. The procurement of supplies and tools will be done using community procurement. Any grievances of members are resolved through a systematic redress mechanism. WUA constitute a social audit committee from among its experienced and acceptable members to social audit, water distribution, finances, institutional aspects etc. The activity description for community management of operation and maintenance are summarized in **Table - 4.6.**

Table - 4.6. Community Management of Operation Maintenance

Main Activity	Activity Description	Key Output
Operation Maintenance and Management of Scheme		
<ul style="list-style-type: none"> • Operating the scheme and distribution of water 	<ul style="list-style-type: none"> • Capacity building of WUA on operation maintenance and management • Approving water charges rates by general body • Finalizing water distribution plan with the approval of general body • Distributing irrigation water and collecting user fees 	<ul style="list-style-type: none"> • Small and Marginal farmers receive irrigation water as per distribution plan
<ul style="list-style-type: none"> • Conflict Resolution 	<ul style="list-style-type: none"> • WUA trying to resolve the issue • Unresolved issues investigated by Social Audit Committee and resolved in the general body 	<ul style="list-style-type: none"> • All issues resolved amicably and WUA strengthened
<ul style="list-style-type: none"> • Maintenance of Scheme 	<ul style="list-style-type: none"> • Undertaking preventive and curative maintenance activities. • Community procurement of supplies and tools • Promoting water saving mechanisms like drip irrigation, sprinkler irrigation and water saving crop management techniques 	<ul style="list-style-type: none"> • Uninterrupted supply of irrigation water as per distribution plan
<ul style="list-style-type: none"> • Accounts and Book Keeping 	<ul style="list-style-type: none"> • Training of WUA on book keeping • Operating bank account • Maintaining books of accounts 	<ul style="list-style-type: none"> • All financial transactions are undertaken transparently
<ul style="list-style-type: none"> • Social Auditing of Operation 	<ul style="list-style-type: none"> • Capacity building of social audit members • Social Auditing and scheme completion report • Social Auditing of water distribution and fee collection 	<ul style="list-style-type: none"> • WUA perform with good governance and remain accountable to its members.

Construction Quality Monitoring

133. As the construction of works and installation of mechanical and electrical units are the responsibility of outside agencies contracted for the purpose, it is important that the implementation follow approved standards of design and quality parameters. The completed schemes are also to be in compliance with the approved SDMP and clause 4.4. of the Technical & Quality control/Quality Assurance manual for minor irrigation sub-projects for the ADMI Project. Though WUA will be monitoring implementation, stringent and scientific quality control need to be undertaken by a

separate quality assurance and quality control unit to be set up within the PMU and DPMUs. These units will be equipped with necessary tools and instruments and staffed with trained technical personnel. Each of these mobile units could cover 3 to 4 districts with the primary responsibility of quality audit, checking and assurance. These units will report directly to PMU.

134. The regular day to day construction supervision and quality assurance will be done by field engineers who supervise the work from DPMU. The detailed quality objectives, assurance processes and quality control test are detailed in quality control manual. Main highlights of their feedback will be presented and discussed by WUA.

Water Distribution Planning

135. The aim of the component is to make irrigation water available so as to enhance cropping intensity and income of farmers by introducing high value crops with assured irrigation. The water requirement is a function of soil conditions, type of crops, climate conditions etc. The immediate effect of assured irrigation is conversion of single crop area to multi crop areas especially during Rabi season. A water balance is typically arrived at considering the proposed crop pattern and water demand. Care will be taken to avoid any water deficit during critical stages of crop growth. The maximum water demand as per a proposed crop plan will be estimated. Based on the water demand and cropping pattern a water distribution schedule will be worked out which will consist of estimated pumping hours/distribution time. The whole distribution plan will be discussed and approved by the WUA general body. The schemes will be operated to achieve the water distribution schedules approved.

Water User Fees

136. Water fees are to be decided to fully recover expenses for running, possible repairs and replacement of worn out parts. The rates are to be approved by WUA general body and regular collection and accounting shall be ensured. The payment of electricity bills are to be promptly done before due dates for uninterrupted operation. Maintenance of the civil construction and distribution system shall best be done through community contribution of labour, material and donations. The factors to be considered in arriving at feasible water charges are: (i) payments to operators, fee collectors and book keepers; (ii) electricity expenses; (iii) cost of repairs and spare parts (based on depreciation of installation on a regular basis and creation of a contingency fund for meeting emergencies); (iv) operational expenses of WUA; and (v) other operational expenses including stationery and audit charges.

137. The per farmer monthly fee is to be decided and agreed upfront based on crop, area of cultivation, seasonality of cultivation, water saving technologies used etc. All collections of revenue and expenditure shall be routed through the bank account and accounts books maintained.

Documenting SDMP

138. The processes and participatory activities leading to the preparation of SDMP result in the preparation of Scheme Development and Management Plan. Compared to traditional investigation, surveying, designing and estimation result in the preparation of Detail Project Reports, (DPR), the SDMP preparation involves farmers who are the potential users of the service being built. In addition to the traditional tools, many participatory tools are used and the iterative community consultations approximate the design and plans to the needs of the farmers. While the DPR mainly detail the

technical designs, drawings and estimates, SDMP is a comprehensive document depicting the baseline situation of water resources, land resources, cropping patterns, farmer details, the physical structures, operation and management arrangements, environmental and social safeguards etc. The document outlines the efficient use of water resources, all round sustainability of the schemes, and the roadmap for effective use of the services for achieving farmer's vision on productivity and income enhancement. The document also contains digitized maps using GPS and social maps prepared through farmer participation using participatory tools. SDMP is a document owned by the WUA, but prepared with active technical and institutional facilitation support from SO, DPMU and SWID. The Executive Engineer cum the Nodal Officer of the SWID will be overall responsible for the quality and feasibility of the SDMP.

139. The detailed format for the SDMP is given in **Annexure - 4.5**. The format of SDMP for Lift Irrigation with Sprinkler have been separately prepared and given in **Attachment 4.6**. The content sheet and the persons responsible for providing the technical assistance are given in **Table - 4.7**.

Table - 4.7. SDMP Contents and Persons Responsible for Technical Assistance

Chapter No.	Title	Responsible Person from SO	Responsible Person from DPMU/ SWID
1	Context	Team Leader, SAE	Surveyor, GIS Expert
2	The Process		
3	Village Profile	TL, AWME, TC, CWs	IDS, Surveyor, GIS Expert
4	Project Area Profile		
5	Hydrology and Water Budgeting	AWME	Hydro-Geologist, Agriculture Expert
6	WUA profile	TL, AWME, TC, CWs	IDS, Surveyor, GIS Expert
7	Scheme Profile		
8	Management, Operation and Maintenance	SAE, AWME, TL	PC/TL, AE
9	Key Concerns on Social Safeguard	TL	IDS
10	Environmental Management Plan	SAE	ES
11	Agriculture Support Services	AWME	Agriculture Expert
12	Cost Benefit Analysis	SAE	PC
13	Time Schedule for Implementation	TL	AE
14	Monitoring and Evaluation	TL	IDS
List Of Annexure			
I.	Engineering Design Drawings and Estimates (DPR)		
II.	Application from Beneficiaries/ Mass Petition		
III.	List of Beneficiary Farmers with land holdings		
IV.	Land Donation Format		
V.	Total Budget Estimates		
VI.	Handing Over Document		
VII.	Scheme Feasibility Report		
VIII.	Checklist for Scheme Preparation and Approval		
IX.	WUA Committee and Subcommittee Details		
X.	Procurement Plan		
XI.	Arrangement for Work Quality Supervision		

CHAPTER- 5 COMPONENT C - AGRICULTURAL SUPPORT SERVICES

Context and Rationale

140. Assured irrigation opens up new opportunities for small and marginal farmers to broad base their livelihood development through increasing cropping intensity, use of modern production technologies like ICM, SRI, improved varieties for productivity enhancement and crop diversification by inclusion of high value crops to reduce risks. In order to convert the gains in yield gap minimization into farm incomes appropriate interventions are also required in loss reduction through better post-harvest management and ensuring access to markets. The project offers a good institutional platform for farmers through Water Users Association in organizing collective activities for sustainable development of the sector.

141. The major crops grown in the state are rice (67% of the total cropped area), wheat (4.3%), pulses including masur, khesari and gram (2.68%), oil seeds including mustard and sesame (9.11%), fibers including jute (7.83%), potato (5.55%) and other commercial crops including tea and sugarcane (1.96%). The productivity of important crops in West Bengal, on a comparison with all India average benchmarked against maximum productivity recorded elsewhere in the country are summarized in **Table - 5.1**.

Table - 5.1. Productivity of Important Crops as Compared with All India Average and Best in India

Crop	Rice	Wheat	Pulse	Oilseed	Jute	Potato
Particulars						
West Bengal Average	2.71	2.7	0.8	1.1	15.2	35.8
All India Average	2.24	2.9	0.7	1.2		21
Best in India	3.8 (Punjab)	4.5 (Punjab)	1.3 (Kerala)	2.1 (Tamil Nadu)	15.2 West Bengal	35.8 (West Bengal)
WB as a % of India Average	121.0%	93.1%	114.3%	91.7%		170.5%
WB as a % of Best in India	71.3%	60.0%	61.5%	52.4%	100.0 %	100.0%

Source: Department of Agriculture, GoWB & Department of Agriculture & Cooperation, GoI

142. For all major crops, there is a critical gap in productivity in the state compared to all India average or the best yields achieved elsewhere in the country. This analysis is a clear indication that there is potential scope for bridging the yield gap of important crops especially rice, wheat, pulses and oil seeds in the state.

143. Interestingly the productivity levels achieved in the state shows substantial differential between irrigated and non-irrigated cultivation. As on 2007 – 2008 approximately 47% of the gross rice area still fall under rain fed condition. Though the yield gap for rice in upland is substantially bigger, there exist significant gaps even in rain fed low lands. This is also true for other crops including horticultural crops. Hence it is expected that assured availability of water and its efficient use coupled with utilization of improved production technologies, strengthening of agriculture support services as well as aligning production commercially with market opportunities would help improving the social and economic condition of the small and marginal farmers in the project area.

Crop Seasons and Crop Calendar

144. Predominantly there are three crop seasons in the state, Pre-Kharif (April to June-July), Kharif (June-July to October-November) and Rabi (October-November to March). The main crops are cultivated confining to the main crop seasons and the overall crop calendar currently being practiced in the state is given in **Attachment – 5.1**.

Main Constraints in the Agricultural Sector

145. The State Agricultural Sector is significantly challenged from a number of constraints and the main ones are summarized in **Table - 5.2**.

Table - 5.2. Constraint Analysis of Agriculture Sector

Human and Social Factors	Input related
<ul style="list-style-type: none"> • Mostly small and marginal farmers • Rain-fed crop production-Western districts • Poor awareness on good agricultural practices • Migration to non-farm activities • Poor co-ordination of advisory services 	<ul style="list-style-type: none"> • Quality seeds and input availability • Poor know how on agriculture implements • Continued use of traditional production and water management practices • Seed/planning materials of improved varieties
Post-harvest aspects	Environmental aspects
<ul style="list-style-type: none"> • Lack of agri-business enterprise orientation • Lack of market linkages • Poor integration of supply chains • Poor access to market information-price, demand 	<ul style="list-style-type: none"> • Indiscriminate pesticide use • Degradation of soil health • Less than adequate use of organic methods

Component Objectives

146. The Objective of the Agricultural Support Service Component is to enhance the production of field crops, horticulture crops and fisheries of small and marginal farmers in the project area through efficient on farm water management practices, dissemination of improved production technologies, strengthening agriculture support and advisory services and better aligning production with markets. The main focus of the component will be improving productivity as well as intensifying and diversifying production system by large scale adoption of technologies and management practices, enhancing farmer's knowledge and skill base, and post-harvest management of produce including market linkages.

Key Results

147. The success of the component will be measured through:

- Increase in yield of main agricultural crops rice, oil seeds, and vegetables, measured in MT /ha. (The main oil seed crops the project will focus are mustard and sesame; the main vegetable crops are brinjal, tomato, cauli flower and onion.
- Clients (Farmers) who have adopted an improved agricultural technology promoted by the project. This will be further bifurcated by
 - Female farmers
 - Tribal farmers
 - Small and marginal farmers

Subcomponents

148. The agriculture support services component will have four sub components namely: (i) Agriculture; (ii) Horticulture; and (iii) Fisheries.

Agriculture Subcomponents

149. **The main activities** to be financed under the project are:

- Supporting Crop Production Plans and Irrigation Plans by Water Users Association
- Demonstrations – of agronomic productivity interventions.
- Organizing Farmer Field Schools for wider adoption of demonstrated technologies
- Community based Farm Mechanization : Promotion of the concept of “Farm Machinery Hub”(Zero tillage Machine, Power tiller, seed drill, Harvester, Paddle thresher, sprayer, Duster, Cono weeding machine, Marker ,Mini Paddy de-husking machine and other need based implements.(MOM by WUA)
- Provision of infrastructure for storage of perishable and non-perishable agricultural commodities, agriculture implements, inputs managed by WUA.
- Community based seed production(seed village)-Construction of common Threshing floor
- Production of vermicomposting (Bio-fertilizer) through women groups.
- Farmer capacity building and exposure visit and organizing Kisan Mela, State Sammalen
- Capacity Building of implementing staff.
- Streamlining Farmer Advisory System through Project Program Promoters.
- Promoting and Strengthening Farmer Producer Companies for value chain integration and market linkages.

Crop Planning

150. As new Minor Irrigation Schemes will be established in existing single cropped rain fed areas, command area farmers will be helped to prepare seasonal crop plans to help them shift to irrigated agriculture with two or more crops, preferably introducing high value crops. This will be achieved through helping farmers in the command area of each scheme to prepare crop plans and water budgets. Each Water Users Association will prepare water distribution plans to help its members carry out the crop plans. The crop planning leading to the preparation of Irrigation Plans depending upon water requirement in the new cropping scenario adopted by its members. Detailed guidelines for the preparation of Irrigation System Wide Agricultural Action Plan, is given in **Attachment - 5.2**.

151. The Agricultural Action Plan will be prepared by each WUA with support of the SO, DPMU and the line department staff as part of the SDMP preparation process and which may be updated as required in subsequent crop seasons. It will be developed as per crop calendar using a participatory approach and will take account of the existing production systems, the agro-climatic and socio-economic conditions and the water available for irrigation.

Crop Demonstrations

152. The project will have demonstrations and services to enhance adoption of various technology themes suiting the agro-climatic zones in which MI Schemes are constructed/operational. Each MI Scheme will have at least one demonstration which will be repeated through Pre-Kharif, Kharif and Rabi seasons. The technology themes will be demonstrated on farmers field ‘as a package of practices’ to fully tap the yield potential of different crops, without being constrained by input availability,

farmer capacity, scalability and adoptability by small and marginal farmers. Though several agronomic productivity interventions will be identified based on farmer demands and implemented in a phased manner over the life of the project, some of the technologies ready for demonstration are: (i) Integrated Crop Management (ICM); (ii) Crop Diversification; (iii) System of Rice Intensification; (iv) Water Management: Methods Of Irrigation; (v) Conservation Agriculture; and (vi) Seed Production. The summary of the crop demonstration technologies are described in **Table - 5.3** and details given in **Attachment 5.3**.

Table - 5.3. Main Technologies for Crop Demonstration

Technology	Details	Remarks
Integrated Crop Management	Crops like Kharif paddy, borow paddy, oil seeds, wheat and pulses will be demonstrated with total package of practices covering 'seed to seed' practices.	Those farmers moving from rain-fed to irrigation to get higher income per year per unit land.
Crop Diversification	A range of cropping options with a judicious mix of crops requiring high, medium and low irrigation water along with other inputs, which would enable farmers to go for high value crops.	Will be tried in areas with farmers already practicing modern crop management including ICM.
Water Management: System Of Rice Intensification (SRI)	Will be adopted during boro cultivation with alternate wetting and drying.	Saving of 40-50% irrigation water and shortening duration by 7 to 10 days for rice cultivation.
Water Management: Method of Irrigation	Different methods of irrigation for improving water use efficiency.	
Conservation Agriculture (CA)	Integrated Management Practices like organic soil conservation, zero or minimum tillage, direct seeding, crop rotation for better management of soil, water and biological resources.	Sustainable practices for environmental conservation.
Seed production demonstrations	Seed production demonstrations in a cluster approach for popular and potential field crops like rice, wheat, pulses and oil seeds. Farmers will be trained on production, storage and quality maintenance.	For ensuring availability of quality seeds of improved varieties.

153. Varietal Introduction (VI): Varietal Introduction (replacement) is an approach that offers farmers a choice of crop varieties depending on duration, disease pest reaction better yield attributes, higher productivity, and location specific adaptability based on their socio-economic and agro-ecological condition matched to their needs. Varietal Introduction has the potential of becoming one of best approaches in research and extension especially in remote areas that are resource poor and have limited number of crop varieties.

154. Focus on high payoff interventions: The demonstrations should follow the integrated crop management approach from land preparation to harvesting of the crop, giving special attention to high payoff interventions like the following:

- Good quality seed of improved variety/hybrid which is recommended for cultivation in the area.
- Use of soil test based dose of fertilizer (including need based micro nutrients) and proper method and stage of fertilizer application, including integrated nutrient management using organic manures, bio-fertilizers and chemical fertilizers.
- Recommended seed rate and optimum time of sowing to ensure proper plant population.
- Pest, disease and weed management including integrated pest management practices.
- Improved methods of on-farm water use and promoting efficient use of land and water resources.
- SRI method of rice cultivation.
- Low cost techniques of raising disease free vegetable seedlings.
- Carrying out all crop husbandry practices from land preparation to harvesting of the crop at optimum stage to obtain highest productivity gains.

155. Additionally, the details will be modified to suit local agro-climatic conditions, production and marketing opportunities. The emphasis should be on 4-5 critical interventions in a demonstration which have high payoffs rather than thinly spreading resources by going for too many interventions.

156. **Farmer Selection:** While selecting farmers on whose land demonstration will be organized, the following aspects are to be taken care off. A progressive farmer (preferably a small or marginal farmer) from among the WUA who owns land in the command area and has the capability and resources to follow the instructions provided by the experts in a timely and complete manner will be selected for demonstration. He should also agree to disseminate the demonstrated technologies to fellow farmers in the tank village(s) and the adjoining villages. He must provide labor for carrying out all operations for preparation of land, completion of complete package practices (sowing, fertilizer application, water management, pest and weed management, etc) up to harvesting of the crop in a timely manner. The selected farmer must agree to use all the inputs provided by the project (like seed, fertilizer, IPM, etc.) for the demonstration plot only, and should neither sell these nor divert their use on his other land. In case of self-pollinated crop demonstrations, he should agree to sell/exchange the seed produced from the demonstration plot to other farmers in the village/adjoining villages on the terms decided by the project staff and WUA. This may include the prevalent rate in the village plus small additional amount in view of the good quality of the variety. He should agree to grow a small control plot by following the farmer's practice in the area. This is required for comparison of results with the improved package of practices followed in the demonstration plot. Different farmers should be selected for different demonstrations, ensuring that the project benefits do not go only to a few farmers.

157. **Site selection criteria:** Area for demonstration plot should be 0.4 Acre. The plot selected for the demonstration should preferably be on the road side and should be easily accessible. This is necessary for organizing trainings and field days at the demonstration site as well as for showing the benefits to the farmers who pass by the demonstration site. The soil type of the plot should be representative of the area. The plot should be leveled and should have access to irrigation facilities. The land should be in the head, middle and tail regions of the irrigation channel. Since on an average four demonstrations are to be organized in each tank, at least one demonstration should be organized in each of these three regions.

158. The project staff should guide the WUA in ensuring that the above criteria are followed while selecting the farmer for organizing the demonstration. The wider village community should be informed about the name of the farmer selected for organizing the demonstration, and it should be done at least two months before the sowing time so that there is adequate time to complete the preparatory work, including the completion of soil test report. All off-farm inputs (like seed, fertilizer, etc.) should be procured well in advance and delivered at the demonstration site about two weeks before the sowing time. If the demonstration involves development of any farm structures and use of pipes, micro-irrigation structures, etc. these should be procured and installed well in advance so that sowing of the crop is not delayed due to delay in completion of these works.

159. **Steps to be followed** in organizing the demonstration: Though the specific details will be determined by the nature of the demonstration and will vary from one demonstration to another, the following steps should be given adequate attention for organizing good field crop demonstrations. The larger tank community should be informed that the demonstration is being organized to disseminate improved technologies and practices to a large number of farmers in the village so that they are able to adopt them in the following years and increase their productivity and income. The treatments in the demonstration should be kept simple – one small control plot showing farmers' prevalent practice for growing that particular crop, fodder, vegetable, etc in the area, and the rest of the plot should have the complete integrated crop management technology including improved seed, recommended fertilizer dose, irrigation/rainwater management, weed control, pest management, etc. Special attention should be given to include critical inputs and management practices which have high payoff but are generally not used by the farmers in the area.

160. 3-4 training sessions should be organized at the demonstration site probably around the sowing time and other stages of the crop to educate the farmers about all the critical inputs and practices which are to be followed for obtaining the highest yield. These trainings should be given wide publicity in advance to ensure that large numbers of farmers participate. Simple brochures or handouts (in local language) listing key practices and operations should be distributed to all the participating farmers. Special attention should be given to ensure proper plant population since one of the main reasons for low productivity in the tank command areas is poor plant population. Soil of the demonstration plot should be tested well in advance so that soil test based application of fertilizers is done. All operations in the demonstration plot should be done at the optimum stage of the crop to obtain optimum yield. All other precautions and steps should be taken so as to demonstrate that the crop in the demonstration plot is visibly much better than the farmer's practice control. At maturity, the crop should be harvested and the yield of the control plot compared with the demonstration plot for quantifying increase in productivity and additional income obtained as a result of adoption of the improved technology demonstrated. A display board should be installed in each demonstration plot.

161. **Organizing field day:** As part of the demonstration a field day will be organized with the objective of using the on-farm demonstrations for disseminating improved technologies to a large number of farmers in the command area villages. As seen and believed, the field day organized at the site of each demonstration will show the benefits of adopting the improved technologies to the farmers. This should be done at a stage when marked differences in crop condition and expected yield between the demonstration plot and the control plot are clearly visible. Normally the appropriate time for organizing the field day is shortly before the harvesting of the crop.

162. The date of the field day should be decided well in advance and this should be given wide publicity in the village and adjoining villages. Steps should also be taken to ensure participation of

staff from the concerned line departments like agriculture, horticulture and animal husbandry. Steps should be taken to ensure that large number of farmers attend the field day. On the field day the farmers should be shown the control and demonstration plots and encouraged to discuss the likely benefits from the demonstrated technologies. A training session should be organized by the project staff to educate the farmers about what has been done in the demonstration plot which is different from the practice normally followed by them; when was it done, how and why; what are the likely benefits; etc. Relevant brochures and handouts should also be distributed to the farmers on the field day. Special attention should be given to educate the farmers about the critical inputs, operations and practices which they should follow to obtain highest productivity levels. In addition to short lectures covering specific aspects, farmers should give free time to ask questions so that it is more of an interactive and question answer session rather than a lecture by an expert. Special attention should be given to ask the farmers if they would like to adopt the demonstrated technologies on their farms in the next crop season, where from they can obtain various inputs like seed, fertilizer, plant protection and weed control materials, how they should carry out all the operations at the optimum stage of the crop, wherefrom they should obtain technical guidance, what are the difficulties they are likely to face in procuring the required inputs and adopting the improved practices, and how these can be addressed. Since seed is a critical input and acts as a catalyst in the adoption of other practices, in case of self-pollinated crops some arrangements should be made to distribute the seed of the demonstration plot to other farmers in the village/adjoining villages. The date of crop cutting, which will take place sometime after the field day, should be announced in the field day. The farmers should be invited to come on that day so that they can actually see the increase in productivity as a result of adoption of improved technologies demonstrated in the plot.

163. Facilitating adoption of the demonstrated technologies by large number of farmers: In order to encourage large numbers of farmers in the command area villages for adopting the critical demonstrated technologies on their fields in the years following the crop season in which the demonstration is organized, meetings of farmers will be organized in the village before the sowing season of the crop in the following year (s). Technical guidance and support should be provided to enable the farmers to acquire the required inputs by tapping into the ongoing schemes funded by Govt. of India and the GOAP, like Rashtrya Krishi Vikas Yojna, National Food Security Mission, Horticulture Mission, State Extension Reforms scheme, etc. Linkages should also be established with the state line departments of Agriculture and Horticulture, for achieving large scale adoption of the demonstrated technologies by the farmers. Based on the response, an enhanced target for the subsequent years may be fixed.

164. Evaluating success of demonstrations: The success of a demonstration should be assessed at two levels – one in terms of how well the demonstration was organized to cover all the above steps and the level of gain in productivity in the demonstration plot vis-à-vis farmer practice in the area; and second in terms of adoption rates of the demonstrated technologies by the farmers in the project villages during the years following the year in which the demonstration was organized and the gains in productivity achieved by the farmers on their fields.

165. For measuring the adoption rates in the following years, the following three parameters should be monitored:

- Number of farmers adopting new technologies. It is likely that most of the farmers may not adopt all the practices due to various constraints. Efforts should be made to facilitate adoption of critical practices which will result in substantial gains in productivity.
- Area over which the new technologies have been adopted

- Gains in productivity achieved by the farmers

166. The focus of the demonstrations should be on maximizing these three parameters. Obviously the gains in productivity levels achieved by the adopter farmers in most cases will be lower than those achieved in the on-farm demonstration plot per se, but these are an excellent indicator of the real success of on-farm demonstration because these benefits will accrue to large number of farmers (and will not be confined only to the direct beneficiary who received input support from the project) in the project area. These benefits will also be sustainable because the farmers will continue to use these improved practices. This will also substantially increase the number of households benefitting from the project, lower the cost per household, and improve the rate of return to investments under this component. The format for O.K. card given in **Attachment 5.4** should be completed and duly signed by all concerned and kept for record.

Training and Capacity Building

167. The project also proposed to organize **Exposure Visits** to selected farmers of WUA to learn directly from other farmers and institutions who have successfully implemented proposed interventions. The project plans to arrange 1080 numbers of intrastate exposure visit (among adjacent districts). Each district of exposure visit will have about 20 farmers (total 1080 farmers) and the visit for one day. The project may also conduct 3 out of state visits with each group consisting of 30 farmers (total 270 farmers). These exposure visits will be made to learn about water management and farming practices adopted in other States that have a potential to be introduced in West Bengal.

168. The **Capacity Building of Project Staff** are aimed at orienting project staff, SO staff and DPMU staff on successful conduct of demonstrations and FFS. Trainings for the line department staff will be conducted at the departmental training institutes or other state level training institutes. Resource persons of specific field from Agricultural Universities and other State and National Agriculture Institutes of repute will be hired for giving these training. The training program and training module etc. will be developed by the SPMU in collaboration with State Nodal Officers of the line department. The training of SO and DPMU staff will be carried out by the SPMU agriculture expert and resource persons from among the trained line department staff. These trainings will be carried preferably in the service area of the respective staffs, mainly at the district or cluster of district level.

169. End of crop season comprehensive **Workshops** are being planned for the five agro-climatic zones. These workshops will be conducted to review the performance of crop demonstration and FFS, fact sheets, results of adaptive trials conducted in that agro-climatic zone. Each workshop will have about 40-50 numbers of participants, including select lead farmers from each district, line department staff, SPMU, DPMU and SO staff and Agriculture University experts etc. The workshop will allow sharing of information and cross learning amongst the district teams from an agro-climatic zone facilitating improvement in the crop demonstration program for the subsequent years.

170. It is also proposed to send select line department staff, who will be associated directly with the implementation of the project for the entire implementation period, for some **Overseas Exposure** and training, particularly to countries which have similar agro-climatic conditions and have successfully implemented innovative agronomic technologies and practices that can be adopted in West Bengal. The participating staff should be willing to take this training and give undertaking that they will work for the entire project period and apply the accumulated knowledge in the project.

Focusing on WUA

171. All activities of the component will have a command area wide approach and will be anchored within the farmer institution mobilized and strengthened around the irrigation facilities set up under the project. The project aims at promoting a more proactive role of the WUAs in improving agricultural livelihoods of its members. So far, the WUAs have not taken up this role in many places. But this can help to build more regular interactions among the members and the Management Committees and can act as a common thread in binding people together to generate more resources through water charges and other agricultural support service charges. At the same time, collective action will provide more opportunities for improving productivity and increasing income. The WUAs will be involved in organizing village/WUA level camps, exposure visits, monitoring demonstrations, maintaining community assets, motivating the members for adoption of improved technology, etc.

172. The agricultural support services interventions primarily focus on agro-based activities and thus the primary beneficiaries will be the command area farmers. Relevance and need for irrigation system-wide interventions will be explained to WUAs, farmers groups and farmers. For example: a) in Kharif, one while emphasizing on methods of maximizing farmer profits (through higher crop yields, lowering cost of production including collective action/purchasing by the WUA inputs like fertilizer), a central target will be to save water b) extension efforts would not be directed towards few selected farmers, instead, a “modified FFS method” would be used as the major method of extension and, as much as possible, project inputs would be focused on collective action through the WUAs and organizing a) to maximize the use of rainfall, by planting at the right time, b) using the same variety (high-yielding and matching with soil and other conditions) by all the farmers to save ground water & energy. They can plant/sow a short-age cash crop just after (or before) harvesting crop to utilize the residual moisture, organizing and facilitating the WUA handling of agricultural inputs (e.g. seeds, fertilizer, pests, diseases and weed control chemicals) and output marketing.

Monitoring System

173. Monitoring and evaluation visits by community members, WUA members, DPMU Agriculture Specialist, Agriculture Specialist from SO, Project Program Promoters and other stakeholders will be organized to review and monitor the progress, methodology and results. The opinions and suggestions from the stakeholders would be recorded in a fact sheet by the resource person and the PPPs for improving the demonstrations in future. In addition, random periodical monitoring of the demonstrations would be done by line department staff and DPMU agriculture expert to review the implementation progress, methodologies followed, results obtained etc.

174. **Identification of best demonstration plots for reward:** Based on the gains in productivity/income achieved and taking into account the evaluations by the WUA members, SO staff, PPPs, line department staff and DPMU members, one best demonstration plot will be identified in each project district and suitably recognized. To create more interest, a quiz contest amongst D.C. owners and trainees can be conducted & or total performance evaluation may be taken up and as a token of appreciation, prize may be given.

175. Implementing agencies (line departments, WUA, field level project staff) will be responsible for collecting and reporting information on physical and financial input and output indicators as part of their regular implementation work. This data will be fed into and assimilated by a computerized Management Information System which will be set-up and managed by the SPMU. The MIS will be

designed to help consolidate, analyze, and use the data for management feedback at different levels, from scheme level to block, district, and project levels.

176. Review of fact sheets and identification of interventions for next season: After harvesting and recording the yield of the demonstration and control plots, a workshop would be organized by inviting all the stakeholders to review the results, analyze the fact sheets and identify the interventions for the next season.

Implementation Arrangements:

177. Community Service Providers

The project proposes to identify and promote Community Service Providers to strengthen demonstration and FFS implementation. They are the village level extension workers from the same village with at least 10th Pass, innovative and having interest, understanding and leadership in Agriculture activities and who have willingness to serve and work effectively in his/her working area. Para-Professionals will be activity and task based. They will be paid consolidated monthly Honorarium @ Rs.250/day for 22 days/Month excluding communication. The working area of one person will be limited to one village or Command area of about 100 Ha, as applicable. The key responsibilities of Community Service Providers are:

- Mobilizing farmers on good agriculture practices
- Identification of Lead farmer for demonstration
- Attend Cluster level Training of Trainers on Good agriculture practices
- Conduct farmer field school activities Classes and field visits to demo plots
- Assist in Distribution of agri inputs
- Ensure proper utilization of agri-inputs by lead farmer
- Record keeping of FFS and Demonstrations
- Facilitate dissemination of GAP within the village
- Reporting of FFS to DPMU
- Assist Focus Group Discussion and Farmer Field day with DPMU/SO
- Bridging the information gap between farmers and Agriculture department

178. The project will hire **Project Program Promoters** to provide direct agriculture advisory support to farmers.

Horticulture Subcomponent

179. Provision of assured irrigation water is expected to trigger diversification from field crops to high value fruits and vegetable crops. The identified fruits crops are banana, papaya, pineapple, guava, Ber and lime and vegetables crops are Bhindi (ladies finger), Tomato, Brinjal, Cauliflower, Cabbage, Capsicum, Cucurbits and Chilli though other horticulture crops may be considered on the demand of the farmers and its suitability to the local conditions. The cropped area under high value horticulture crops like vegetables and fruits are projected to cover at least 17% of the gross irrigated area created under the project.

180. **The main activities** to be carried out under the horticulture subcomponent are: (i) horticulture demonstrations; (ii) green house for high value vegetables with micro irrigation system (iii) organic nutrition kitchen garden; (iv) vermi-compost; (v) vegetable production with gravity based drip

irrigation and (vi) raising quality vegetable nursery using poly house. The main details of the activities and assistance from the project are summarized in **Table - 5.4.**

Table - 5.4. Details of Horticulture Development Activities

01 Horticulture Demonstration						
Unit Area	Activity Approach	Beneficiaries	Unit Cost	Input Items	Project Contribution	Farmers Contribution
1 Bigha (0.33 Ac.)	Individual	Depending on the irrigation facilities WUA with the help of DPMU team will decide the number of beneficiaries.	(A) For open pollinated varieties of vegetables Rs.4,900/- per 0.33 Ac. land per unit (B) For Hybrid varieties of vegetables Rs.5740/- per 0.33 Ac. land per unit.	These rates includes cost of seed, Seed treatment, Fertilizers (Nitrogen, Phosphate & Potash), Micro nutrients, Low cost bio-fertilizers, Herbicides, IPM materials & need based pesticides. Also carrying cost for supply of inputs from DPMU to field level may be incurred from 10% of total cost of demonstration.	(A) For open pollinated varieties of vegetables Rs.4,900/- per 0.33 Ac. land per unit & (B) For Hybrid varieties of vegetables Rs.5740/- per 0.33 Ac. land per unit.	All labour component, FYM application, Nursery Management, Transplanting, Weeding, Crop management, Staking, Water Management & Marketing.
Selection Criteria for beneficiaries						
<ul style="list-style-type: none"> Any women / men those are member of WUA could be a beneficiary under this project if they should have minimum 0.33 Ac. of homestead land & not more than 2.5 Acre of land. It means they should come under small & marginal farmers. Individual member of any WUAs with having assured irrigation facilities shall be eligible for getting the technical support & benefit under this program. WUA is the sole authority to select & recommend the list of beneficiaries with due consultation of DPMU team. They should have some basic knowledge on vegetable cultivation, so that they can easily understood the basic need, practices & regarding crop management issues. They should agree with WUA assuring their presence, involvement & cultivation of vegetable crops as a demonstration for one season minimum. 						
Distribution of Profit						
Individual profit from demonstration plot as per actual after deducting their labour components.						

02 High Value Vegetable Production with Micro Irrigation						
Unit Area	Activity Approach	Beneficiaries	Unit Cost	Input Items	Project Contribution	Farmers Contribution
500 SQM (0.125 Ac.)	Group approach (Maximum 2-4 members per WUA)	2 to 4 farmers / unit	Rs.6,35,000/-	(1) Cost of open ventilated Green house in 500 SQM is Rs.5,30,000/- (2) Cost of Micro irrigation system in 500 SQM is Rs.80,000/-	(a) Rs.6,35,000/- (Six lakh thirty five thousand only)	All labour component, FYM application, Nursery Management, Transplanting, Weeding, Crop

				(3) Rs.25,000/- for Cost of nursery (Plug tray nursery which includes “Coco peat, vermin-compost, Organic manure, Pesticides etc) & Crop management cost which includes (Soluble fertilizers & Micronutrients such as “19:19:19, 12:61:00, 46:00:00, MgSo4, CaNo3, FeSo4, ZnSo4 & Boron, PPC & other biological control materials) & for promotion of market linkage under post-harvest management 10 plastic crates can be given to the beneficiaries per unit for transportation of produce.		management, Staking, Water Management & Marketing.
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Selection Criteria for beneficiaries

- Any women / men those are member of WUA could be a beneficiary under this project if they have minimum 0.125 Ac. homestead land & not more than 2.5 acre of land. It means they should come under small & marginal farmers.
- A group of 2 (or) maximum 4 women / men / mixed (both male & female members) of any WUAs shall be eligible with having homestead land of 500 SQM, for getting the technical support under this program.
- WUA is the sole authority to select & recommend the list of beneficiaries with due consultation of DPMU team.
- They should have some basic knowledge on vegetable cultivation, so that they can easily understood the basic need, practices & regarding crop management issues.
- They should agree of the policy of WUA assuring their presence, involvement & cultivation of high value vegetable crops for a period of three years minimum for their sustainability with the support of project.
- If any group fail to manage the Green house (or) not utilize the Green house cultivation in future, then WUA have power to hand over the SAME (GREEN HOUSE) to other beneficiaries, because it is the assets of WUA not of any individual.
- As a token of taking benefit from the project through WUA the beneficiaries should pay a lump sum amount decide by the WUA “@ Rs.4,000/- (or) @ Rs.8,000/- (or) @ Rs.10,000/- per season” before (or) after each cultivation for avail the Green house benefit as their user’s charges for getting the benefit freely.

Distribution of Profit

Among the members of Greenhouse but they should invest their input cost for the second crops from their benefit (or) profit.

03 Organic Nutrition Kitchen Garden

Unit Area	Activity Approach	Beneficiaries	Unit Cost	Input Items	Project Contribution	Farmers Contribution
0.05 Ac (200 SQM) / Beneficiary (Total One	Group approach (Maximum 20 members of WUA)	20 farmers / unit	Rs.96,000/- (For 20 farmers)	(1) Seed cost @ Rs.600/- (2) Vermi-compost @ Rs.1200/- (3) Crop guard @ Rs.200/- (4) Compost pit Rs.10,000/- @ Rs.500/- each & (5) for Treadle pump Rs.46,000/- @ Rs.11,500/- each (i.e. One pump per 5	Rs.96,000/- (Ninety-six thousand only)	All labour component, FYM application, Nursery Management, Transplanting, Weeding, Crop management, Staking, Water

acre-4000 SQM)				members i.e. four pump per 20 members only)		Management & Marketing.
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Selection Criteria for beneficiaries

- Any women those are member of WUA could be a beneficiary under this project if they have minimum 0.125 Ac. homestead land & not more than 2.5 Acre of land, it means they should come under small & marginal farmers.
- A group of 20 women members of any WUAs shall be eligible with having homestead land of 200 SQM each, for getting the technical support & benefit under this program.
- WUA is the sole authority to select & recommend the list of beneficiaries with due consultation of DPMU team.
- They should have some basic knowledge on vegetable cultivation, so that they can easily understood the basic need, practices & regarding crop management issues.
- They should agree about the policy of WUA & assuring their presence, involvement & cultivation of high value vegetable crops for a period of three years minimum for their sustainability with the support of project.
- All four sets of TREADLE PUMP belong to WUA assets not of any individual.
- If any beneficiaries fail to manage the Nutrition garden (or) not utilize the implements in future, then WUA have power to hand over the SAME (benefit) to other beneficiaries, because it is the assets of WUA not of any individual.
- As a token of taking benefit from the project through WUA each beneficiaries should pay a lump sum amount decide by the WUA may be “@ Rs.500/- (or) @ Rs.750/- (or) @ Rs.1000/- per season” before (or) after each cultivation for avail the Nutrition Garden benefit as their user’s charges for getting the benefit freely.

Distribution of Profit

Each members of Nutrition Garden will share their benefit of their own but they should invest their own input cost for their second crops from their benefit (or) profit to manage this Nutrition Garden effectively.

04 Vermi Compost

Unit Area	Activity Approach	Beneficiaries	Unit Cost	Input Items	Project Contribution	Farmers Contribution
21 SQM	Group approach (Maximum 5 members of WUA) Unit cost: Rs.53,000/-	5 farmers /unit	Rs.53,000/-	(1) Construction of Vermi-compost Pit @ Rs.49,880/- (2) Vermi 4 kg of Rs.3120/-	Rs.53,000/- (Fifty three thousand only)	All labour components, Water Management & Marketing.

Selection Criteria for beneficiaries

- Any women member of WUA could be a beneficiary under this project if they have minimum 0.01 Ac. homestead land & not more than 2.5 Acre of land, it means they should come under small & marginal farmers.
- A group of 5 women members of any WUAs shall be eligible for getting the technical support & benefit under this program.
- WUA is the sole authority to select & recommend the list of beneficiaries with due consultation of DPMU team.
- They should have some basic knowledge on vegetable cultivation & use of vermicompost so that they can easily understood the basic need, practices & regarding vermicompost production & management issues.

- They should agree with the policy of WUA to manage this program, their presence, involvement & production (or) selling of vermicompost for a period of three years minimum for their sustainability with the support of project.
- If any beneficiaries fail to manage the vermicompost pit (or) not utilize the pit in future, then WUA have power to hand over the SAME (benefit) to other beneficiaries, because it is the assets of WUA not of any individual.
- As a token of taking the benefit from the project through WUA each beneficiaries should pay a lump sum amount decide by the WUA may be “@ Rs.400/- (or) @ Rs.600/- (or) @ Rs.1,000/- per group” before (or) after each production for avail the vermicompost benefit as their user’s charges for getting the benefit freely.

Distribution of Profit

Five members under vermi-compost production programme will share their benefit equally among them but they should invest their own input cost for their second crops from their benefit (or) profit to manage this vermi-compost production activity effectively.

05 Gravity based Drip Irrigation System for Vegetable Production

Unit Area	Activity Approach	Beneficiaries	Unit Cost	Input Items	Project Contribution	Farmers Contribution
1000 SQM (0.25 Ac.)	Group approach but each beneficiary should have (his / her) own land.	1 farmer / unit	Rs.49,500/-	(1) Cost of Drip system with pressure compensated dripper line in 1000 SQM is Rs.29,000/- (2) Cost of 1000 liters water tank is Rs.7,000/- & (3) Cost of nursery & Crop management cost (Plug tray nursery which includes “Coco peat, vermin-compost, Organic manure, Water soluble fertilizers, Micronutrients, Hormone, PPC & other biological pest control materials)	49,500/-	All labour component, FYM application, Nursery Management, Transplanting, Weeding, Crop management, Staking, Water Management & Marketing.

Selection Criteria for beneficiaries

- Any women / men those are member of WUA could be a beneficiary under this project & they should have minimum 0.25 Ac. (1000 SQM) homestead land & not more than 2.5 Acre of land. It means they should come under small & marginal farmers.
- Any male (or) female member of any WUAs shall be eligible for getting the technical support under this program.
- WUA is the sole authority to select & recommend the list of beneficiaries with due consultation of DPMU team.
- They should have some basic knowledge on vegetable cultivation, so that they can easily understood the basic need, practices & regarding crop management issues.
- They should agree with the WUA policy & assuring their presence, involvement & cultivation of vegetable crops for a period of three years minimum for their sustainability with the support of project.
- If any member fail to manage the Drip system (or) not utilize the Drip system in future, then WUA have power to hand over the SAME (Drip system & water tank) to other beneficiaries, because it is the assets of WUA not of any individual.
- As a token of taking benefit from the project through WUA the beneficiaries should pay a lump sum amount decide by the WUA that may be “@ Rs.5,000/- (or) @ Rs.7,500/- (or) @ Rs.10,000/- per farmer per season” before (or) after EACH cultivation for avail the Drip system benefit as their USER’S CHARGES for getting the benefit freely.

Distribution of Profit

Each member of Drip irrigation vegetable cultivation avail their benefit individually but each farmer should invest their INPUT COST for the second crops from their benefit (or) profit.

06 Poly House with Shade Net for Raising Quality Vegetable Nursery						
Unit Area	Activity Approach	Beneficiaries	Unit Cost	Input Items	Project Contribution	Farmers Contribution
96 SQM (Size: 12 meter *8 meter)	Group approach	10 farmer/unit	Rs.1,50,000/-	Installation of Poly house with shade net & with bricks soling.	Rs.1,50,000/-	All labour components, Nursery Management, Water Management, Fencing the area & Marketing.
Selection Criteria for beneficiaries						
<ul style="list-style-type: none"> Any women / men those are member of any WUA could be a beneficiary under this project & they should have minimum 0.25 Ac. homestead land & not more than 2.5 Acre of land. It means they should come under small & marginal farmers. Only selected 10 drip farmers of any cluster i.e. male (or) female members (or) mixed (both male & female) of any WUAs shall be eligible for getting the technical support under this program. WUA is the sole authority to select & recommend the list of beneficiaries with due consultation of DPMU team. They should have some basic knowledge on vegetable cultivation, so that they can easily understood the basic need, practices & regarding nursery management issues. They should agree with the policy of WUA & assuring their presence, involvement & raising good quality vegetable seedlings for a period of three years minimum for their sustainability with the support of project. If any group fail to manage the Poly house (or) not utilize the Poly house for raising vegetable nursery in future, then WUA have power to hand over the same (Poly house) to other beneficiaries, because it is the assets of WUA not of any individual. The land should belong to any of the member of that 10 members group with having proper formalities with the WUA seeking no objection for installation of Poly house for three years minimum. As a token of taking benefit from the project through WUA the beneficiaries should pay a lump sum amount decide by the WUA that may be “@ Rs.5,000/- (or) @ Rs.7,500/- (or) @ Rs.10,000/- per group per season” before (or) after each cultivation for avail the Poly house benefit as their user’s charges for getting the benefit freely. 						
Distribution of Profit						
Each member of Drip irrigation vegetable cultivation avail this benefit individually but each farmer should invest their input cost for the second phase nursery raising from their own benefit (or) profit.						

181. The detailed guidelines for Organic Kitchen Garden are given in **Attachment 5.5**. Attachment 5.6 contains the details of High Tech Poly Green House

Fisheries Subcomponent

182. The fisheries component of project will be implemented in only eight districts, namely Jalpaiguri, Alipurduar, Birkhum, Bankura, Burdwan, Paschim Medinipur, Purulia and Darjeling covering a total area of about 989 ha. The beneficiaries for fisheries development will be landless and marginal farmers who are members of the WUAs of the MI scheme in which the fishery intervention is being made. The WUA will constitute a Fisheries Community Association to look after the day to day operation of the fisheries activities. The fishery activities will provide the beneficiaries an additional source of employment and income and also a source for generating additional revenue for the WUA to take up operation and maintenance of the pond.

183. The main activities to be financed under the project are:

- *Selection of water bodies, beneficiaries and supporting fish production Plans*
- *Fish Farming Demonstrations*
- *Training of fish farmers and exposure visits.*
- *Community based fingerlings production.*
- *Identification and training of lead fish farmers (Matsya Mitra)*
- *Community based fingerlings production.*
- *Capacity Building of implementing staff*

184. The fishery activities can be undertaken in any of the project villages within or outside the command area of a minor irrigation scheme under the project. The **Selection of Water Bodies** for fish cultivation, selection of landless and marginal farmers as beneficiaries will follow a step by step approach leading to planning of the activity. The steps are:

- SO and DPMU staff under the guidance of the line department staff to identify WDS and SFMI schemes that are conducive for fishery development interventions;
- SO and DPMU staff will organize a meeting with the WUA members to create awareness about the potential for fish farming in their area including the type of fish farming that is suitable for their MI scheme. During the meeting an agreement will be arrived at with the WUA on taking up fishery development activity with them;
- SO and DPMU staff under the guidance of the line department staff will collect the measurement of water body and other data required for the line department staff to plan the fishery development intervention for the MI scheme;
- The WUA will constitute a Fishers Community Association (FCA) within the WUA members who will be the fishery development activity beneficiaries. The SO staff will assist the WUA in formation of the FCA.
- The WUA will enter into an agreement with the pond owner, handing over the pond to FCA for five years.
- The SO and DPMU will collect the list of identified FCA members from the WUA for organizing training and exposure visit;
- The line department staff in coordination with the SO and DPMU staff and in consultation with the WUA will select the lead fish farmer and provide him / her with the Matsya Mitra training;
- On approval of implementation of the fishery development intervention by the DLIC and the SPMU, the DPMU will make the requisite funds available to the WUA to purchase the first year's inputs for the fish farming activity under the guidance of the line department staff.

Fishers Community Association

185. The Fishers Community Association (FCA) is an informal functional group of fish farmers working under the overall guidance and supervision of WUA. Depending upon the water bodies selected for implementation, the fishers living around will be mobilized into FCA. About 20 of them will constitute the FCA who will be inducted as WUA members, if they are not already its members. If a private water body is used for fish culture necessary least agreement will be signed for a minimum period of five years with WUA. The details of the members of the FCA are given in **Table - 5.5.**

Table - 5.5. Details of FCA Members

Sl.no.	Position	No (10)	Post
1.	President	1	Selected by WUA
2.	Secretary	1	Selected by WUA
3.	Treasurer	1	Selected by WUA
4.	Lead farmers	2	Selected by WUA
5.	Feed workers	2	Selected by WUA
6.	Netting workers	2	Selected by WUA
7.	Fish sellers	2	Selected by WUA
8.	Reporters	1	Selected by WUA.
9.	Common fishers	8	Selected by WUA
<i>At least 7 persons will be from woman-in any position</i>			

186. The detailed responsibilities of the different members of the FCA are given in **Attachment 5.7**.

Training Activities

187. Fisheries department will cover block level fisheries extension officers and district and State level nodal officers involved in project implementation. The project will organize tailor made training at the Central Institute of Fisheries Education, Mumbai (Kolkata centre), the Central Institute of Freshwater Aquaculture, Bhubaneswar, Central Inland Fisheries Research Institute, and in other ICAR/GoI fishery research institutes on relevant technologies and packages of best practices. In order to provide exposure to line department staff on advanced technologies in the field of fisheries management covering culture technologies, best harvesting practices, health management, post-harvest, marketing, policies and socio-economic aspects, the project will organize training cum exposure visits to foreign countries which are climatologically and farming practices wise comparable to West Bengal i.e. China, Thailand, Vietnam, etc. About twelve line department officers will be imparted overseas training by the project. The different training programs to be organized at various levels are summarized in **Table - 5.6**.

Table - 5.6. Details of different types of training on Fisheries

Type	Subject	Training held at	Trainees	Trainer	Duration
General /Basic course	Basic fishery, various technology, pathogens & remedies, post-harvest technology	DPMU	Community worker of supporting organization	Dept. fisheries officer, fisheries Spl., Farm expert, Fisheries NGO, Leading Company	1 day
Cluster level course	Implementing technological session	SPMU	PPP/Fisheries Specialist	Fisheries Coordinator/State Fishery Dept.	2 days
FIG level course	Every session of the adoption technology	Implementing project village	Members of the FIG	PPP	6-9months
Community level course for awareness	Essence of Fish farming	Project Village/nearby locality	New fisheries interest person/existing fishers	PPP/SO	1 day

Type	Subject	Training held at	Trainees	Trainer	Duration
General /Basic course	Basic fishery, various technology, pathogens & remedies, post-harvest technology	DPMU	Community worker of supporting organization	Dept. fisheries officer, fisheries Spl., Farm expert, Fisheries NGO, Leading Company	1 day
Institutional course	Specific advance technology	Research institute, SFU/aboard	Selected FIG by DPMU, field level officers	Scientist/Lecturer of research institute or SAU	Weekly/bi-weekly/

188. The project has prepared different training modules for the smooth conduct of the training programs and its details are given in **Attachment 5.8**.

189. The fish farming **Demonstrations** will be separately planned for seasonal (ponds with 5 feet depth of water for about six months a year) and perennial ponds. The demonstrations for seasonal ponds are aimed at improving aquaculture productivity and consist of: (i) composite fish farming (47 ponds with around 47 ha. Water spread area); (ii) Pangus Mono Culture Demonstration (70 ponds with 70 ha water spread area). The demonstration for perennial ponds consists of: (i) Intensive composite fish farming; and (ii) poly culture. All demonstrations will be for optimal technologies like stocking density, feeding, water quality monitoring etc. Depending upon year wise schedule of MI structure under the project, the extent of fishery development intervention is given in **Table - 5.7**.

Table - 5.7. Area of Fishery Demonstration

Project Year	Water Spread Area to be Covered under Fishery Demonstration (ha)	Percentage of Total Target Area
Year 01	97	10%
Year 02	199	20%
Year 03	302	31%
Year 04	236	24%
Year 05	155	15%
Total	989	100%

190. The demonstrating farmers will be provided with critical input costs for the first year and technical guidance. The project will also organize basic two days training on fish farming practices to about 5430 project beneficiaries which will also include field visit. With a view to provide technical facilitation and advisory support to fish farmers, a cadre of **Lead Fish Farmers (Matsya Mitra)** will be selected from amount the beneficiaries and provided with advanced training in fish farming and management practices. One Matsya Mitra for each fish farming demonstration will be trained to ensure sustainable management of the fish farms developed under the project. The training module will be prepared by the SPMU in consultation with the line department nodal officer and the trainings will be provided by the district level line department staff in coordination with the SO and DPMU staff. Training material will also be prepared in local language by the SPMU for distribution among the trainees.

191. In addition it is proposed to organize **Exposure Visits** for about 400 fishery development beneficiaries to other States for studying best practices that can be developed back in the project area.

192. With a view to share experience and disseminate lessons learned from fishery development activities implemented under the project one annual State level fishery development **Workshop** is proposed to be organized by the project. Around 100 participants will participate in the workshop representing project staff, line department staff, lead fish farmers, representatives of fishery development and research institutes.

193. The fishery development interventions is therefore expected to provide additional employment to about 5,430 landless and marginal farmers in the project area and produce around 3062 tons fish and around 293 tons prawns during the project period against the current production of 558 tons, ie. an incremental production of around 2,504 tons fish and 293 ton prawns during project period.

Monitoring Arrangement for the Component

194. In line with the overall monitoring learning and evaluation framework of the project, the monitoring of the component activities will be done at four levels: (i) Water User Association Level; (ii) SO Level; (iii) DPMU Level; and (iv) State Level.

195. At the **WUA level**, participatory monitoring will be done. SPMU will develop simple monitoring formats for the activities to record inputs, outputs and returns to farmers in consultation with the SO and DPMU and test it with select WUAs before finalizing it (sample of formats given below). The formats will be introduced to the WUAs to carry out self-monitoring. First the WUAs and the lead / beneficiary farmers will be trained on applying these formats by the SO staff, who would then maintain them for the season. After each cropping / annual season, the findings in the formats will be analyzed and discussed in a WUA General Body meeting. The SO, DPMU and line department staff will assist the WUA in making these assessments and facilitate discussions during the meeting. The self-monitoring exercises will be done under the supervision of the WUA M&E Sub-committee. Based on the self-monitoring and assessment, the SO and DPMU staff, in consultation with the WUA, will identify the weaknesses and shortfalls in the ASS interventions and suggest corrective measures for future interventions. The findings of the WUA self-monitoring will be compiled by the SO staff into a comprehensive report for submission to the DPMU.

196. At the **SO level**, monthly physical and financial progress reports on ASS activities will be submitted by the SO to the DPMU through the Project MIS. Similarly, the SOs will also submit progress report against annual action plan on quarterly basis to the DPMU. They will also submit half yearly and annual report as stated in their contract for progress review to the DPMU. The SPMU in consultation with DPMU and SOs will prepare the formats for monthly, quarterly, half yearly and annual physical and financial progress reports to be submitted by the SOs.

197. At the **District Level** the physical and financial progress reports submitted by the SOs will be compiled and reviewed against the ASS action plans to monitor timely and effective completion of the scheduled work, identify scheduled work left incomplete and suggest actions to be taken therein by the SO. The DPMU will also directly monitor a sample of the ASS work progress within its work area to cross verify performance and determine actions to be taken to improve performance in implementation. The DPMU will compile the SO progress reports and its own monitoring reports into

monthly physical and financial progress report for a district and submit it to the SPMU for review through the project MIS.

198. At **State Level**, with in the SPMU dedicated persons for ASS component will monitor progress in implementation of ASS activities based on the physical and financial progress report submitted by the DPMU. SPMU will also assess ASS performance through periodic field visits. The SPMU will prepare quarterly, half yearly and annual progress reports to be submitted to the Project Steering Committee, GoWB and the World Bank for review through the Project MIS. SPMU will also undertake case study and document best practices of ASS activities every year.

Implementation Arrangements

199. At the **State Level**, the implementation responsibility will be shared between SPMU Specialists dedicated for the component and Nodal Units of the participating line departments. The implementation responsibility and monitoring will hence be shared between the permanent government mechanism and consultancy arrangement to supplement line departments. Hence, strategic planning, visioning and building partnerships form a core function at the project level.

200. At the SPMU Level it is planned to hire one Expert each to look after the agriculture, horticulture and fisheries activities proposed under the project. Developing the ASS strategy for the project, capacity building of SO and DPMU project staff and monitoring ASS activities will be the main function at the SPMU ASS specialist. The SPMU will also be responsible for overall coordination of the entire agricultural support services activities with the respective line departments.

201. The line departments at the state and district level are envisaged to provide technical back stopping to the project for ASS activities. It is therefore proposed to set up nodal units in the respective departments at state level for smooth coordination with the SPMU for overall planning, implementation and monitoring of ASS activities under the project and for co-ordination at the district and sub-divisional level with the DPMU and SOs for smooth planning, implementation and monitoring of ASS activities at the field level. The SPMU will coordinate with the Nodal Units at the state level while the DPMU will coordinate with the nodal unit at the district level.

202. Accordingly, it is proposed to set-up a State Level Nodal Unit at the Head Quarter of the Departments of Agriculture, Horticulture and Fishery with one senior officer as a Nodal Officer and with at least two Deputy Director or Assistant Director level officers (only one Deputy Director or Assistant Director level officers for Fishery Department) devoted to planning, supervision and monitoring of project ASS activities from the State level. The activities which are to be executed by the State Nodal Unit include preparing the respective overall ASS strategy and action plan for the project in consultation with the SPMU, conducting training of line departmental and SO and DPMU staff, organizing inter-state exposure visits for farmers and overseas trainings for departmental staff / officers, selection of technologies for demonstrations / adaptive trials, monitoring and review of respective ASS activity implementation and outcomes and overall assist the project in achieving its proposed ASS results. Consequently, out of the two proposed Deputy Director level officers at the Nodal Unit of the line departments one is proposed to be from the Administrative Wing and one from the Research Wing of the department. Moreover, for follow-up activities on surveying on adoption of the demonstrated technologies in the project area, the Evaluation Wing of the departments is proposed to be involved at the State as well as district level.

203. The State Nodal Unit in the line departments will keep close liaison with SPMU to prepare project action plan and technically support execution. All ASS works will be implemented through the district level offices of the line department in coordination and support of the DPMU and SO. The Nodal Units

at the State Level will also monitor implementation of ASS activities through the district level offices. They will also act on the feedback from the district level offices and follow it up with the SPMU. The Nodal Unit will also help assist in ASS activity documentation and adaptive research.

204. It is also proposed to hire contractual staff at the Nodal Unit in the line departments during the implementation stage of the project who will be paid out of the project funds.

- For the Agriculture Department one Agriculture Coordinator, one Monitoring and Evaluation Specialist, two Accountants and three Computer Operators are proposed to be hired at the Implementation stage of the project and placed in the Nodal Unit under the Nodal Officer.
- For Horticulture Department it is proposed one Horticulture Coordinator and one Accountant cum Computer Operator is proposed to be hired at the Implementation stage of the project and placed in the Nodal Unit under the Nodal Officer.

205. For Fishery Department it is proposed one Accountant cum Computer Operator and one Grade IV staff is proposed to be hired at the Implementation stage of the project and placed in the Nodal Unit under the Nodal Officer.

206. At the **District Level**, similar to the arrangement at the State Level the implementation and monitoring responsibility will be shared between district level line department units, a DPMU and Support Organization.

207. The district level officers of line departments will have a critical role in implementing ASS activities under the Project. They will operate through their existing staffs and the Project Program Promoters (PPPs) who will be hired for the Project by the DPMU and be placed at the sub divisional offices of the line departments (Agriculture / Horticulture). The district line departments' officers will provide his technical expertise and guidance to the DPMU in identifying the type of demonstrations to be taken up, quantify and assist in procurement of needed good quality inputs required for the demonstrations and provide technical support in conducting the demonstrations. They will also assist in the identifying and selection of lead farmers / Matsya Mitra in coordination with the SO Agriculture Coordinator and the WUA and then assist in providing them with training. They will assist in monitoring ASS activities by reviewing the demonstration Fact Sheets prepared by the lead farmers and suggest review and re orientation of demonstration technologies to the DPMU as well as the State Nodal Units. They will take part in the seasonal workshops and assist plan and implement adaptive trails. In performing all these activities the district line department officers will coordinate with the DPMU ASS expert and the SO Agricultural Coordinators.

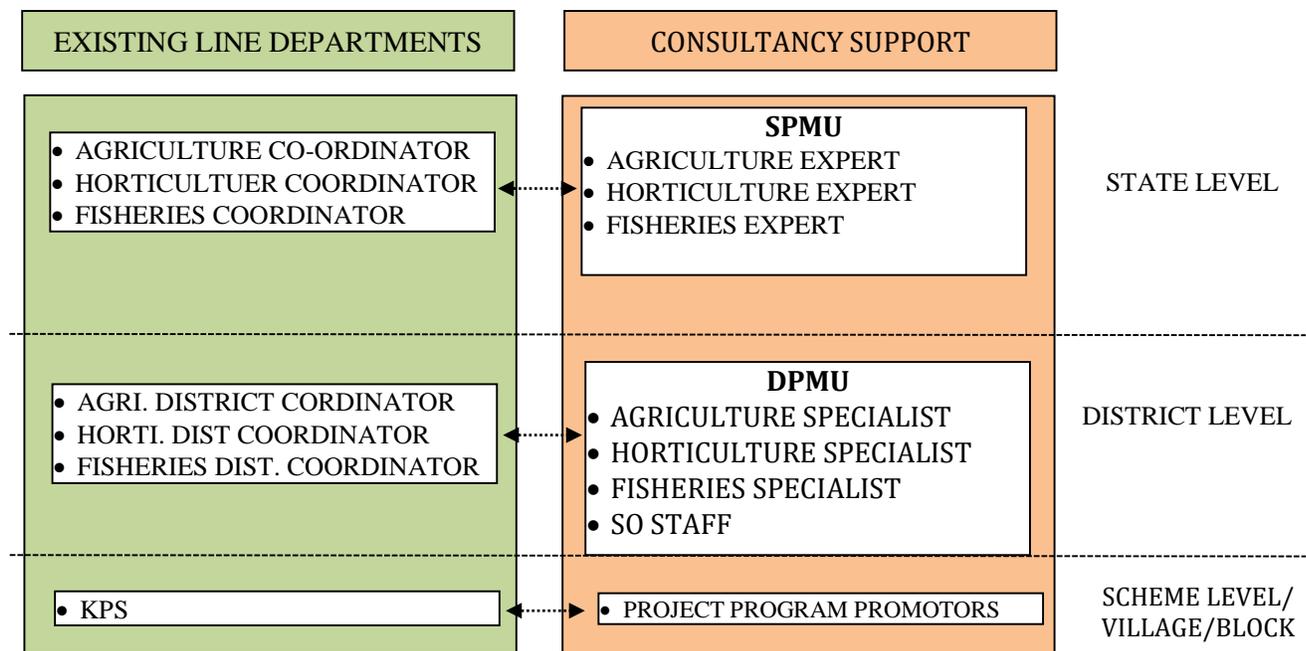
208. The DPMU will have one Agriculture Expert AND one Fisheries Expert who will work as district level coordinators for the agriculture / horticulture and fishery activities respectively. The DPMU ASS experts will have the primary responsibility of planning and implementing the MI scheme based ASS activities. This includes design, and development of the district level ASS strategy covering identification of ASS opportunities, linking them to operational areas, capacity building of farmers and SO staff, identification of resource persons for FFS, allotment of demonstrations to resource persons, reviewing progress of works, identification of partner organizations such as KVKs, ATMAs and agriculture research stations and working out the area and operational modalities for the partnership, liaison with district line department nodal units and monitoring and reporting ASS activity progress to SPMU. The DPMU ASS experts will be in continuous interactions with the Agriculture Coordinator of the SOs and the WUAs while performing these responsibilities.

209. The DPMU ASS experts will finally be responsible for procurement of all goods and services for ASS activities as per the project (World Bank) procurement norms and procedures and distribute them to the demonstration site under the custody of the WUA well in advance of the crop-growing season. This will also be done in coordination and with the help of SO Agriculture Coordinator.

210. Support Organization (SO) will be hired at district level to work directly with the WUAs and farmers in the field. Each SO will have one Agriculture Coordinator who will be responsible for supporting WUAs in planning, implementing and monitoring ASS activities at the MI scheme level. They will be responsible for organizing the demonstrations, FFS, farmer intra-state exposure visits, conducting field level awareness campaigns, conducting regular meetings with WUAs on ASS activities, monitoring and reporting progress to DPMU on a regular basis. They will also be responsible for assisting the WUAs in preparing the ASS Action Plan, the seasonal crop and irrigation plan, forming common interest groups for fishery and conducting self-monitoring of ASS activities by the WUAs.

211. To supplement the human resources of the district line departments, the project will hire and place Project Program Promoters (PPPs) at the sub-divisional level as ASS facilitators at the disposal of the district line department offices. The PPPs will keep liaison with the ASS experts in the DPMU, the district line departments' office, the SO Agriculture Specialist and the WUAs / farmers in conducting demonstrations / FFS as well as farmer trainings. The work of the PPPs will be jointly monitored by the DPMU and the district line department officers. The roles and responsibilities of different positions are given in **Attachment 5.8**. The overall implementation arrangement for the component is given in **Figure - 5.2**.

Figure - 5.2 Overall Implementation Arrangement for the Component



CHAPTER -06 COMPONENTS D - PROJECT MANAGEMENT

212. The project would be implemented by Department of Water Resource Investigation and Development (DWRID) Government of West Bengal. In addition departments of Agriculture, Food

Processing Industries and Horticulture and Fisheries are also involved in implementation. The project management component would facilitate overall coordination, implementation, monitoring and learning of the project at state, district and scheme level.

213. The policy of GOB has been to handover completed MI schemes to be beneficiaries for management operation and maintenance. The DWRID has been implementing MI schemes with an average annual spending of USD 50 million envisaging construction of up to 70 MI schemes. Though the department possesses the capacity to implement MI schemes, the project design calls for intensive technical assistance especially in surface flow based schemes. Departing from the usual implementation modalities the project envisages a community based implementation approach which require additional capacities in the areas of social, community institutions, monitoring etc. Hence the component would aim at strengthening the man power support to the DWRID in areas where the department lacks necessary skills and functional areas.

Objectives

214. The objective of the component is to ensure smooth implementation of project activities, monitoring of project implementation progress and outputs/outcomes achieved and learning from project experience.

Main Component Activities

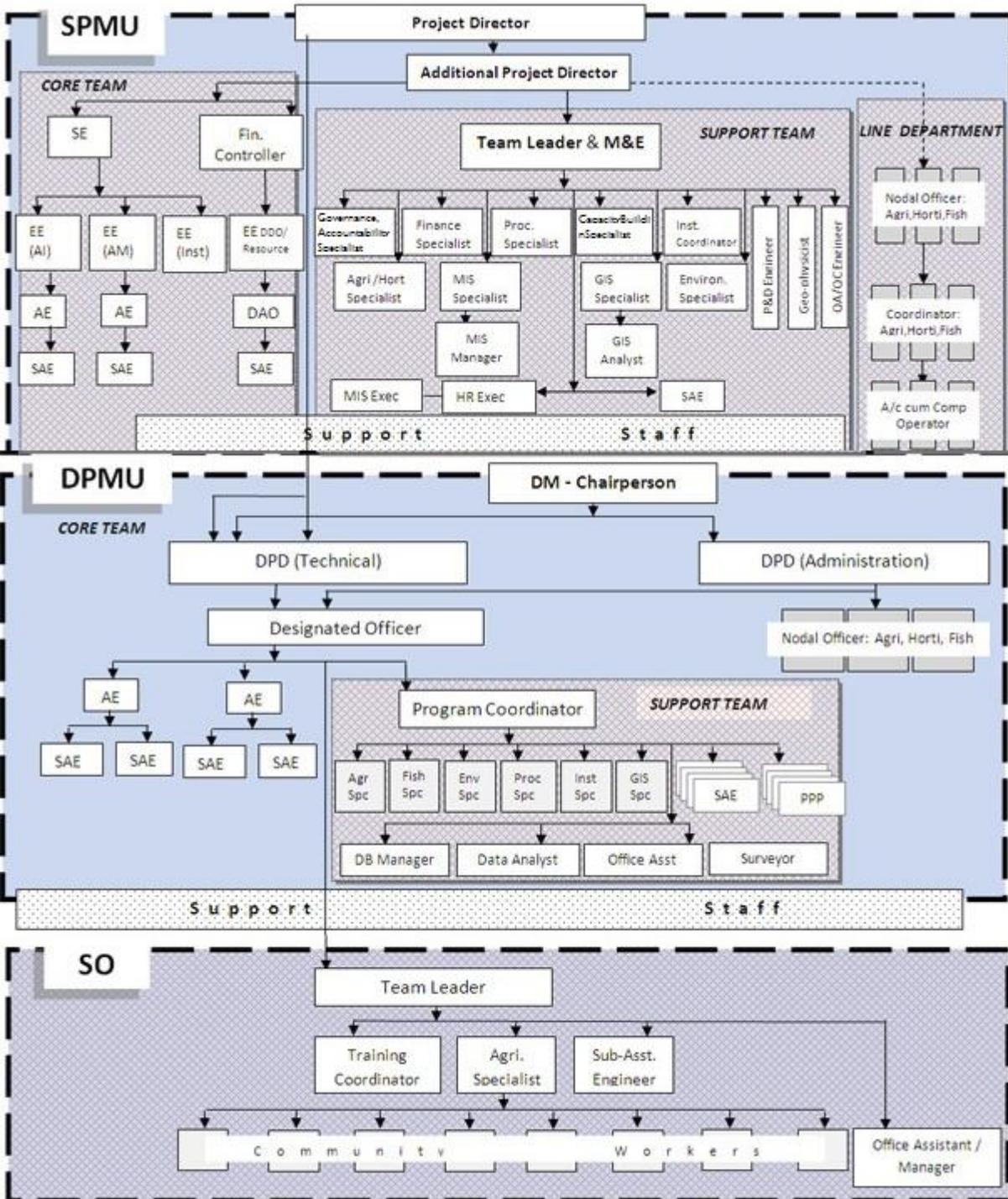
215. The component would help setting up and strengthening state and district level implementation support arrangements, providing office infrastructure and logistic support and setting up of monitoring evaluation and learning systems. Specifically the component activities are:

- Supporting State Project Management Unit (SPMU) and District Project Management Units within (DWRID);
- Supporting Co-ordination Units within Departments of Agriculture, Food Processing Industries and Horticulture and Fisheries for liaison and conversion activities;
- Contracting Resource Agencies to provide a support team of specialists within SPMU and DPMU to supplement DWRID skills during the project period;
- Designing and establishing a project specific Management Information System (MIS);
- Setting up and running the project monitoring learning and evaluation activities including M and E consultants;
- Developing and disseminating IEC and other communication material;
- Establishing water quality labs, remote sensing GIS labs etc. to strengthen DWRID; and
- Designing and implementing evaluation studies including special studies.

Project Implementation Arrangement

216. The overall implementation arrangement is shown in **Figure – 6.1**.

Figure – 6.1 Overall Project Implementation Arrangement



***Note:** SPMU: State Project Monitoring Unit; DPMU: District Project Monitoring Unit; SO: Support Organization
 DAO – Divisional Accounts Officer; PPP – Project Progress Promoter

217. The project institutional arrangement has been put in place through the government order No. 2039-MI/2R-7/99 dated 1.6.99 issued by DWRID, Government of West Bengal. The arrangement consists of a State Level Project Steering Committee headed by Principal Secretary DWRID for overall

monitoring and oversight, a State Project Management Unit (SPMU) headed by Project Director for overall project implementation. The SPMU consists of a combination of seconded government staff and a team of contractual staff provided through a consulting firm. The arrangement at the district level correspondingly includes the District Level Implementation Committee (DLIC) headed by the District Magistrate and District Project Management Unit (DPMU) headed by District Project Directors. The DPMUs are staffed with seconded officers from the department and contracts staff provided by the consulting firm. The scheme level support and facilitation to WUA is provided by Support Organizations, which are NGO hired for the purpose. The cost and other support for SOs are provided for in the Component A - Institutional Strengthening.

218. The overall project team composition is given in **Table – 6.1**.

Table – 6.1. Overall Project Team Details

S No	Team	Current Numbers	Approved Numbers	Proposed New
1	SPMU Core Staff	12	12	0
2	SPMU Consulting Team	22	27	0
3	SPMU Contractual	5	6	2
4	DPMU Core	139	139	0
5	DPMU Consulting	20	44	0
6	DPMU Contractual	156	228	18
7	Support Organization	137	156	30
	Grand Total	491	612	50

State level Project Steering Committee

219. The project at the state level will be reviewed by a Project Steering Committee with the Chief Secretary as the Chairperson. The Project Director will be the Member Convener of Project Steering Committee. The other members of the Project Steering Committee will be:

- Principal Secretary, DWRID
- Engineer-in-Chief & EO Secretary, DWRID
- Secretary Finance
- Secretary, Agriculture
- Secretary, Horticulture
- Secretary, Fisheries
- Secretary, Animal Husbandry
- Secretary, I&WD
- Secretary, Panchayat & Rural Development

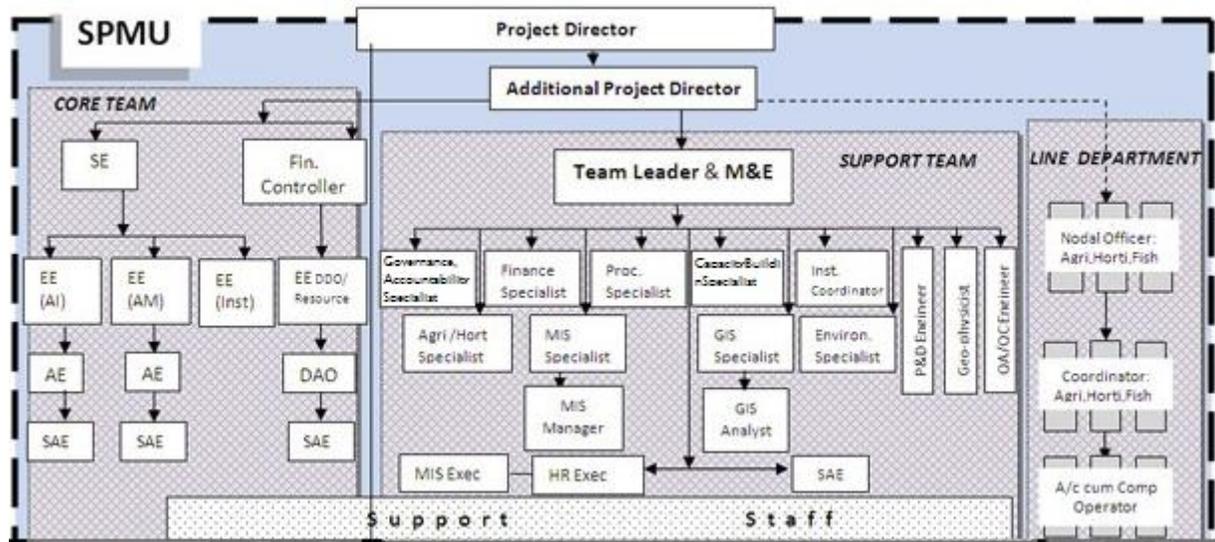
220. The State Level Project Steering Committee will review the project progress every six months and provide strategic directions, guidance on policy matters and resolve inter-agency issues, if any, amongst the implementation partners.

State Project Management Unit

221. The state level agency responsible for implementation of the project will be the DWRID, Government of West Bengal. The Engineer-in-Chief & EO Secretary, DWRID will be the Project Coordinator. For the day to day management of the project, the DWRID will establish a dedicated State Project Management Unit (SPMU) with a State Project Director with the rank of a Chief Engineer as its head. The SPD will be supported by a team of staff both with engineering and non-engineering expertise in implementation of the project.

222. The **composition** of the SPMU consists of: (i) Core Team of seconded DWRID staff; (ii) the Nodal Officers specially assigned by the coordinating departments; and (iii) contract staff fielded by the consulting agency. The overall composition of SPMU is shown in **Figure – 6.2**.

Figure – 6.2 Composition of SPMU



223. The **Core Team** constitutes Government staff on deputation primarily from DWRID. The **Contract Staff** hired through a Consulting Firm complement the Government Staff with additional skills and expertise required for project implementation. At full strength the SPMU is expected to have about 30 professional staff of which roughly half will be government staff on deputation and the rest will be specialists contracted from the market. The SPMU is organized into 5 subject matter unit and 2 administration units and the detailed staff positions are summarized in **Table – 6.2**.

Table – 6.2. SPMU Personnel Position Summary

Sl. No.	Unit Name	Position Name	No. of Positions	Mode of Recruitment
1	Project Director	Chief Engineer DWRID	1	Core Staff
2	Technical & Procurement Unit	Superintendent Engineer AI/AM	2	
		Executive Engineer AI/AM	2	
		Assistant Engineer AI/AM	2	

		Sub-Assistant Engineer AI/AM	4	
		Procurement Specialist	1	
3	Institution Development	Institutional Development Coordinator	1	Contract Staff
		Capacity Building Specialist	1	
4	Agriculture Support Services (ASS)	Agriculture Specialist	1	Contract Staff
		Agriculture Coordinator	1	
		Horticulture Coordinator	1	
5	Monitoring and Learning	Monitoring & Evaluation Specialist cum Team Leader	1	Contract Staff
		MIS Specialist	1	
		GIS Specialist	1	
		Training cum Documentation Coordinator	1	
		MIS Manager	1	
		GIS Analyst	1	
6	Social and Environment Safeguard	Environment Management Specialist	1	Contract Staff
		Accountability and Governance Specialist	1	
7	Financial Management	Controller Finance	1	Core Staff
		Drawing & Disbursement Officer (DDO)	1	
		Finance Management Specialist	1	Contract Staff
8	General Management	Support Team of DEO / Office Assistant and Office Attendant	7	Contract Staff

224. At full strength SPMU will have about 30 professional staff out of whom half will be seconded from department and rest hired contracted through consulting firm. In addition short term expertise will be hired through the SPMU whenever required. The job descriptions for SPMU staff are given in **Attachment – 6.1**.

225. The main **responsibilities** of the SPMU are:

- Responsible for collectively delivering the results of the program;
- Project planning and scheduling;
- Coordination with other implementing partners;
- Project-wide budget control and financial management;
- Quality assurance and control; monitoring of the project inputs, outputs, and outcomes;
- Providing timely and quality resources as well as technical assistance and guidance to other project implementing agencies including project management support;
- Developing implementation strategies, operational guidelines, packaging them as project manuals; and
- Capacity building and providing trainings to support the implementing staff, field functionaries, WUAs and Support Organizations.

District Level Implementation Committee (DLIC)

226. At the district level, the project will be regularly monitored and reviewed by a District Level Implementation Committee (DLIC) chaired by the District Magistrate. The composition of DLIC will be as follows:

- District Magistrate, **Chairperson**
- District Project Director, Administration (DPD-A) as **member secretary**
- District Project Director, Technical (DPD-T), member
- The Krishi Karmadhaksa, Zila Parisad, member
- District level Officer of Line Dept., member (Departments of Agriculture, Horticulture, Fisheries, concerned Executive Engineers of WRID, SWID and WBSEDCL)
- Support Organization and WUA representatives, member

227. The DLIC will be the main forum for district level coordination of project activities with other ongoing government programs. All schemes require DLIC approval. The schemes are selected for WUA formation, registration and SDMP preparation only after this approval. In addition all SDMPs are to be ratified by DLIC. The main roles of the DLIC are:

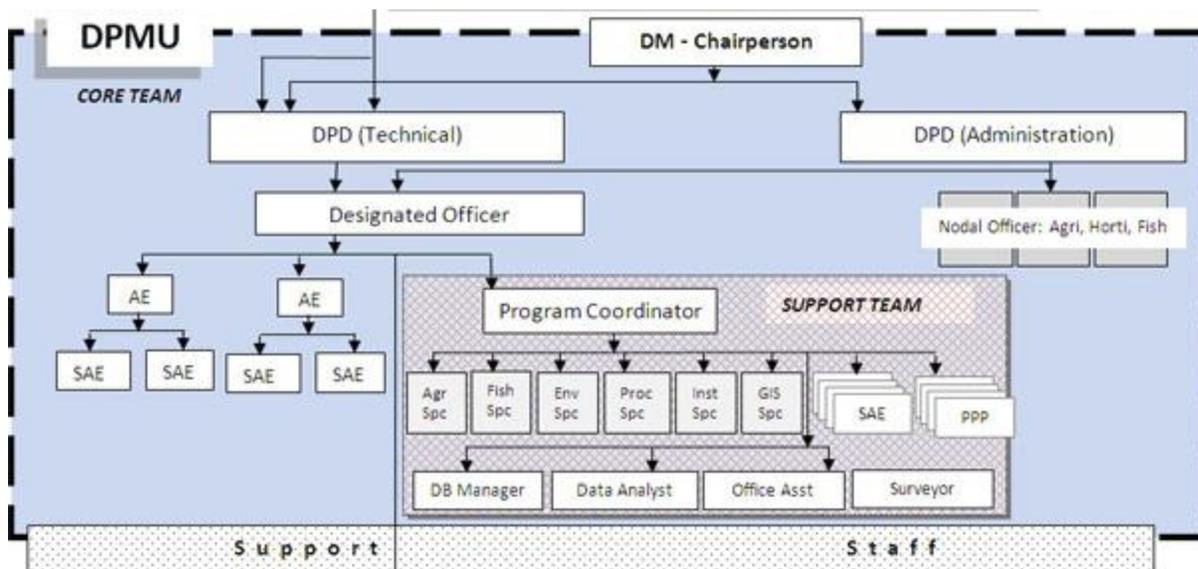
- District level coordination of project activities
- Approval of annual action plans,
- Convergence with other ongoing government programs,
- Monitoring of project progress,
- Resolution of conflicts, if any, amongst the implementing partners.
- Grievance redress
- Review project progress at least once every quarter

District Project Management Units (DPMU)

228. The District Project Management Units (DPMU) located at district headquarters will be responsible for the implementation of the project at the field level. The DPMUs will be headed by a team of District Project Directors, one Technical (DPD-T) and one Administrative (DPD-A) and will have corresponding but smaller dedicated multi-disciplinary teams similar to the SPMU.

229. The composition of the DPMU, like SPMU will consists of Core Team of the seconded staff, Nodal Officers of the coordinating departments and Contract Staff fielded by the consulting agencies. The overall composition of DPMU is shown in **Figure - 6.3**.

Figure - 6.3. Composition of DPMU



230. The DPMU personnel position summary is given in **Table – 6.3**.

Table – 6.3. DPMU Personnel Position Summary

Sl. No.	Unit Name	Position Name	No. of Positions	Mode of Recruitment
1	DPD Technical	Superintending Engineer SE	1	Core Staff
	DPD Administration	Additional District Magistrate	1	
	Technical Assistant/Nodal Officer	Executive Engineer	1	
	DDO	Executive Engineer AI/AM	1	
	Program Coordinator	Program Coordinator	1	
2	Technical & Procurement Unit	Executive Engineer AI	1	
		Executive Engineer AM	1	
		Procurement Engineer	1	
		Assistant Executive Engineer AI/AM	1	
		Sub Assistant Engineer	1	
		Surveyor	1	
3	Institutional Development Unit	Project Officer - Institutional Development	1	Contract Staff
4	Agriculture Support Services	Agriculture Specialist	1	
		Fishery Specialist	1	
5	Monitoring & Learning Unit including Environment Management Unit	GIS Specialist	1	
		Database Manager	1	
		Data Analyst	1	
		Environment Specialist	1	
6	Fiduciary Unit	Divisional Accounts Officer	1	
		Office Assistant	1	

231. The DPMUs will be **responsible** for the implementation of district programs; achievement of physical and financial milestones; quality assurance; and working closely with communities to achieve the project development objective. Requisite authority will be delegated to the DPMUs for planning, decision making, use and allocation of funds and monitoring in their districts. The focus is on creating a participatory institutional structure that will ensure accountable and efficient governance for project implementation.

232. The DPD-T will be responsible to accord necessary technical sanction for the projects in the district within the financial powers delegated to him / her and provide all sorts of technical assistance to the field level implementation units, oversee all technical activities under the project in the district and also assist the SPMU in day to day monitoring of progress of the projects in the district.

233. DPD-A will be empowered with general administrative functions of the DPMU and also the coordination functions with the line departments. The DPD-A will remain responsible for all functions of the DPMU including its establishment matters etc. and will act as coordinator between the DLIC and the field level implementation units including those with the line department's nodal units. The DPD-A will also be responsible for all communication with the SPMU on day-to-day matters and reporting.

234. DPD-T will be in the rank of Superintending Engineer of DWRID, holding this assignment as additional charge for two districts. The DPD-T will be assisted by one Technical Assistant in the rank of Executive Engineer from DWRID for the day to day work of the project and who will be full time dedicated to the project. The DPD-A will be in the rank of an Additional District Magistrate of the Department of Personnel and Administrative Reforms. The DPD-A will be nominated by the District Magistrate and will hold the function as additional charge.

235. The DPMU will have subject specific cells that are very similar to that of the SPMU. Key staff in the Technical Cell will comprise a team of engineers from the DWRID. There will also be a Fiduciary Cell, an Agricultural Cell, an Institutional Development Cell and a Monitoring, Learning and Evaluation Cell (including the safeguard staff) and a General Management Cell. If adequate numbers of technical officers are not available in a district, there will be an option to hire technical staff on contract to augment the strength of the DPMUs, as and where required. The staff of the units other than Technical Unit will be a combination of existing government staff deputed to the DPMU and contracts staff hired through consultancy firm. The job description for the DPMU staffs is given in **Attachment - 6.2**. The standard facilities to be provided for the smooth functioning of DPMU are provided in **Attachment - 6.3**.

Line Departments

236. Project implementation support for Component C Agricultural Support Services will be provided by the Departments of Agriculture, Food Processing Industries & Horticulture, and Fisheries. For coordination and oversight, each department will set up a Nodal Unit at state level that will operate from within the mother department, but will liaise regularly with SPMU staff. The departments will also designate senior district level officers as focal persons for coordination of project activities at the district level. The nodal district level officers will participate in the DLIC meetings and will act as the main departmental contact points for the DPMUs.

Support Organizations

237. Support Organizations (NGOs) will be recruited by the project to facilitate community mobilization, participation and institutional strengthening of the WUAs. Each SO team will consist of staff with expertise in community mobilization, technical works and agriculture and will be assigned a cluster of MI schemes in a district. The team will be responsible for building capacities of the WUAs and facilitate their participation in all aspects of project implementation.

238. The SO team will constitute of three units, each comprising of one Community Mobilization Specialist, one Agriculture and Water Management Expert, one Sub Assistant Engineer and one Training Coordinator and Facilitator. These key experts will be supported by one Office Manager-cum Computer Operator and eight Community workers. The Community Mobilization Specialist of the unit will be the Unit Team Leader and take the responsibilities for deliverables of all other members of his / her unit. He / she will also report to the DPMU/SPMU for all purposes related to the services for the unit.

239. The detailed qualification and experience as well as key responsibilities of the SO staff are given in **Attachment 6.4**. The composition of SO is given in **Figure - 6.4** and the details of personnel to be deployed by SO are given in **Table - 6.4**.

Figure - 6.4. SO Composition

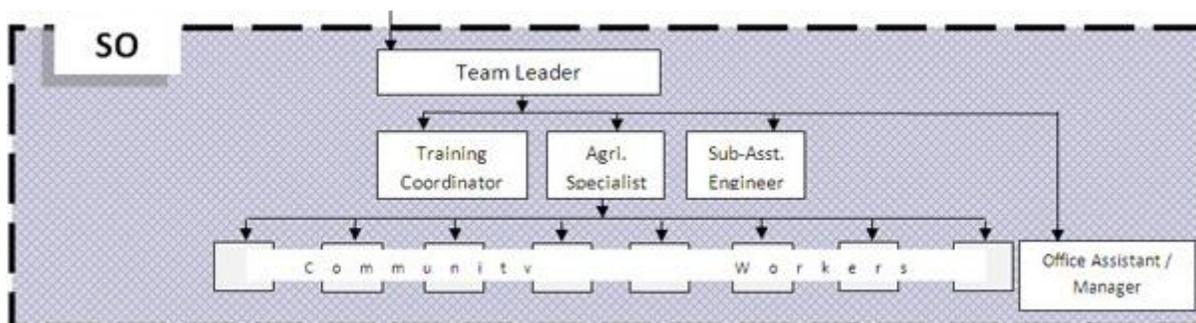


Table - 6.4. SO Personnel Deployment Summary

Sl. No.	Position Name	No. of Positions
1	Community Mobilization Specialist / Team Leader	1
2	Agriculture & Water Management Expert	1
3	Sub Assistant Engineer	1
4	Training Coordinator and Facilitator	1
5	Community Workers	1
6	Office Manager-cum Computer Operator	1

240. The scope and description of services to be provided by the SO is given in **Attachment - 6.5**.

Scheme Level Farmer Organization

241. At the MI scheme level, the focal point will be the Water Users Association (WUA) to which all command area farmers will belong. The WUA will be expected to play an active role in the planning and management, operation, and maintenance of its MI scheme and participatory monitoring of the MI scheme effectiveness and sustainability. Each WUA will have a Governing Body and four Sub-Committees, e.g. for works and water management, etc. to carry out its responsibilities. The legal status of a WUA proposed under the project is that of a society registered under the West Bengal

Societies Registration Act, 1961. The detailed composition structure roles and responsibilities are described in Chapter – 03 Component A Strengthening Community Based Institutions.

Project Annual Action Plan

242. The SPMU and DPMU members will prepare the annual action plans for the project and set up implementation targets to be achieved in a particular financial year. Based on the annual plans, each unit of the SPMU will prepare their own action plans in consultation with the DPMU staff. The DPMU staff will initiate their work along with the SO by assessing the district situation in terms of extension needs, development potential and emerging opportunities. Planning at the district level will also include brainstorming, discussions and planning of collaborative working with the WUAs, various line departments and partner agencies. Based on this assessment first a draft SO annual plan will be prepared by each SO. Based on these SO plans each DPMU will further develop a district annual action plan covering institutional development, technical works (infrastructure development) and agricultural support services promotion. This plan will be discussed and reviewed in the DPMU and DLIC and then finally submitted to the SPMU. The SPMU sub-units will develop project level plans and will review the progress of works on a quarterly basis with the Project Director. The state annual action plan of the project will be submitted to the Project Steering Committee and the World Bank for approval.

243. The processes and systems set for project implementation planning will be continued in subsequent years with addition of annual review workshops linked to the planning process. These will be useful in understanding the gaps in implementation, challenges of scaling up interventions in subsequent years and the learning's generated through the implementation process. The annual schedule for AAP preparation is given in **Table – 6.5**.

Table – 6.5. Schedule of Annual Plan Preparation

Step	Schedule	Responsibility
Annual Planning Workshop	Oct-Nov	SPMU
Annual Plan of WUA	Nov-Dec	Support Organization
SO Wise District Annual Plan	Dec	Support Organization
Consolidated District Annual Plan	Dec-Jan	DPMU and Line Department Ag/ Horti/ Fishery/ Backward Welfare department
District Annual Action Plan Workshop	Jan-Feb	SPMU and Ag/ Horti/ Fishery/ Backward Welfare department
State Annual Action Plan	Feb	SPMU
Approval of State Annual Action Plan	Mar	PSC & World Bank
Sharing the plan with the respective teams SO & DPMU	March-April	SPMU

Project Progress Reporting System

244. **Reporting Arrangement:** The SPMU will develop a comprehensive result based monitoring, learning and evaluation system for the project. Hence, the thrust of the project reporting system will

be on generating information and knowledge for learning and informed decision making through various sources and methodologies. The overall reporting arrangement of the project is given in **Table - 6.6.**

Table - 6.6. Project Progress Reporting Arrangement

Sl. No.	Type of Information	Nature	Frequency of Reporting	Link to MLE Component
1	Information on inputs and outputs	Quantitative	Quarterly	MIS & GMIS
2	Information on results and outcomes	Quantitative	Annual	Six Monthly Reviews and Concurrent monitoring
3	Information on impacts on the target population	Quantitative	Once in two years	Baseline, Mid Term Assessment and Final Assessment
4	Information on processes	Quantitative	Six monthly	Field Based Monitoring
5	Information on institutional development	Quantitative & Qualitative	Quarterly	WUA Self Rating linked to MIS, Theme based reports
6	Information on progress of works	Quantitative	Six monthly	Six Monthly Reviews and MIS
7	Information on sequencing of events	Quantitative	Six monthly	Six monthly Reviews and MIS

245. **Progress Reports and Frequency:** The various project implementing agencies will adhere to an agreed schedule of reporting as prepared by the SPMU in consultation with them. The proposed reporting schedule is given in **Table - 6.7.**

Table - 6.7. Project Progress Schedule

Reporting Agency	Report Submitted To				
	SO	DPMU	SPMU	State Government	World Bank
WUA	M / S*				
SO		M	M Social Audit		
DPMU			M		
Line Department			M	M	
SPMU				M / Q / S / A / Other as required	M / Q / S / A / Other as required
External Agencies			As per agreement		

M - Monthly Progress Report; Q - Quarterly Progress Report; S - Six Monthly Progress Report; A - Annual Progress Report; * SR&A – Self-rating / Self-assessment by WUA

246. **Project Management Information System:** Project reporting and monitoring will be carried out through a dedicated MIS specially developed for the project. The Project MIS will be combination of followings:

- Web Based
- GIS based
- Mobile App
- Excel based reports
- Other reports as specified

247. The formats for the MIS will be developed and accordingly MIS & GIS software and Mobile apps will be designed and developed by the project through a specialist vendor. The vendor will define the necessary guideline, systems and procedures in consultation with the SPMU. The vendor will also train the project teams members in field based documentation, data collection, data entries, its validation and report generation.

Monitoring and Learning System

248. The project monitoring, learning, and evaluation framework will be designed to facilitate:

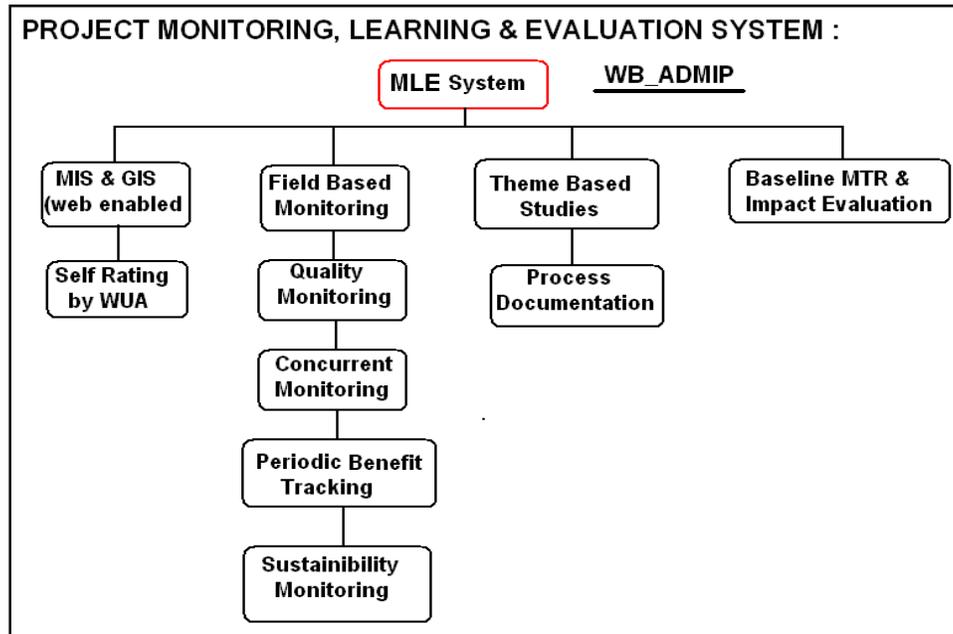
- Results-based management through timely monitoring, analysis, and feedback of relevant indicators;
- Learning for process enhancement, through a mix of participatory assessments, Self-ratings and reviews, and special thematic studies; and
- Impact evaluation, through measurement of specific performance indicators, including use of appropriate baseline and controls.

249. The focus of the project's MLE system is to enable appropriate oversight and management, self-learning by project staff and beneficiaries, and full evaluation of project experience. Management action at various levels will be guided by the following reports:

- District-level monthly MIS reports on the status of implementation activities collated and produced by DPMUs;
- Regular reports by external M&E agency on its concurrent monitoring activities;
- Six-monthly consolidated reports produced by DPMU at district levels and by SPMU at the project level - these will form an important basis for the six monthly performance review to be undertaken jointly by the Bank and GoWB;
- Consolidated mid-term implementation report by SPMU and mid-term impact assessment report by the external agency, which will form the basis of the Mid-Term Review to be undertaken by the Bank and GoWB around March 2014; and
- Consolidated project implementation and assessment report by SPMU and overall project evaluation report by external agency at project completion, to be used for the preparation of the project Implementation Completion Report (ICR).

250. The overall project MLE Framework will have distinct but inter-related aspects or "constituents" and the schematic diagram is given in **Figure – 6.5**.

Figure – 6.5. Schematic Diagram on MLE Frame Work



251. The project MLE Framework will have five distinct components, namely: (i) the project will regularly monitor the project’s physical and financial inputs and outputs through the **project MIS**. The MIS information will be used for project management through a Progress Review System (PRS) on a regular basis; (ii) **field based monitoring** is planned to concurrently monitor project progress and processes for institutional strengthening and measure output, outcome and impacts. Monitoring of quality of civil, mechanical, electrical works will be one of the important activities under field based monitoring. Field level implementation is planned to be monitored by selecting a sample of MI schemes within each district for intensive monthly visits and monitoring. Six monthly reviews are proposed under the system; (iii) there will be a system of **participatory MLE** to engage the beneficiaries in assessing progress and achievements of the project. Going beyond extraction of information through group-based methods, the participatory MLE process will aim to involve the key stakeholders in developing a framework measuring results, evaluating achievements and learning from the project experience. This will also help build up local capacity to reflect, analyze, propose solutions and take actions. Where possible, the process would try to ensure that marginal voices are heard; (iv) the project would also undertake issue and **theme based studies** as identified by the joint reviews and six monthly reviews. These themes / issues are likely to relate, inter-alia, to implementation processes, identification of constraints (technical, administrative, financial) and estimation of project output / impact. Impact of the project on poverty status and changes will be covered through a longitudinal study on sample sub-project and households tracking in command areas; (v) an **independent MLE agency** will carry out a baseline survey to benchmark the pre-project situation and will undertake impact evaluations at mid-point and at completion of project implementation. Annual evaluations will be also undertaken to review project performance and assess key implementation issues arising.

Implementation Arrangement for MLE

252. The SPMU, through its dedicated MLE unit, comprising of a minimum of one MLE expert and one data analysis and documentation expert will have overall responsibility for planning and

coordinating MLE activities. In this role, the SPMU will coordinate MLE activities with three sets of entities that will undertake the bulk of the data collection and analysis work: (i) the field implementing units at the district levels; (ii) an external M&E agency; and (iii) beneficiaries, primarily WUAs. The process of participatory MLE by beneficiaries will be facilitated by the SO. The SPMU will have overall responsibility for developing the systems and procedures for appropriate analysis and presentation of the collected MLE data (including participatory MLE data) to ensure their use for project monitoring, management, learning, and beneficiary capacity building.

253. All implementing agencies (field level project staff, line department staff, service providers contracted by the project, etc.) will be responsible for collecting and reporting information on physical and financial input and output indicators as part of their regular implementation work. This data will be fed into and assimilated by a computerized MIS which will be set-up and managed by the SPMU. The MIS will be designed to help consolidate, analyze, and use the data for management feedback at different levels, from MI scheme level to block, district, and State levels.

254. An external M&E agency will collect primary data about project implementation and impact through four types of data collection exercises: (i) baseline survey; (ii) special monitoring of implementation progress studies on relevant themes and in a format agreed in advance with the SPMU; (iii) outcome-focused impact evaluations, especially at Mid-Term Evaluation and Final Evaluation; and (iv) systematic („panel data“ type) evaluation of project impacts through repeated monitoring of the same sample set of households from the beginning to the end of the project. For each data collection exercise, information will also be collected from appropriate “control” or reference sites in order to help assess the incremental impact of project interventions vis-a-vis generic growth influences over time.

255. A complementary set of information on quality and effectiveness of implementation processes and on project impacts, from the beneficiaries' point of view, will be gathered through a structured process of participatory monitoring and learning (PML). Project interventions at the field level will be primarily group-based (through e.g. WUAs, fishermen cooperative societies, and farmers' producer groups). As part of their implementation experience, each group will provide feedback on themes and through media and format understood and agreed in advance on their participatory experiences. The SO will record these self-assessments as well as quantified participatory assessments, and feed them into the overall project MLE system. The information will be monitored and used by project management at district and other relevant levels for improving: (i) effectiveness of project interventions and processes with regard to the communities; and (ii) management and capacity building of the communities themselves.

256. Quality control will be given priority in project planning and implementation process. The project will follow the DWRID / other line departmental SoR and BIS guidelines for quality control. The bidding document will incorporate suitable clauses for ensuring quality control and performance. There will be a two-tier quality control mechanism for materials (3rd party inspection by GoI authorized inspecting Agency followed by Departmental inspection) and one tier inspection by district WRDD installation team for civil, mechanical and electrical works of MI schemes.

257. Project MLE activities will include baseline studies, regular performance tracking of inputs and outputs by concerned implementing agencies, concurrent performance monitoring (on a sample basis) by external M&E agency, systematic (“panel data” type) analysis of project impacts through repeated monitoring of the same sample set of households through project lifetime, mid- term and final impact evaluations and continuous participatory monitoring and learning by WUAs. Reports from these MLE activities will be generated in agreed format according to a set schedule and

compiled into the project MIS to facilitate a comprehensive integrated project reporting and monitoring system.

258. The project will have a dedicated website where all relevant information and data will be posted for a wider audience. The website will be designed to serve as a one-stop information place with user friendly features on different aspects of the project. It will be updated regularly to make the information as current as possible. Updating and managing the information flow shall be the responsibility of the MLE Unit under the SPMU. The website will also have a mechanism to handle feedback from the audience. Other mechanisms of feedback will be used as well, including mail and phone.

259. The detailed summary of project MLE activities and operational plan for each of the tools covering type of monitoring, methodology and responsibilities is given in **Attachment – 6.6**.

Results Chain

260. The project has finalized the results frame work which is included in project appraisal document. In order to monitor the results, activities, processes, outputs and outcomes, indicators have been developed as a result chain. The component wise presentation of these indicators is given in **Attachment – 6.7**.

Capacity Building for MLE

261. The MEL framework of the project envisages active role of different project stakeholders in the process of carrying monitoring, evaluation and learning from the project. This will require building the capacities of the different stakeholders involving project staff, line department staff, SO staff, WUAs and other key agencies and personals in project implementation.

262. Some local capacity regarding awareness, understanding, and use of MLE and PML exists and the project will seek to build upon this in order to ensure availability of adequate expertise as well as methods and tools for data collection and analysis. The SPMU, with the assistance of a specialized consultant, will develop a standardized format for data collection and reporting, with special attention paid to user friendliness and capacity for the collected data to be integrated into a project-wide MIS. Second, basic training in data collection and reporting will be provided to all field level implementation staff, with repeater trainings on special themes as necessary.

263. Capacity building interventions for MLE will cover training programs on overall MLE approach, RBM approach, participatory monitoring and learning, process monitoring, concurrent input-output-outcome monitoring, quality assurance and control monitoring, etc. Orientation training on MLE framework will be provided to all project staff. However, specific skill trainings such as use of various MLE tools will be provided specifically to the MLE team and the staff who are going to use them so as to cater to the project needs. The major focus of capacity building for MLE will therefore be on creating and facilitating capacities at various levels of project implementation in data collection, analysis and interpretation, generating learning and using the learning to improve performance. For sharing and disseminating learning from the MLE process the project will hold a number of theme based workshops and experience sharing sessions not only for project staff but also for external participants for cross learning and bringing in new ideas.

264. The SPMU in collaboration with the DPMUs and concerned departments will organize experience sharing and exposure visits for beneficiary groups and implementing agencies. The SPMU

will also use available media (e.g. video conferencing, teleconferencing) to organize discussions and communicate experiences on how implementation is facilitated and how topical issues are addressed by different units. The various training programs for different stakeholders being planned under MLE are summarized in **Table – 6.8.**

Table – 6.8. Project MLE Training

Stakeholders	MLE Components			
	Six Monthly Reviews	MIS	Participatory Monitoring and Learning	Baseline and Impact Assessment
SPMU Staff	Orientation	Training	Orientation	Workshop
DPMU Staff	Orientation	Training	Orientation	Workshop
District MLE staff	Training	Training	Training	Workshop
Line Department Staff	Orientation	Exposure visits	Orientation	Workshop
SO Staff	Orientation	Training	Training	Workshop
WUA Governing Body & Office Bearers	Orientation		Exposure visits, Training	Workshop
WUA Members	Orientation		Orientation	

Management Information System

265. The MIS Department at the SPMU level functions to gather, process and manage the information as they come from the different DPMUs. The information in excel based system arrives over share drive system online through Google, One Drive and stored initially in those cloud based storage systems viz. Drop Box. These are, then, downloaded and accumulated offline in excel based system. The data stored in SPMU’s computers are time-to-time physically copied and stored in external Hard Disks.

266. These information are the pre-requisites to build the MIS for all the running projects which were actually implemented in batches. At present, the MIS of the running projects and the future projects are recorded and updated manually time-to-time. There are data maintained in Master Sheets separately for all the recordings of the DPRs and the SDMPs of the on-going projects. Similarly, MIS formats are shared with DPMUs to capture data of the future projects which are accumulated monthly at the SPMU’s end in Consolidated Excel formats.

267. There is a future plan to build a full-fledged MIS database to record information at the SPMU level. This would be based on the client-server architecture and the information stored would be share online. Work for developing such a system already got initiated, work offloaded to vendor agency, and the system would be in place shortly.

268. At present, the MIS Department is responsible for accumulating information from the District level as well as the SO level, then record and store those data in database for analysis and report making as and when required. The archiving of information collected from DPRs and SDMPs are used for preparing reports on project progress for the reviewing by the World Bank and other stakeholders. The consolidation of information of new projects complete with their potentiality analysis, geo-positioning etc. is made for the Government to review possibilities of future

development. Thus MIS is required to work in tandem with the DPMU and SO to produce information for the Government as well as the World Bank and other stakeholders.

269. Decentralization of Database: There is a principal followed in the procedure of collection as well as distribution of information from the State level to the District level down to the level of the Support Organizations. This process benefitted in keeping the authenticity of the information intact. Separate MIS Database was made for all the District level DPMUs as well as all the SOs, district-wise. The Databases were shared with the SPMU through cloud technology using public domains like Google and Outlook and information from the projects directly come from sites to these Databases. These different level data accumulates real-time at the SPMU office and monthly consolidations are made to archive within a centrally operated excel based Database.

270. Backup Arrangement: Backups of District-wise information are kept on online drives regularly viz. Dropbox, Google Drive and Outlook.com. Physical backups are taken on monthly basis in External Harddisks in the SPMU offices from every nodal point. Scope is there to build client-server architecture to protect the data in a server in the near future.

CHAPTER –07 PROJECT SOCIAL AND ENVIRONMENTAL MANAGEMENT FRAMEWORKS

272. The project The Social Assessment study conducted for the project as part of project preparation identified participation, inclusion and equity, decentralization and human and institutional development as key social development issues / principles, which should underpin the project's strategy and implementation. Specific attention would be required to facilitate and support participation and equitable distribution of benefits to tribal and women. The assessment also showed that in some of the project areas the OP 4.10 of the World Bank on Indigenous Peoples (Tribal) is triggered. Consequently, it is proposed to prepare Tribal Development Plans (TDP) for these project areas and an overall project Gender Development Plan (GDP) to ensure these social safeguards.

273. The assessment also brought out that while there is no need to acquire lands involuntarily and OP 4.12 of the World Bank is not triggered, there will be need for some land for installation of the MI scheme, namely for source works, mainly head works and pump houses, spouts, which are water outlets for regulating distribution, and distribution systems, mainly field channels for transmitting water to the plots. The size of the land required for each MI scheme is so small that it is proposed that the land be made available to the project through voluntary donation by the beneficiaries whose contribution will be recognized and gratitude in some agreed ways extended by the WUA.

Stake holder Involvement

274. The project implementation arrangement as outlined in chapter 06, project management outlines the balanced involvement of all key stakeholders in project implementation. The state Project Management unit (SPMU) is the nodal department at state level for implementing the West Bengal Accelerated Development of Minor irrigation Project” (WBADMIP). A technical steering committee (TSC) established at state level, chaired by chief secretary, Project Director is the convener & secretary of the committee. The committee (TSC) will review project progress every six month on average and provide strategic direction, guidance on policy matters, and will resolve conflicts, if any among the implementing partner. At district level the actual implementation of the day-to-day project activities will be carried out by the staff of DWRID and departments of Agriculture, Food Processing Industries & Horticulture, Fisheries and Rural Development and Panchayat Raj Department will participate in the planning implementation, regular monitoring, providing data and mid-course correction if required with consultation of SPMU. At district level project will be reviewed at least once every quarter by a District Level Implementation Committee, chaired by the District Magistrate. 18 District Project Management Units (DPMU) has set up with Government order in each in one of its respected implementing district. The DPMU will comprise a combination of key staff from government agencies, supplemented with qualified individually selected specialists. The team will be guided by District Project Director and one District Project Director (Technical, rank of Superintendent Engineer of DWRID) in each District. District Project Director (Administration) will serve as the secretary of the DLIC which will include District Project Director (Technical) and have representative from senior district level staff from involved departments, and on invitation basis, representatives of SOs, WUAs etc. The DLIC will be the main forum for district level coordination of project activities with other ongoing government programmers, approval of annual action plans monitoring of project progress, redressing of grievances, and resolution of conflicts, if any, among the implementing partners. Each Water User Association (WUA) will be responsible for monitoring and coordinating of the activities related to the planning of the schemes, implementation, crop planning, and water management with the hand holding support from Support Organization (SO). Other water users such as fisherman also be there member of water user Association. It is noted that fishing will be feasible in selected tank only and that agriculture water use has preference.

275. The WBADMIP consultant team support SPMU/DPMU by providing all necessary technical assistance, advising on over all coordination, institutional, environmental, scientific and technical aspects as well as capacity building and monitoring of the project. The SO will do the necessary facilitation support, handholding and capacity support to WUA.

Social Development Plan

276. The project will be executed with the full involvement and cooperation of villagers, ensure community involvement in site selection, design, installation, maintenance and water distribution. The main elements of the Social Development aspects are summarized in **Figure - 7.1**

Figure - 7.1: Components of Social development Plan

Inclusive and Accountable WUA	Location of Village	Locating Command Area	Rules for Water Charges and Distribution	Community Operation and Maintenance	Capacity Building and Monitoring
<ul style="list-style-type: none"> •Nurturing a collective vision of a better life among the member; •Developing a strong sense of ownership for new initiative •Facilitate the realization for the positive change, group effort is required •Develop appropriate attitude among members about working together in a group •Imparting the necessary skills in operating and managing the system 	<ul style="list-style-type: none"> •The presence of a large number of small and marginal farmers •Caste- wise and hamlet-wise homogeneity •Potential to impact on large number of poor families •Priority to be given to tribal villages •Communities are ready to WUAs willing to participate in the planning and to take over management, operation and maintenance irrigation 	<ul style="list-style-type: none"> •Consider upstream and downstream issue •the distribution of plots under the command area is fair or not skewed in favors of few members •Consider all possible command areas options for a source and select the best suitable starting from the coverage of family, coverage of land, cost effectiveness, and technicalities ,upstream and downstream issues. 	<ul style="list-style-type: none"> •Equitable distribution of Water by fixing timing for each area of opening the spout to ensure the full pressure of water for tail end farmers •The WUA will decide the water rate per hour from members. •Introduce Coupon system •Calculate the water demand both for Agriculture and fisheries and availability of water in the command area at planning stage 	<ul style="list-style-type: none"> •Select and train the operator among the group member to exclusively run and maintain the pump. •Water users pay the pump operator for the services •Pump operators attend a refresher course to upgrade the knowledge and skills •Water user pay for repair and maintenance of pump •A pump log book will maintain by the pump operator and follow the maintenance schedule provide during training. 	<ul style="list-style-type: none"> •Mobilizing communities into local level institution •Developing knowledge, skills & management practices in them •Linking them with the external world.

Involvement of Women

In the command area of project schemes, if the women headed households have land ownership they should invite to join in managing committee of WUA. One third of its managing committee member should be women. Prospective female dominated SHGs should be identified. The experiences of women in managing finance in SHGs help them to carry out the task of collecting rental and keeping accounts. The familiarity of managing SHGs has also help of supervising the service providers such as pump operator and accountant and to resolve conflict. Working in a group is a distinctive competency that the women posses which help them in make adjustments, resolve conflicts amicably and developed synergy. Important part is to impart proper skills for Leadership development and in the technical tasks related to managing assets of minor irrigation.

In addition Membership of Water User Association should be household basis and hence both husband and wife automatically are members of WUA.

277. Specifically the project will ensure women participation through:

- Women in Managing committee (At least 3 women in managing committee)
- Women member in (4) sub-committees (works, water management, finance and monitoring)
- Women headed household (HH) member of WUA
- Demo plot managed by women Member
- Promote women managed Water User association

Land Requirement

278. Requirement of land in the Project is very small i.e. construction of pump house, laying pipe line, trench preparation etc, in those cases where private land is required it can be secured on a volunteer basis as donations. The opportunity of installation of pump house should offer to small and marginal farmers in order to avoid centralization of power and the pump house size has decided to keep to the minimum .Water User Association will responsible for coordination with the members and make a resolution among them who can donate land as required to schemes for common benefit, considering the following stipulation and ensure proper documentation. The land requirement for different technology/ Scheme types are summarized in **Table - 7.1.**

Table-7.1. Land Requirement for Different Scheme Types

Scheme Type	Minimum Land Required
1.RLI (MIDI &Mini)	30 sq m /322.92 sq. ft
2.MDTW	30 sq m /322.92 sq. ft
3.LDTW	10 sq m /107.64 sq. ft
4.STW	10 sq m approx per point /107.64 sq. ft
5.PDW	5 sq m approx per point /53.82 sq. ft

279. The arrangements for making available required land are:

- Water User Association will be responsible to ensure the ownership of agreed donated land that the said property is belongs to his/her in respect of title and firm without any ambiguity. It is easy for them as they familiar with each other. The land in question must be free of squatter, encroachers, share cropping or other claims or encumbrance.
- The whole process of discussion of land donation should be documented in the meeting minutes of the Water Users Association. Support organization should facilitate the process; ensure voluntariness of the donor and donor’s commitment to WUA that he/she shall not create any pressure to other members (those are using the land) directly or indirectly
- Support Organization and Assistant Engineer of the Department shall conduct enquiries as deemed necessary, to understand the land user’s ‘interest’ / ‘motive’ behind the offer to donate land for the scheme.
- The land donation will be for the sake of common benefit and with commitment to

provide benefit to others and should not result in any physical relocation.

- Water user Association will accountable for complete the legal land transfer of land, land title will be vested in the government; and provision will be made for redress of grievances if any. The model declaration of donor is given in **Attachment 7.1**
- District Water Resources and Investigation Department will ensure that there shall be no adverse impacts on the livelihood of household donating the land. To avoid any adverse effect, land donated shall not be more than, 1.500sq ft viz,0.035 Acre from individual donor.(Please see the reference: Social Assessment of WBADMIP, WAPCOS)
- Redress of Grievances. The Executive Engineer, District Water Resources and Investigation Department shall address grievances, if any. If an amicable solution cannot be found at Executive Engineer level, the same shall be referred to the Superintending Engineer whose decision shall be final and binding. The State Project Management Unit will function as a supervisory in the process grievance redressed.
- It is the courtesy of Water user Association to express their gratitude note to the donor. With the consent of all members of WUA may entail some cash, location of spout or employment as pump operator etc. This gratitude note shall find a reference in and annexed to the MOU as and when it is signed.
- WUA may set Preference to waive some water charges annually considering his/her income from the particular land (donated) or some cash one time. Selection of pump operator is discouraging to connect with the land donation to avoid centralization of power (privatization of scheme).
- DPMUs will maintain records of all land donations in the format given in Table 7.2. The information needs to update for each scheme after DLIC approval.

Table - 7.2. The format for keeping Record of land donation

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Project year	District	Block	Mouza	Scheme name & ID	Type of scheme	Cause of land required (i.e.pump ,house, spout, channel etc)	If it is on private land name of the owner	ST/SC/obc/Gen	Total area of land in (ha)	Plot no	Donated area in Sq m /Ac	Pl.mention type of document attached with SDMP for land transfer	Date of availability of the donated land for common use	What advantage(s) WUA is offering to the donor please mention

Tribal development plan

280. West Bengal is inhabited by a substantial number of Scheduled Tribe (ST) communities, which constitute about 5.8% of the total population of the State and about 7.8% of the rural population of the State. Tribal communities are found almost in all the districts of the State, though they are predominantly present in the seven districts of West Midinipur, Purulia, Dakshin Dinajpur, Malda, Jalpaiguri, Birbhum and Burdwan. There are in all 38 notified ST communities in the state, including the Santhal who represent more than half of the total ST population of the State. The State has three tribe communities, namely Lodha, Birhor and Toto, who have been declared as Primitive Tribal Groups (PTGs). The Lodhas are domicile of Paschim Medinipur and Sagar Block of South 24 Parganas, the Totos are domicile of Jalpaiguri district and the Birhors are found in only six villages spread across three Blocks, namely Baghmundi, Balarampur and Jhalda-I of Puruliya district. Based on predominance of ST population, the Government of West Bengal has identified 4,568 villages as tribal villages, which have at 40% of its total population as ST population and the details are given in **Attachment-7.2** Considering the relatively under developed situation of these ST villages and the need to bridge this gap, the project has proposed preparation of Tribal Development Plan (TDP) exclusively for the identified tribal villages.

281. The **Objectives** of Tribal development Plan are: (i) to ensure equitable access of project benefits to the tribal farmers in the project area; and (ii) to enhance tribal participation in WUA decision making.

282. **TDP- Coverage and Fund Outlay:** To ensure 'inclusion' of Tribal, in accordance with the World Bank's policy, a separate Tribal Development Plan (TDP) has been prepared. 13% of the total project cost should be spent for the tribal community. Details of which are available in a separate Report. Out of 4568 tribal villages 450 or 10% already covered under minor irrigation facilities thus the remaining 90% or 4000 is coming under the project purview. However seeing the resource limitation it is not possible to cover 100% tribal villages from project. Moreover there are a number of non-tribal habitations uncovered (*reference TDP of WBADMIP, WAPCOS*). Considering the situation, it is called for a prioritization. The details of Fund allocation and coverage for the proposed Tribal Development Plan for WBADMIP are given in **Attachment -7.3**

283. **Special Conditions** In the TDP are :

- 13% of the total project outlay will spend for Tribal community
- In Tribal villages Chairperson and Secretary of WUA will be ST
- Ensure Tribal representative in Managing committee of WUA
- Tribal representative in (4) sub-committee (works, water management, finance and monitoring)
- 6% Lead farmer for crop demonstration should select from ST community (as per population sharing of state)
- Identify Women tribal SHG; link them with different government schemes and the guidelines to tap the fund for their own development.
- Promote Tribal women managed Water User association

284. **Convergence with other Programs and Departments:** Many Government of India (GoI) and Govt. of West Bengal sponsored programs are under implementation in the state have provisions for supporting livelihood promotion activities. Specific emphasis has been laid in this project to achieve inter departmental coordination so that an integrated development approach can be adopted under the project by effective channelization and dovetail of funds and resources for promotion of MI based livelihoods. District Project Management unit will liaison with different department Agriculture,

fisheries, SC&ST development department channelizing infrastructural and resource support from the department as well as required administrative support for the benefit of common mass under the MI system. Support organization should work as a catalyst to strengthen the process of coordination.

285. Seeding the concept of irrigated Agriculture (Post Implementation Stage): Generating awareness and creating a demand for participation by tribal is the key to success. Once have gathered the preliminary information about the caste composition, land distribution, agricultural practices etc encouraged people to think ways to increase their incomes. If Agriculture is the primary means of livelihood of most of the residents, it is likely that they would discuss possibilities of farm based interventions /if fisherman they would plan for aquaculture or can be mixed on farm /off farm. Encourage people who have some experience of irrigated agriculture using well/river water to express their opinion. An Exposure visit to a nearby community managed minor irrigation project can be effective for the opinion leaders to create awareness and demand among the targeted people. Establishing demonstration plot for agriculture/fisheries/horticulture linking with line department will ensure support services.

286. Livelihood Promotion plan apart from Irrigated Agriculture: The livelihood option of tribal's by and large divided into on-farm and non- farm based. Increasing the potential of irrigation alone may not lead the economic development as in most of the cases as their land holdings are very small. Focused on best utilization of the small land holding hence ; need to crop planning with farmers, secondary crop i.e. vegetable, and moisture induce horticulture, Agro-forestry, need to plan for common property resources i.e. grazing land for fodder, seasonal village pond for fisheries, minor forest produce they collecting like sal, kendu leaf etc. Some of the key intervention can be sabai grass & rope making, vermin composting, kitchen garden, grafting, nursery raising, back yard poultry, goat rearing etc as per need and the expertise they have of the local area. Many Government sponsored (GoI & WB Govt.) schemes are implementing in the Project district for tribal development, need to enhance the knowledge of WUA about the different government schemes and the guidelines to tap the fund for their own development.

287. Ensure Involvement of Women (tribal) in the Project: In tribal society women generally play a significant role in the livelihood system as compared to other castes. Ask to the women who have land in the command area/ fishing community should involve in WUA .Women are mostly travelling long distance for collect fuel wood ask if they can plan for fuel wood with agricultural crop adopt WADI model (through convergence. Through National Rural Livelihood Mission they can tap the fund potential for livelihood in the area. Strong SHG in the command area will be supportive for regular savings, community contribution. Support organization should make conscious effort to enhance involvement of Tribal women through convergence with central sponsored scheme in the respective district.

Environmental Management Plan

288. The project envisages construction and installation of around 4,660 MI schemes in 333 blocks of 18 districts of West Bengal. These blocks are dispersed over four agro climatic zones of the state, viz., the Teesta-Terai zone, the Gangetic and Vindhyan alluvial zone, the undulated red lateritic zone, and the coastal saline zone. The Environmental Assessment Study for the project has shown that the projects need to address environmental issues arising out of project implementation that may have adverse impacts. The project is assessed to fall into the Environmental Category A as per World Bank OP. The EA assessed that the environmental impacts of the individual MI schemes are expected to be low and limited. Further, impacts will vary as the environmental context varies and so the direct and indirect impacts in different contexts of sensitive natural resources receptors had been analyzed by

the EA. Overall, the EA assessment suggested that the project will not have any significant adverse and/or irreversible environmental impact.

289. The Environmental Assessment however identified a few sources of potential negative impacts, which include construction activities impacting flora; stream or riverside construction accelerating erosion of stream banks; increasing command areas resulting in conversion of unprotected natural habitats and wildlife corridors; lack of drainage, salinity increase, and health impacts of inundation; enhanced use of chemical and synthetic fertilizers and pesticides; and possibility of using industrial waste water for irrigation in urban fringe. The major issues related to incremental water use related to direct and indirect impacts on water quality, the issue of downstream flow, specifically in case of river lift irrigation schemes and ground water use profiles and unsustainable ground water extraction. The EA also assess the need to ensure safety of the small tanks to be created by the project.

290. The major possible project interventions creating negative impacts include the following:

- Ground water depletion due overexploitation;
- Downstream impact due to overexploitation of river water upstream;
- Lack of drainage, salinity increase, Arsenic and Fluoride contamination;
- Enhanced use of chemical and synthetic fertilizers and pesticides;
- Impacts of inundation;
- Use of diesel operated pump may resulted in air pollution;
- Protection of historical and other important remains and sites;
- Increasing command areas resulting in conversion of unprotected natural habitats and wildlife corridors;
- Construction activities Impacting flora;
- Stream or riverside construction accelerating erosion of stream banks;
- Possibility of using industrial waste water for irrigation in urban fringes; and
- Safety of the small tanks to be created by the project.

291. To prevent and protect against the above identified environmental concerns there is a need to implement mitigating measures, especially in the MI schemes that will be relatively big in size and will involving larger surface storage and construction activities. Towards this the project has developed an Environmental Management Plan (EMP) that incorporates the key findings and recommendations of the EA. The EMP contains a set of procedures for environmental management including specimen EMPs and Environmental Codes of Practice (ECoP) that will be used during project implementation.

292. The **objectives** of the EMP are: (i) to mitigate and prevent adverse environmental impacts of project implementation; and (ii) Reinforce and strengthen the beneficial environmental impacts of project outcomes.

Statutory and Legal Compliance

293. **Central and State Government Compliance:** The project does not attract the Environment Impact Assessment Notification, 2006 of Government of India. The project or any activities proposed under the project also does not attract the provision for prior environmental clearance either from the Union or the State Government Regulators. The project has been planned in accordance to the principles set out in the following statutes: the National Environmental Policy (2006), the National Agricultural Policy (2002), the National Water Policy (2002), the National Farmers' Policy (2007),

and the West Bengal Environmental Policy (1985).

294. However, according to the prevailing procedures, the project may require: (i) forestry clearances if any forest land is used in the construction of MI schemes; and (ii) permission for ground water use from the State Water Investigation Directorate (SWID), for all MI schemes that will use ground water. While the environmental screening criteria for the MI scheme will ensure avoiding any use of forest land it will make provision that each ground water MI scheme obtains necessary permissions from SWID for abstraction before being approved for financing. The relevant clearances / permits required before execution of a MI scheme are:

- Approvals from SWID for ground water abstraction for any groundwater MI scheme; and
- Clearance from the Divisional Forest Officer for felling and removal of trees for construction of MI schemes:

295. **World Bank OP Compliance:** The project is classified as a Category A under the World Bank environmental screening procedures specified in Operational Policy 4.01. The project triggers six of the ten World Bank safeguard policies and requires partial environmental assessments. These are:

- Environmental Assessment (OP/BP 4.01)
- Environmental Assessment (OP/BP 4.01)
- Pest Management (OP 4.09)
- Physical Cultural Resources (OP/BP 4.11)
- Indigenous Peoples (OP/BP 4.10)
- Safety of Dams (OP/BP 4.37)
- Projects on International Waterways (OP/BP 7.50)

Expected Output and Outcome

296. A summary of the expected output and outcome of the project EMP is given in the table below.

Table - 7.3. Summary of Expected Output and Outcome of Project EMP

Outcome	Output	Activities
Environmentally Safe Site Selection	Completed Environmental Screening	<ul style="list-style-type: none"> • Collection of baseline environmental data • Environment Screening based on criterion and relative scoring. • Categorization of the Subproject based on scoring • Identification of subprojects on the basis of low impact & medium impact category
Environmental Mitigation Measures	Safeguard for Water Environment Protection of Water Resource	<ul style="list-style-type: none"> • Surface water schemes will be chosen wherever feasible over ground water. • Ground water recharge by rain water harvesting • Ensure less than 50% water abstraction for surface water flow
	Maintain Aquatic Ecology <ul style="list-style-type: none"> • Increased aquaculture practices like production Fish 	<ul style="list-style-type: none"> • Water body maintenance • Aquaculture like fisheries • Restoration of existing water body

Outcome	Output	Activities
	<ul style="list-style-type: none"> • Ground water Recharge • Employment Generation 	
	<p>Enhancement of Soil Quality & Productivity</p> <ul style="list-style-type: none"> • Increased soil fertility • Increase food production • Employment Generation 	<ul style="list-style-type: none"> • Soil quality testing • Soil profile base farming • Use organic fertilizer and pesticide • Balance use of chemical fertilizer
	<p>Better Agro-Chemical Management</p> <ul style="list-style-type: none"> • Increased adoption of integrated pest management practices • Reduced soil and water pollution by fertilizer and Pesticides • Better understanding on optimum use of pesticide and fertilizer 	<ul style="list-style-type: none"> • Optimum mix of inorganic and organic fertilizer • Maximum use of Bio fertilizer and bio Pesticide • Adoption of good agriculture practices • Awareness development and training on implementation of the IPM
	<p>Protection of Ecology</p> <ul style="list-style-type: none"> • Protection of flora and fauna • Compliance as per stipulated legal provisions. 	<ul style="list-style-type: none"> • Tree felling will be compensated by twice number of tree plantation
	<p>Energy Efficiency Culture</p> <ul style="list-style-type: none"> • This will negate the chances of pollution/losses. • Energy as well as money savings 	<ul style="list-style-type: none"> • Installation of electric operated pump • procurement system of the pump set and other accessories will ensure highest standard of efficiency • Proper Maintenance • Promoting energy efficient pumps
	<p>Bio-Village Program/ Good Agricultural Practices (GAP)</p> <ul style="list-style-type: none"> • Increased the demand of organic fertilizer & pesticide • Comprehensive approach toward organic farming • Employment Generation • local entrepreneurship development • Production of organic as well as safe food 	<ul style="list-style-type: none"> • Production of organic fertilizer • Judicious mix of inorganic and organic fertilizer • Avoid use of synthetic pesticide as much as possible • Use of Bio- pesticide • Increase awareness of community on organic farming

Outcome	Output	Activities
	Unconventional practices <ul style="list-style-type: none"> • Implementation of new ideas for irrigation & agriculture • Sustainable irrigation and agriculture 	<ul style="list-style-type: none"> • Solar power passed pump operation • Unconventional irrigation practices • Unconventional agricultural practices • Introduction of solar /sprinkler /drip /low-cost Technology
Institutional Setup, Capacity Building and Empowering Community on Environmental Management Practices	Modernization and strengthening of SWID Laboratory for water and soil testing	<ul style="list-style-type: none"> • Testing and Monitoring of water and soil quality
	Involvement of WUA for implementation of Mitigation Measures WUA as water regulatory authority for this subproject	<ul style="list-style-type: none"> • Water budgeting • Judicious use of water/water allocation • Manage crop pattern & maintenance of subprojects • Use of bio fertilizer and pesticides
	Integration Convergence of all activities in the micro and macro level	<ul style="list-style-type: none"> • Convergence of different activities of environments • Convergence of different activities for irrigation and agriculture • Stake holder's consultation on each activity.
	Capacity Building for Environmental Sustainability	<ul style="list-style-type: none"> • Training on environmental aspects • Exposure visit • Work shop • Awareness Campaign with in various stake holders

Project Interventions

297. Environmentally Safe Site Selection: The environment screening of MI schemes will be based on the collected baseline data. The site will be selected for the proposed MI scheme on the basis of the environmental screening criterion including exclusion criterion and relative scoring of the criteria. The selection criteria will reduce the chance of negative impact on ground water and on surface water environment and will also address all other issues related to site selection and impact of the MI scheme on the environment.

298. Environmental Mitigation Measures: The EMP for a typical scheme contains a set of procedures which will be implemented during the preconstruction / construction as well as in the operation phase. The EMP will be implemented through the environmental codes of practice (ECoP). A multi-level structure of responsibility has been stipulated in the EMP. It will ensure mitigation and reduced negative impact on the environment caused by the MI scheme. The EMP will deal with various attributes of environment in this regards.

299. Safeguard for Water Environment: At the time of selection of MI schemes, most prominent among these is the choice between the use of surface water or ground water. For each site this selection will be done carefully and surface water schemes will be preferred over ground water wherever feasible, provided that small storage schemes will be undertaken only when there is no need for acquisition of private land. There will be several cases where there will be alternative sites

within the same locality. The final sites will be chosen in consultation with the local communities and depending on the environmental and hydrological characteristics.

300. In case of ground water, fall of water table is not anticipated in any of the MI schemes selected for execution as the exclusion criteria will not permit extraction of ground water in critical or semi-critical blocks. The distance between two irrigation pumps will be maintained as per SWID norms. Apart from the SWID norms and approval, options for ground water recharge will be taken up as necessary to ensure that the project is also involved in ground water recharge to protect the water environment.

301. Adverse impacts of low flow regime may occur when the same flowing waters of a stream are proposed to be used by a number of river lift irrigation schemes of minor and medium types. To mitigate the degree of impact on downstream flow-regime affecting riparian habitat and livelihood of downstream users, condition is imposed in the selection criteria to avoid any surface water based MI scheme where more than 50% stream discharge is used for irrigation.

302. **Air Environment:** During the construction of MI schemes negative impact on air quality may be felt in the construction area because of operation of machinery and movement of vehicles transporting construction materials. However, the impact is expected to be very limited and localized. Air quality is not expected to be affected much due to operation of the MI schemes since they will mostly be electric power operated.

303. **Ecology:** Sensitive areas like protected areas of wildlife sanctuaries, national parks, wetlands with rich biodiversity and reserved and protected forests etc. will not be impacted by the project as the site selection criteria will ensure that such areas are not selected for project intervention. However, tree felling during MI scheme construction may be required. If tree felling is required, it will be compensated through plantation of double the number of trees felled in the command area as per the operative regulatory framework of the State.

304. **Maintain Aquatic Ecology:** The project has provision for aquaculture intervention by creating or restoring existing surface water body. This will increase the richness of the aquatic ecology of the area as the selected species for aquaculture will be local and it will not create any stress to the existing ecology. These surface water bodies will also recharge the ground water table of the area and pose a positive impact on the water environment.

305. **Enhancement of Soil Quality and Productivity:** The project will increase soil fertility in the proposed command areas. The outcome of the increased soil fertility will impact positively on the production of food grains and employment and as a whole on the sustainable economic development of the project area. But it might also increase the use of fertilizer and pesticide and in the long run some cumulative adverse impact may be observed. The project under its ASS interventions will promote balance use of chemical fertilizer and use of bio-fertilizer, pesticide to reduce the chances of soil pollution by the project.

306. **Agro-Chemical Management:** The impact of agro-chemical pollution through intensive use of fertilizers and pesticides will require mitigation through judicious use and sustainable agriculture practices under the project. This will optimize inputs of water, fertilizer and pesticides and make the farmers aware of use of an optimum mix of inorganic and organic fertilizer and adoption of good agriculture practices. Awareness generation and training on implementation of the IPM etc. will be the deciding factor in addressing the problem of agro-chemical pollution.

307. **Pest Management:** Irrigated agriculture introduced under the project may potentially increase

the use of chemical pesticides for pest control, which in turn may affect water quality at large. The project will propose a series of activities aimed to improve pest management in the project area, including discourage use of WHO Class 1B and Class 2 pesticides, encourage use of organic farming, support production and entrepreneurship development in supplying bio-fertilizers and bio-pesticides, and “Bio-village/GAP” program implementation.

308. Study of accumulation of pesticides in food crops: The project intends to bring approximate 139,000 ha of cultivated land to be brought under the command of surface and ground water irrigation schemes. The project will also support intensification and diversification of agricultural systems. Through the execution of this program, the cropping intensity has been proposed to be raised to the level of 200% on an average in 6 agro-climatic regions of the state, which currently is at the level of 180%. The intensification of agriculture may result in increasing use of fertilizer and pesticide which may create problem of the environment. In view of the above the WBADMIP has decided to launch a systematic study of bio-accumulation of synthetic and persistent chemicals in popular agricultural crops.

309. Bio-Village Program / Good Agricultural Practices: Augmenting minor irrigation in the state may potentially increase the use of chemical fertilizers (and pesticides), in turn affecting water quality at large. The rate of use of fertilizers in the state is below the national average and the recommended maximum dose is 450 kg per ha. The ratio of NPK fertilizer use in the state is balanced (2.3: 1.3: 1). Given these baseline scenarios, incremental fertilizer use induced by the project is not expected to have any significant impact. However, as a positive environmental enhancement measure, the project will support increased use of bio inputs through awareness campaigns, improved agriculture extension services and training, and through the “GAP” activities. GAP will be the means of achieving, implementation of Bio-Village program identified in the EMP.

310. The GAP will be implemented in up to 50 villages in the various agro-climatic zones in the state. In each village the targets will include converting at least 10 ha of agricultural land to organic farms. Implementation of the GAP will accelerate a shift towards enhanced use of bio-pesticides & bio-fertilizers. GAP program will have the components of (i) awareness generation of beneficiaries & their capacity building, (ii) production of bio-fertilizer and bio pesticides & (iii) supply of bio-inputs.

311. This assignment will undertake promotion of application of bio-inputs particularly bio-pesticides and production, wherever possible in the state and a series of activities aimed to improve pest management in the state, including discouraging use of WHO Class 1B and Class 2 pesticides, encouraging GAP through the use of bio-inputs, supporting production and entrepreneurship development in supplying bio-fertilizers and bio-pesticides.

312. It is expected that every household in the target area will get the benefit of latest technologies. These interventions will help to utilize the available natural resources in a better way; the environment will be free from the hazardous chemicals, hence the food safety will be ensured. Apart from this, the effort will initiate few more activities so the productivity of the crops will increase, income of the farmers will also increase.

313. Further, the agricultural service providers –the knowledge workers will be the model entrepreneurs, thus the employment generation will be another outcome of the program. As the agricultural productivity will increase, secondary employment also will be generated for a large number of people. The program is for the village as a whole. Training will be provided to local villagers (focusing on unemployed or partially employed youth, especially from the scheduled castes and scheduled tribe communities if present in the particular village) so that they become village level

service providers in implementation of the GAP program for the intended 4 years, and with an aim to continue providing the required good agricultural practice services in future. The entire activity for the implementation of the GAP is to be completed within 4 years' time. Continuation of the activities in any particular village will be dependent on achieving the annual outcomes which will be evaluated on the basis of annual report for each village (covered under the GAP) in each year. The Terms of Reference for Good Agriculture Practices (GAP) is given in Attachment 7.4

314. Energy Efficiency Culture: The project will preferably use electric operated pumps instead of diesel operated ones. The project procurement procedure for pump set and other accessories will ensure procurement of pumps with high standards of efficiency. In this way energy efficiency will be achieved at each individual MI scheme level. It will also negate the chances of pollution at the time of MI scheme operation. The project also provides a unique opportunity to adopt some unconventional or special interventions such as use of solar powered pump, drip / sprinkler irrigation for farming to boost for energy efficiency under the project.

Institutional Setup, Capacity Building and Empowering Community on Environmental Management Practices

315. Modernization and Strengthening of SWID Laboratories: Modernization and strengthening of central SWID laboratory which will provide services for testing of water and soil quality will be undertaken by the project. The tests will facilitate planning for optimal use of fertilizers and bio-chemicals under the project.

316. Awareness Campaign: A special drive on awareness building on environment and various related issues will be propagated in a systematic manner with in the various groups. And in totality it will help to improve environmental quality as a whole.

Involvement of WUA: WUA will be responsible to prepare and maintain crop plans and water budget for their command area, which will show the total water abstraction and production of crops in a season. They will be the authority who will allocate water to the farmers in accordance with the crop type and water availability. They will also manage the cropping pattern in their command area on the basis of the soil profile and availability of water for irrigation. Ultimately the WUA will need to manage demand supply of the water and act as the water regulatory authority in their command areas.

317. Capacity Building of Project Staff for Environmental Sustainability: To effectively implement the project EMP training and capacity building of project staff and WUAs will constitute an integral and critical project intervention under the EMP. This will enhance the awareness, knowledge and skill level for all project stakeholders. Ultimately training and capacity building will help in implementation of efficient irrigation, good agriculture practices and maintain environmental sustainability.

Intervention Area Selection Criteria

318. MI schemes included under the project will not require environmental clearance either from the Ministry of Environment and Forests, Government of India or the Department of Environment in the State Government. The project may however require some permission under the regulatory framework of the State such as for ground water abstraction or tree felling. To ensure that the MI schemes being constructed under the project do not under any circumstances cause any significant adverse impact on the environment the project will adopt strict MI scheme site selection criteria.

319. Selection of MI Scheme Site: The selection of a MI scheme site will be guided by the site screening criteria developed for the project.

Socioeconomic criteria:

- There is demand from farmers for development of a subproject of minor irrigation at the site and beneficiaries are willing to take over operation of such projects.
- Farmers with the support of the Agriculture Department are well disposed towards implementation of integrated pest and nutrient management
- Abstraction of water from water bodies coming under the definition of ‘debottar land’ need to be avoided unless the local communities permit use of such water voluntarily.
- The proposed sub-project at the site normally should not involve any land acquisition

Ecological criteria:

- The reservoir and water detention structures do not impact any wildlife protected area. Water bodies identified as habitats of good population of wetland birds or waterfowl should not be proposed for development of surface irrigation sub-projects under this program.
- The site should not encroach into the protected area around preserved archaeological monuments and historical sites.

Technical criteria:

- In case of gravity surface flow schemes the catchments of the proposed reservoir should be reasonably free from signs of rill, sheet or gully erosion
- Signs of impeded drainage, water-logging or flooding normally be absent at the proposed site of reservoir/ water detention structures and the CCA.
- Construction of major access roads for haulage of materials for construction can be avoided for execution of the sub-project
- The magnitude of excavation works is manageable keeping in view the problem of disposal of solid waste in the immediate project surround.
- In case of river lift schemes, sites close to banks with signs of bank erosion normally should be avoided

320. Selection Criteria: All MI scheme sites identified under the project will be selected on the following criteria.

Table - 7.4. MI Scheme Selection Criteria

Criterion	Particulars
Criterion I	Siting of the project with reference to environmentally sensitive areas which will include protected area network including wildlife sanctuaries, national parks, natural habitats including reserved forests/protected forests, wetlands of national and international importance, sacred groves of significant bio-diversity, wild elephant corridors etc.
Criterion II	Status of ground water availability
Criterion III	Degree of Arsenic contamination in the aquifers/Block
Criterion IV	Degree of Fluoride contamination in the aquifers/Block
Criterion V	Irrigation water quality determined by parameters of pH, EC (electrical conductivity), SAR (Sodium absorption ratio) and Boron as set by Central Pollution Control Board,

Criterion VI	Degree of impact on downstream flow-regime affecting riparian habitat and livelihood of downstream users
Criterion VII	Presence or absence of historic and archaeological remains preserved under the provisions of the Ancient Monuments and Archaeological Sites and Remains (Act), 1958
Criterion VIII	Possibility of energisation with electrical sources of power

Classification of criteria by MI scheme type:

- Criterion I, II, III, IV, V, VII & VIII are relevant for MI schemes proposing ground water abstraction;
- Criterion I, V, VI, VII & VIII are relevant for surface flow or river lift irrigation MI schemes.

Each selection criteria may be rated on the scales suggested below.

Table - 7.5. Rating Scale for MI Selection Criteria

Criterion	Scale			
	0	1	2	3
Criterion I	Present beyond 500m	present within 251m to 500m of CCA or Head works and the reservoir	Present within 101m to 250m	Present within 100m
Criterion II	Safe	Semi critical	Critical	
Criterion III	Present within permissible limits of 10µg/l as approved by WHO	present within permissible limits of 50 µg/L as approved by the country	present beyond permissible limits of 50µg/l as approved by the country	
Criterion IV	present within permissible limits of 1mg/l as approved by BIS	present within limits of > 1.mg/l < 1.5mg/l	present beyond > 1.5mg/l	
Criterion V	All parameters well within CPCB standards; EC at 25° C < 2000 micromhos /cm and SAR < 20	SAR > 20 and < 26 and EC at 25° C >2000 and < 2250 micromhos/cm and other parameters within CPCB standards	one or more of parameters exceed CPCB standards	
Criterion VI	less than 10% stream discharge is used: adverse impact imperceptible	11-30% stream discharge is used: adverse impact low	31-50% stream discharge is used: adverse impact moderate	more than 50% stream discharge is used: adverse impact irreversible and significant
Criterion VII	present beyond 500m	present within 251m to 500m	present within 101m to 250m	present within 100m

Criterion	Scale			
	0	1	2	3
Criterion VIII	Available	Available on short term of 2 years	Available on midterm of 5 years	likely to be available beyond 5 years

321. Categorization of MI Schemes

Ground Water based MI schemes:

- Low Impact Category: Ground water abstraction MI schemes having score of 0 to 10 can be categorized as low impact category scheme;
- Medium Impact Category: MI schemes scoring 11 to 13 will be categorized as medium impact category scheme.

Surface Water based MI schemes:

- Low Impact Category: Surface water MI schemes having scores of 0 to 8 will be categorized as low impact category scheme;
- Medium Impact Category: Surface water MI schemes having scores of 9 to 10 will get categorized as medium impact category scheme.

322. Exclusion Criteria

Based on selection Criteria:

- All ground water abstraction MI schemes having scores of 2 against one or more of criteria II , III, IV , V shall not be taken up for execution because of likely adverse impacts on ground water depletion, soil quality and on human and livestock health through arsenic and fluoride intake through food chain;
- All surface water MI schemes (surface flow or river lift) having scores of 2 against criterion V shall not be taken up for execution. Similarly all surface water MI schemes having scores of 3 against criterion VI will be avoided as execution of such sub-projects may have irreversible adverse impact on down stream flow regime, infiltration rate and crop productivity;
- All MI schemes requiring diversion of areas included in protected areas like sanctuaries and national parks should not be considered for execution as diversion of such areas is a very sensitive issue with the Ministry of Environment and Forests of the GOI and getting clearance for such projects is a time consuming process involving even the Supreme Court of the country under the orders in force.

Apart from above listed exclusion criteria:

- No MI scheme will be located within any natural habitat, protected or not, such as wetlands, elephant corridors, mangroves, or community forests;
- No MI scheme will be located within or within one km of any protected natural habitats, such as reserved forests, national parks, or wildlife sanctuaries;
- The traditional common property resources or ponds (which may contain niche habitats of wetland birds or rare, endemic, or threatened flora and fauna) will be identified and avoided;
- Any MI scheme, particularly river lift irrigation schemes will be avoided if the relevant river / rivulet enter a downstream protected natural habitat within 2 km of its abstraction point, so as not to disturb flow of water into the protected natural habitat.

323. Mitigation Measures for Low Impact Category MI Schemes: The Generic Environment Management Plan (EMP) and the Environmental Code of Practice developed for project execution suggesting mitigation measures for low impact category MI schemes both at the construction and the operation phase. However, specific EMP will need to be prepared for each individual low impact category MI scheme to address the specific issue related to the scheme.

324. Mitigation Measures for Medium Impact Category MI Schemes: MI schemes categorized as medium impact category will require limited Environmental Assessment and terms of reference for the assessment have been stipulated in the project ECOP keeping in view the guidelines of the World Bank. Under this EA a MI scheme specific EMP will be prepared for mitigation of the identified environmental impacts.

Environmental Guidelines for Ground-Water Based Sub Projects

325. The following environmental guidelines are to be followed in the selection of Ground Water based Sub Projects. The details have to be collected for the block under which the village exists. Find out the status of the block in terms of Ground water quality SWID list and follow the composite of all criteria listed in **Table 7.6**. In those blocks where ground water is contaminated with arsenic or fluoride or where salinity is high the first option is to examine the feasibility of surface water sub projects. Only when surface water sub projects are not possible backed up with evidence, then alone ground water sub projects are considered. Prior testing of water quality of all surrounding ground water schemes is a must and clearance from SPMU is required. The exclusion criteria to be followed strictly are:

- a. No subproject should be planned (i) within 100m of any natural habitat, protected or not, such as wetlands, elephant corridors, mangroves, or community forests; (ii) within one km of any protected natural habitats, such as reserved forests, national parks, wildlife sanctuaries, tiger reserves, biosphere reserves; and (iii) within 100 m of any archaeological monuments and historical sites.
- b. If any of the above situation exists, neither groundwater nor surface water schemes are to be taken up.

326. All ground water based sub projects have to comply with The West Bengal Ground Water Resources (Management, Control And Regulation) Act, 2005. SWID advice may be sought for extracting ground water in case of As, Fl or Salinity affected blocks. The detailed procedure for planning ground water sub projects affected with arsenic, fluoride or salinity is presented in **Table 7.7**.

Table 7.6 Composite Criteria for Ground Water Status and Quality

Groundwater Abstraction Status			Groundwater Quality Status			
Groundwater Critical Block	Groundwater Semi-Critical Block	Others	Arsenic Affected Blocks	Fluoride Affected Blocks	Salinity Affected Blocks	Other Water Pollutant
No groundwater scheme or sub-project should be planned	Only Dug Well or Pumped Dug Well should be planned only with prior permission from SWID	Groundwater scheme or sub-project can be planned. Provide evidence in the SDMP.	Ordinarily groundwater scheme or sub-project should not be planned.	Ordinarily groundwater scheme or sub-project should not be planned.	Ordinarily groundwater scheme or sub-project should not be planned.	Can be planned. But with mitigation measures.
			However, if surface water schemes are not possible (provide evidence), and seek SPMU Guidance.	However, if surface water schemes are not possible (provide evidence), and seek SPMU Guidance.	However, if surface water schemes are not possible (provide evidence), and seek SPMU Guidance.	Refer the EMP. Seek guidance from SPMU. Design mitigation measure, and include in scheme design.
			If SPMU agrees, follow Procedures in Table 2.	If SPMU agrees, follow Procedures in Table 2.	If SPMU agrees, follow Procedures in Table 2.	

Table 7.7 Procedure to be followed for Ground Water Sub Projects in Blocks affected with Arsenic, Fluoride and Salinity

Stage of Planning	Sequential Procedures to be undertaken	Verification and Monitoring
Village identification	Provide evidence that surface water scheme is not possible. DPMU EE to undertake site visit, and certify this.	SPMU will verify by sample site visit.
Groundwater Scheme Concept	<ul style="list-style-type: none"> Conduct water quality tests for all existing groundwater schemes (both public and private schemes) within the village and within 500m of the village. Provide evidence that no such existing source of groundwater is excluded from the survey. If there are 2 such schemes in each of the eight major directions, private sources may be ignored. If there is any existing groundwater scheme, where (a) arsenic level is found to be higher than 0.05mg/l; 	

Stage of Planning	Sequential Procedures to be undertaken	Verification and Monitoring
	<p>or, (b) fluoride level is higher than 1.5 mg/l; or, (c) salinity level is higher than 2250 micro mhos/cm maximum at 25°C and Sodium Absorption Ratio (SAR) maximum 26 –groundwater scheme should not be planned.</p> <ul style="list-style-type: none"> • If the water quality tests for all existing groundwater schemes reveal that all are within the above standards, the priority for planning should be (i) dug well, (ii) pumped dug well, (iii) shallow tube well, where the lower priority option is to be considered only when higher priority option is not technically feasible (provide evidence). • If there is no groundwater scheme in the area of the village and 500m beyond (provide evidence), one shallow tube well scheme is acceptable. • In no case medium duty or heavy duty tube wells should be planned, unless all sources within 2 km boundary of the village is tested and found to be within limits of water quality. Alert SPMU on each of such cases prior to taking up the water quality surveys. • No SDMP or Scheme Feasibility Report of DPR will be signed by DPMU until all the required water quality test results are available. 	
Groundwater Scheme Design	<ol style="list-style-type: none"> 1. No shallow or light duty tube well will be planned within a distance of 200 m of any existing ground water abstraction structure (irrespective of its type or ownership). 2. No medium-duty tube well will be planned within a distance of 600 m of any existing ground water abstraction structure (irrespective of its type or ownership). 3. No heavy-duty tube well will be planned within a distance of 1000 m of any existing ground water abstraction structure (irrespective of its type or ownership). Further, 4. No shallow or light duty tube well will be planned within a distance of 600 m from the India-Bangladesh border. 5. No medium-duty tube well will be planned within a distance of 800 m from the India-Bangladesh border. 6. No heavy-duty tube well will be planned within a distance of 1000 m from the India-Bangladesh border. 	

Stage of Planning	Sequential Procedures to be undertaken	Verification and Monitoring
Groundwater Scheme Implementation	<ul style="list-style-type: none"> • During implementation, signage and other mitigation measures should be implemented (such as warning signs for people to avoid drinking or using such water for non-irrigation purposes). • Before handover to the WUA, water quality testing (for all relevant drinking water quality norms) should be completed, and test results to be prominently displayed. • Where water quality issues are detected, additional mitigation measures (such as to prevent drinking or similar other use) should be implemented by the WUA. • WUA needs to sign an undertaking to conduct water quality tests every 6 months (especially if non-irrigation uses are to be permitted by WUA, irrespective of whether water quality is good or deficient). As and when water quality issues are detected, WUA undertakes to implement mitigation measures. 	
Groundwater Scheme Operation	<ul style="list-style-type: none"> • WUA conducts water quality tests every 6 months (especially if non-irrigation uses are to be permitted by WUA, irrespective of whether water quality is good or deficient). As and when water quality issues are detected, WUA will need to implement mitigation measures. 	

Environmental Guidelines for Surface-Water Based Sub Projects

327. The exclusion criteria are same as for ground water schemes. The environmental guidelines for planning surface water sub projects are summarized in **Table 7.8**.

Table 7.8 Procedure to be followed for Surface Water Sub Projects – Status and Quality

Stage of Planning	Sequential Procedures to be undertaken	Verification and Monitoring
Village identification	1. Surface water scheme is the first priority for selection of type of any subproject.	DPMU will verify by site visit.
Surface water Scheme Concept	<ol style="list-style-type: none"> 2. Conduct water quality tests, sample of surface water will be collected from the proposed intake point of the stream or within proposed detention structure. Water quality should be tested to ensure safe water quality. 3. Ensure that water quality is fit for irrigation, particularly unaffected by industrial effluent. 4. Contaminated water, affected with Industrial pollutant beyond permissible limit will not be used for irrigation. 	

Stage of Planning	Sequential Procedures to be undertaken	Verification and Monitoring
	<ol style="list-style-type: none"> 5. If salinity level is higher than 2250 micro mhos/cm maximum at 25°C and Sodium Absorption Ratio (SAR) maximum 26 –surface water scheme should not be planned. 6. Ensure maintaining at least 50(%) percent of the peak agriculture season in stream flow in small rivers and local streams used for the project to ensure that downstream villages are not impacted significantly. 7. Maintaining flow of the minor river/rivulet about 10% of incoming average annual flow, if flow is less than that and then the subproject needs to be avoided. 	
Surface water Scheme Design	<ol style="list-style-type: none"> 8. If more than 50% stream discharge has to be used for irrigation by the proposed subprojects than this subproject needs to be excluded. 9. In case of Lift Irrigation (LI), river/source should be perennial otherwise LI subproject should be in conjunction with weir/check dam structure. 10. Sub project will ensure that the traditional common property resources or ponds which may contain niche habitats of wetland birds or rare, endemic, or threatened flora and fauna will be identified and absolutely avoided. 11. River lift irrigation sub-project will be avoided if the relevant river/rivulet enters a downstream protected natural habitat within 2km of its abstraction point, so as not to disturb flow of water into the protected natural habitat. 12. The reservoir and water detention structures should not impact any wildlife protected area. Water bodies identified as habitats of good population of wetland birds or waterfowl should not be proposed for development of surface irrigation sub-projects under this program. 13. No subprojects will be taken up in any of the 48 small local rivers or rivulets flowing directly into the Bangladesh. 	SPMU will verify by sample site visit.
Surface Water Scheme Implementation	<ol style="list-style-type: none"> 14. During implementation, signage and other mitigation measures should be implemented (such as warning signs for people to avoid drinking or using such water for non-irrigation purposes). 15. Before handover to the WUA, water quality testing (for all relevant drinking water quality norms) should be completed, and test results to be prominently displayed. 	

Stage of Planning	Sequential Procedures to be undertaken	Verification and Monitoring
	<p>16. Where water quality issues are detected, additional mitigation measures (such as to prevent drinking or similar other use) should be implemented by the WUA.</p> <p>17. WUA needs to sign an undertaking to conduct water quality tests every 6 months (especially if non-irrigation uses are to be permitted by WUA, irrespective of whether water quality is good or deficient). As and when water quality issues are detected, WUA undertakes to implement mitigation measures.</p>	
Surface Water Scheme Operation	<p>18. WUA conducts water quality tests every 6 months (especially if non-irrigation uses are to be permitted by WUA, irrespective of whether water quality is good or deficient). As and when water quality issues are detected, WUA will need to implement mitigation measures.</p>	

Reporting and Monitoring

328. Reporting and monitoring will play an important role for effective implementation of the EMP. Proper reporting will ensure smooth functioning and implementation of the multi-level EMP. Regular monitoring will provide updated status on EMP implementation and also it will be instrumental to find out deviation and required corrective measures. Based on monitoring system a MIS based reporting system for the EMP will be developed. The EMP includes two types of monitoring viz. one for implementation of different types of activities involved in environment management and second on monitoring of environmental parameters to ensure that there are no adverse impacts. The environmental parameters monitoring will supplement different activities under the environment management as an instrument.

329. Steps of Monitoring

The first step in monitoring will be the implementation of mitigation measures included in the EMP to ensure that the MI scheme has minimally effect on the environment in the project area both during the construction and in the operation phase. The second step will be the monitoring of key environmental parameters to assess the effectiveness of mitigation measures suggested in the EMP to avoid contingent situations arising in the future because of commissioning of the MI scheme.

330. Monitoring of Mitigation Measures: Monitoring of mitigation measures has to be undertaken during the pre-construction and construction phase as well as during the initial years of MI scheme operation. In the pre-construction phase monitoring will lay stress on the following issues:

- Siting of the project with reference to criteria as suggested in the ECoP;
- If required, establishment of construction camps and storage areas keeping in view the provisions under ECoP;
- Site preparation works have to be monitored primarily with reference to ECoP.

331. Activities in the Construction Phase: Activities in the construction phase will revolve around procurement of raw material from identified sources, their transportation and storage at the site of construction and undertaking construction of intake, head works, water detention structures, pump house, distribution towers, laying of conveyance pipes with attendant spouts, construction of surface channels for distribution, etc. Construction activities will also include excavation and construction of embankments. All these activities will generate some adverse impacts on the environment, which can be mitigated through the implementation of MI scheme specific EMP. In accordance with ECoP provisions, monitoring during construction phase will focus on the following;

- Procurement, transportation and storage of materials;
- Erosion and sediment control: This may be an issue in gravity surface flow projects of medium and major category and this activity has to be guided by the norms;
- Water Quality: This will be an important issue for all ground water and surface water projects particularly in cases where the MI schemes are located in an existing surround of intense agriculture development or located close to industrial and urban areas. As many of the MI schemes will also get located in identified blocks affected by arsenic and fluoride, there is need to create benchmarks for water quality criteria before taking up implementation of scheme. The ECoP has prescribed norms for prevention of degradation of water quality, which will be monitored;
- Flora and fauna: This will be a minor issue for low impact category projects and if required it will be addressed by compensatory plantation on identified lands in the project influence area as per guidelines of the regulatory framework of the State;
- Air Quality: ECoP has suggested measures for control of air pollution. This impact will be localized, temporary and low;
- Noise level: This impact will also be low, localized both during the construction and the operation phase.

332. Decommissioning and operation phase monitoring activities will concentrate on:

- Closure and rehabilitation of borrow pits and quarries opened up for the project;
- Closure and rehabilitation of construction camps opened up at the project site;
- Monitoring of environmental quality parameters like water quality, siltation rate at the reservoir site.

333. Environmental Parameter Monitoring: Monitoring of environmental quality has to be carried out during the construction and operation phase. Monitoring needs to be conducted in accordance with the MI scheme type and the environmental condition prevailing in the scheme site. The environmental parameters that need to be monitored including the site of monitoring, frequency and responsibilities for carrying out such monitoring are detailed out in the EA report and will be included in the MI scheme EMP as part of the SDMP.

Environmental Audit

334. Environmental Audit will be carried out in the project to find whether all EMPs have been implemented properly. The audit will cover all districts where project is being implemented. The audit report will be used to improve the implementation of EMP. The EMP may be modified as per findings of the audit report. This audit will be undertaken by an external agency before the end of the second and the fourth year of the project.

Implementation Arrangements

335. Environmental Screening for Site Selection: Before selection of a MI scheme a survey will be conducted using the Rapid Environmental Checklist annexed with ECoP. This Checklist needs to be filled up by the SO and DPMU staff as the first step for proposing a MI scheme site for implementation. The area covered during this survey should be 3 to 6 times of the command area of the proposed MI scheme. For small isolated ground water structures like shallow tube wells, light capacity tube wells, dug wells, tanks and mini RLIs or surface flow schemes it should normally be 3 times whereas for medium /major RLIs or surface flow schemes the area covered should be 6 times or more of the CCA depending on the environmental sensitivities of the project surround.

336. Preparation of MI Scheme Proposal: The DPMU engineers will prepare the MI scheme proposal using the rapid environmental survey steps and consultation with the local communities as detailed in the ECoP. Irrigation water quality parameters will be checked with the help of SWID. SAR may be determined only for MI schemes to be located in saline blocks.

337. Verification of Proposal and Categorization: The DPMU Executive Engineer will verify the checklist and carry out categorization of the MI scheme using the screening criteria and the scale of categorization. In undertaking this exercise he will obtain advice from the DPMU Environmental Engineer / Environmental Specialist where they are located.

338. Permission for Implementation; The DPMU will permit implementation of low impact category MI schemes and the appointed contractor will have the responsibility of implementing the provisions of the Generic EMP provided in the ECoP. For medium impact category MI schemes the DPMU will undertake a limited EA of the proposed scheme with the assistance of the DPMU Environmental Engineer / Environmental Specialist. MI scheme specific EMP will be prepared by the DPMU and stipulated. The contractor will be responsible for implementation of the MI scheme specific EMP as per stipulation in the construction phase.

339. Incorporation of Environmental Management Requirement in Bidding Document: While preparing the bid document, the DPMU will ensure that:

- The Environmental Management Plan is made as appendices to the bid document in case of low and medium impact category projects, respectively;
- The bid document has specific requirement for the contractor to implement all mitigation measures to minimize environmental impacts during the construction phase;
- The contractor shall have the responsibility of restoration of campsites, borrow pits and quarries opened up for procurement of materials at the stage of decommissioning. Abandoned bore wells will need to be filled up properly with proper filler materials by the contractor.

340. Site Preparation Activities by the Contractor: After the site has been handed over to the contractor by the DPMU, the contractor will be required to submit schedules and methods of operation of various items during the construction stage for approval by the DPMU. He shall also take care to keep the local communities and the Gram Panchayat informed. The contractor shall take up execution only on approval of schedules by the DPMU. During site preparation activities, following norms should be observed:

- The clearance of site shall involve removal of all materials such as trees, shrubs, roots, part of top soil and rubbish. The measures to be adopted by the contractor will include measures like limiting the surface area of erodible earth material exposed by clearing and grubbing and

- conservation of top soil and stock piling the same for future use;
- All trees above 30 cm bhg requiring removal shall be inventorised prior to taking up clearing and grubbing operation;
- To minimize adverse impact on flora and vegetation cutting of trees and vegetation will be restricted to the minimal area required for construction;
- The location for disposal of grubbing will be finalized well ahead of the date of actual construction works at the site. Where erosion or sedimentation is a problem, grubbing operations should be so scheduled so that erosion / sediment control plan can follow grubbing operations;
- Use of blasting for rock cutting will only be resorted to if absolutely necessary. This has to be carried out in such a manner so as to ensure that it does not destabilize slopes and initiates movement of rock mass. All precautions need be taken to avoid damage to any public or private properties. Proper dissemination of information amongst the communities has to be ensured and warning signs put up.

Responsibility for Implementation of EMP

341. EMP for low and medium impact category MI schemes are provided in the project ECoP. The DPMU and the appointed contractor will share the responsibility of carrying out such monitoring at the time of construction, while at the time of operation of the MI scheme the WUA and DPMU will be responsible for environmental monitoring.

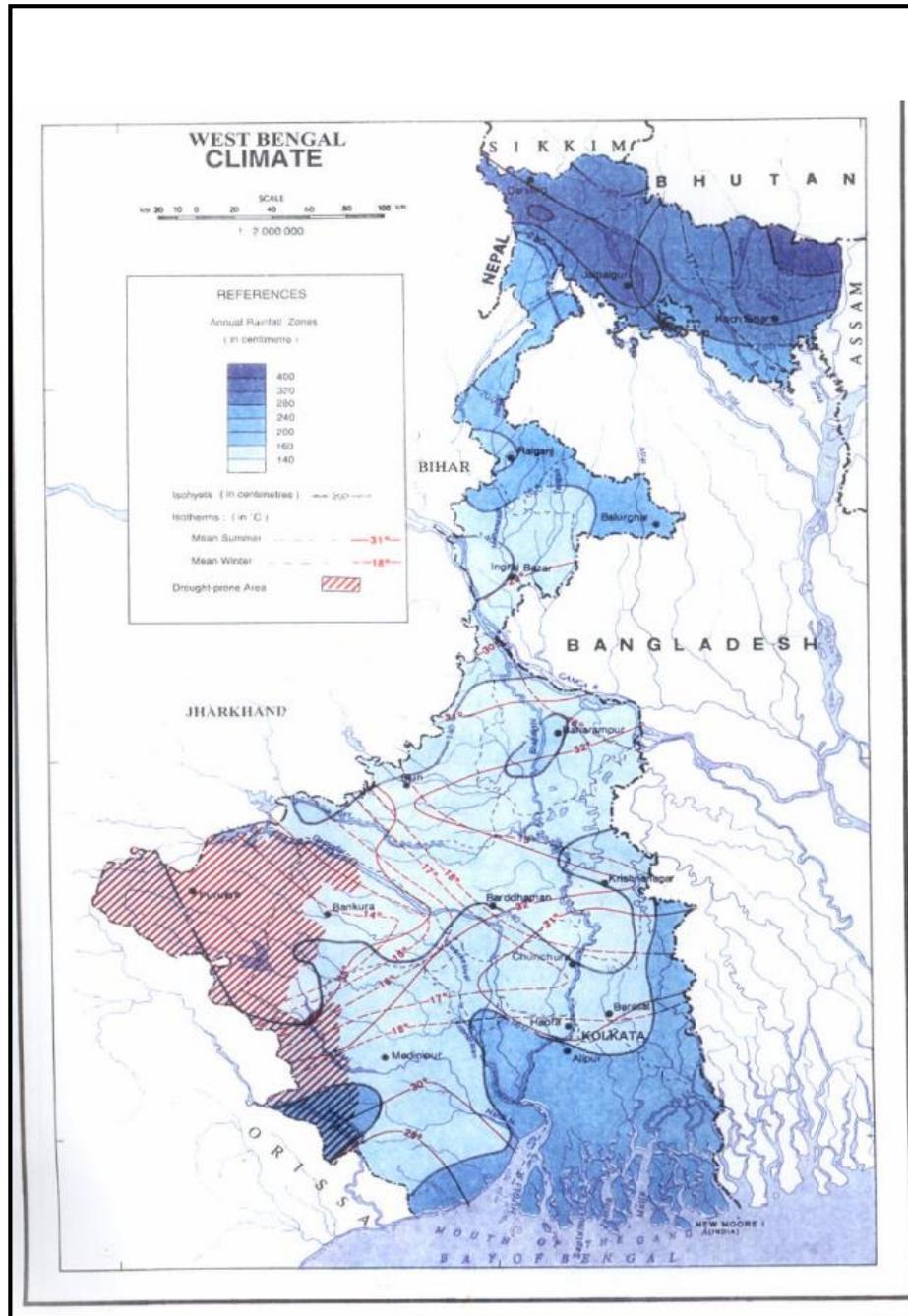
Role of DPMU: In each DPMU, an Assistant Engineer or an Executive Engineer will be in-charge for implementing the EMP with support from a full-time environmental specialist who will ensure that all environmental mitigation and management measures are fully implemented.

Role of SPMU: At the SPMU, a distinct safeguard management unit will be formed with environmental (and social) specialists. The responsibility of the unit will be to:

- Review and inspect implementation of the EMP;
- Review and verify the environmental screening of the candidate MI schemes, including sample field verification;
- Implementation of the environmental capacity building and awareness activities;
- Coordinating with relevant departments with respect to the larger state-wide issues of water quality including heavy metal, arsenic and fluoride contamination; water efficiency, reducing energy use in irrigation, promoting renewable energy in irrigation, integrated pesticide and nutrition management; and Managing the environmental audit process.

ATTACHMENTS

Map of West Bengal showing Climatic Details



Agro- Climatic Zones of West Bengal

Sl. No.	Agro- Climatic Zone	Climate	Soil Type	Main Crops Grown/Vegetation	%Geographic Area
1	Northern Hill Zone	Sub-tropical humid climate with rainfall varying from 2500 to 3500 mm, maximum and minimum air temperature being 19.50C and 4.80C (annual normal), respectively in this zone. The distribution of rainfall from March to May is 398.5 mm, June to October is 2637.5 mm and November to February is 68.5 mm respectively.	Soils are shallow, coarse and medium texture, highly susceptible to soil erosion, reasonably high in organic matter, poor in base & phosphate and acidic in soil reaction		3
2	Terai - Teesta Alluvial Zone	Tropical humid climate with rainfall between 2000 to 3000 mm with maximum and minimum air temperature being 32.30C and 12.80C (annual normal) respectively are the main characteristics of this zone. The distribution of rainfall from March to May is 376.6 mm, June to October is 2134.0 mm and November to February is 42.6 mm.	Soils are deep, medium in texture, moderate level of organic matter, pH ranges from highly acidic to acidic, low in bases, phosphate, potash and some micro nutrients		14
3	Gangetic Alluvial Zone	Tropical humid with rainfall of 1350 to 1650 mm and air temperature varying between a maximum of 35.0C and a minimum of 15.60C (annual normal). The distribution of rainfall from March to May is 233.8 mm, June to October is 1206.0 mm and November to February is 67.8 mm.	Soils are very deep, medium fine to medium in texture, neutral to mildly alkaline in pH, N, P status medium to medium low and potash is medium to high		17
4	Vindhyan Alluvial Zone	tropical moist sub-humid with rainfall varying between 1500 to 2000 mm and air temperature being maximum of 35.40C and minimum of 15.20C (annual normal). The distribution of	Soils in general are deep, textually medium fine, mostly acidic in soil reaction, pH increases with depth, low in bases,		20

		rainfall from March to May is 137.23 mm, June to October is 1206.12 mm and November to February is 66.68 mm	organic matter and phosphate, medium in potash		
5	Coastal Saline Zone	Tropical humid having rainfall between 1600 to 1800 mm and air temperature varying between a maximum of 37°C and minimum of 22.7°C (annual normal). The distribution of rainfall from March to May is 195.0 mm, June to October is 1475.2 mm and November to February is 82.8 mm.	Soils are mostly very deep, fine textured, varying grades of soil salinity exists and soil salinity increases with depth, excessive presence of K & Mg under poor drainage has given rise to typical physical condition problematic to attain soil health.		17
6	Undulating Red and Laterite Zone	Tropical dry sub-humid having rainfall ranging from 1100 to 1400 mm and air temperature being maximum of 37°C and minimum of 14.8°C (annual normal). The distribution of rainfall from March to May is 137.0 mm, June to October is 1224.4 mm and November to February is 66 mm.	Soils are normally well-drained, susceptible to soil erosion, pH ranges from acidic in ridge and near neutral in valleys, base saturation, organic carbon content, phosphate & potash are significantly low		29

Physiographic Map of West Bengal

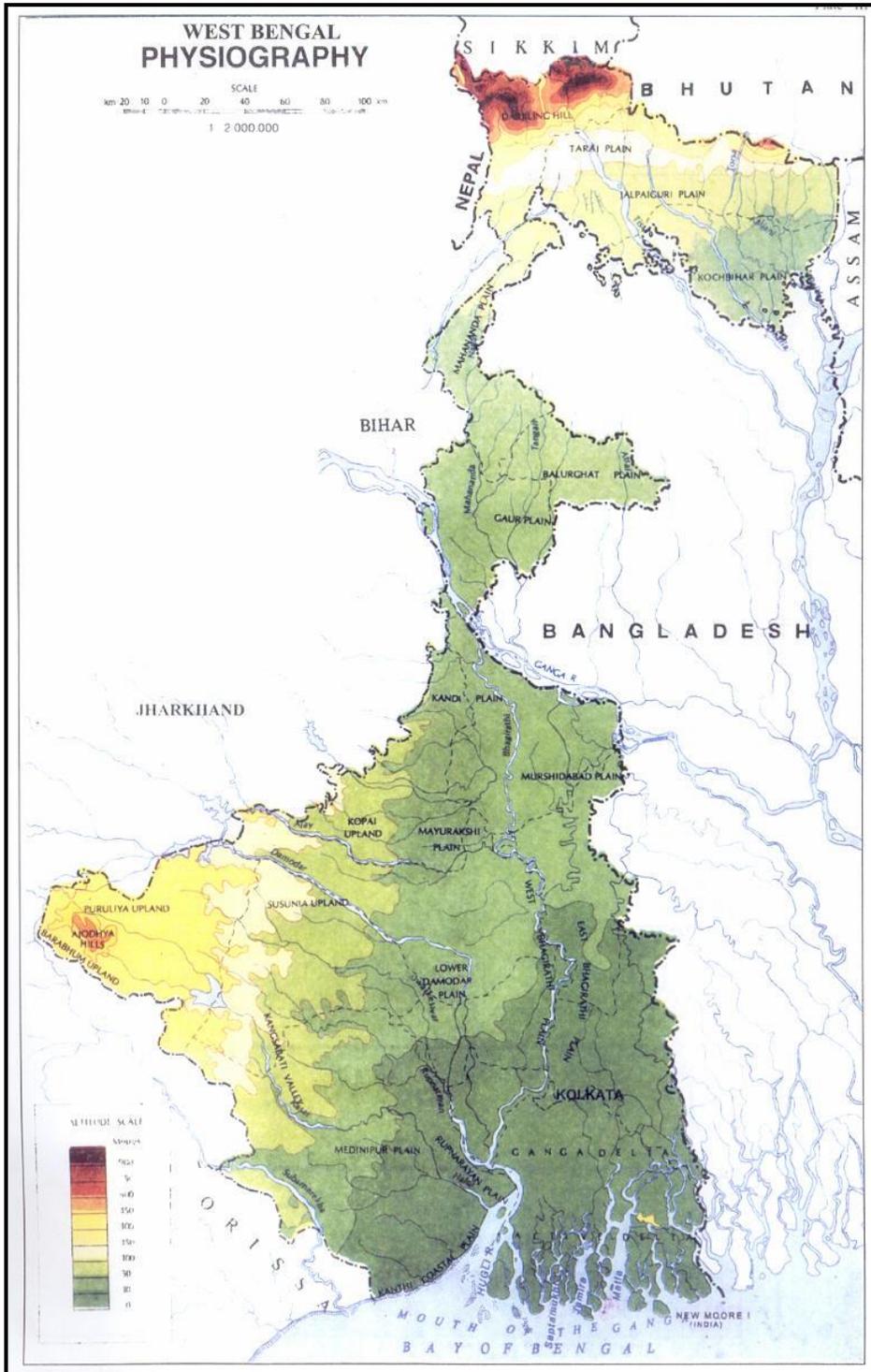


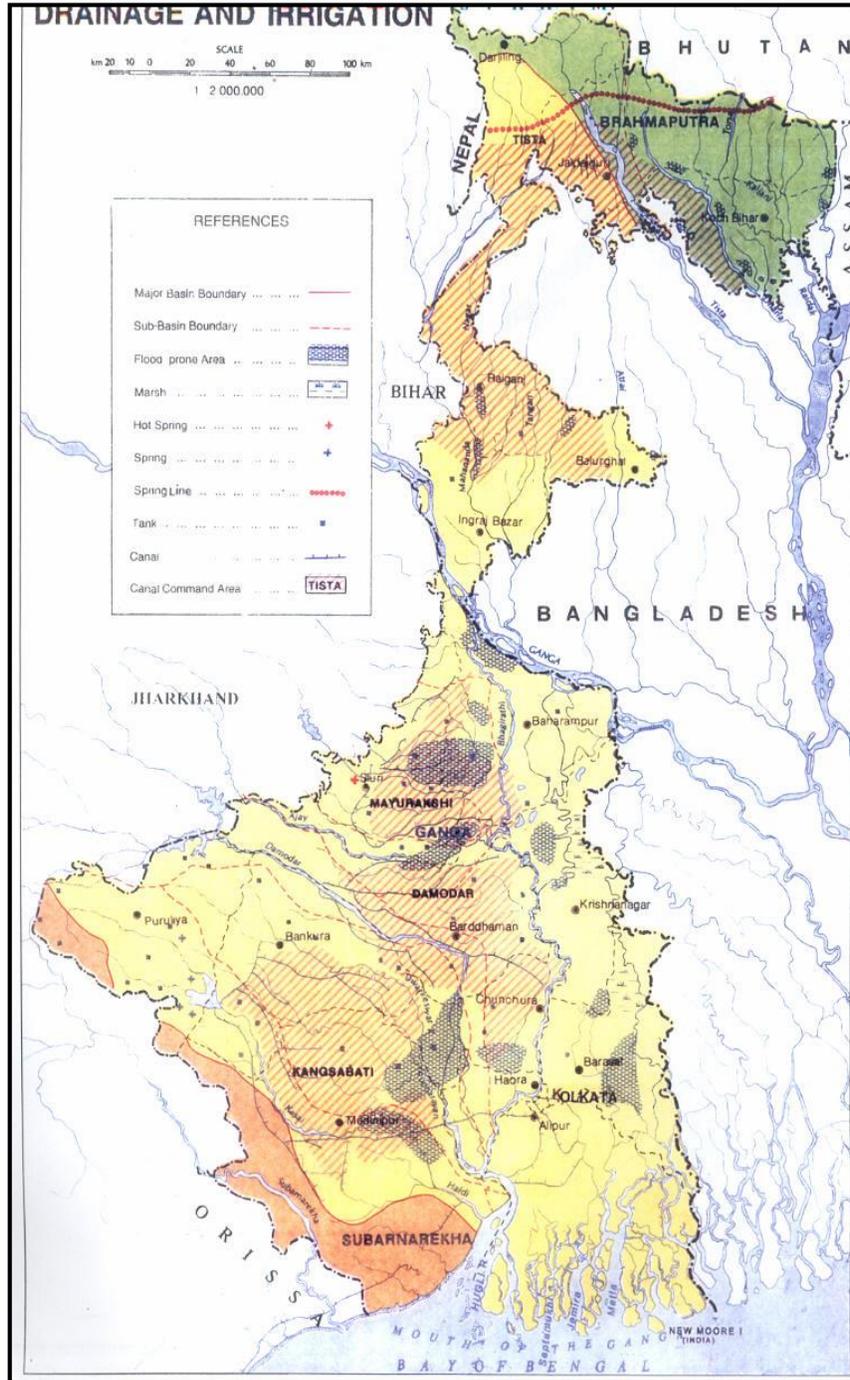
Table 1.4: River Basin Wise Surface Water Availability and Utilization

Name of Basin	River Sub basin	District	Water Availability (MCM)			Water Resources Utilization (MCM)			
			Surface Water	Ground Water	Total	Existing		Proposed	
						Major / Medium	Minor	Major / Medium	Minor
Brahmaputra	Sankosh	Jalpaiguri / Coochbehari	1365	41	1496				
	Raidhak	Jalpaiguri / Coochbehari	6666	246	6912				
	Torsa	Jalpaiguri / Coochbehari	11908	1295	13203				
	Jaldhaka	Jalpaiguri / Coochbehari	12665	822	13487				
	Teesta	Darjeeling / Jalpaiguri / Coochbehar	32124	439	32563	3810		1535	
Ganga - Bhagirathi	Mahananda	Darjeeling / U. Dinajpur / Malda	13334	1425	14759				
	Punarbhaba	Darjeeling / U. Dinajpur / Malda	1034	211	1245				
	Atreye	Dakshin Dinajpur	487	172	659				
	Pagal - Bansloi	Birbhum / Murshidabad	591	162	753				
	Brahmani - Dwarka	Birbhum / Murshidabad	1957	629	2586				
	Mayurakshi	Birbhum / Murshidabad	2590	798	3388	1470		200	
	Ajoy	Birbhum / Burdwan	2509	810	3319			360	

Name of Basin	River Sub basin	District	Water Availability (MCM)			Water Resources Utilization (MCM)			
			Surface Water	Ground Water	Total	Existing		Proposed	
						Major / Medium	Minor	Major / Medium	Minor
	Damodar	Purulia / Bankura / Burdwan	8924	877	9801	5000			
	Dwarakeswara & Gandheswari	Hooghly / Howrah	3330	638	3968			300	
	Silabai	Purulia / Bankura / Hooghly	2068	709	2777	100			
	Kangsabati & Kumari	Purulia / Bankura / W. Medinipur	3233	653	3886	2288			
	Kaliaghai	Purulia / Bankura / W. Medinipur	818	253	1071				
	Jalangi, Khari & Gangur	Medinipur	3707	964	4671				
	Churni	Murshidabad / Nadia	-						
	Bhagirath - Hooghly	Nadia	13643	2408	16051				
	Rupnarayan	Murshidabad / Nadia / Burdwan / Hooghly / Howrah / N. 24 Parganas	1188	63	1251				
Subarnarekha	Subarnarekha	Hooghly / Howrah / E. Medinipur	3645	241	3886				
	24 Parganas & Calcutta Port Drainage Basin	Purulia / W. Medinipur	3929	639	4568				

Name of Basin	River Sub basin	District	Water Availability (MCM)			Water Resources Utilization (MCM)			
			Surface Water	Ground Water	Total	Existing		Proposed	
						Major / Medium	Minor	Major / Medium	Minor
	Pichabhang a Drainage Basin	Calcutta / N & S 24 Parganas	462	44	506				
	Rasulpur Drainage Basin	E. Medinipur	401	39	440				
	Haldi Drainage Basin	Darjeeling / Jalpaiguri	327	1	328				
West Bengal			13290 5	14579	14748 4				

Drainage Map of West Bengal



Ground Water Statistics for West Bengal

A. District Wise Groundwater Available in West Bengal (as on 31st March, 2004) (in ham)

District	Recharge from				Total Annual Ground Water Recharge	Natural Discharge (Non-monsoon season)	Net Annual Ground Water Availability (6-7)
	Rainfall (Monsoon season)	Other sources (Monsoon season)	Rainfall (Non-monsoon season)	Other sources (Non-monsoon season)			
1	2	3	4	5	6	7	8
Bankura	104088	28873	29170	47022	209153	19227	189926
Bardhaman	178041	34645	49654	71528	333868	30573	303295
Birbhum	71505	26062	19271	49876	166715	14103	152612
Darjeeling	39332	565	10813	1465	52175	5218	46957
Dakshin Dinajpur	55956	5321	18962	14964	95203	8083	87120
Howrah	19382	2883	5576	9193	37034	3703	33330
Hooghly	86202	18763	24882	39754	169601	16960	152640
Jalpaiguri	198706	1518	59567	3830	263621	26362	237259
Coochbehar	157742	3686	61238	9000	231666	23167	208500
Malda	86128	6587	25363	22260	140338	13210	127128
Purba Medinipur	54616	2453	15258	10273	82601	8260	74341
Paschim Medinipur	231555	23133	69527	57592	381808	37362	344447
Murshidabad	138378	21043	41382	51461	252264	25226	227038
Nadia	111789	16817	42127	46501	217234	21723	195511
24 Parganas (North)	95287	8980	26958	26416	157640	15764	141876
Purulia	47629	10640	12742	5734	76745	6598	70147
Uttar Dinajpur	110836	6669	31624	19062	168191	14505	153686
West Bengal	1787173	218639	544114	485932	3035857	290044	2745812

B. District Wise Groundwater net ground water availability, utilization and status of groundwater development in West Bengal (as on 31st March, 2004) (in ham)

District	Net Annual Ground Water Availability	Existing Ground Water Draft for All Uses		Total	Stage of Ground Water Development (%)	Allocation for domestic and industrial water supply requirement for next 25 years from April, 2004	Additional Ground Water Draft for mining activity	Net ground water availability for future irrigation development beyond March, 2004
		For Irrigation	For Domestic & Industrial Water Supply					
1	2	3A	3B	3C	4	5	6	7
Darjeeling	46957	1700	807	2507	5.34	1719		43539
Jalpaiguri	237259	6635	3700	10335	4.36	5957		224667
Coochbehar	208500	31081	3702	34783	16.68	5006		172412
Uttar Dinajpur	153686	68657	3608	72265	47.02	5808		79221
Dakshin Dinajpur	87120	39045	2186	41231	47.33	3519		44556
Malda	127128	67237	5142	72379	56.93	8278		51613
Murshidabad	227038	191893	8944	200837	88.46	183003		16842
Nadia	195511	166677	6266	172943	88.46	9320		19513
24-Parganas (North)	141876	94066	6939	101005	71.19	10859		36951
Howrah	33330	5096	1774	6870	20.61	2421		25813
Hooghly	152640	53047	6047	59094	38.71	8419		91175
Burdwan	303295	123679	8221	131900	43.49	12187	5622	167429
Bankura	189926	52097	4742	56839	29.93	6376		131453
Purulia	70147	6000	3666	9666	13.78	4940		59207
Birbhum	152612	34887	4472	39359	25.79	6073		111651
Purba Medinipur	74341	26034	2847	28881	38.85	3965		44342
Paschim Medinipur	344447	116340	7507	123847	35.96	10453		217654

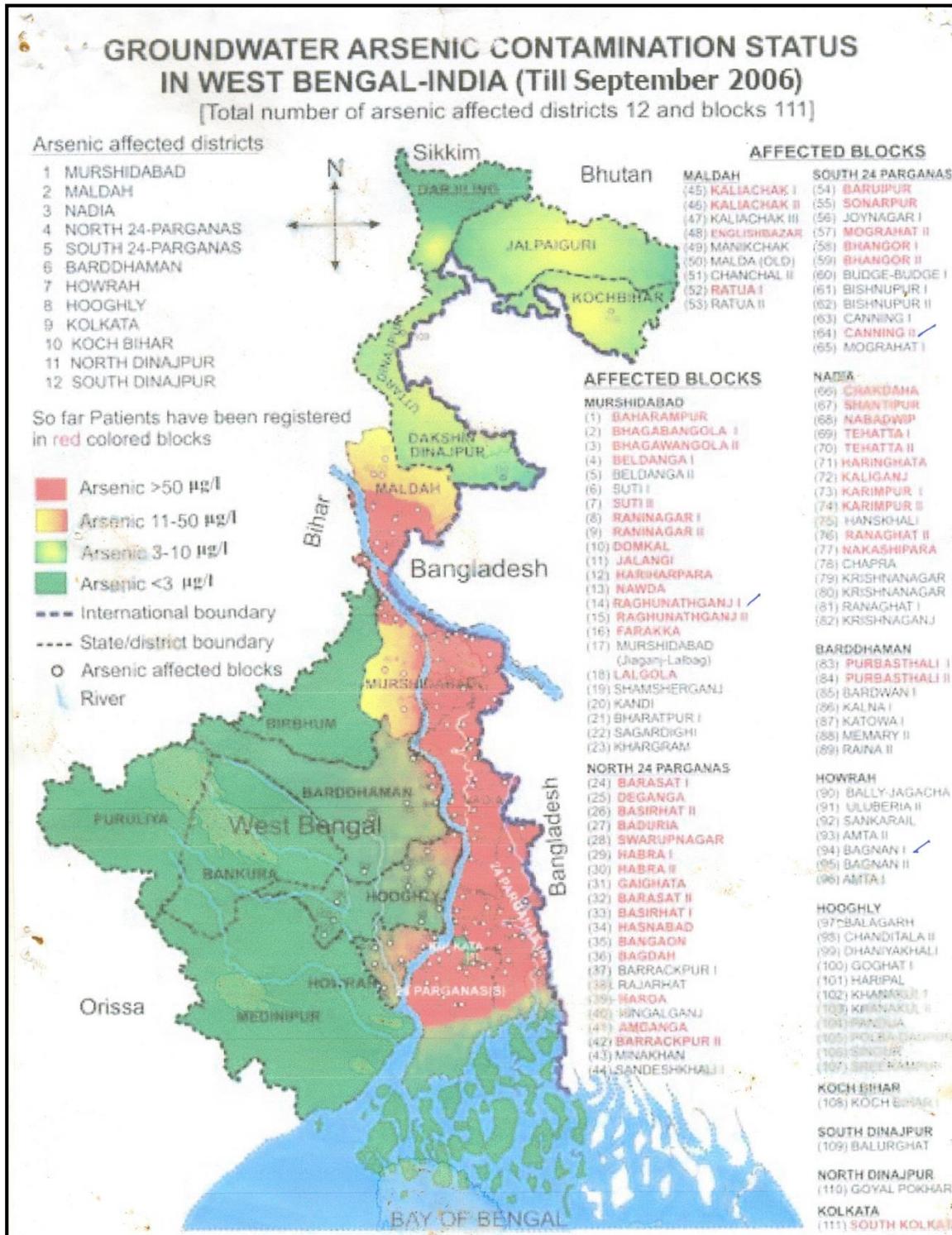
Source: SWID

C. District Wise Categorization of Blocks by Exploitation and Quality

District	Total No. of Blocks	Blocks with GW Data	Blocks Classified as			Arsenic Effectuated Blocks	Fluoride Effectuated Blocks
			Safe	Semi Critical	Critical		
Darjeeling	12	2			0	0	0
Jalpaiguri	13	8			0	0	0
Coochbehar	12	12			0	0	1
Uttar Dinajpur	9	9		1	0	0	7
Dakshin Dinajpur	8	8		7	0	7	4
Maldah	15	15	7	4	0	22	0
Murshidabad	26	26	22		1	0	9
Birbhum	19	19		9	0	5	0
Barddhaman	31	29	5		0	17	0
Nadia	17	17	17		0	17	0
24 Pargana(N)	22	17	17		0	1	0
Hoogly	18	18	1		0	0	12
Bankura	22	22		12	0	0	15
Puruliya	20	20		15	0	0	0
Purba Medinipur	26	10			0	0	0
Paschim Medinipur	28	28			0	0	0
Howrah	14	5			0	0	0
West Bengal	341	265	227	37	1	69	48

Source: SWID

Ground Water Quality Map of West Bengal

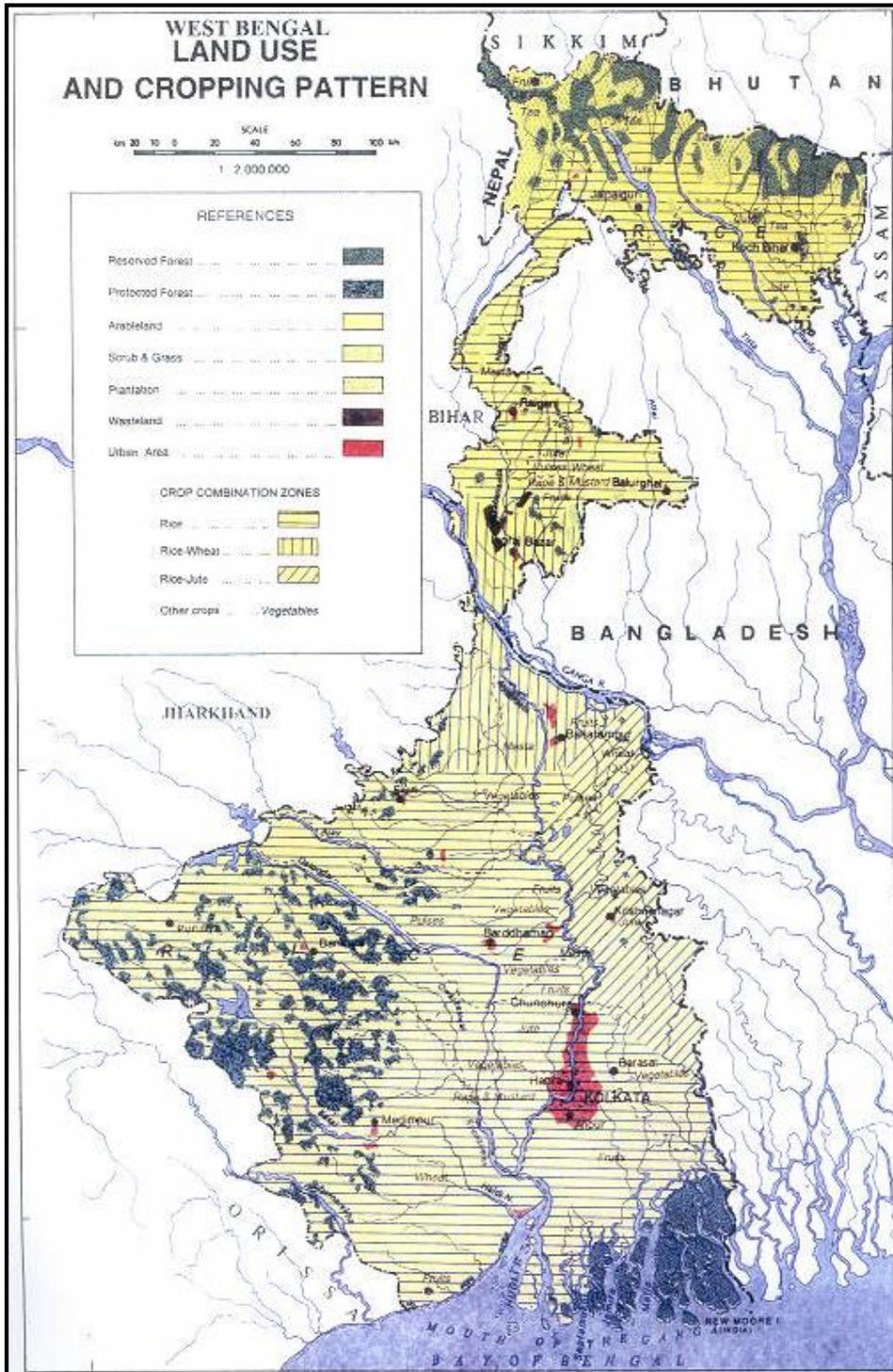


District wise Land use pattern of West Bengal (in ha)

District	Cultivable Area	Net Cropped Area	Gross Cropped Area	Cropping Intensity (%)
Burdwan	475,239	458,511	852,176	185.9
Birbhum	340,150	317,674	549,725	173.0
Bankura	389,922	344,656	551,043	159.9
Purba Medinipur	297,803	291,154	552,564	189.8
Paschim Medinipur	597,088	555,615	966,714	174.0
Howrah	88,869	82,186	164,019	199.6
Hooghly	223,941	220,519	535,781	243.0
North 24-Parganas	266,820	259,978	516,214	198.6
South 24-Parganas	385,789	372,785	539,085	144.6
Nadia	302,680	290,002	701,345	241.8
Murshidabad	404,374	402,295	946,786	235.3
Uttar Dinajpur	280,523	277,602	470,490	169.5
Dakshin Dinajpur	190,233	175,032	303,018	173.1
Malda	284,768	211,400	396,827	187.7
Jalpaiguri	356,917	335,726	550,464	164.0
Darjeeling	163,014	142,362	192,458	135.2
Cooch Behar	259,632	248,268	486,873	196.1
Purulia	443,358	310,240	358,953	115.7
West Bengal	5,751,120	5,296,005	9,634,535	181.9

Source: Department of Agriculture, GoWB

District Level Details of Land Use Pattern



District Wise Status of Existing Ground Water and Surface Water Minor Irrigation Development

A. District wise Existing Ground Water Minor Irrigation Schemes (2006-07)

District	Dug Well		Shallow Tube Well		Deep Tube Well		Total
	No.	IP (ha)	No.	IP (ha)	No.	IP (ha)	IP (ha)
Burdwan	63	530.38	33,923	217,256.16	655	52,650.89	270,437.43
Birbhum	167	559.68	10,979	61,103.00	136	6,922.36	68,585.04
Bankura	1,365	1,646.61	17,586	66,616.34	168	6,345.55	74,608.50
Purba Medinipur	1	15.00	10,102	95,463.09	187	10,632.24	106,110.33
Paschim Medinipur	2,411	6,060.41	48,077	270,314.54	407	15,599.95	291,974.90
Howrah	1	26.00	570	3,958.10	220	14,227.97	18,212.07
Hooghly	0	0.00	15,530	113,810.79	552	34,468.19	148,278.98
North 24-Parganas	33	289.28	52,058	137,819.56	381	23,681.68	161,790.52
South 24-Parganas	0	0.00	6,871	24,529.61	71	2,846.00	27,375.61
Nadia	23	253.04	94,347	252,670.05	793	57,092.18	310,015.27
Murshidabad	2	6.00	68,077	289,689.99	632	38,325.99	328,021.98
Uttar Dinajpur	79	376.32	44,519	215,941.79	197	11,611.38	227,929.49
Dakshin Dinajpur	31	97.76	23,911	105,872.31	154	9,843.04	115,813.11
Malda	60	375.46	25,703	119,771.15	377	20,121.74	140,268.35
Jalpaiguri	3,293	21,166.68	7,254	49,597.21	184	14,616.80	85,380.69
Darjeeling	229	942.91	1,035	5,587.09	4	300.00	6,830.00
Cooch Behar	1,098	1,631.01	41,219	138,911.25	78	5,291.00	145,833.26
Purulia	3,611	2,259.15	15	16.11	0	0.00	2,275.26
West Bengal	12,467	36,235.69	501,776	2,168,928.14	5,196	324,576.96	2,529,740.79

B. District wise Existing Surface Water MI Schemes (2006-07)

Sl. No.	District	Surface Flow		Surface Lift		Total
		No.	IP (ha)	No.	IP (ha)	IP (ha)
1	Burdwan	491	46,402.52	2,277	33,067.27	79,469.79
2	Birbhum	1,518	9,511.08	10,681	66,472.16	75,983.24
3	Bankura	8,971	156,988.09	2,633	33,735.36	190,723.45
4	Purba Medinipur	449	12,188.38	3,110	53,788.23	65,976.61
5	Paschim Medinipur	728	15,313.66	2,944	51,152.87	66,466.53
6	Howrah	192	9,850.07	6,233	50,076.85	59,926.92
7	Hooghly	76	8,937.57	2,387	41,427.97	50,365.54
8	North 24-Parganas	864	2,098.01	790	9,882.63	11,980.64
9	South 24-Parganas	1,804	40,725.21	9,946	102,193.64	142,918.85
10	Nadia	112	2,362.40	361	23,263.16	25,625.56
11	Murshidabad	229	2,562.07	1,625	31,252.19	33,814.26
12	Uttar Dinajpur	25	627.51	240	7,403.66	8,031.17
13	Dakshin Dinajpur	33	359.43	1,187	33,630.93	33,990.36

14	Malda	239	1,902.51	2,287	60,298.14	62,200.65
15	Jalpaiguri	228	26,540.74	740	45,989.11	72,529.85
16	Darjeeling	169	9,837.91	143	7,384.78	17,222.69
17	Cooch Behar	9	94.61	630	19,680.72	19,775.33
18	Purulia	13,732	65,803.98	539	10,029.44	75,833.42
	West Bengal	29,869	412,105.75	48,753	680,729.11	1,092,834.86

Source: 4th MI Census, GoWB

Attachment - 1.12

District wise Status of Operation and Maintenance of Minor Irrigation Schemes Operated by DWRID

A. District Wise Status of Minor Irrigation Schemes Operated by DWRID (March 2013)

District	DTW	HDTW	MDTW	LDTW	STW	RLI Diesel	RLI Electric
Burdwan	283	162	36	0	408	51	222
Birbhum	30	0	39	0	0	7	99
Bankura	30	0	92	0	0	78	105
Purba Medinipur	72	51	7	32	22	30	16
Paschim Medinipur	104	64	65	52	73	220	147
Howrah	55	10	45	0	30	39	54
Hooghly	217	93	43	74	0	129	199
North 24-Parganas	213	50	13	50	276	52	108
South 24-Parganas	6	0	33	0	0	39	19
Nadia	475	123	34	70	506	30	289
Murshidabad	379	130	34	0	611	12	342
Uttar Dinajpur	69	96	7	0	103	72	22
Dakshin Dinajpur	62	59	11	0	97	177	74
Malda	148	130	18	0	239	223	158
Jalpaiguri	45	10	0	0	0	63	23
Darjeeling	1	0	0	0	0	21	6
Cooch Behar	29	11	0	0	90	57	46
Purulia	0	0	0	0	0	57	78
West Bengal	2218	989	477	278	2455	1357	2007

B. District Wise Status of Permanently Defunct MI Schemes Operated by DWRID (March 2013)

District	DTW	HDTW	MDTW	LDTW	STW	RLI Diesel	RLI Electric	Total
Burdwan	11	8	2		388	17	13	439
Birbhum	6	0	4			0	1	11
Bankura	14	0	36			0	0	50
Purba Medinipur	31	14	0	11	22	0	0	78
Paschim Medinipur	18	5	9	0	73	41	4	150
Howrah	9	0	15	0	30	0	0	54
Hooghly	5	0	0	0	0	6	16	27
North 24-Parganas	11	1	0	18	125	5	7	167

District	DTW	HDTW	MDTW	LDTW	STW	RLI Diesel	RLI Electric	Total
South 24-Parganas	4	0	7			0	0	11
Nadia	38	5	4	0	285	3	12	347
Murshidabad	67	18	2	0	383	1	27	498
Uttar Dinajpur	16	5			80	0	0	101
Dakshin Dinajpur	7	3	1		40	3	0	54
Malda	48	31	2		174	11	9	275
Jalpaiguri	4	0				2	2	8
Darjeeling	1	0				1	0	2
Cooch Behar	1	0			61	0	0	62
Purulia			0			14	3	17
West Bengal	291	90	82	29	1661	104	94	2351

C. District Wise Status of Temporarily Broken Down MI Schemes Operated by DWRID (March 2013)

District	DTW	HDTW	MDTW	LDTW	SOSTW	RLI Diesel	RLI Electric	Total
Burdwan	13	9				2	6	30
Birbhum	5	0	9			4	14	32
Bankura	0	0	7			25	9	41
Purba Medinipur	3	1	0	0	0	6	4	14
Paschim Medinipur	7	1	2	5	0	70	13	98
Howrah	0	0	0	0	0	7	2	9
Hooghly	18	8	6	18	0	0	0	50
North 24-Parganas	18	3	0	2	1	3	0	27
South 24-Parganas	0	0	5			20	5	30
Nadia	31	15	5	4	7	0	5	67
Murshidabad	45	20	9	0	36	6	32	148
Uttar Dinajpur	6	32	0			27	1	66
Dakshin Dinajpur	3	7	4		15	11	2	42
Malda	3	13	1			41	16	74
Jalpaiguri	8	1	0			15	4	28
Darjeeling	0	0	0			12	6	18
Cooch Behar	8	0	0		12	6	6	32
Purulia	0	0	0			19	11	30
West Bengal	168	110	48	29	71	274	136	836

Source: DWRID, GoWB

District Wise Status of Handed Over Minor Irrigation Schemes by DWRID (March 2013)

District	DTW	HDTW	MDTW	STW Diesel	STW Electric	LDTW	
Burdwan	54	64	2	0	87	696	
Birbhum	0	0	73	0	0	385	
Bankura	0	0	50	0	160	254	
Purba Medinipur	0	8	34	0	0	267	
Paschim Medinipur	0	97	102	0	0	960	
Howrah	0	0	77	0	0	6	
Hooghly	43	58	10	0	0	873	
North 24-Parganas	22	28	18	0	143	483	
South 24-Parganas	1	0	30	0	99	2	
Nadia	51	62	2	0	546	496	
Murshidabad	23	48	18	216	581	479	
Uttar Dinajpur	4	28	1	5241	713	48	
Dakshin Dinajpur	0	9	2	2234	1128	320	
Malda	0	58	29	1513	548	352	
Jalpaiguri	0	5	11	4259	954	0	
Darjeeling	0	0	0	902	141	0	
Cooch Behar	0	0	21	3407	1188	0	
Purulia	0	0	0	0	0	0	
West Bengal	198	465	480	17772	6288	5621	
District	Major RLI	MIDI RLI	MINI RLI	WHT	PDW	ODW	Community RLI Scheme
Burdwan	43	0	15	15	0	0	0
Birbhum	8	0	131	30	0	950	1
Bankura	17	88	185	105	0	1479	1
Purba Medinipur	62	50	12	28	0	9	27
Paschim Medinipur	116	68	34	145	0	364	31
Howrah	59	3	17	0	0	0	1
Hooghly	51	13	42	1	0	0	2
North 24-Parganas	29	0	46	1	0	0	0
South 24-Parganas	25	1	6	22	0	0	0
Nadia	46	0	23	0	0	0	0
Murshidabad	85	6	56	3	0	0	0
Uttar Dinajpur	9	6	165	20	0	0	0
Dakshin Dinajpur	2	0	132	0	0	0	0
Malda	1	36	153	11	0	0	1
Jalpaiguri	1	0	402	0	158	268	0
Darjeeling	1	0	161	120	207	0	0
Cooch Behar	4	0	290	0	0	0	0
Purulia	4	7	107	149	0	4328	8
West Bengal	563	278	1977	650	365	7398	72

Source: DWRID, GoWB

GO No. 1710-MI/2R-3)2004 dated 16th August 2011 [Replace the following text with copy of the GO]

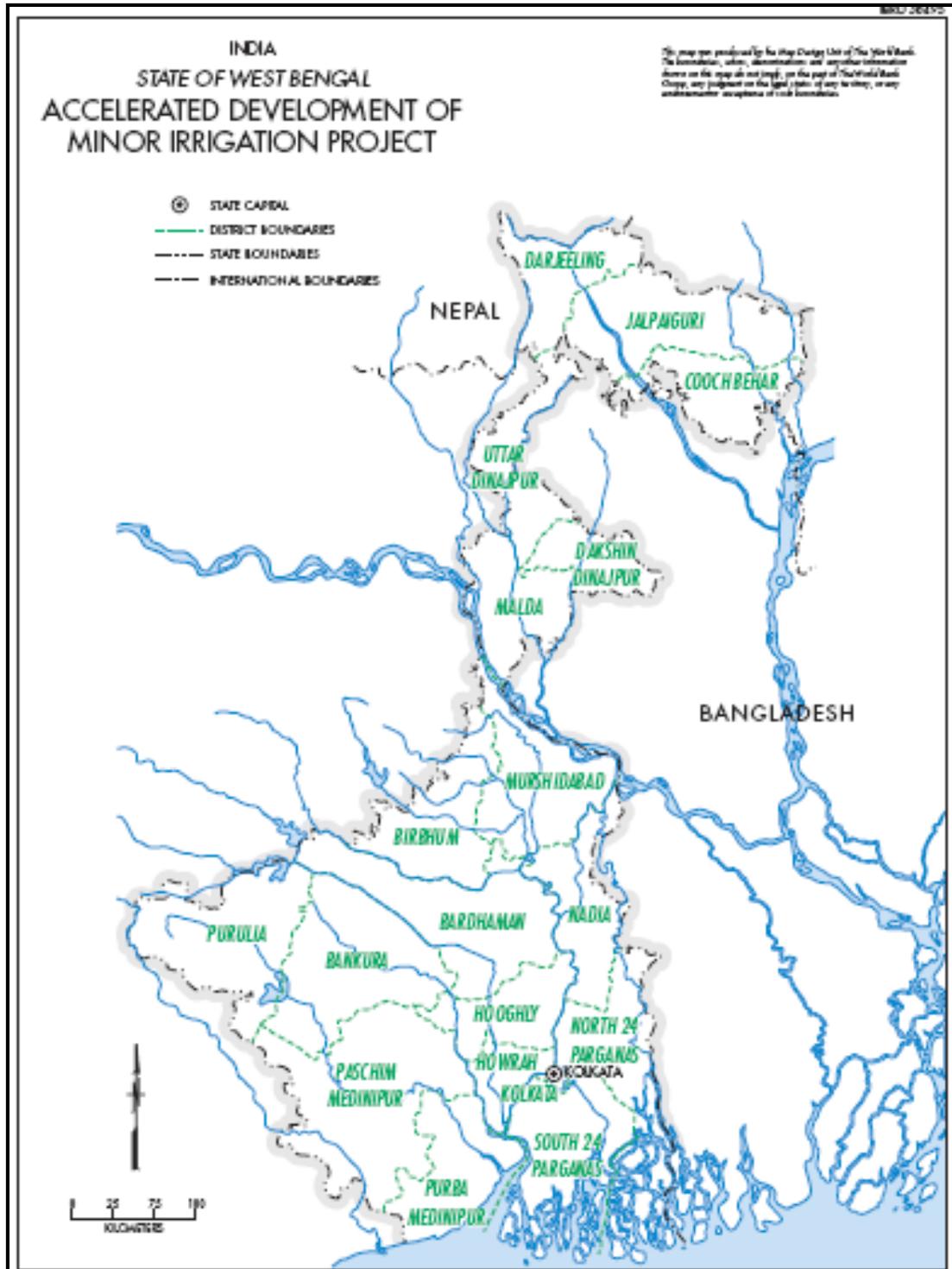
Roles & Responsibilities of the MI Scheme Management Committee:

- Manage the minor irrigation asset handed over to the Committee;
- Regulate the use of irrigation water amongst the Committee members so as to achieve full utilization of irrigation potential created under the scheme;
- Prepare cropping program suitable to all its members;
- Assist the State government employees in preparation of demand and collection of water charges;
- Collect money from the members of the Committee for payment of energy charges, for repair, management of machines and conveyance system and make provision in the sinking fund for offsetting the depreciation of asset;
- Keep in safe custody all assets under the scheme and to prevent theft or loss of assets. In the event of damage, theft of any asset the Chairman of the Board of Director shall report the same in the Police Station and the Office of the AE, DWRID;
- Resolve the disputes, if any between the members of the Committee;
- Maintain the accounts and the records of the Committee mandated under the provisions of the West Bengal Societies Registration Act;
- Publish accounts at the end of the year as prescribed under the provisions of the West Bengal Societies Registration Act; and
- Conduct General Body meeting under the provisions of the West Bengal Societies Registration Act;

Roles & Responsibilities of DWRID engineers:

- The AE/EE, DWRID will mobilize the scheme beneficiaries and assist in formation of the MI Scheme Management Committee;
- The AE/EE, DWRID will mark the Spout Command Areas (SCA) of each spout in the map and determine the total command area of the scheme. He/she will also make the land schedule of the command area of the scheme and will produce the same to the respective Committee;
- The AE/EE, DWRID will arrange for training to enable the Committee in operation and maintenance of the scheme but will not interfere in the day-to-day management of the scheme;
- As the MI schemes, even after handing over will continue to remain government property, the EE, the AE and the Sub-Assistant Engineer (SAE), DWRID will have the joint responsibility to look after the handed over schemes but once again, they will not interfere in the day-to-day management of the scheme; and
- The AE/EE, DWRID will have the powers to summon any member of the Committee or call for producing such documents as will be necessary to establish claims by any member, or inspect the scheme site and give directions or prohibit any action being perpetuated by any member of the Committee.

Map 2.1: District Map of West Bengal



**Guideline for Village & Scheme Selection Criteria
Version-3 dated 15th June 2014**

Village selection criteria:

- The implementation will be done in focused clusters/polygons/watershed (? sq km) in each district which may cover around 1-2 blocks at a time. Once the implementation is complete in one polygon, the project will move to next polygon/watershed with the district.
- The villages in which the schemes will be proposed for selection shall fall within the polygon created including number of mini watersheds (10 sqkm-25sqkm) based on remote sensing based land use, site reconnaissance survey by DPMU, and social baseline (based on census information).
- The polygon shall comprise predominantly of Rain fed area (preferably. Single cropped Kharif only) which has no source of irrigation. Within the polygon, the schemes shall be provided to rain fed areas only.
- The buffer of ~10% around polygon will be permitted in order to cover entire village or beneficiaries falling outside the periphery of polygon. For instance if the beneficiaries from the scheme proposed in close periphery to polygon include the beneficiaries from nearby village but falling partially outside the polygon then that that part of the village will be included in the project area.
- Since the cropping practices vary with respect to rainfall pattern and other hydro-geological characteristics in the various regions of the state, the identification of rain fed areas (without any irrigation) in various regions of the state will follow following procedures:
 - Priority area (Western Region): Majority of rain fed crops are Single cropped Kharif area in this region. Therefore the priority will be given to Single cropped Kharif area. The remote sensing based land use and field verification will be used as guideline to identify the polygons.
 - The rain fed areas in Northern Region may have two crops including pre-Kharif crop and Kharif crops but without any irrigation source. These areas and practice will be verified by the field team while also supplementing with the latest remote sensing images.
 - Southern Region: In this region, the rain fed areas may have double cropped wherein second crop is grown in residual moisture but no irrigation source. The selection of area will be made based on the recommendation of agricultural department, reconnaissance survey by DPMU and based on latest remote sensing images.
- The actual area for scheme development within the polygon shall target contiguous area in adjacent villages. A typical village should have a rain fed area of 80-100 ha however it may vary in small villages.
- While selecting the villages, priority shall be given to tribal dominated & backward villages. In the Villages under tribal development plan, the need is to ensure more than 60% beneficiaries belong to tribal community. At least 13% of the project fund will be used for sub projects in Tribal dominated area.
- Further within the polygon, the watershed project area is recommended to be taken on priority for convergence to ensure much better results.

Support Organizations will submit the list of identified villages to DPMUs in the specified format and facilitate the Village selection process.

DPMU will do the necessary verification and recommend the proposal for selection of these villages to the SPMU for The World Bank Clearance.

Scheme selection process:

- Watershed approach need to be followed to harness the maximum irrigation potential
- Before the actual site selection, preliminary selection of potential sites/ areas should be planned out of remote sensing based water resource, cropping pattern, agricultural statistics data and field verification by support staff.
- The final selection would be done after receiving the mass petition from the villagers showing willingness to form WUA and carrying out operation and maintenance of their own and verification by the DPMU engineers and specialists both technically, socially and environmentally through Technical Feasibility Report (TFR).
- During final selection of schemes, SWID clearance will be necessary (for all kind of schemes) and it will be submitted along with the Technical Feasibility Report.
- In the villages under tribal development plan, the need is to ensure more than 60% beneficiaries are tribal;
- In order to have a manageable size of WUA and simplified system to operate and maintain, the priority will be given to small size schemes. The midsize surface and groundwater schemes will be discouraged to the extent possible.
- Priority is to be given to surface water based schemes which are i) Water Detention Structure (WDS/ Tank**) ii) River Lift Irrigation(RLI), iii) Gated check Dam, iv) Surface Flow Minor Irrigation Structure(SFMIS) v) Hydrum
- The water distribution should have a facility to upgrade with Sprinkler/drip irrigation system which will be provided later depending upon the cooperation of community.
- While deciding type of the scheme, surface water schemes should be preferred. If the possibility of surface water scheme is limited then ground water structure is to be considered judiciously along with surface water schemes. Where ground water is very scanty the possibility of PDW type scheme might be considered along with surface scheme in clusters.
- Areas without permanent irrigation facility are only eligible.
- The selected schemes shall be technically and environmentally feasible
- Small and Marginal farmers preferably be minimum 80% of total water users
- Potential beneficiaries Farmers are to be ready to form WUA and agreeable for the Operation and Maintenance (OMM) of schemes
- Priority to be given to Women farmers to be the beneficiaries and also the representative of WUA management committee and subcommittee.
- Further fishery activity may be taken/proposed in the proposed villages within/outside command area and fishery Interest group will be formed separately but must be part of the any ongoing project promoted WUA.

Further for southern districts

Following proposal may be submitted which will be cleared case to case basis till the project plan is revised during MTR:

- The proposal for strengthening the WUA in existing government or community managed schemes may be submitted for consideration.
- Solar/Sprinkler/Drip system may also be introduced as individual/group activity and WUA may be formed with all the proposed/potential beneficiaries for promoting Agriculture/ Horticulture/Fishery activities.

Support Organizations will submit the list of identified schemes to DPMUs in the specified format and facilitate the Scheme selection process.

DPMU will do the technical feasibility assessment and place the proposal for selection of these schemes to the DLIC for their approval.

- a) Areas having undulating terrains are suitable for constructing small detention structures or low height weirs across streams for storing surface water runoff. Where possibility of gravity flow irrigation is limited provision of small lifting pump can be provided for water distribution.
- b) In the plain area creation of Reservoir in the form of tank, pond (new or re-excavation of silted up scheme) and deepening the natural small drainage and creating ponding by providing gates etc may be considered.
- c) Diversion structures: The storage structure in a wasteland may be constructed which would receive the water diverted from the river after constructing a weir and conveyance channel (open, piped as deemed suitable)
<http://www.oas.org/dsd/publications/Unit/oea59e/ch15.htm>

**Water User Association Memorandum of Association & Regulations of Association
WEST BENGAL SOCIETIES REGISTRATION ACT, 1961
Memorandum of Association**

1. NAME OF THE SOCIETY: XXXX Water Users' Association

2. REGISTERED OFFICE OF THE SOCIETY SHALL SITUATE AT:

Village: XXXX

Post Office: XXXX

P.S: XXXX

District: XXXX

3. OBJECTS OF THE SOCIETY:

- a) Collaborate with the Department of Water Resources Investigation and Development (DWRID) in preparing a Scheme Development and Management Plan (SDMP) for planning, designing and implementing works for construction of a minor irrigation scheme for the benefit of the WUA members;
- b) Keep in safe custody all minor irrigation assets handed over to the WUA by the DWRID and to prevent theft or loss of assets. In the event of damage, theft of any asset report the same in the Police Station and the Office of the AE, DWRID;
- c) Maintenance, operation and management of the minor irrigation scheme handed over to the WUA;
- d) Prepare cropping season wise cropping program suitable to all WUA members;
- e) Regulate the use of irrigation water amongst the WUA members so as to achieve full utilization of irrigation potential created under the scheme;
- f) Monitor and meter flow of water from the minor irrigation scheme and promote economy in the use of water allocated;
- g) Undertake environmental monitoring on water and land quality to sustain irrigation services and agriculture productivity;
- h) Estimate demand and collect irrigation water charges from the WUA members for payment of energy charges, for operation, maintenance and management of the minor irrigation asset handed over including pump motor and conveyance system and for provisioning a sinking fund for offsetting the depreciation of assets;
- i) Resolve disputes on irrigation water distribution and sharing, if any between the members of the WUA;
- j) Organize trainings for WUA members in different aspects of agriculture development such as advanced methods of agriculture and fishery, post-harvest management, value addition, agro processing and marketing for improving productivity and water use efficiency in the minor irrigation scheme;
- k) Maintain the accounts and the records of the WUA mandated under the provisions of the West Bengal Societies Registration Act;
- l) Publish accounts at the end of the financial year as prescribed under the provisions of the West Bengal Societies Registration Act; and
- m) Conduct regular General Body meeting under the provisions of the West Bengal Societies Registration Act;
- n) Do all such acts as may be deemed incidental and conducive to the forgoing objects;
- o) Acquire such property both movable and immovable for the Water User Association as may be deemed incidental and conducive to the forgoing objects.

The functions and objectives of the society shall always remain restricted within the meaning of Section 4(2) of the West Bengal Societies Registration Act irrespective of any object mentioned in the present document in agreement or opposed to the said section.

Before commencing the activities of the society necessary approval/permission will be obtained from the Government or other appropriate/Concerned authorities as and when required.

The income and properties of the society whatsoever derived or obtained shall be applied solely towards the promotion of the objectives of the society and no portion thereof shall be paid to or divided amongst any of its members by way of profits.

4. The names, address and description of the members of the Governing Body:

Sl. No.	Name	Address	Post held in the Society
1.			President
2.			Vice -President
3.			Secretary
4.			Treasure
5.			Jt. Secretary
6.			Member
7.			Member

We the undersigned persons being associated with the foregoing objects hereby subscribe our names to the present Memorandum of Association and intend to file it along with a copy of Regulations as required under section 4(1) of the West Bengal Societies Registration Act for registration of the association as a society:

Sl. No.	Name	Address	Occupation	Signature
1.				
2.				
3.				
4.				
5.				
6.				
7.				

Witness to the signatures as above:

Signature with Date :

Name :

Address :

Occupation :

**The West Bengal Societies Registration Act, 1961
Regulations of Association**

.....
Unless the context otherwise requires words and expressions contained in these Regulations shall bear the same meaning as in the WBSR Act, 1961 or any statutory modifications thereof.

A. MEMBERSHIP

1. Admission

Every Water Users Association shall consist of the following members, namely:

- i. All the water users who are land holders in the command area of the minor irrigation scheme to be handed over to the WUA by DWRID;
 Provided that where both the owner and the tenant are land holders in respect of the same land, the tenant;
 Provided further that any person who is in lawful possession and enjoyment of the land under a water source, on proof of such possession and such enjoyment in a crop year, may claim membership not withstanding whether he is a recorded land holder or not, in which case the WUA shall not refuse the membership of such person and such person shall be liable to pay the water charges and the fees as may be prescribed as if he is a land holder under the minor irrigation scheme.
- ii. All other water users (non agriculture) in command area of the minor irrigation scheme;
- iii. Members specified in clause (i) and (ii) shall only constitute the General Body for a Water Users Association;
- iv. Members specified in clause (i) and (ii) shall only have the right to vote in the General Body of the Water User Association. Each member will have only one vote.

2. Cessation of membership

Any member shall cease to be a member:

- i. On cessation of being a land holders in the command area of the minor irrigation scheme;
- ii. On cessation of being a water users (non agriculture) in command area of the minor irrigation scheme;
- iii. On the acceptance of his/ her resignation from membership; and
- iv. On his/ her conviction of any offence in connection with the formation, operation and management of conduct of affairs of the Water User Association.

3. Register of Members:

The Water User Association shall maintain a Register of members containing the names addresses and their occupations, the date of admission and of cessation of membership. The Register will be kept open for inspection of the members of the Water User Association on requisition. All entries required to be made therein shall be entered within a period of 15 days.

4. Right and obligations of the Members:

Any member of the Water User Association has the right to:

- i. Receive his/ her share of allocation of water from the minor irrigation scheme in lieu of payment of water charges levied by the Water User Association;
- ii. Participate in preparation/ approval of the Water User Association's SDMP, Annual Action Plans, Financial Plan and Budget, MI Scheme Maintenance, Operation and Management Plan, Seasonal Crop Plan, Water Distribution Schedule, Estimation and collection of water charges and Environmental Monitoring Plan;
- iii. Elect and be elected in any election of the Water User Association;
- iv. Submit suggestion for discussion to the General Body, Governing Body and Sub-committee on any matter relating to the Water User Association;
- v. Inspect the records, accounts and books of the Water User Association on appointment with the Secretary;
- vi. Pay his/ her subscription within the prescribed time. Defaulting members shall not be allowed to take part or vote in a General Body meeting.

5. Expulsion & Removal

Frequent action of any member, if found by the Governing body to be detrimental to the interest and in violation of the MoA / regulation of the Water User Association, may be, after due enquiry, censured, suspended or expelled from the membership by the General Body. In that the Governing Body shall first serve the member concerned with a show cause notice showing therein the charges framed and ask him/ her to submit a statement of defense within a month. On receipt of the explanation, the General Body shall have the power to take a suitable action against the concerned member after allowing him/ her to defend his/ her case. If no reply to the show cause notice is received within a month, the General Body may take an ex-parte decision.

For any act to expulsion or termination no such member shall be entitled to prefer any claim for compensation or damage even if proved on subsequent date that such act of expulsion or termination was wrongful and/ or unlawful.

B. GENERAL BODY

6. Composition

The General Body of the Water User Association shall be constituted of all its members.

7. Power and Duties of the General Body

- i. Approve membership of applicants and removal of members from the Water User Association;
- ii. Approval the Water User Association's SDMP, Annual Action Plans, Financial Plan and Budget, MI Scheme Maintenance, Operation and Management Plan, Seasonal Crop Plan, Water Distribution Schedule, Estimation and collection of water charges and Environmental Monitoring Plan;
- iii. Elect the Governing Body and the officer bearers of the Water User Association;
- iv. Ask the Governing Body to convene an emergency General Body meeting through a notice approved by at least 1/4th the General Body members;
- v. Remove a Governing Body member or office bearer or dissolve the Governing Body through a 2/3rd majority vote during a General Body meeting;
- vi. Approval the books of account and annual financial report of the Water User Association;
- vii. Inspect the records, accounts and books of the Water User Association;

8. Conduct of Annual Meetings of General Body:

Notice: The Secretary shall call the Annual Meeting of the General Body as per provisions of West Bengal Societies Registration Act giving at least 14 days' notice to all members. The notice shall contain the place, date, time and the points of business of the meeting.

Agenda: The points of business to be transacted at the Annual Meeting shall be:

- i. To confirm the minutes of the last Annual Meeting and of Special General Meeting, if any;
- ii. To adopt with or without modification the report of the working of the Water User Association for the previous financial year;
- iii. To pass audited accounts of the Water User Association for the previous financial year;
- iv. To appoint qualified auditor for the current financial year;
- v. To approve the Action Plan and Budget of the Water User Association for the current year;
- vi. To transact such business as may be fixed by the Governing Body;
- vii. To transact such other business as may be brought forward by a member by giving 14 days' notice;
- viii. To conduct the election for the new Governing Body and the officer bearers.

Quorum of the Meeting: 1/3rd members personally present at the commencement of the meeting shall constitute the quorum.

Manner and method of voting: The members shall decide the manner and method of voting at the outset of the meeting.

9. General Body Meeting for Crop and Irrigation Planning

The Secretary shall call the meeting of the General Body before every crop season (kharif and rabi) to prepare the seasonal MI Scheme Maintenance, Operation and Management Plan, the seasonal Crop Plan, the seasonal Water Distribution Schedule and the seasonal Environmental Monitoring Plan for the Water User Association. The Self Rating of Water User Association exercise for the previous crop season shall be conducted during this meeting and the action plan prepared for the next season. The members shall be giving at least 14 days' notice for the meeting. The notice shall contain the place, date, time and the points of business of the meeting. The quorum and method of voting shall remain similar to that of the Annual Meeting.

10. Special Meetings of General Body

A special meeting of the General Body may be convened by the Governing Body at any time in view of urgency of the matter. At least 7 days' notice shall be given to every member for a special meeting of the General Body. Members may request the Governing Body for a special meeting of the General Body by placing a requisition signed by 1/4th of the total members. In that case the Governing Body shall convene a special meeting within 7 days from the receipt of such notice. In default by the Governing Body, the members requisitioning the meeting shall hold such a meeting provided no business other than those specified in the notice shall be transacted. The quorum and method of voting shall remain similar to that of the Annual Meeting.

11. Extra-ordinary General Body Meetings

The Governing Body may convene an Extra-ordinary General Body Meeting for consideration of addition, alteration or amendment of the MoA / regulations of the Water User Association. 7 days' notice along with the proposed draft of change shall be circulated to all members before the meeting. The resolution for change, amendment etc. of the MoA / regulations may be carried out if accepted by 3/4th of the members present at the meeting. The quorum for the Extra-ordinary General Body Meeting shall be 2/3rd of the total members and the method of voting shall be decided by the members present at the start of the meeting.

C. GOVERNING BODY

12. Composition

There shall be a Governing Body consisting of not less than 7 members, the office bearers of the Governing Body shall comprise President, Vice-president, Secretary, Joint Secretary, Treasurer and other members. The office bearers and members shall be elected at the Annual General Body Meeting of the Water User Association.

13. Power and Duties of the Governing Body

The Governing Body shall have general power of supervision and conduct over all the affairs of the Water User Association and in particular shall discharge the following duties:

- i. Deliver to the members his/ her share of allocation of water from the minor irrigation scheme in lieu of payment of water charges levied by the Water User Association;
- ii. Prepare the Water User Association's SDMP, Annual Action Plans, Financial Plan and Budget, MI Scheme Maintenance, Operation and Management Plan, Seasonal Crop Plan, Water Distribution Schedule, Estimation and collection of water charges and Environmental Monitoring Plan;
- iii. Convene the General Body meeting of the Water User Association before each crop season and take approval of the members on the Water User Association's SDMP, Annual Action Plans, Financial Plan and Budget, MI Scheme Maintenance, Operation and Management Plan, Seasonal Crop Plan, Water Distribution Schedule, Estimation and collection of water charges and Environmental Monitoring Plan as relevant;
- iv. Maintain proper and up to date records, accounts and books of the Water User Association, to open and operate a bank account in the name of the Water User Association in a local Nationalized or Cooperative Bank and to annually audit the accounts of the Water User Association;
- v. Present to the General Body for approval the books of account and annual financial report of the Water User Association;
- vi. Appoint Sub-committees with such power and duties as may be considered necessary or expedient for effective functioning of the Water User Association;
- vii. Co-opt not more than two members to the Governing Body without voting powers;
- viii. Appoint a person on payment to assist the Governing Body in the maintenance of records, accounts and books of the Water User Association;
- ix. Conduct any other business not specified herein for the attainment of the object of the society provided such business is not repugnant to such object.
- x. Accept donation, gift subscription, movable or immovable property for the objects of the society.

14. Election, Resignation and Removal

Fifteen days before the completion of term of office of a Governing Body, it will convene a General Body meeting to announce a notification for the election of a new Governing Body and officer bearers. The General Body will nominate a member who is not a member of the current Governing Body or a Sub-committee as the Election officer in-charge of conducting the elections.

In case the Governing Body members and the officer bearers are unanimously elected by the General Body, they may be constituted during the same meeting and a formal General Body resolution passed listing the names of the Governing Body members and the office bearers. However, if there is a need to hold elections, the General Body will fix a date for conducting it. Also members desirous to stand for Governing Body or officer bearer positions will need to inform the Election Officer about it during the meeting so that their nomination and the position for which they wish to stand may be formally recorded and announced in the General Body meeting.

The Election Officer shall conduct the elections for the Governing Body and the officer bearers on the date fixed for this purpose. Election may be conducted using raise of hands or ballot papers depending on the wishes of the General Body members. All General Body members shall have one vote, which they may exercise only in person. The Election Officer shall count the votes immediately after voting is completed and the results declared thereafter. Once the election results are declared, a formal General Body resolution constituting the Governing Body and the officer bearers shall be passed listing the names of the Governing Body members and the office bearers.

However, while electing the Governing Body and the officer bearers the Water User Association shall adhere to all legal provisions of representation of women and SC / ST as mandated under the West Bengal Societies Registration Act.

The resignation and removal of the Governing Body members shall be dealt with as has been prescribed as in the cases of other members noted herein before. However, the General Body members may initiate removal of a Governing Body member and office bearer or dissolve the Governing Body through a 2/3rd majority vote during a Special Meeting of the General Body convened for the purpose and following the procedures laid down for convening a Special Meeting of the General Body.

15. Terms of Office

The terms of office of the Governing Body shall ordinarily be one year unless it is dissolved / terminated early under unforeseen circumstances. After election, the old Governing Body will continue to function till the new Governing Body takes over charge which shall under no circumstances be more than 15 days from the date of election.

16. Meeting

A meeting of the Governing Body shall be held at least once a month at such place, date and time as the President or the Secretary may determine. Any four members of the Governing Body may together requisition an emergency meeting and the Secretary shall summon the same within seven days and failing which the President or the members requisitioning the meeting may do so provided no business other than that specified in the notice shall be transacted at such meeting.

Notice and Quorum: 7 days' notice of the meeting specifying the place, time and the points of business to be transacted shall be given to every member of the Governing Body. Emergency meeting may be called on 24 hours' notice. Half the members personally present shall constitute a quorum and if a quorum is not present within 30 minutes of the time, members present shall adjourn the meeting.

Procedure of the Meeting: The President or in his absence the Vice-president shall preside over all meeting of the Governing Body and in their absence members present shall elect a Chairman of the meeting. All points of business before the meeting shall be decided by a majority of votes, each member having one vote. The President shall have a second or casting vote in addition to his/her own vote in case of equality of votes.

D. DUTIES OF THE OFFICE BEARERS

17. President

The President shall

- i. Preside over all meetings of the Water User Association;
- ii. Take all disciplinary actions such as removals, dismissals etc. in consultation with the General Body;
- iii. Advise the Secretary in any matter requiring urgent attention;
- iv. Call for emergency meetings of the Governing Body or General Body

18. Vice-President

In the absence of the President, the Vice-President shall perform all the duties of the President.

19. Secretary

The Secretary shall:

- i. Prepare the MI Scheme Maintenance, Operation and Management Plan, Seasonal Crop Plan, Water Distribution Schedule and Environmental Monitoring Plan for the Water User Association in consultation with members for approval by the General Body;
- ii. Convene all meetings of the Water User Association;
- iii. Maintain proceedings register of all meeting;
- iv. Issue general circulars and notices;
- v. Receive all applications for membership which shall be placed before the General Body;
- vi. Sign and give pay order on all bills for payment;
- vii. Get the accounts of the Water User Association audited by a Chartered Accountant;
- viii. Ensure compliance with all statutory requirements under the West Bengal Societies Registration Act;
- ix. Transact all other business subject to the direction of the General Body.

20. Joint Secretary

In absence of the Secretary, the joint secretary shall perform all the duties of the secretary.

21. Treasurer

The Treasurer shall:

- i. Prepare the financial Plan and budget for the Water User Association in consultation with Secretary for approval by the General Body;
- ii. Prepare the Estimation and collection of water charges and for the Water User Association in consultation with members for approval by the General Body;
- iii. Collect and receive all sorts of subscriptions, donations and deposit of money and grant receipt thereof;
- iv. Sign on behalf of the Water User Association all receipts for all sums received as subscriptions etc.
- v. Sign and give pay order on all bills for payment;
- vi. Maintain and keep cash book and such other accounts as are necessary;
- vii. Operate bank account jointly either with the Secretary or with the President;

E. SAFE CUSTODY OF PROPERTIES

The Governing Body shall be responsible for the safe custody of the funds, properties and assets of the Water User Association.

The funds of the Water User Association shall be kept in a saving account in a local Nationalized Bank / Cooperative Bank with any two of the President, Secretary and Treasurer as the joint signatories.

F. RECORDS, BOOKS OF ACCOUNTS & INSPECTION

The records, books of accounts and other statutory books of the Water User Association shall be kept at the registered office and shall be open to inspection by all members at such time and place as the Governing Body directs on a written request made by any member.

G. FINANCIAL YEAR

The financial year for the Water User Association shall be from the 1st day of April of each year to the 31st day of March of the following year.

H. MAINTENANCE AND AUDIT OF ACCOUNTS

The Water User Association shall maintain books of accounts as required under Sec.15 (1) (a) and (b) of the West Bengal Societies Registration Act. The accounts shall be audited by a duly qualified auditor as stated in Sec.15 (2) of the West Bengal Societies Registration Act.

I. SUIT AND LEGAL PROCEEDINGS

All suits and legal proceedings by or against the Water User Association shall be in the name of the Secretary or such person as shall be appointed by the General Body.

J. ALTERATION OF MEMORANDUM OF ASSOCIATION & REGULATIONS

The General Body shall have the power to make, alter, modify or rescind such sections of the Memorandum of Association / regulations as may be considered necessary in the interest of smooth functioning of the Water User Association.

The Memorandum of Association / regulations of the Water User Association may be altered, modified, rescinded or added to by special resolutions passed by the 3/4th members present in an

Extra-ordinary General Body Meeting called for the purpose with a quorum of 2/3rd of the total members.

K. DISSOLUTION OF THE SOCIETY

Subject to the provisions of Sections 24 & 27 of the West Bengal Societies Registration Act or any statutory modifications thereof, the Water User Association may be dissolved by a resolution to that effect passed by 3/4th members at a General Body meeting. The said meeting shall also decide the manner of disbursement of the funds and assets of the Water User Association, if any, after dissolution. However, the minor irrigation scheme assets handed over to the Water User Association by the DWRID shall be handed back to the DWRID on dissolution of the Water User Association.

After dissolution the funds and remaining assets of the Water User Association shall be transferred to another Water User Association duly registered having the same aims and objectives.

We, the undersigned members of the Governing Body of the Water User Association do hereby certify that the above is a true copy of the Regulations of the Water User Association.

Signature of three members of the Governing Body:

- 1.
- 2.
- 3.

Description of Training Modules for WUA

No.	Topic	Objective	Expected out put	Participants	Duration
1	About West Bengal Accelerated Development of Minor Irrigation (WBADMI) Project	<ul style="list-style-type: none"> To make WUA members aware about the importance of Participatory Management of Minor Irrigation scheme and West Bengal Accelerated Development of Minor Irrigation Project To enable WUA members prepare SDMP 	<ul style="list-style-type: none"> Optimally utilizing the opportunities provided through ADMI project 	Members / Potential WUA Members	2 Days
2	Objectives, Structure and functions of WUA	<ul style="list-style-type: none"> To make WUA members aware about the importance of WUA, roles & responsibilities of WUA members in irrigation scheme 	<ul style="list-style-type: none"> Empowerment of WUA Effective functioning of WUA Management Committee Active participation of women and tribals in WUA activities Record maintenance Regular meetings Raising of internal resources Updating of Water charge demand, collection and balance details Ensuring the formation Sub committees Regular financial audit 	WUA General Body Members	2 Days
3	Supervision & monitoring of MI scheme during construction and post construction	<ul style="list-style-type: none"> To enable WUA and Monitoring Sub-committee understand their role in participatory irrigation management and equip them with appropriate 	<ul style="list-style-type: none"> Ability to assess institutional functioning of WUA in a participatory role Role clarity of sub 	<ul style="list-style-type: none"> Governing Body Members Water Management Sub-committee members Monitoring Sub- 	3 Days

No.	Topic	Objective	Expected out put	Participants	Duration
	period	tool to monitor the procedure.	<ul style="list-style-type: none"> committees Construction work is appropriately supervised by WUA Installation work is appropriately supervised by WUA Quality of work is maintained Gained skill to facilitate WUA self-assessment exercise for each crop season with WUA members 	committee Members	
4	Operation and Maintenance of Minor Irrigation schemes	<ul style="list-style-type: none"> To gain technical knowledge and skill regarding regular operation and maintenance of minor irrigation scheme for its sustainability by the O & M subcommittee members of WUA 	<ul style="list-style-type: none"> Maintenance of records regularly Holding regular meeting Repair & maintenance of electric pump / diesel pump Updating water charge demand, collection and balance details Raising of internal resources Regularity of financial audit Maintenance of pump efficiency, fuel efficiency 	<ul style="list-style-type: none"> Governing Body Members Scheme Operator O&M Sub-committee Members 	2 Days
5	Accounts and book keeping for WUA	<ul style="list-style-type: none"> To equip for maintaining accounts/book keeping, preparing annual budget, better utilization of resources 	<ul style="list-style-type: none"> Maintenance of accounts regularly Updating water charge demand, collection and the balance details 	<ul style="list-style-type: none"> Governing Body Members Scheme Operator Finance Sub-committee Members 	2 Days

No.	Topic	Objective	Expected out put	Participants	Duration
			<ul style="list-style-type: none"> • Pooling of resources and preparation of budgets as per the resources available • Regularity of financial audit 		
6	Agriculture based Livelihood promotion	Detail of module is given under Component C: Agricultural Support Services			

WUA Role in SDMP Preparation, Implementation and Monitoring

SDMP Preparation: The Scheme Development and Management Plan (SDMP) for a MI scheme is an integrated plan document that will provide the details of the MI scheme command area; MI scheme design, cost estimates and all the activities to be implemented in construction of the MI scheme; a livelihood development plan (LDP) covering field and horticulture crops, and fisheries; plans to deal with social and environment safeguard issues; a training and capacity building plan; plan and estimates for MI scheme annual MOM requirements; and indicators and arrangements for participatory monitoring of project implementation progress and impacts. The SDMP for a MI scheme will be prepared by the Water Users Association with the support of the SO and DPMU staff. The steps involved in preparing a SDMP are:

- The SO and DPMU staff will visit a village to build up rapport with the farmers and create awareness among them about the project. If the farmers show willingness to implement a MI scheme by agreeing to abide with the norms of the project, then the SO and DPMU staff along with the farmers will carry out a participatory assessment of the resources and opportunities available in the site through a Transact Walk.
- Through the Transact Walk they will assess:
 - location of the village (name of mouza, panchayat, block and district)
 - existing land use pattern and ownership (availability of cultivable land, period of cultivation, availability of forest land and type of forest, availability of pasture, orchard, fallow land, period of no cultivation)
 - topographic condition and gradient
 - soil condition (type of soil)
 - location of water sources
 - existing irrigation sources (location and capacity)
 - existing and probable problems, risk (if flood, soil erosion, draught prone area)
 - state of infrastructure (distance of all metal road, post office, other communication, market, cooperative, bank, community hall, ICDS, schools from the village, no. of SHG, youth club, cultural troupe in the village, availability of electricity, etc.)
- After the Transact Walk, the SO and DPMU staff along with the farmers will identify and map the poorest households in the village on a Social Map, the site for the MI scheme, the potential configuration of the command area and the households in the command area
- Based on the information collected, the SO and DPMU staff, in consultation with the farmers identify the point for installation of the MI scheme, the type of the MI scheme and the design of the distribution pipe layout including the location of the spout.
- The SO and DPMU will place these information along with a request letter from the farmers to the DLIC for approval
- On receiving approval from the DLIOC, the SO and DPMU staff in consultation with the farmers will prepare the SDMP for the MI scheme including all the components of the SDMP listed above. The SDMP will be prepared using the standard formats and templates circulated by the SPMU for the various types of MI schemes
- Before commencing preparation of a SDMP, the SO staff will provide the WUA with orientation and training on the procedure of preparing a SDMP using the standard formats and templates developed and circulated by the SPMU
- SDMP preparation will require various primary and secondary level data - village level, command area level, WUA level and household level. The information will be collected by the SO and DPMU staff through PRA exercises such as transact walk, social mapping, resource mapping, wealth ranking and spatial mapping and by carrying out a survey. All these will be

done with the participation and consultation of the farmers.

- SDMP comprises of:
 - Social, economic and resource status of the village
 - Identification, analysis and prioritization of the problems in the village
 - Strength, weaknesses, opportunity and threat with respect to project objective
 - Technical information on the catchment and command area
 - Work design and cost estimate
 - WUA Training plan
 - Assessment of current agricultural production in MI scheme command area
 - Identification of agriculture support service and a Livelihood Development Plan
 - An Environment Management Plan
 - A Gender Development Plan
 - A Tribal Development Plan
- During the same time the SO staff will mobilize the farmers of the MI scheme command area and form them into a WUA (as described above)
- Once the SDMP is ready, it will be presented to the General Body of the WUA for discussion and approval. The WUA General Body on approval of the SDMP will pass a resolution and adopt it as its agreed MI scheme plan
- The DPMU will forward the WUA approved SDMP to the SPMU for assessment against project norms and indicators.
- On approval of the SDMP by the SPMU, the DPMU will place a summary of the SDMP along with all supportive documents before the DLIC for administrative and financial approval
- After DLIC ratifies the SDMP the DPMU will initiate the process of SDMP implementation by starting the bidding process for the MI scheme construction and direct implementation of other activities by the WUA with support from the SO

SDMP Implementation: While the MI scheme construction work will be tendered out to a contractor, the activities for WUA strengthening and agriculture development will be implemented by the WUA with support and hand holding from the SO and DPMU staff. The SDMP implementation may be divided into three stages – MI Scheme Construction Stage, the Post Construction Stage and the MI Scheme O&M Stage (perpetual).

WUA roles during the MI Scheme Construction Stage are:

- Place of construction and installation of MI scheme structure has to be identified in presence of responsible representative of DPMU, representative/s of contractor, and representative of WUA. Presence of SO representative is also desirable for that.
- Contractor has to purchase necessary materials and machineries. Purchased materials and machineries will remain under the custody and supervision of the WUA until the work is over.
- WUA has to be made aware by DPMU about the kinds, quantity and quality (brand) of materials and machineries required for construction and installation of MI scheme, as they have to play crucial role in monitoring and supervising the work. It is to be noted that till completion of the work all materials and machineries will remain under the custody of WUA.
- As per the design included in the SDMP, under the supervision of technical team of DPMU and in consultation with WUA location of the spout will be fixed and layout of the distribution channels finalized. SO will facilitate WUA in building consensus on this.
- Capacity building and skill development training of the WUA on 6 training modules will be provided by the SO and DPMU.
- WUA will execute the social, tribal and gender development plan with support and handholding of the SO and DPMU.

- WUA will implement part of the environmental monitoring task assigned to it with support and hand holding by the SOs and DPMU.
- Module 1 to Module 5 will be covered in 11 training days, spread over 24 months per WUA.
- On completion of the construction, electrification, installation of pumps/ motors and successful testing (water flowing out of spouts as per design discharge) the MI scheme will be handed over to WUAs formally. **A Memorandum of Understanding (MoU)** will be signed between WUA and DPMU that thereon, WUA will remain responsible for operation and management of sub project.

WUA roles during the Post Construction Stage are:

- Further training need of the WUA will be assessed and accordingly support will be provided to WUA. Refresher training for WUAs of 2 to 3 days duration will be conducted as per requirement by the SOs and DPMU.
- WUA will continue to execute the social, tribal and gender development plan with support and handholding of the SO and DPMU.
- WUA will continue to implement part of the environmental monitoring task assigned to it with support and hand holding by the SOs and DPMU.
- WUA will prepare annual action plan with the help of SO and accordingly operate. The annual action plan will include activities on O&M, training program, WUA meeting, budget estimate and source of fund to meet the above needs.
- WUA will fix membership fees and irrigation service charge. Then, it will start operating and maintaining the MI scheme, collect the irrigation service charge, maintaining records and accounts, and self-monitor its performance with hand holding support of SO.
- WUA members will be capacitated by line department to take up agro based livelihood activities. Lead farmers will be identified out of the members by SO in consultation with WUA for crop demonstration in the command area. The demonstration may be on good agriculture practice, use of improved variety seed, new technology, etc.
- Field Farm Schools will be organized on the respective demonstration plots. This will help the cultivators to learn new techniques for improving productivity. It will encourage more farmers to accept and replicate the improved technology or ideas in agriculture, fishery and horticulture.
- Exposure visit for the WUA to best practice unit will be organized by the SOs and DPMU.
- There may be possibility of damage and theft of pumps and other equipments. WUA should take insurance of the equipment. SO and DPMU may help them on this issue.
- Convergence plan with line department schemes will be prepared by the WUA for enhancing productivity, value addition, and wider inclusion. SOs and DPMU will assist the WUAs in preparing the plan.

WUA roles during the MI Scheme O&M Stage are:

- WUA Annual Action Plan, MI scheme Operation Plan, WUA budget which has to be accepted by General Body of WUA has to be prepared, accepted and implemented by the General body of WUA.
- WUA members have to actively participate in and supervise implementation of the plans.
- Water distribution schedule (distribution on which plot, when, what quantity of water) for each irrigation season has to be prepared, accepted and implemented by the General body of WUA.
- Fee for MI scheme operator has to be determined by the WUA.
- MI scheme Maintenance Plan has to be prepared, accepted and implemented by the General Body of WUA. This plan should be in accordance to the operation plan, so that delivery of

water may not get stalled due to break of machineries. Stock of machineries has to be maintained out of the WUA fund.

- Economy in using water has to be promoted, so that, in one hand, wastage of water can be avoided and equitability of distribution of water is maintained. Farmers have to be encouraged to cultivate crops which require less water.
- Water charge has to be decided considering expenses for running the scheme.
- Water charges have to be collected regularly and electricity bill needs to be paid regularly by the WUA.
- A penalty to the defaulter of water charges as per the by-law has to be implemented.
- Resources/assets of WUA has to be protected and also required to be raised.
- WUA Records, registers, accounts need to be maintained for audit and for transparency.
- WUA has to resolve disputes that may arise between the water users regarding the operation of the MI scheme or irrigation supply distribution and sharing.

**Criteria for WUA Scoring System
WB ADMI PROJECT**

Score Card for rating WUA During Planning Stage [Draft for further working]

A. WUA Information:

(i) Name of WUA: **(ii) Year of formation:****(iii) Village:**

(iv) Sub- District: **(v) District:**

SL	Indicators	Basis for Scoring				Score obtained	Weight for the indicator	Marks obtained (Score X Weight)	Main issues identified	Action Plan	
		Poor (1)	Average (2)	Good (3)	Very Good (4)					Corrective action	Responsibility
1	Percentage of farmers in the command area obtained membership in WUA	Up to 50	51-60	61-70	71 & above						
2	Percentage of women farmers in the total membership	10 and less	11-15	16-18	Above 19						
3	Percentage of small and marginal farmers in the total membership	69 and less	70-74	75-80	81 and above						
4	Awareness of WUA leadership on project principles and implementation steps	Poor understanding	Average understanding	Fair understanding	Full understanding						
5	Participation in SDMP preparation	Not many farmers know about the scheme	Only few committee members aware of scheme details	Only committee members of WUA aware of scheme details	Most farmers aware of scheme details						
6	Mobilization of capital contribution	69 and lower	70-79	80-89	Above 90						
Marks obtained						100					
Score achieved = Marks obtained /100											
Grade obtained(A grade-80 and above, B grade-70-79, C Grade-50-69 and D Grade-upto 49)											

Score Card for rating WUA During Planning Stage [Draft for further working]

B. WUA Information:

(ii) Name of WUA: **(ii) Year of formation:** **(iii) Village:**

(iv) Sub- District: **(v) District:**

SL	Indicators	Basis for Scoring				Score obtained	Weight for the indicator	Marks obtained (Score X Weight)	Main issues identified	Action Plan	
		Poor (1)	Average (2)	Good (3)	Very Good (4)					Corrective action	Responsibility
1	Percentage of farmers in the command area obtained membership in WUA	Up to 50	51-60	61-70	71 & above						
2	Percentage of women farmers in the total membership	10 and less	11-15	16-18	Above 19						
3	Percentage of small and marginal farmers in the total membership	69 and less	70-74	75-80	81 and above						
4	Participation in SDMP implementation	No meaningful involvement	Average involvement	Good involvement	All committee member actively involved in implementation monitoring						
5	Collection of user fees	69 and lower	70-79	80-89	Above 90						
6	Adequacy of fees collected	Collection not covering full operational expenses	Enough to cover operational expenses	Enough to cover operational expenses and	Enough to cover all costs and mainten						

				administrative cost	ance fund						
7	Accounting and book keeping	No proper records maintained	Some records maintain but not updated	Some records maintained and updated	Updated and all proper records maintain						
8	Percentage of farmers adopting improved technologies	Less than 10	11-25	26-49	Above 50						
9	Extend of collective activities among farmers	Not much group activities	Sharing of common equipments	Seeds and input supply	Many inputs and market linkage						
10	Conflict resolution mechanism	No facilities	In place but not effectively working	In place but many complaints not resolved	In place and all conflicts internally resolved						
Marks obtained						100					
Score achieved = Marks obtained /100											
Grade obtained(A grade-80 and above, B grade-70-79, C Grade-50-69 and D Grade-up to 49)											

REVISED MENU OF TECHNOLOGY OPTIONS ON SCHEME TYPES

Type	Short description	CCA	Approx. Unit cost (Rs in Lakh)
Tube well (TW)	Uniform 150 dia PVC tube well tapping GW from deeper aquifer at 30 cum/hr discharge with help of electric operated submersible pump in a cluster of 3-8 no tube well. Water to be distributed with raised tank and suitable pipes.	6 Ha each	8 lakh each
Lift Irrigation (LI)	Water from rivers, canals, beels and check dam, SFMIS etc. is lifted by electric operated centrifugal pumps sets each capable of varying discharge ranging from 25- 100 cubic meter per hour with pressurized pipe system and ready for sprinkler operation.	5-25 ha	10-35 lakh
Small Earthen Dam Tank	Low height earthen dam across a sloping ground or small river taken up within catchment areas of natural streams by using gravity flow system with spillways to pass flood waters, and outlets for providing irrigation supplies.	30-50 ha	30-200 lakh
New Tanks- WDS – Type-I	Small over flow weir across streams for storing surface water runoff and base flow of the stream and lifting arrangements with electric or solar operated pump set and water distribution system with pipe-spout or drip or sprinkler where feasible.	5-30 ha	25-200 lakh
Tank Renovations WDS-Type-II	Construction of new WHT or re-excavation of old filled up tanks to store surface run off and lifting arrangement with electric or solar operated pump . Drip / sprinkler system may be incorporated where feasible.	5-20 ha	10-50 lakh
PDW	Open masonry wells having low discharges tapping low aquifer within 20m and diameters of open wells may vary from 2 to 9 m and they are generally less than 20 m in depth. lifting arrangement with electric or solar operated pump. Drip / sprinkler system may be incorporated where feasible.	2-5 ha each	5-10 lakh
Drip / Sprinkler system	Where water source is already created drip and sprinkler system operated with electric or solar energy source to be taken up.	1-10 ha	1-5 lakh
Hydrum	This is a pumping device which uses the momentum of the moving column of water to lift a small part of the same water to a height above its original supply head. Drip / sprinkler system may be incorporated where feasible.	2-10 ha	2-4 lakh

PUMP DUG WELL (PDW)

Dug wells are simple water development structures. These are constructed normally to tap shallow water table aquifers with poor to moderate yield potential. A dug well should preferably tap the entire thickness of the saturated zone. Dug wells are constructed by excavation and require a lining up to the depth to which the formation is loose and collapsible. In alluvial formation dug wells are lined along its entire depth. In West Bengal dug wells are generally constructed in the Laterite Zone of the hard rock areas and in the areas of relatively thin deposits of highly permeable riverine alluvium. Concrete rings of 1.5 meters to 1.2 meters diameters are used as lining for dug wells in alluvial formations while brick masonry linings of 3.6 meter or higher diameters are used for rock formations. The depth of these dug wells usually varies from 10 meters to 18 meters.

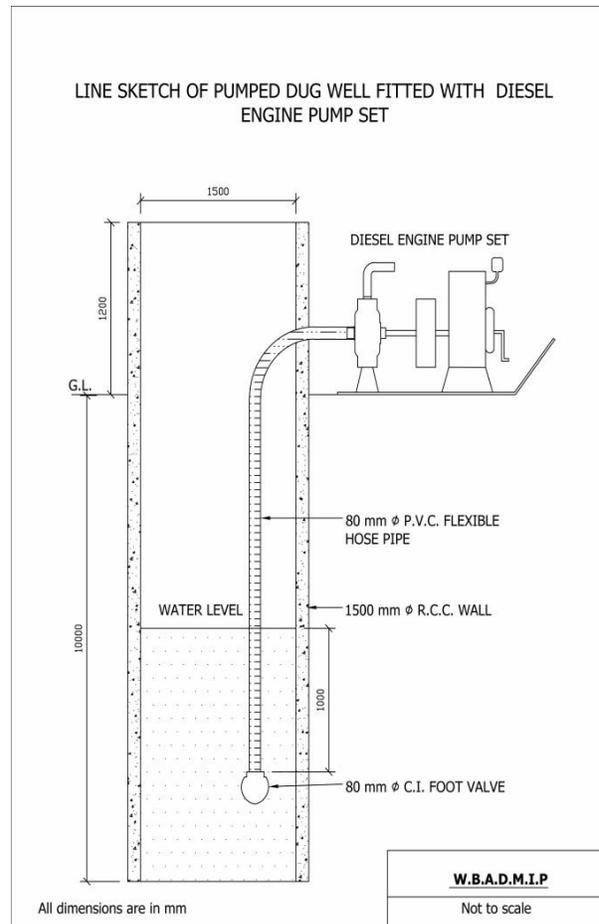


Dug wells in hard rock formation are partly lined and receive water as percolation through the weathered and fractured rock aquifer. Static water level in a dug well is water table which rises and falls in response to the seasonal variation in rainfall. A dug well is dried up when the water table vanishes completely or recedes below the bottom of the well. High water level fluctuation is observed in a well which receives water from an aquifer having low permeability and vice versa. Centrifugal pumps are used most conveniently to extract water from dug wells



TUBE WELL

Tube wells are most ideal for tapping high yielding confined granular aquifers occurring at considerable depths. Tube wells are also convenient for tapping groundwater from a thick unconfined granular aquifer with deep water table. These are constructed by adopting suitable drilling techniques as is applicable to the formation in question.



In alluvial formation drilling is done commonly by cutting tools using rotational motion and the drill cuttings are flushed out by mud circulation using mud pump. The entire depth of a bore hole needs to be cased to prevent it from collapsing. In order to allow water to enter into the well from the aquifers, small openings usually in the shape of thin slots are provided at appropriate locations in the casing pipe. The casing is assembled by joining blank and slotted pipes in desired lengths and sequences in such a way that on insertion, the slotted pipes face the aquifers to be tapped and the blank portions stay against non-productive formations. The bottom end of the casing pipe is also closed using a “bottom plug” to prevent entry of sand into the well during pumping of water from the well. Since, the entire well in loose alluvial formations is provided with a casing pipe, such wells are referred commonly as a tube well.

In alluvial area, the annular space between the casing pipe and the bore is usually filled up with pea sized gravel of uniform size till the top of the first aquifer. Gravel filling is not extended up to the ground level so as to prevent entry of polluted water in to the formation from surface run-off through the gravel filled annular space. The remaining depth above the gravel pack is usually filled up with impervious clay.

A newly constructed tube well needs to be cleaned and developed properly. This is done by pumping the well with a high capacity pump for many hours till all the muddy water with fine sand entering through the slots are removed enabling the well yield clean water.

Till now mild steel (MS) are used commonly as casing pipes as these are strong, can be cut and joined easily at site and are heavy enough for easy insertion into the bore. The MS casing pipes however are prone to severe rusting resulting in an effective life not more than 15 to 20 years depending on the site conditions. High Density Polyethylene (HDPE)/ UPVC casing pipes are more popular these days as these are also easy to cut and join and available in large diameter with requisite thickness and hardness. Resistance to rusting provides a longer life to HDPE/UPVC casing and hence to the tube well.



LOWERING OF UPVC CASING PIPES

The slots/screens of standard length, thickness and pattern are manufactured in the factory itself. Based on the knowledge of the strata, the casing assembly is designed joining slotted and blank pipes in desired sequence and length, so that on insertion into the bore, the slotted portion(s) lies against the aquifer(s) to be tapped. The purpose of a slotted pipe is to allow entry of water from the aquifer into the well and at the same time prevent entry of

undesirable sand particles. The blank part of the casing does not allow entry of any water into the well from the adjacent formations.

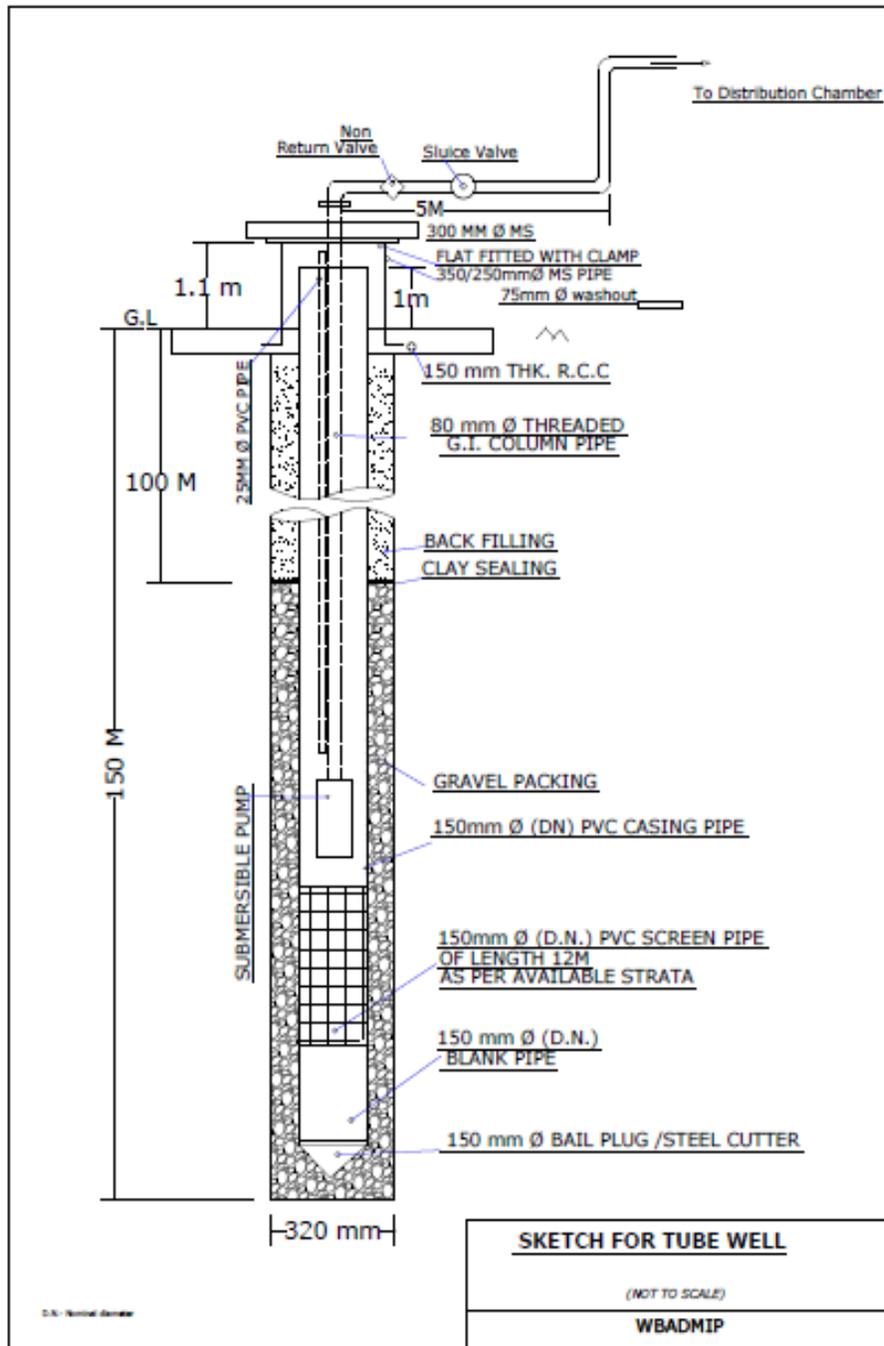
After insertion of the casing pipe, the annular space between the casing and the bore is filled with pea sized gravels

Submersible pumps are most suitable for lifting water from a tube well. A submersible pump is essentially a centrifugal pump designed in such a way that both its motor and the pump assembly coupled together can be submerged within water without damaging the electric motor. The pump looks like a long cylinder, the lower half of which is the motor and the upper half is the pump body within which a number of impellers (stages) are placed in series. The motor and the pump are coupled together through a common shaft with a small gap in between for entry of water in to the pump. The power cable from the motor runs upwards to the surface for running the pump (motor). When the impellers are rotated at a high speed, water rises through the rising pipe attached to the pump due to the centrifugal force created. There is no need for a suction pipe in the system as the entire pump assembly is lowered directly into the water. The Tube well is designed for discharging 30 cubic meter per hour to irrigate 6 ha of land through flexible pipes or buried pipe lines emanating from an over ground water tank.of uniform size. The gravel packing



SUBMERSIBLE MOTOR PUMPSET

serves the purpose of acting as a filter to prevent entry of sand from aquifer into the well and also act as a support to hold the casing pipe in place.



SURFACE FLOW MINOR IRRIGATION SCHEMES

Such structures shall be taken up within catchment areas of natural streams by using gravity flow system. It would comprise mainly small storage works created by the construction of low height earthen embankment across a stream and providing spillways to evacuate flood waters, and outlets for providing irrigation supplies. Specific approach to irrigated agriculture demands that the catchment shall be properly maintained along with conservation of surface water to meet the needs of the downstream areas. Soil erosion in the catchment shall be minimized and proper drainage arrangement provided identifying recharge and discharge areas based on adequate investigation.

The Surface Flow Minor Irrigation Schemes (SFMIS) under the project will comprise small storage dam schemes with cultivable command areas varying from 30ha to 50ha. The storages for these small flow irrigation schemes will be created by constructing low height embankments across the stream.

In general, all SFMIS under the project will be small dams with a maximum embankment height of 5m from the base, The following would comprise the main components of the SFMIS:

- Embankment dam for creating the storage reservoir
- Spillway for evacuation of flood waters
- Irrigation outlet(s)
- Distribution system comprising canals and field channels, as appropriate

EARTHEN BUNDS (Embankment dam)

An earthen bund is formed by constructing an embankment with locally available material like soil, morrum etc. across a natural stream to impound water. Earthen bunds require one escape outlet for excess water (spill way) but do not require solid foundation.

SELECTION OF SITE FOR EARTHEN BUNDS

- The size of the catchment in the upstream of the site should be such that adequate water be available from the given rainfall in the area for the required storage.
- Storage depends upon the slope of the storage area and height of the bund. The site should ensure adequate storage capacity without undue extension of the submergence area. The storage area should be deepened if necessary to increase storage capacity.
- The soil permeability of the storage area be such that the quantum of subsurface infiltration is within the acceptable limit.
- The downstream area should permit natural way for safe and economic disposal of the surplus water from the stream.
- The site should be such that the length of the bund does not increase unnecessarily due to unfavorable topography.

DESIGN CRITERIA

The important features of an earthen bund are its top width, side slope and height. Once the base width and side slopes are fixed, top width of a bund is determined by its height. Top width should normally be kept 1/2 to 1/3 of base width. It is a good practice to maintain the top width uniform throughout the length.

The core of the bund should be made with impervious clayey soil with adequate compaction. Masonry or concrete core or cutoff walls are also provided. The core wall is normally kept

embedded to a depth roughly equal to $\frac{1}{3}$ to $\frac{1}{4}$ of the water column and the top level is kept about 30-50 cms above the high flood level. The purpose of the core wall is to add strength to the bund and also to prevent infiltration (seepage).

Side slopes of a bund depend upon the nature of the material to be used. The side slopes should be such that the soil does not show the tendency of slipping. Upstream slope is kept flatter than the downstream slope.

FACTORS FOR DETERMINING THE HEIGHT OF BUND

High Flood level (H.F.L)

Free board to be provided.

Amount of foundation clearance. Deeper the foundation, below the ground level, the higher would be the bund.

Amount of allowance for settlement.

The extent of height should be 3 times the bottom width.

In order to increase the stability of a bund, the following precautions should be taken:

- To prevent overlapping, sufficient free board and proper escape weir (spillway) be provided.
- The upstream slope should be protected by stone pitching or adequate margin of slope to prevent scouring by wave action.
- Toe erosion should be prevented by providing riprap on the downstream.
- The seepage line should remain well within the downstream face. Cut-off wall makes percolation gradient flatter. A longitudinal drain parallel to the cut-off trench (wall) and cross drains at intervals help in providing good drainage to any water that may enter by percolation through the heart of the dam or rainfall
- The upstream face slope should be stable against sudden drawdown. Minimum inside slope should be 1:3 and outside slope be 1:2.
- The up and downstream slope of the earthen bunds should be flat enough so that the shear stress produced in the foundation is less than the shear strength of the material in the foundation.
- The seepage flow passing under the bund when it reaches the discharge surface should have the pressure and velocity so small that it is incapable of moving material from the foundation of the bund.

SPILLWAY:

This component of the small dam is usually located at the ends or in the middle of the embankment as an overflow section to pass off the excess floodwater safely to the stream down below without damaging the embankment. For SFMIS of the project, most of the spillway sections will be located on the stream bed with embankments on both sides. The excess flood water past the weir is carried safely away from the embankment through a properly designed and constructed channel to prevent damage to the earthen embankment and arrest retrogressive erosion of the bed material of the channel, behind the waste weir body wall.



To facilitate smooth flow of approaching floodwaters towards the weir, the upstream area of the weir is cleared for the required width and to the levels, to prevent heading up of water that may cause overtopping of the embankment.

CONVEYANCE / DISTRIBUTION SYSTEM

It consists of a main canal taking off from the cistern behind the embankment downstream of the sluice. It has a designed capacity for the maximum demand to be supplied in the crop season. It may have branch canals, distributaries and minors feeding the watercourses to irrigate the fields, sequentially depending upon the size of the tank and the command area.



The conveyance channels have minor masonry structures such as outlets structures with or without controlling gates, cattle crossings, cart track crossings, cross drainage works crossing valleys, canal drops etc. to safely carry the channel flow to the tail end of the command area.

WATER DETENTION STRUCTURES

Undulating terrains of Purulia, Bankura, Paschim-Medinipore, Jalpaiguri and Darjeeling districts are suitable for constructing small detention structures or low height weirs across streams for storing surface water runoff. These are excellent tools for water harvesting and effecting recharge of subsoil moisture. The arrested water will be useful for irrigation to the ruggedly barren areas adjoining Chhotonagpur range in the western fringe of the state.

OVERFLOW WEIRS / CHECK DAMS

Weir is a continuous solid structure built across a stream over which water may flow. Weir impounds and raises water in the upstream side.



SELECTION OF SITE

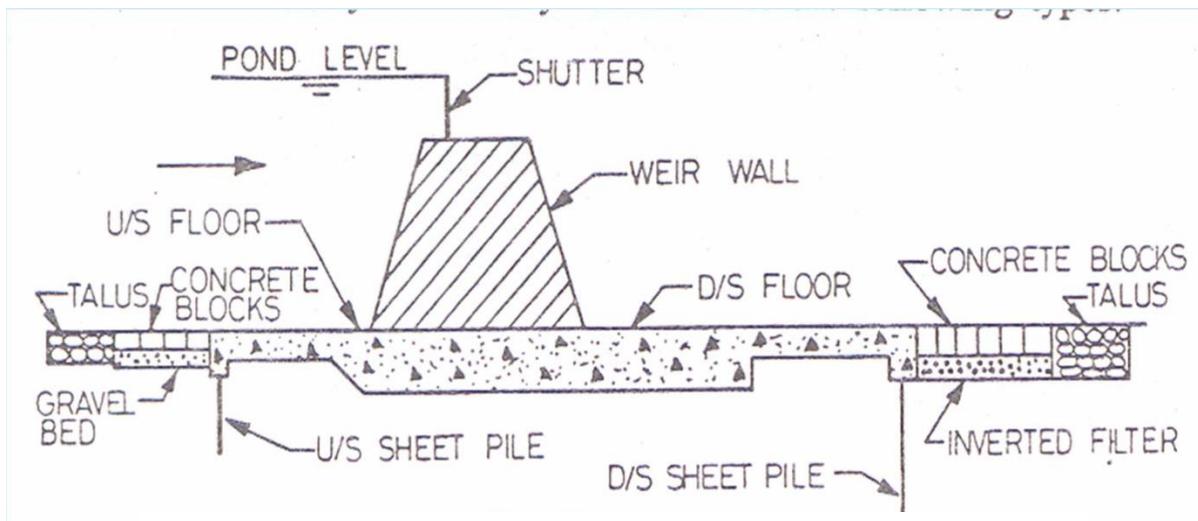
The stream should be as straight as possible to permit maximum storage and allow minimum side scouring (erosion).

Stream should have good depth and smaller width so that the length of the weir remains small.

The upstream side should be reasonably broad so as to permit greater average volume of storage per unit height and length of weir.

Presence of rock formation at shallow depth of the stream bed provides a stable foundation for the weir. Site with thick clayey formation in the stream bed should be avoided as far as possible from foundation point of view.

The longitudinal slope in the stream bed in the upstream side should be gentle so that larger volume of water is stored mostly as channel storage with minimum submergence of the surrounding area.



A TYPICAL WEIR SECTION

DUG CUM BOREWELL

An area where both shallow unconfined and deep confined aquifers are present, groundwater is tapped most profitably by constructing dug cum bore well in which vertical boreholes are drilled from the bottom of the dug well.

While the dug well taps water from the shallow aquifer, the bore taps deeper confined aquifer, the piezo metric surface of which rises sufficiently high to reach into the dug well for accumulation. Water received from both the aquifers as stored in the dug well can then be pumped out using ordinary centrifugal pumps.

HYDRAULIC RAM OR HYDRAM

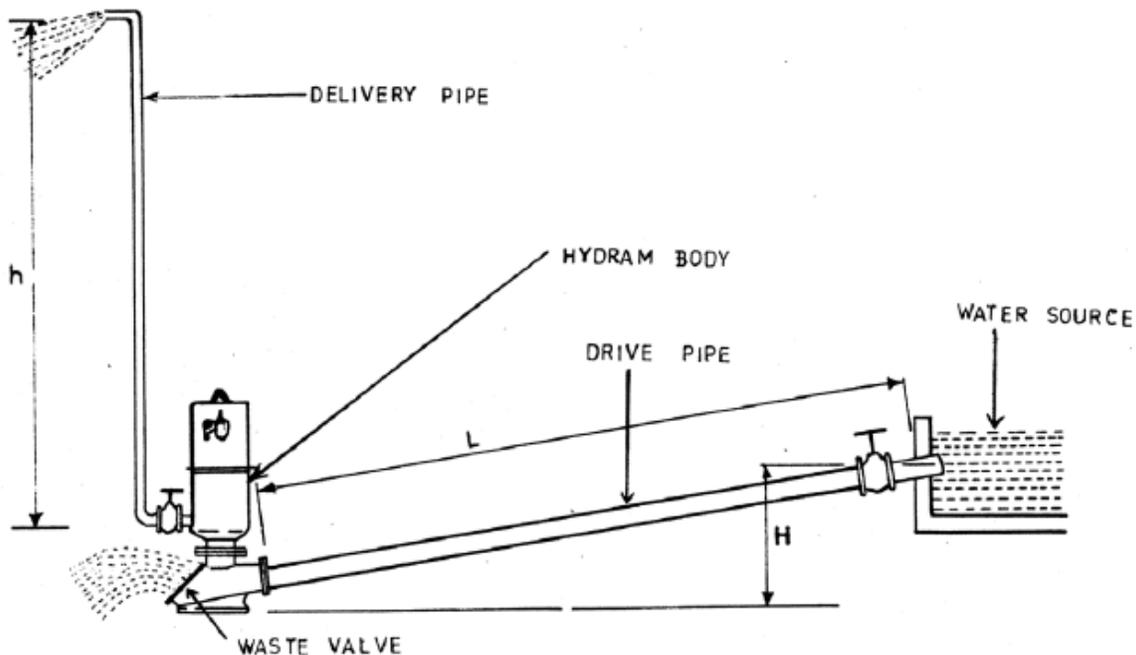
This is a pumping device which uses the momentum of the moving column of water to lift a small part of the same water to a height above its original supply head. It basically uses the concept of water hammering as the source of the driving force. It uses the force created due to sudden stopping of a large quantity of falling water to lift a part of this water while the remaining of water gets releases for disposal. This is suitable for remote hilly areas where source of conventional power is limited.

A hydam consists of an inclined supply pipe, Ram assembly and delivery pipe. The ram assembly comprises of an air chamber, air valve, waste water outlet and the delivery outlet.

FEATURES OF HYDRAM

- No fuel is required and hence running cost is very low.
- It is durable and reliable except the valve element which requires frequent replacement. Maintenance cost is also less as it has only two moving parts.

- Although capacity is comparatively low and discharge is pulsating but once a hydam is set in motion it runs continuously.
- Suitable for remote hilly areas where source of conventional power is limited.
- It is efficient for lift upto 30 m.
- Adequate water supply for drive pipe should be available round the year and the location should also be favourable for such installation.
- Water should be clean. Presence of sand, grit or floating matter in the water may hamper normal functioning.



HYDRAULIC RAM (HYDRAM)

Lift Irrigation

Water from rivers, canals, reservoirs, etc. is lifted by two centrifugal pump sets each capable of discharging 50 cubic meter per hour i.e. total 100 cubic meter per hour to irrigate 20 ha of land. Water is distributed through buried PVC pipe lines attached with pressure relief valves and may have the provision of sprinkler irrigation arrangement. The lift irrigation schemes essentially have pump houses for keeping the centrifugal pumps securely.

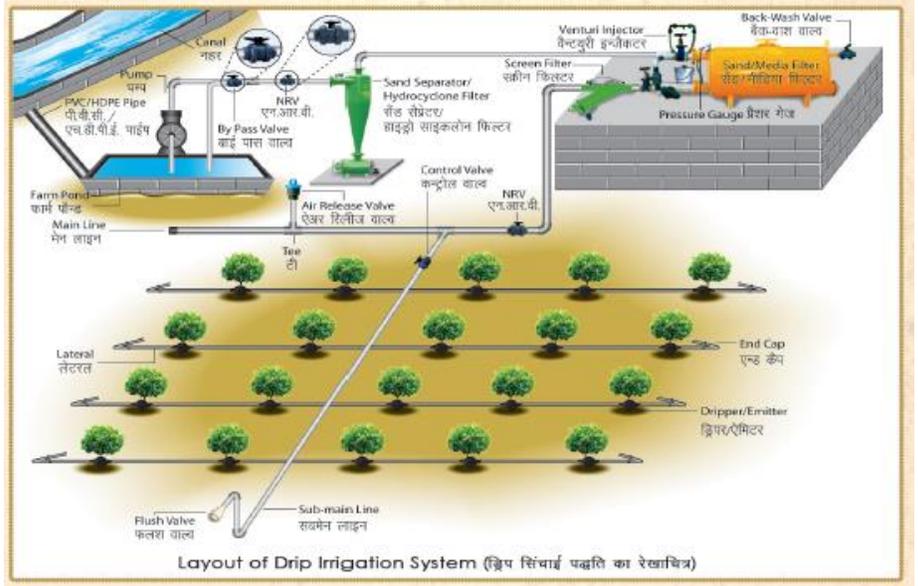


Drip

Irrigation system

Irrigation:

Drip Irrigation involves technology for irrigating plant sat the root zone through emitters fitted on a network of pipes (mains, sub-mains and laterals). The emitting devices could be drippers, micro sprinklers, mini sprinklers, micro jets, misters, fan jets, micro sprayers, foggers etc which are designed to discharge water at prescribed rates. The use of different emitters will depend upon specific requirements, which may vary from crop to crop.

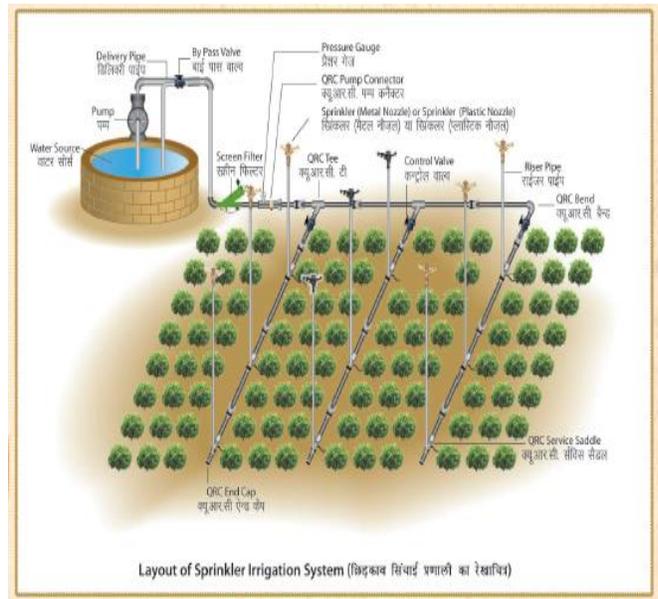


Sprinkler Irrigation

In Sprinkler Irrigation, water is discharged under pressure in the air through a set of nozzles attached to a network of High Density Polyethylene (HDPE) pipes, simulating rainfall. Sprinkler irrigation systems are suitable for irrigating crops where the plant density is very high. It is widely used for cereals, pulses, seed, spices and other field crops.

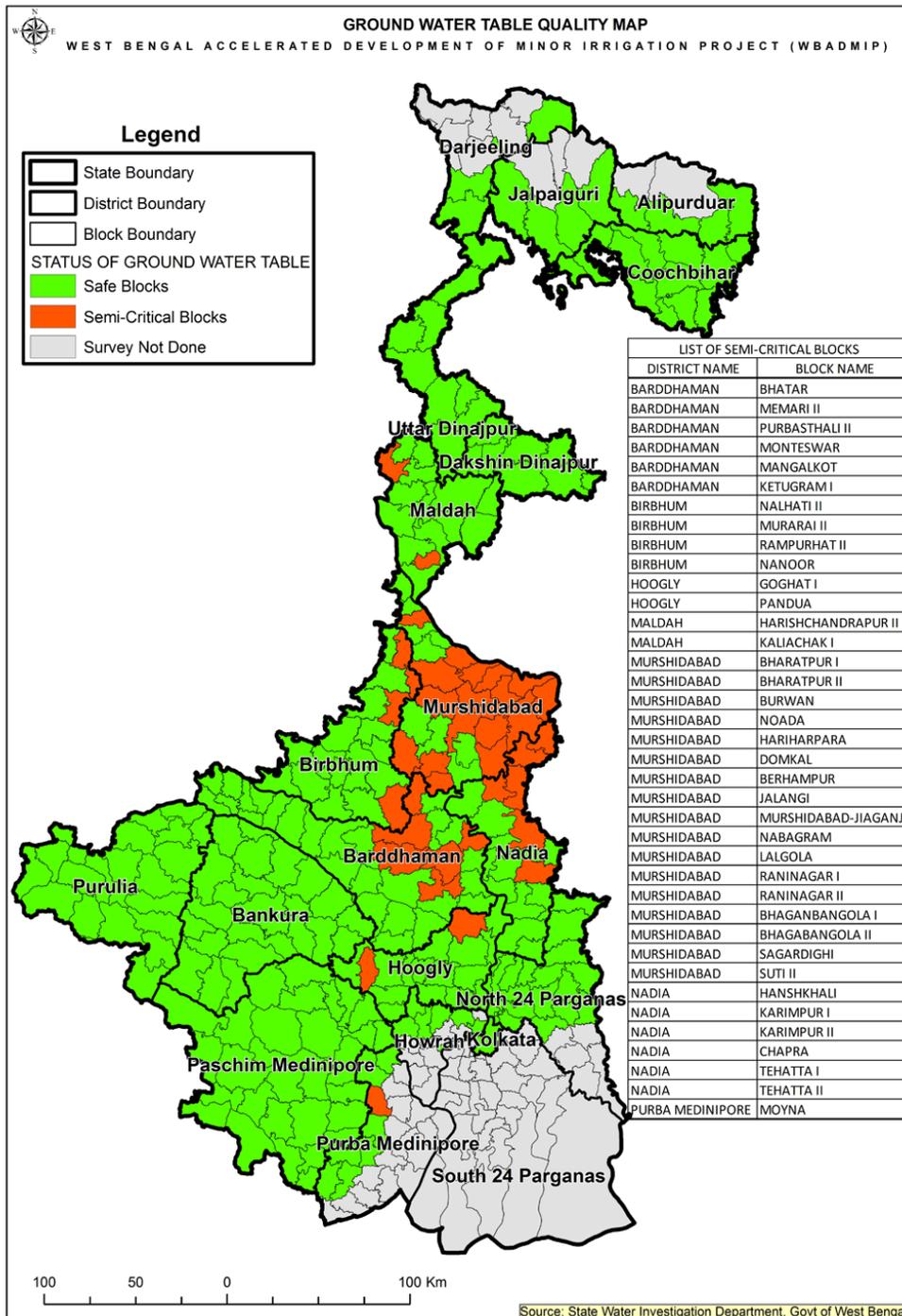
Portable Sprinkler Irrigation System

In portable sprinkler irrigation system, the HDPE pipes are used for mains and sub-mains which can be shifted from one place to another as per the irrigation schedule with respect to design layout. These types of sprinklers have a radius of throw from 12 m to 18 m with a discharge of 1200 lph to 1800 lph. These can be used in both plains and undulating terrains.



Attachment 4.2

Ground Water Quality Map



Attachment 4.3

OK Card for schemes

(This card has to be filled up and a copy to be submitted to DPMU
before settling the final payment of Contractor)

Sl. No	Phase	Activity	Proposed/ Designed	Satisfaction level : Code: 4=Unsatisfactory, 3=Satisfactory, 2=Good, 1=Excellent Put Satisfaction level in code for each proposed activity		Remarks	
				Quality (put satisfaction level code)	Quantity (put satisfaction level code)		
1	Pre- Planning	1.Site selected	a. Awareness meeting				
			b. Farmers proposing the scheme				
			c. Consultation with farmers before selection of Scheme				
			d. Water Quality Testing				
2	Planning	2. Demarkation of command area	a. Selection of Beneficiaries (including activity beneficiaries)				
			b. WUA formation				
			c. Signing of agreement with activity interest group				
			d. Land donation				
			e. Leasing of water area				
			f. Finalisation of Design of scheme jointly				
			g. Preparation of SDMP thro' WUA participation				
			h. Approval of SDMP				
3	Implement ation	3. Key features in construction/ installation Maintained* *	e.g. Design, specifications, layout etc				
			4. Finishing Work	a. Placement			
			b. Foundation				
			c. Masonary work				
			- Ratio of material				
			- Quality				

			d. Finishing work			
			i. Painting			
			ii. Signboard			
			iii. Signage to display water quality (if not safe then warning signs for people to avoid drinking or using such water for non-irrigation purposes).			
			iii. Testrun			
			iv. Removal of unused materials			
			v. Protection arrangement (flood/theft etc)			
			vi. Proper drainage system			
		5. In case of defunct schemes	a. Closure			
			b. Capping of borehole			
			c. Sand filling of abandoned Borewell			
		6. Distribution System	a. Pump			
			b. Pipe			
			c. Electricity			
			d. Discharge			
			e. Storage			
		7. Training conducted on	a. Role			
			b. O & M			
			c. Record keeping			
			d. Agriculture			
			e. Fisheries			
			f. Demonstration on Agriculture			
			g. Demonstration on Fisheries			
		8. Exposure visit for different activities				
		9. Final Status				

4	Post-Implementation **	10. Checklist of items with WUA	a.Signed MoU of hand over including an undertaking to conduct water quality tests in every 6 months				
			b.Registration certificate				
			c.WUA By law				
			d.Map of command area (including water area for possible fishery activity)				
			e.Land use map of Mouza (including water area for possible fishery activity)				
			f.SDMP				
			g.Design lay out				
			h.Cost estimate				
			i.Record books - consisting of 8 formats				
			j.WUA Sahaj Paath				
			k. Trunk				
			11. Hand holding support	a. Refresher training on O & M			
				b. Demonstration on Agriculture			
	c. Demonstration on Horticulture						
	d. Demonstration on Pisciculture						

****SDMP plan to be attached for reference**

Signed by President
with date & seal

Signed by Secretary
with date & seal

Memorandum of Understanding between WUA and DWRID

Memorandum of Understanding (MoU) between the Water Users Association (WUA) and the Department of Water Resources Investigation and Development (DWRID) on establishing the roles and responsibilities of either party in handing over of Minor Irrigation Scheme constructed under the West Bengal Accelerated Development of Minor Irrigation Project (WB ADMIP).

This MoU is signed between _____ WUA of _____ minor irrigation scheme situated in _____ (village) _____ (Post Office) _____ (District) (further referred to as the WUA in the MoU) and the _____ Executive Engineer, DWRID (further referred to as the DWRID in the MoU) on this ---____(Day) of____(Month) _____(Year).

Both the parties have desired to put in writing the contents of the MoU as follows:

Objectives of MOU

With the intention to provide meaningful role to WUA in the maintenance, operation and management of the minor irrigation scheme, the DWRID, Government of West Bengal has issued Notification No. 1710-MI/2R-3?2004 dated 16th August 20011. As per the Notification, for the purpose of maintenance, operation and management of the minor irrigation scheme, the minor irrigation asset and the demarcated command area under the minor irrigation scheme is transferred to the concerned WUA till the stipulated period (the map showing the command area is appended with the MoU). The task of maintenance, operation and management of the minor irrigation scheme includes the operation and maintenance of the minor irrigation system, equitable distribution of water to all WUA members (command area farmers), resolving any disputes that may arise thereof and collection of the water charges from the command area farmers, payment of power bill for the minor irrigation scheme and utilization of the balance funds for the purpose of O&M of the minor irrigation scheme. However, the ownership of the minor irrigation scheme asset continues to rest with the DWRID.

The objective of transferring the responsibility of maintenance, operation and management of the minor irrigation scheme to the WUA is to ensure efficient and equitable use of irrigation water and increase in agricultural productivity. Therefore the objective of executing this MoU is to arrive at an agreement between the WUA and the DWRID in understanding and establishing the roles and responsibilities of the respective parties in undertaking sustainable maintenance, operation and management of the minor irrigation scheme construction under the West Bengal Accelerated Development of Minor Irrigation Project.

Roles and Responsibilities of WUA:

WUA agrees to

- Manage the minor irrigation asset handed over to the WUA;
- Regulate the use of irrigation water amongst the WUA members so as to achieve full utilization of irrigation potential created under the scheme;
- Prepare cropping programme suitable to all its members;
- Assist the State government employees in preparation of demand and collection of water charges;

- Collect money from the WUA members for payment of energy charges, for repair, management of machines and conveyance system and make provision in the sinking fund for off setting the depreciation of asset;
- Keep in safe custody all assets under the scheme and to prevent theft or loss of assets. In the event of damage, theft of any asset the President of the Governing Body shall report the same in the Police Station and the Office of the AE, DWRID;
- Resolve the disputes, if any between the WUA members on irrigation water distribution and sharing;
- Maintain the accounts and the records of the WUA mandated under the provisions of the West Bengal Societies Registration Act;
- Publish accounts of the WUA at the end of the year as prescribed under the provisions of the West Bengal Societies Registration Act; and
- Conduct General Body meeting under the provisions of the West Bengal Societies Registration Act;

Role and responsibilities of District Project Director (DPD):

The DWRID agrees to:

- The AE/EE, DWRID will mobilize the minor irrigation scheme beneficiaries and assist in formation of the WUA;
- The AE/EE, DWRID will mark the Spout Command Areas (SCA) of each spout in the map and determine the total command area of the minor irrigation scheme. He/she will also make the land schedule of the command area of the scheme and will produce the same to the respective WUA;
- The AE/EE, DWRID will arrange for training to enable the WUA in operation, maintenance and management of the minor irrigation scheme but will not interfere in the day-to-day management of the scheme;
- As the minor irrigation schemes, even after handing over will continue to remain government property, the EE, the AE and the Sub-Assistant Engineer (SAE), DWRID will have the joint responsibility to look after the handed over schemes but once again, they will not interfere in the day-to-day management of the scheme; and
- The AE/EE, DWRID will have the powers to summon any member of the WUA or call for producing such documents as will be necessary to establish claims by any member, or inspect the scheme site and give directions or prohibit any action being perpetuated by any member of the WUA.

General Conditions of the MoU

This MOU is executed voluntarily between the WUA and the DWRID without any undue influence and duress on either of the parties.

In implementation of the MoU, the working systems and procedures will be as per the provisions under the Notification No. 1710-MI/2R-3?2004 dated 16th August 20011 and the rules and orders issued by the DWRID from time to time and the provisions of the Project Implementation Plan of the West Bengal Accelerated Development of Minor Irrigation Project.

Any dispute between the WUA and the DWRID regarding the MoU shall in principle be resolved through mutual negotiation and consensus. In case the two parties fail to resolve the dispute, it shall be referred to the District Collector and his decision shall be final and binding on both the parties.

This MoU may be terminated by either of the parties with sufficient prior notice of three months of intend in writing by stating the causes related to breach of conditions of the MoU. The other party shall be provided sufficient time to present their case before the termination procedure is initiated.

Duration of the MoU

This MOU will be in force for a period of _____ years from ____/____/_____ (dd / mm / yyyy) to ____/____/_____ (dd / mm / yyyy).

In acceptance to the above contents of this MoU, the WUA (through its President) and the DWRID (through its Executive Engineer) give their consent to enter into the MoU. In the presence of two witnesses, both parties hereby put their hands and seals / rubber stamp on the MoU in two copies, one each to be retained by either of the party, on this day of MoU as mentioned below.

On behalf of WUA

District Project Director

President WUA

Executive Engineer

Witness 1

Witness 2

Signed this day, the ____/____/_____ (dd / mm / yyyy).

Format for Scheme Development and Management Plan (SDMP)

A. List of Chapters

Chapter No.	Title	Page No.
Chapter 1	Context	
Chapter 2	The Process	
Chapter 3	Village profile	
Chapter 4	Project Area Profile	
Chapter 5	Social Safeguard	
Chapter 6	WUA Profile	
Chapter 7	Sub-project Profile	
Chapter 8	Agriculture Support Services	
Chapter 9	Stakeholder Analysis	
Chapter 10	Operation, Maintenance & Management and Water Charges	
Chapter 11	Cost Benefit Analysis	
Chapter 12	Environment Management Plan	
Chapter 13	Time schedule for Scheme Implementation	
Chapter 14	Budget Estimate	
Chapter 15	Monitoring and Evaluation	

B. List of Annexure

Annexure No.	Title	Page No.
Annexure I	Engineering design , drawing and estimates	
Annexure II	Details Of Agriculture Support Service	
Annexure III	Detail Cost Benefit Analysis	
Annexure IV	Format for Handing Over	
Annexure V	Scale for WUA Monitoring & Evaluation	
Annexure VI	Check List for Scheme Preparation and Approval	
Annexure VII	Scheme Selection Criteria	
Annexure VIII	Scheme Feasibility Report	
Annexure IX	WUA members with land holdings	
Annexure X	Mass petition	
Annexure XI	WUA Capacity building plan	
Annexure XII	WUA MoM records	

C. Summary Sheet of SDMP

MI Scheme ID:

A. Village Profile		B. Scheme Profile	
A.1 Location		B.1 Basic Information	
River Basin		Latitude	
District		Longitude	
Block		Type of Scheme	
JL no.		Source of water	
Mouza		Source of Energy	
Mouza category (SC / ST / Minority / Backward / General)		If electricity, then distance of 11 KV line from scheme (kms):	
Total households		Total depth of suction (m)	
Population		Discharge (m ³ /hr)	
A.2. Agro climatic Information		B.2 Beneficiary Profile	
Agro-climatic Zone		Total no. of households	
Annual rainfall (mm)		No. of female beneficiaries	
Soil type		% of SC/ST beneficiaries	
Hydro geology		No. of small and marginal farmers	
Water Table (m)		Average land holding size (ha)	
Water quality parameters		Number of land donors	
Total geographical area (ha)		Total Area donated (ha)	
Cultivable area (ha)		Land donated in % of individual land holding	
Single cropped area (Kharif) (ha)			
No. of clusters with single cropped area with area more than 120 ha		Tribal Development Plan	
Area without irrigation (ha)		Number of tribal benefitted:	
Irrigated area (ha)		- Directly from scheme	
No. of existing minor irrigation schemes		-Agricultural support services	

(borewell/tubewell/dug well etc)			
Total area selected under ADMI project (ha)		Environment Management Plan	
Total Area developed by WRIDD (ha)		Monitoring plan	
B.3 WUA Profile		Suggested interventions	
Name of the WUA			
Number of members		B.3 Scheme Cost	
Name of President		(a) Scheme construction	
No. of women members in the WUA governing body & sub committees		(b) Agricultural support services	
Agricultural Support Services		(c) others (if any):	
Crop Demonstration		Total cost (Rs)	
Horticulture activity		Net income (Rs.)	
Pisciculture Activity		BC Ratio	

Scheme Achievement		
Achievement Parameters	Before Scheme (Baseline)	Projected (Target)
Command Area (ha)		
Single cropped area (ha)		
Multiple cropped area (ha)		
Annual Irrigation requirement (ha m)		
Area irrigated (ha)		
Available water for irrigation (ha m)		
% of Irrigation demand met		
Major crops (Kg/ha):		
(a) Paddy		
(b) Maize		
(c) Oilseeds		
(d) Vegetables		
(e) Fish (kg/ha)		
Net income from agriculture (Rs)		

D. Village Profile

1. Administrative Profile

Administrative Unit	Name	Census Code	Lat. & Long.
Village			
Mouza			
Gram Panchayat			
Block			
Sub Division			
District			

Source:

2. Hydro Geologic Profile

	Description
Agro Climatic Zone	
Climate	
Temperature	
Rainfall	
Seasons	
Geology	
Soil Type	
Soil Quality (Nutrient)	
Groundwater Level	
Ground water Quality	

3. River / Stream Hydrology

Features	Unit	Value
Name of River		
River Basin		
Catchment area		
Width of river		
Depth of River		
Average Flow in the river		
Number of months river flows		
Water level (Jan) Discharge		
Water level (May)		
Water Quality issues(list parameter values)		

4. Demographic Profile

Population Type	Unit	Social Groups					
		SC	ST	OBC	Minority	General	Total
Population Total	No.						
Population Men	No.						
Population Women	No.						
Population Children	No.						
Households Total	No.						
Literacy Rate (Men)	%						
Literacy Rate (Women)	%						

5. Occupation Profile

Occupation Type	Unit	Social Groups (Households)					
		SC	ST	OBC	Minority	General	Total
Large Farmers	No.						
Medium Farmers	No.						
Small Farmers	No.						
Marginal Farmers	No.						
Landless	No.						
Livestock Keepers (Only)	No.						
Fisher Men	No.						
Village Manufacturing / Processing	No.						
Potters	No.						
Washer Men	No.						
Other Water Using Occupations	No.						
Other	No.						

6. Income Profile

Income Level	Unit	Social Groups (Households)					
		SC	ST	OBC	Minority	General	Total
Below Poverty Line	No.						
Less than Rs. 5,000 / Year	No.						
Rs. 5,000 – 10,000 / Year	No.						
Rs. 10,000 – 20,000 / Year	No.						
Rs. 20,000 – 50,000 / Year	No.						
Above Rs. 50,000 / Year	No.						

7. Land Use Profile

Land Use Type	Total Area (ha)	%age of Total	Remarks
Total Land			
Non Cultivated Waste			
Cultivable Waste			
Forest			
Groves & Orchards			
Cultivable Land Total			
Rain fed Cultivable Land			
Irrigated Cultivable Land			
Land Cultivated Once			
Land Cultivated Twice			
Land Cultivated Thrice			

8. Agriculture Profile

Crop Type	Seed Variety		Cultivated Area (ha)		Productivity (kg / ha)	
	Rain fed	Irrigated	Rain fed	Irrigated	Rain fed	Irrigated
Kharif Crop						
Rabi Crop						
Summer Crop						

Crop Type	Fertilizer Use N/P/K (kg / ha)		Insecticide Use (kg / ha)		Pesticide Use (kg / ha)	
	Rainfed	Irrigated	Rainfed	Irrigated	Rainfed	Irrigated
Kharif Crop						
Rabi Crop						
Summer Crop						

9. Irrigation Resources Profile

	Bore Wells			
	Public (Government Installed)		Private (Farmer Owned)	
	Electric	Diesel	Electric	Diesel
Total Numbers				
Numbers Operational				
No. Installed by WRIDD				
Area Irrigated Kharif (ha)				
Area Irrigated Rabi (ha)				
Area Irrigated Summer (ha)				
Average Annual Power / Diesel Cost (Rs.)				
Average Annual Maintenance Cost (Rs.)				
O&M Practice in Public Schemes				

	Open Well (Energized)			
	Public (Government Installed)		Private (Farmer Owned)	
	Electric	Diesel	Electric	Diesel
Total Numbers				
Numbers Operational				
No. Installed by WRIDD				
Area Irrigated Kharif (ha)				
Area Irrigated Rabi (ha)				
Area Irrigated Summer (ha)				
Average Annual Power / Diesel Cost (Rs.)				
Average Annual Maintenance Cost (Rs.)				
O&M Practice in Public Schemes				

Other Irrigation Resource	Number	Area Irrigated (ha)		
		Kharif	Rabi	Summer
Ponds / Tanks				
Open Wells (Non Energized)				
Check Dams				
Nala Bunds				

10. Community Institutional Profile

Type of Institution	Numbers	No. of Members	Level of Operation ¹
Self Help Groups (Women)			
Farmer's Cooperatives			

¹ Very Good / Good / Average / Poor / Defunct

Type of Institution	Numbers	No. of Members	Level of Operation1
Student Clubs			
Youth Club			

11. Community Asset & Services Profile

Type of Asset	Number	Location		Remarks
		Within Village	Distance from Village	
Nationalized Bank				
Cooperative Bank				
Post Office				
Local Market				
Krishi Samabay Unnayan Samiti				
Agricultural Mandi				
Seed Shop				
Fertilizer Depot				
Agro Chemical Shop				
Diesel Depot				
Electric Sub-Station				
Agri Power Transformer				
Soil Testing Lab				
Water Testing Lab				
Agri Extension Centre / Krishi Vigyan Kendra				

E. Estimates of Annual MOM of MI Scheme and Irrigation Charges

1. Annual MOM Cost

Sl. No.	Items	Unit Cost (Rs. / month)	No. of Months	Total Annual Cost (Rs.)
1	Honorium for Operator	Unit cost (monthly)Rs.		
2	Monthly Electricity / Diesel Charges	6000.00/year		
3	Maintenance of Motors, Pumps, Pump house and distribution system (pipe lines)	Unit cost x unit consumed ((HP x .746=....kw)x hours run) = 2500.00		
4	WUA Administration Cost (meeting, stationeries, communication, etc.)	As required(should not be more than 4% of total cost per year)		
5	WUA Audit Fee	200.00		
6	Miscellaneous Expenses	1000.00		
7	Total Amount Required by WUA for Annual MOM	500.00		
	Total			

2. Annual Irrigation Charges

Sl. No.	Irrigation Charge	Method for Calculation	Annual Amount (Rs.)	Seasonal Amount (Rs.)
1	Annual Irrigation Service Charge per ha	Total MOM Cost / Total Irrigated Area (in ha)		
2	Annual Irrigation Service Charge for Member	Annual Irrigation Service Charge per ha x Area Irrigated in ha for Member		

F. Detail Cost Benefit Analysis of MI Scheme

1. Economics of Existing Crops in ha

Sl. No.	Activities	Area Covered (ha)	Items	Total Cost (Rs. / ha)	Total Production (kg)	Total Cost of Cultivation (Rs.)	Net Returns (Rs.)
1	Cost of cultivation of kharif paddy						
2	Cost of cultivation of Rabi paddy						
3	Cost of cultivation of Ground nut						
4	Cost of cultivation of Til (Sesame)						
5	Cost of cultivation of Vegetables (Chillies & Bitter gourd)						
6	From Fish						
	Total						
			Per capita Ava. Income =				

2. Cost of Cultivation of Proposed Crops in ha

Sl. No.	Activities	Area Covered (ha)	Items	Total Cost (Rs. / ha)	Total Production (kg)	Total Cost of Cultivation (Rs.)	Net Returns (Rs.)
1	Cost of cultivation of kharif paddy						
2	Cost of cultivation of Rabi paddy						

Sl. No.	Activities	Area Covered (ha)	Items	Total Cost (Rs. / ha)	Total Production (kg)	Total Cost of Cultivation (Rs.)	Net Returns (Rs.)
	followed by SRI						
3	Cost of cultivation of Ground nut						
4	Cost of cultivation of Til (Sesame)						
5	Cost of cultivation of Mustard (As paira Crop)						
6	Cost of cultivation of Vegetables (Chilies & Bitter gourd)						
7	From Fish						
	Total						
			Per capita Ava. Income =				

Net benefit (excluding fisheries) =

3. Benefit Cost Ratio

1	Capital cost of the MI Scheme	Rs.		Remarks
2	Life of the MI Scheme	Year		
3		Rate	Amount (Rs.)	
a)	Interest on Capital Cost	10%		
b)	Depreciation Charges	4.50%		
c)	Operation & Maintenance Charges	4%		
d)	Total Annual Expenditure on Capital Cost (a+b+c)	Rs.		
4	Annual Benefit	Rs.		
5	Benefit / Cost Ratio			

G. Proposed Action Points for Environment Management

Sl. No.	Project activities	Triggered in Scheme (Yes / No)	Proposed Action for Environment Management	Responsible Staff / Person
1. Construction Phase				
1.1	Identification of construction areas of reservoir, embankment, dams, bunds, pump houses, distribution towers, spouts, conveyance channels.		All the construction area should be demarcated on ground at first.	Contractor
1.2	Topsoil available through scraping and clearance.		Top soil should be preserved for future use for farming	Contractor
1.3	Alignment of access roads or haulage roads		Formal land acquisition has to be avoided. Temporary arrangement for access roads need to be demarcated on ground after obtaining the consent of the private land owners and the representatives of Gram Panchayat and Panchayat Samiti.	Contractor and DPMU
1.4	Shifting of small religious structures or memorials		Should be relocated to sites decided in consultation with local community leaders and the PRIs	Contractor and DPMU
1.5	Shifting of public utilities like telephone lines, water/ sewerage lines etc falling in areas of construction site		It need to be inventoried and relocated in consultation with the communities and the concerned departments Any chance find of treasure trove, materials of archaeological and historical importance should be reported to the Archaeological Department	Contractor and DPMU
2.0	Establishment of camp Office and storage area			
2.1	Camp office for construction		To be located on vested wasteland or community land in consultation with local communities. Use of cultivable and privately owned land need be religiously avoided	Contractor
2.2	Storage areas for fuel/lubricants		Area should have an impermeable basement; separate storm water collection system has to be installed for	Contractor

Sl. No.	Project activities	Triggered in Scheme (Yes / No)	Proposed Action for Environment Management	Responsible Staff / Person
			separation of oil and lubricants prior to discharge.	
2.3	On completion of construction regarding the camp site and associated structure		Structure will be dismantled and the site should be restored to as close to its state prior to establishment of such facilities.	Contractor
3.0	Establishment of labour camp sites			
3.1	Site selection for labour Camp		This should be done in consultation with the land holders and all related govt. Dept. like revenue Dept.& Gram Panchayat. Avoid private and social forestry area, maintain distance from 100 m from water body, water courses, agriculture land etc. All this activities should consider the parameters provided under ECoP of the program.	Contractor
3.2	Water facilities in the camp site		Campsite should have adequate quantum of potable water supply, water for washing and sanitation and other infrastructural facilities.	Contractor
3.3	Sanitation facilities in the camp site		The camps shall have temporary septic tanks/soak pit of adequate capacity to last for the projected duration of such camps.	Contractor
3.4	Cooking facilities		Construction camps need be provided with alternative fuel like kerosene/ LPG for cooking to ensure that the inmates of such camps do not take resort to use of fuel wood for cooking and heating.	Contractor
4.0	Procurement of construction materials			
4.1	Procurement of construction materials like boulders, stone aggregates of various descriptions		This will be procured only from licensed quarries within a lead of 100 km. In absence of such quarries, permits for opening up new quarries will be obtained from competent authority	Contractor
4.2	Procurement of		Sand shall be collected from approved	Contractor

Sl. No.	Project activities	Triggered in Scheme (Yes / No)	Proposed Action for Environment Management	Responsible Staff / Person
	construction materials sand		quarries	
4.3	Procurement of materials from stone crushing unit.		It should be ensured that such crushing units are working under valid permits and all pollution control measures are in place and such units have implemented measures for protection of health of their	Contractor
4.4	Borrow areas		Conversion of cultivable lands into borrows areas strictly avoided at all costs.	Contractor
4.5	Borrow areas identification		Borrow area to be demarcated with the consent of the communities and the competent authorities in the department of Land and Land Reforms.	Contractor
5.0	Transportation of construction materials and storage			
5.1	Material transportation to worksites.		Material transportation to worksites through long haulage need be avoided to reduce the level of gaseous emission, pollution level .The haulage distance should preferably kept within 100 km.	Contractor
5.2	Construction of access roads		Construction of long access roads to the site need be avoided as much as possible.	Contractor
5.3	Transportation of materials like earth, sand, stone aggregates through trucks		All materials like earth, sand, stone aggregates during transit through trucks should be properly covered to avoid littering, dust pollution and spillage	Contractor
5.4	Hazardous materials transportation		Hazardous materials like fuel, lubricants need be transported in safe containers to avoid leakage and spills	Contractor
5.5	Segregation of storage materials into hazardous and non-hazardous category.		Materials need be segregated into hazardous and non-hazardous category and stored at site in clearly demarcated areas, Earth and stone aggregates; cement should be stored away from water courses/ water bodies (at least 25m) and properly stacked. The stacks in case of earth should have slopes 1:2 (vertical to horizontal)and the height be limited to 1,5m. Sand heaps should have peripheral bunds.	Contractor
5.6	Storage areas for		Storage areas for fuel, lubricants should	Contractor

Sl. No.	Project activities	Triggered in Scheme (Yes / No)	Proposed Action for Environment Management	Responsible Staff / Person
	fuel, lubricants		have proper pavement to prevent contamination of soil and ground water.	
5.7	Route & time selection during transportation of materials		During transportation of materials congested routes and hours should be avoided as far as possible	Contractor
6.0	Waste management			
6.1	Construction Waste		Wastes will generate though excavation at the sites of the reservoir, dismantling of existing water detention structures, and conveyance channels etc. Such wastes need be segregated for reuse and safe disposal	Contractor
6.2	Wastes of concrete blocks, stones		This waste may be used in sub-grades of haulage roads, riveting of embankments, construction of check dams, toe walls etc.	Contractor
6.3	Excavated earth		Excavated earth should normally be used in construction of embankments or raising embankments. In case there are low lying cultivable fields in the CCA, such soils if suitable for agriculture may be used in raising the levels of such fields.	Contractor
6.4	Surplus spoils		Surplus spoils have to transported to disposal sites identified in consultation with local stakeholders and the PRIs or the Municipalities	Contractor
6.5	Hazardous wastes		Hazardous wastes, if any, like waste asbestos pipes, sheets have to be necessarily disposed off at identified sites	Contractor
7.0	Noise pollution			
7.1	Construction activities		All construction plant and machinery like transport fleet, rigs used for drilling, concrete mixers , compressors etc should conform to the standards set by the CPCB /SPCB	Contractor
7.2	Vehicles and machineries used at construction site		All vehicles and machineries should have valid PUC (Pollution under control certificate) during the period of operation	Contractor
7.3	Operation of noise generating machinery		Worker involved around such machineries should be provided with mufflers No such machinery should be located within 250 meters of any settlement or	Contractor

Sl. No.	Project activities	Triggered in Scheme (Yes / No)	Proposed Action for Environment Management	Responsible Staff / Person
			any sensitive receptor	
8.0	Air pollution			
8.1	Dust generation through construction activities		Dust suppression measures have to be put in force through spraying of water at regular intervals on haulage roads near the site	Contractor
8.2	Vehicles used for construction		Vehicles used for construction should have valid pollution under control certificates	Contractor
8.3	Generators operations		Generators operating in the project site should conform to CPCB/ SPCB standards for emission	Contractor
9.0	Protection of flora and re-vegetation			
9.1	Tree felling		Before tree felling approval need to be required from the DFO. Double the number of trees (>30cm bhg) removed have to be planted at sites identified in consultation with local communities and PRIs. The communities should have a say in species selection keeping in view the site parameters. There should be a preference for fruit bearing species	DPMU with Contractors & WUA
9.2	Embankment protection		All embankment slopes should be turfed with grass and planted with site specific trees to attract birds. Planting on the waterfront side should only be undertaken above the highest water level	Contractor and DPMU
9.3	Fire wood collection by the Campsite workers		Campsite workers need always be provided with alternate fuel like kerosene/LPG to avoid damages to the local vegetation through pruning and lopping for collection of fuel wood	Contractor
10.0	Water Quality			
10.1	Trapping sediments from the surrounding slopes or slope management.		Silt fencing or brush barrier shall be used from trapping sediments from the surrounding slopes into the water body during the process of development or rehabilitation	Contractor
10.2	Sediment trap		Run-off with sediment load can be	Contractor

Sl. No.	Project activities	Triggered in Scheme (Yes / No)	Proposed Action for Environment Management	Responsible Staff / Person
	from run off		allowed in the water body after the sediment from such run off gets trapped in properly designed sediment traps	
10.3	Movement of machinery and work force		Movement of machinery and work force should be restricted around the water body	Contractor
10.4	Excavation spoils		Excavation spoils should be properly stacked away from water bodies / water courses	Contractor
10.5	Disposal of solid waste or waste water from construction camps		No solid waste or waste water from construction camps should be disposed off in the water bodied or water courses	Contractor
10.6	Hazardous materials		All hazardous materials like fuel, lubricants should be stocked in safe containers and placed on paved platforms away from water bodies and water courses	Contractor
11.0	Rehabilitation of borrow pits			
11.1	Topsoil form borrow areas		Topsoil form borrow areas need be preserved and used for restoration of such site on completion of the project	Contractor
11.2	Use of borrow areas		The borrow areas wherever possible may be converted into tanks /ponds for the purpose of surface storage for recharging and use for pisciculture. This will be an enhancement measure for the benefit of the local community.	Contractor
11.3	Abandon Boswells		Abandon bore wells need to fill up properly by filler materials like sand.	Contractor
12.0	Removal of vegetation		Compensatory plantation of at least double the no. of trees removed at sites selected in consultation with beneficiaries ; Site matching species need be selected in consultation with the beneficiaries and the Forest Department approval.	DPMU with WUA
2. Operation Phase				
1.0	Use of Irrigation Water		Water resources will be managed by judicious use, selection of suitable crop, upgraded irrigation technology like sprinkler etc.	WUA
2.0	Alternative of		Future plan should be chalked out for	WUA

Sl. No.	Project activities	Triggered in Scheme (Yes / No)	Proposed Action for Environment Management	Responsible Staff / Person
	Ground water based Irrigation		reducing the dependency on ground water by constructing surface water structure like Pond/WHT and on conjunctive use of GW and SW.	
3.0	Soil Quality based farming		Based on soil test, crop will be selected for farming. And this will provide optimum use of soil conditioner and reduce possibility of soil pollution	WUA with the help of DPMU
4.0	Agro Chemical		Promote & use of bio pesticide in place of chemical or synthetic pesticide. Bio fertilizer will be used as much as possible, as soil conditioner to increase soil quality as well as productivity.	WUA with the help of DPMU
5.0	Invasion of aquatic		Uproot invaded aquatic weeds from the surface flow canal and water detention structure.	WUA
6.0	Water bodies		Fill-up of water bodies need to be prohibited. Soil erosion will be checked to protect siltation & regular removal of siltation has to be undertaken. Restricting any kind of waste (liquid or solid) disposal in the water body. At least 30% of the water is to be retained in the dry season to keep alive perennial water body. Use and disposal of chemical in the water body need to be strictly prohibited	WUA
7.0	Removal of Siltation		Soil erosion will be checked by the vegetation and supported by minor engineering structures will reduce the siltation load in the surface flow schemes and water detention structures. Siltation will be monitored and removed on the regular basis from the surface flow schemes and water detention structures.	WUA
8.0	Removal of Vegetation		Compensatory plantation of at least double the no. of trees removed; Site matching species need be selected in consultation with the Forest Department.	WUA

H. Self Rating Scale for WUA

Sl. No	Monitoring Parameters	Tot. Weightage	Poor Marks-1	Average Marks-2	Good Marks-3	Excellent Marks-5
1	Membership & Management	30				
I	% of female members in WUA managing committee		0	Less than 1/3 of tot. mem.	1/3 of tot.mem.	More than 1/3 of tot. mem.
i	% of tribal out of total tribal members in managing committee		0	Less than 30%	30-50%	More than 50%
iii	No. of Management Committee meeting held in last year		< 6	6-8	9-11	12
iv	Average attendance of women members in Management Committee meeting		0	Less than 50% of tot. women members in mang. Comm..	50% - 70% of tot. women members mang. Comm..	More than 70% of tot. women members mang. Comm..
v	No. of Governing Body meeting held in last year & average attendance of WUA members in the meetings		0	1 & less than 50% of tot. members	1 & 50% & more of tot. members	2 & more than 30% of tot. members
vi	Average attendance of women members of WUA out of total women members in the general body meetings		0	Less than 50%	50% - 70%	More than 70%
	Marks obtained					
	Recommendation					
2	Transparency	5	Members	Only	Only	Information

Sl. No	Monitoring Parameters	Tot. Weightage	Poor Marks-1	Average Marks-2	Good Marks-3	Excellent Marks-5
			do not know	Chairman/ President knows	Management committee knows	abt. Expenditure, fund amount, meeting schedule are displayed on a fixed wall, so, everybody knows
i	Detail knowledge about the schemes					
ii	Water release schedule					
iii	Water distribution plan					
iv	Determination of water charge					
v	Quantity of fund collected in WUA account					
vi	Purposes of using that fund					
vii	System of O & M activities are taking place					
viii	When last Management Committee meeting took place					
ix	When last Governing body meeting took place					
x	Quantity of fund required for maintenance activities					
	Marks obtained					
	Recommendation					

Sl. No	Monitoring Parameters	Tot. Weightage	Poor Marks-1	Average Marks-2	Good Marks-3	Excellent Marks-5
3	Performance	25				
i	Area (in ha.) irrigated per mcft					
ii	% area turned double cropped or multiple cropped		25%	>25%-50%	>50%-85%	>85%
iii	% of water charge collected		<50% of demand	51%-70%	71%-95%	>95%
iv	% of water charge used for creation of extra resources		0	20%	21%-50%	>50%
v	% of water charge used for maintenance		0	20%	21%-50%	>50%
vi	Financial audit in last year		Not aware, not done	Aware not done	Aware, done but not on time	Aware, done on time
	Marks obtained					
	Recommendation					
4	Self-Management	5				
i	Maintenance of Up to Date records		No records maintained	Records maintained occasionally, whenever anyone can get the time to write	Records maintained but not updated, President/ secretary writes whenever gets time	Records maintained and updated, a person hired from outside to maintain/ learned members has given the responsibility
ii	List of records					
iii	Such as, Member register					
iv	Meeting minutes register (GB/MC/SC)					
v	Irrigation					

Sl. No	Monitoring Parameters	Tot. Weightage	Poor Marks-1	Average Marks-2	Good Marks-3	Excellent Marks-5
	register					
vi	Stock register					
vii	Income / expenditure register					
viii	Subcommittee register					
ix	Pump log book					
x	Cash book					
xi	Bank Pass book					
	Marks obtained					
	Recommendation					
5	Water Release	5				
i	Water release schedule		No plan prepared & farmers are not aware about water release schedule	Plan prepared & 50% of the plan has been followed	Schedule is made known to all members & followed within 15% variation	Schedule is made known to all members & followed regularly
	Marks obtained					
	Recommendation					
6	Water Distribution	10				
i	System of distribution of water(quantity & time) to the users		Continuous flow as per water availability	Informal arrangements for water distribution	Date wise schedule prepared and followed occasionally	Date wise schedule prepared and followed regularly
ii	Tail end issues & adequacy of water received by the tail ends		Less than 50% of identified Tail end area receive inadequate or no water	51-75% identified Tail end area received adequate water	76-90%of identified Tail end areas received adequate water	91% and more of identified Tail end areas received adequate water
	Marks obtained					
	Recommendation					
7	Estimation of Water Charge	5				
i	How water charge is being		Users not aware	SO/DPMU done	Assessment done by	Joint assessment

Sl. No.	Monitoring Parameters	Tot. Weightage	Poor Marks-1	Average Marks-2	Good Marks-3	Excellent Marks-5
	estimated				SO/DPMU/ depts. Before harvest & users are made aware	done by SO/ DPMU/ depts. & WUA before harvest and the charge is determined
	Marks obtained					
	Recommendation					
8	Maintenance	5				
i	How WUA is maintaining the MI scheme		No Maintenance plan prepared and no work done	No Maintenance plan prepared but works done by members	SO / DPMU prepared maintenance plan and accordingly work done by members thro' WUA fund	WUA prepared maintenance plan and completed works before season
	Marks obtained					
	Recommendation					
9	Conflict Management	5				
i	How WUA is managing conflicts		Conflict exists, no specific action taken for mitigation	Conflict exists, discussed in WUA, not resolved	Members, representatives of gram panchayat discussed jointly and tried to resolve, partially resolved	Managing committee, WUA repeatedly discuss and resolve the issues
10	New Technology	5				
i	No. of Water users out of total members adopting improved techniques (like SRI etc.) which were demonstrated					

Sl. No	Monitoring Parameters	Tot. Weightage	Poor Marks-1	Average Marks-2	Good Marks-3	Excellent Marks-5
	Marks obtained					
	Recommendation					
	Consolidated Grade	100				
	Score					

I. SDMP Budget Estimate

Scheme Id.:

Scheme Name:

Village:

Block:

District:

Implementation Year:

Sl. No.	Major Activity	Sub-activity	Method	Input	Responsibility	Estimated Budget (Rs. Lakhs)	
						By Govt.	By WUA
1	MI Scheme						
2	Agriculture Support Services						
3	Environmental Management Plan						
4	Social & Gender Development Plan						
5	Capacity Building						
6	Farmer Training						
7	Exposure – Social & Technical						

J. Time Schedule for SDMP Implementation

Scheme Id.:

Scheme Name:

Village:

Block:

District:

Implementation Year:

S N . N o . N o . N o .	N a m e o f A c t i v i t y	Scheme Implementation Month																														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
A	MI Scheme																															
1																																
2																																
B	Agriculture Support Services																															
1																																
2																																
C	Environmental Management Plan																															
1																																
2																																
D	Social & Gender Development Plan																															
1																																
2																																
E	Capacity Building																															
1																																
2																																
F	Farmer Training																															
1																																
2																																

G	Exposure – Social & Technical																
1																	
2																	

K. SDMP Formats: Procurement Plan

Scheme No.: **Scheme Name:** **Village:** **Block:**
District:

Implementation Year:

Sl. No.	Name of Activity	Required Input	Procurement Method	Responsible Person	Remarks
A	MI Scheme				
1					
2					
B	Agriculture Support Services				
1					
2					
C	Environmental Management Plan				
1					
2					
D	Social & Gender Development Plan				
1					

2					
E	Capacity Building				
1					
2					
F	Farmer Training				
1					
2					
G	Exposure - Social & Technical				

DPR format for Lift Irrigation with Sprinkler

A. <u>Location and Description</u>			
1.	Date of last Inspection of site:		
2.	Name of scheme (Sub-Project):		
3.	Proposed Command Area (ha) :		
4.	To be operated by (deisel pump / electric motor):		
5.	Location		
	(a)	Latitude :	
		<i>["000000" (degree, nminute, second)]</i>	
	(b)	Longitude :	
		<i>["000000" (degree, nminute, second)]</i>	
	(c)	Name of District:	
	(d)	Name of Block:	
	(e)	Block Category: (DPAP/LWE/Normal)	
(f)	Name of Mouza:		
(g)	Mouza Category: (SC / ST / Minority / Backward / General)		
(h)	J.L. No.:		

		i)	Plot No.:	
		(j)	Name of Police Station:	
		(k)	For electrified schemes, distance of 11 KV line from scheme (kms):	
		(l)	For diesel operated schemes, distance of scheme from nearest locality (kms):	
		(m)	Approx. distance from the Block HQ (in kms):	
		(n)	Approx. distance from motorable road (m):	
		(o)	mode of transport available	
B.	<u>Scheme Features</u>			-
	1.	Type of schemes		
	2.	Distance of adjacent private/public scheme (m)		
	2.	Type of soil & topography of the land proposed to be irrigated.		
	3.		Proposed Command area (ha)	
			Area without any irrigation (ha)	
			Area belonging to Small and Marginal Farmers (ha)	
			Percent of command area without any irrigation	
			Percent of area belonging to Small and Marginal Farmers	

	6.	Type of soil & topography of the land proposed to be irrigated:		
	7.		Major Crops	
C.	<u>Farmers' Participation</u>			
	<u>1.</u>		Total number of farmers in command area	
	2.	Number of farmers within the proposed command area are agreeable to bear the O&M cost		
	3.	Number of farmers within the proposed command area are agreeable to form WUA		
	4.	Number of farmers within the proposed command area are willing to adopt multiple cropping pattern		
	5.	Mode of transfer of land (Land against land/ Purchase by beneficiaries/ Free water for certain period/ Operator's service/ any other extra advantage to landowner as agreed upon)		
D.	<u>Flowing Water Source</u>			
	1.	Name of water source (<i>river/tributary/stagnant waterbody /any other</i>):		
	2.	Level of Stream (Primary/secondary)		
	6.	Whether flow is perenial or seasonal		
E.	<u>Stagnant Water Source</u>			
	1.	Approx. waterbody area (m ²)		
	2.	Average depth (m)		

	3.	Estimated capacity of waterbody (m ³)		
	3.	Estimated available water in November (m ³)		
	4.	Amount of water available for proposed scheme		
G.	<u>Environment</u>	-	-	
	1.	Distance of proposed scheme from environmentally sensitive areas * (m)		
	6.	Percentage of stream discharge to be used for proposed scheme (%)		
	7.	Distance of proposed command area from any archaeological site (m)		
	8.	Possibility of energisation with electrical source of power (no. of years)		
<p><i>* this would include protected area network including wildlife sanctuaries, national park, natural habitats including reserve forest/protected forest, wetlands of national and international importance, sacred groves of significant bio-diversity, wild elephant corridor</i></p>				

Monthly Water Availability (can be collected based on farmers interview)								
							Crosssection	
Sl No.	Month	Water Level in m	Cross section in m2	Velocity in m/s	Discharge in cum / s	Amount of water available in cubic meter(If the source is stream)	Water Level in meter	Available Water in Reservoir in cubic meter (If source is Reservoir)
1	January				0	0		0
2	February				0	0		0
3	March				0	0		0
4	April				0	0		0
5	May				0	0		0
6	June				0	0		0
7	July				0	0		0
8	August				0	0		0
9	September				0	0		0
10	October				0	0		0
11	November				0	0		0
12	December				0	0		0

Estimation Of Command Area								
Months	Amount of Water Available	Estimated Command Area (Ha)			Proposed Command Area (Ha)			Scheme Command Area
		Rabi	Summer	Monsoon	Rabi	Summer	Monsoon	
June-Oct	0	0	0	0				
Nov-Feb	0							
March-May	0							

Major Crops

Rabi		Summer		Kharrif		Standard Irrigation Water Requirement	
Name of Crops	Command Area (Ha)	Name of Crops	Command Area (Ha)	Name of Crops	Command Area (Ha)	Rabi	8000 cubic meter/Ha
Oil Seed	10.8	Crop-1		Crop-1		Summer	5000 cubic Meter/Ha

Potato	3.6	Crop-2		Crop-2		Monsoon	7000 cubic meter/Ha
Vegetable	1.8	Crop-3		Crop-3			
Boro Paddy	1.8	Crop4		Crop4			
Total	18	Total		Total			

Determining Discharge of The Pump based on data of Rabi Season

Name of Crop	Command Area (Ha)	Depth of Water (cm)	Irrigation Interval (days)	Area to be Irrigated per day (Ha/day)	Quantity of water required per day (Ha-cm)	Total water requirement per day (Ha-cm)	Actual water requirement per day (Ha-cm) [irrigation efficiency=0.7]	Operating hours of Pump	Discharge capacity of Pump (cumec)	Discharge capacity of Pump (lps)	Remarks
Oil Seeds	10.8	7.6	30	0.36	2.736	7.2675	10.38214286	10	0.028839286	28.83928571	We consider two pumps of 14 lps discharge capacity each
Potato	3.6	3.8	8	0.45	1.71						
Vegetables	1.8	6.35	20	0.09	0.5715						
Boro Paddy	1.8	5	4	0.45	2.25						

Month wise Water Requirement & Availability

Month	Monthly water requirement in cm for	Month wise Water	Actual month	Month wise Water	Percentage of Water
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	Oil seed	Potato	Vegetables	Boropady	Requirement (ha-cm)	wise water requirement in cubic meter	Availability (B)	requirement in scheme
Nov	7.6	15.2	10.2		155.16	22165.71429	0	#DIV/0!
Dec	8.9	15.2	15.2	15.2	205.56	29365.71429	0	#DIV/0!
Jan	6.3	12.7	8.9	15.2	157.14	22448.57143	0	#DIV/0!
Feb	5	7.6	6.3	35.6	156.78	22397.14286	0	#DIV/0!
Mar				35.6	64.08	9154.285714	0	#DIV/0!
Apr				30.5	54.9	7842.857143	0	#DIV/0!
May				20.3	36.54	5220	0	#DIV/0!
Total	27.8	50.7	40.6	152.4			Average % water Requirement	#DIV/0!

Assumed Data

Depth of water (Inches)	Depth of water (cm)	Total water requirement (Inches)	Total water requirement (m)
3	7.62	11	0.2794
1.5	3.81	20	0.508

2.5	6.35	16	0.4064
2	5.08	60	1.524

Design of Pump

Design Data

SI No.	Particulars	Value
1	Static suction lift in m, H_s	5.50
2	Length of PVC flexible in 100mm suction side in m, l_1	20.00
3	Friction loss in suction flexible pipe in m/m, hfl	0.04590
4	Length of 100 mm dia PVC flexible delivery pipe of thickness 4 mm in m, l_2 (pump to PRV)	20.00
5	Length of 140 mm dia UPVC pipe(CI-II) of wall thickness 3.50 mm in m, (Main Line)	619.00
6	Length of 110 mm dia PVC pipe (CI-II) of wall thickness 3 mm in m, (Branch Line of the last spout)	94.00
7	Elevation at pump inatallation point in m	100.00
8	Elevation of spout outlets in m	104.00
9	Velocity of water(V_1)= Q/A_1 in m/sec (inlet size 100mm OD)	2.107
10	Discharge of pumps in LPS, Q	14.000
11	Velocity of water(V_2)= Q/A_2 in m/sec (OD=140mm)	1.008
12	Velocity of water(V_3)= Q/A_3 in m/sec (OD=110mm)	1.649
13	Friction loss in 140 mm dia UPVC pipe in m/m,	0.00707

14	Friction loss in 110 mm dia UPVC pipe in m/m,	0.024
15	Command Area in Ha	18
16	Discharge of pumps in LPS, Q	14

SUCTION SIDE

SI No.	Details	Value in m
1	Static suction lift in m H_s	5.500
2	Total friction loss in flexible pipe in m, $=h_{f/m} * l$	0.92
3	Head loss in 100 mm strainer $= 0.95 \times V_1^2 / 2g =$	0.21
4	Head loss in 100 mm foot valve $= 0.50 \times V_1^2 / 2g =$	0.181
5	Velocity head $= V_1^2 / 2g$	0.226
Total Dynamic Suction Lift		7.040 m

DELIVERY SIDE :

SI No	Details	Value in m
1	Static discharge head in m	4.00
2	Frictional Head loss in one priming bend $= 0.1V_1^2 / 2g$ in m	0.02
3	Frictional head loss in 100mm C.I Sluice valve $= 0.2V_1^2 / 2g$ in m	0.05
4	Frictional head loss in 100mm flexible pipe, 20m length in m	0.918
5	Frictional head loss in Pressure relieve valve (PRV) in m	0.05
6	Frictional head loss in 140mm PVC Non return valve in m	0.02
7	Frictional head loss in 619 m of 140mm DIA PVC Pipe	4.38
8	Frictional head loss in 140×140×140 mm Tee & 140×110 mm Reducer	0.01
9	Frictional head loss in 94 m of 110mm DIA PVC Pipe	2.26
10	Frictional head loss in 110×110×110 mm Tee	0.02
11	Friction Head Loss in 1.3 m length 110 mm dia PVC Riser Pipe	0.03
12	Frictional head loss in 90 degree bend $= 0.1V_1^2 / 2g$	0.01

13	Frictional head loss in 100mm control valve= $0.1V^2/2g$	0.01
14	Minimum head required for operating portable sprinkler set	16.00
Total Dynamic Discharge Head		27.78

TOTAL HEAD OF PUMP=TOTAL DYNAMIC SUCTION LIFT+TOTAL DYNAMIC DISCHARGE HEAD-SUCTION VELOCITY HEAD		34.59
Say		35.00

Power Capacity of each pump set		
1	Discharge of the Pump in lps (Q)	14.000
2	Total Head of the Pump in m (H)	35.00
3	Water Horse Power of the Pump	6.53
4	Brake Horse Power	10.05
5	Recommended HP	10

Selection of SFU and Cables:

HP rating of the starter	=	10
Size of cable from starter to motor (C1)	=	3C X 4 sq.mm
Size of cables from Bus bar to SFU+ starter(C2)	=	3C X 6 sq. mm
Size of cables from Main SFU to Bus bar (C3)	=	3C X 10sq. mm
The rating of the individual SFU	=	32 Amps
The rating of the Main SFU is	=	63 Amps

The rating of the Bus Bar Unit is

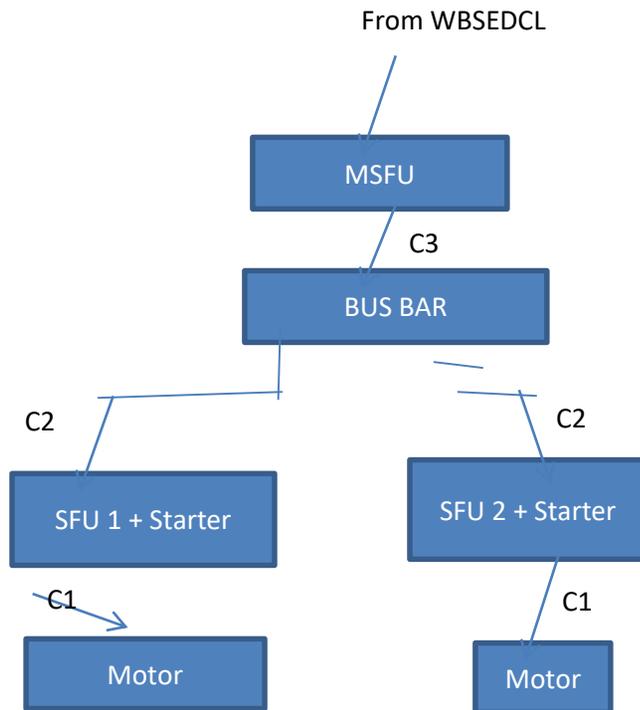
=

63 Amps

Capacitor rating

=

5 KVAR



DESIGN OF PORTABLE TYPE SPRINKLER IRRIGATION SET:

1. PEAK WATER REQUIREMENT (PWR) CALCULATION:

$PWR = ABC/E$ Where, A=Evapotranspiration rate=6mm/day
B=Crop factor=0.80 (for vegetables)
C=Canopy factor=0.85
E=Sprinkler irrigation efficiency=80%=0.80
So, $PWR = 6 * 0.8 * 0.85 / 0.80 = 5.10 \text{ mm/day}$ for vegetables

2. SPRINKLER SELECTION:

Select plastic impact sprinkler, full circle, double nozzle(2.8mm & 1.8mm)
Sprinkler details are as follows:
Nozzle size=2.8mm×1.8mm
Operating pressure, P=1.5 kg/cm²
Discharge, Q=0.520 m³/hr. =0.15 lps =520 lph
Diameter, D=19m; Radius, R=19/2=9.5m
1/2" Male threaded sprinkler
Now, Sprinkler spacing=0.5D to 0.7D=9.5m to 13.30m (D=19m)
Sprinkler spacing must be a multiple of 6m (length of one pipe)
So select the sprinkler spacing= 12m
Now, ED (end distance) =R/1.14 =9.5/1.14=6.73m
So select the ED =7m

3. WATER APPLICATION RATE (WAR):

$WAR = \text{Sprinkler discharge} / (\text{Sprinkler spacing} \times \text{Sprinkler spacing}) = 0.520 \times 1000 / (12 \times 12) = 3.61 \text{ lph/m}^2$

4. IRRIGATION TIME (IT):

$IT = PWR/WAR = 5.10/3.61 = 1.42$ hr. =85 minutes/day, Say 80 minutes/day

The system is designed to render irrigation at 2 days interval for convenience of shifting

So irrigation time per day considering 2 days time interval= $80 \times 2 = 160$ minutes

5. NO OF IRRIGATION SHIFT POSSIBLE:

Consider that time required for each shifting=10 minutes

So Total time required for 1 shift= (Irrigation time+ shifting time)= $160 + 10 = 170$ minutes=2.80 hr.

So no of irrigation shift possible=Pumping Hours per day/irrigation time for one shift = $11/2.8 = 3.92$ nos,
say 4 nos.

So select 4 nos of shifting

6. DESIGN & SELECTION OF SUBMAIN (S/M):

Specific discharge rate, $SDR = \text{No of sprinkler} \times \text{sprinkler discharge} / \text{max. Length of sub main}$

= $8 \times 0.520 \times 3600 / 96 = 43.33$ lph/m

From SDR curve, select 63mm S/M line which covered the required length.

7. DESIGN & SELECTION OF MAIN LINE (M/L):

Flow in two S/M=Flow in M/L=no of sprinkler \times sprinkler discharge/ $3600 = 2 \times 8 \times 0.520 \times 1000 / 3600 = 2.32$
lps

So from SDR curve select 75 mm M/L this covered the required length.

Now, h_f (Frictional loss in M/L)= $5m/1000m$

So actual $h_f = 5 \times 96 / 1000 = 0.48m$

8. AREA IRRIGATED BY EACH SPRINKLER SET PER DAY

Area covered by each set = Area irrigated per shift x Number of shifts per day
= 100 m x 25 m x 4 = 10000 sq m = 1 Ha (Per day)

9. TOTAL AREA IRRIGATED BY EACH SPRINKLER SET:

Area irrigated per day x Irrigation Scheduling in number of days = 1 x 2 = 2 Ha

10. TOTAL AREA IRRIGATED BY 4(FOUR) NUMBERS OF SPRINKLER SET:

Area irrigated by one set x total no of sprinkler set = 2 x 4 = 8 Ha

COST ABSTRACT OF KOYRAPUR-I SURFACE WATER LIFT IRRIGATION-I SCHEME
UNDER BURDWAN (AGRI-MECH) SUB-DIVISION UNDER ADMI
PROGRAMME(BATCH-II) FOR THE YEAR 2014-15.

Sl. No.	Description of Estimate	Amount in Rs.
1	Construction of W.T.A.	282494.11
2	Construction Pump House	239007.00
3	Cost of Electrical Wiring	20179.00
4	Cost of Materials and equipments	1397291.20
7	Water level guage and Micro level water mgmnt.	14715.00
8	Monitoring of installation and progress using ICT tools	3000.00
9	Cost of Energisation (WBESDCL part)	600000.00
	Total=	2556686.31

6. DETAILED ESTIMATE FOR LAYING OF W. T. A. OF KOYRAPUR-I SURFACE WATER LIFT IRRIGATION SCHEME UNDER WBADMI PROJECT

1	No. of spout chambers	0
2	Inner dimension of spout chamber	0.9 m X 0.6 m
3	Length of 140 mm dia pipe (m)	1200.00
4	Length of 110 mm dia pipe(m) (20 nos X 50 mtr avg.)	1000.00

Sl. No.	Source	Description of item								Unit	Qty.	Rate (Rs)	Amount (Rs)
		Item	No.		Length (m)		Width (m)		Depth/Height (m)				
1.	Pg-1, Sl.no.- 2(a)of PWD	Earthwork in excavation of foundation trenches or drains in all sorts of soil (including mixed soil but excluding laterite and sand stone), including removing, spreading or stacking the spoils, as directed and including trimming the sides of trenches, leveling, dressing and ramming the bottoms, bailing or pumping out of water etc. as required complete. Depth of excavation not exceeding 1.5 metre (not required shoring).Lead upto 15 metres.								%m ³	1,575.86	9121.30	143738.92
		140 mm pipe laying	1	X	1200.000	X	0.750	X	1.000	=	900.00		
		110 mm pipe laying	1	X	1000.000	X	0.750	X	0.900	=	675.00		
		Pr Relief Valve	2	X	0.600	X	0.600	X	1.200	=	0.86		
		Total								=	1575.86		
2.	Ch. 6 sl.no -1(A) of WRDD	Laying of PVC pipes of different diameters within field trenches in curve/ straight line including using UPVC fittings, Viz. Horizontal and Vertical Bends, riser pipes, Tee Reducer etc.and making leak proof joints with couplers after roghening the surface with wire brush and emery paper and applying solvent cement (The rate is inclusive of transport of pipesfittigs and solvent cement to be supplied by deptt.) all complete asper direction of Engineer-In- charge.											
		i)140 mm. dia								m	1,200.00	10.01	12012.00

		iii)110 mm. dia	m	1,000.00	8.06	8060.00
3	Pg - 3, Sl.no.- 3(a) of PWD	Earth work in filling in foundation trenches or plinth with good earth in layer not exceeding 15 cm. Including watering and ramming etc. layer by layer complete with earth obtained from excavation of foundation.	%m ³	1,547.04	5949.00	92033.41
		140 mm pipe laying	1 X 1200.000 X $\frac{(0.75 \times 0.9 - \pi \times (0.14)^2 / 4)}{}$	= 881.54		
		110 mm pipe laying	1 X 1000.000 X $\frac{(0.6 \times 0.8 - \pi \times (0.11)^2 / 4)}{}$	= 665.50		
		Total	= 1547.04			
4	Page no 137, Ch.6 sl.no - 10 of WRDD	Labour charges for fitting and fixing 90 mm. dia PVC CONTROL valve with 90mm. dia class-II U.P.V.C riser pipe by jointing with P.V.C elbow and providing 110mm CI-II short piece as per drawing for sprinkler set connection.	Each	20	101.10	2022.00
5	Page no 135, Ch.6 sl.no - 2(xxviii) of WRDD	Labour charges for fitting and fixing 100mm dia Pressure relief valve with 110mm. dia class-II U.P.V.C riser pipe by jointing with P.V.C bend as per drawing and direction of Engineer-in-Charge.	Each	2	50.6	101.20
6	Page no 138, Ch.6 sl.no - 18 of WRDD	Supplying, fitting and fixing including transportation of sign board for identifying the exact location of MIDI RLI scheme (one at road side and other at site) the board will be made 3 mm thick MS plate of size 300 mm x 600 mm and fitted and fixed on 50 mm GI Pipe of IS 1239/90 (part-1) including cutting, welding and writing of both sides of Sign board. Base - Yellow, and ward Red. Both bottom end of the stands pipe will be grouted in 1:2:4 CC on a single brick flat soiling. This will include one materials and labour complete as per drawing and direction of EIC.	LS	1	3900	3900.00

7	Page 137, Ch.6 sl.no - 11 of WRDD	Labour charges for fitting, fixing 125 mm X100mm dia G.I reducer with 140 mm dia CL-II UPVC pipe with the help of PVC flanged tail piece by joining flanged end of tail piece and expander with rubber insertion nuts and bolts and P.V.C end of tail piece & 140 mm dia UPVC pipe with coupler.	Each	2	101.1	3900.00
8	Ch.6 sl.no - 18 of WRDD	Suppling 1 mtr x 0.6 m x 24 swg MS board containing list of spout wise water users by making numbers of spout as directed by EIC. The board should have base colour - Black and words - White to be fitted and fixed on the wall of the pump house.	LS	1	1000	1000
9	Ch.6, Pg.-136 sl.no -7 of WRDD	Testing of pipe line system against leakages by filling the distribution chamber with water and supplying water through the entire pipe line net work for at least 4 (four) hour by running the departmental Diesel Engine pumping set/ Electro-Motor pumping set, including supplying necessary fuels & lubricants and hiring and transporting tools and plants all complete as per direction of Engineer-in-Charge.				
		i) For .L.I.	Each System	1	3120.00	3120.00
10	Ch.6, Pg.-166 sl.no -16 of WRDD	Transportation of Electro-Motor pumping set for Mini R.L.I. of any make/ brand with necessary fixtures viz. M.S. bend, M.S. Pipes, Rubber Hose Pipe, foot valve, non-return valve, tail piece, sluice valve, priming chamber etc. over Pucca / Kancha road from Sub-Divisional Store to worksite excluding loading at the lifting point and unloading at the delivery point.	Set	2	1315.00	2630.00
11	Ch.6, Pg.-137 sl.no -15 of WRDD	Installation of Electro Motor Pumping set of approved make / brand and for LI scheme on pump foundation over SAL sleeper by fixing nuts and bolts and making connection of suction hose and foot valve with necessary fittings at the inlet end of the water pump and fitting fixing of 90° M S priming bend, sluice valve and delivery hose with all necessary fittings at the delivery end of the water pump, duly connected with the pipe line, maintaining proper alignment and level including cutting holes on the wall of the pump house where necessary, mending good damages after completion of the works as per direction of Engineer-in-charge.				
		a) For L.I. Scheme.	Each Set	2	874.30	1748.60

Total 274266.13

Add Contingency @ 3 %

Total 8227.9839
Rs 282494.11

7. Estimate for construction of Pump House for Kayrapur-I surface water Lift Irrigation Scheme under Burdwan (Agri-Mech) Sub-Division under ADMI Project for the year 2014-15

Sl. No.	Description of Item	Unit	Qty.	Rate	Amount in Rs.
1	Earth work in excavation of foundation trenches or drains, in all sorts of soil (including mixed soil but excluding laterite or sandstone) including removing, spreading or stacking the spoils within a lead of 75 m. as directed. The item includes necessary trimming the sides of trenches, levelling, dressing and ramming the bottom, bailing out water as required complete. [Vide Page no.1, item no. 2(a) of PWD Schedule] <i>(a) Depth of excavation not exceeding 1,500 mm.</i>	% Cu.m	20.00	9221.30	1844.26

2	Earth work in filling in foundation trenches or plinth with good earth, in layers not exceeding 150 mm. including watering and ramming etc. layer by layer complete. (Payment to be made on the basis of measurement of finished quantity of work) [Vide Page no.3, item no. 3(a) of PWD Schedule] (a) With earth obtained from excavation of foundation.	% Cu.m	14.00	5949.40	832.92
3	Filling in foundation or plinth by silver sand in layers not exceeding 150 mm. as directed and consolidating same by thorough saturation with water ramming complete, including the cost of supply of sand. (Payment to be made on measurement of finished quantity) [Vide Page no.5, item no. 4(A) of PWD Schedule]	% Cu.m	6.00	51564.38	3093.86
4	Single brick flat soling of picked jhama bricks including ramming and dressing bed to proper level and filling joints with powdered earth or local sand. [Vide Page no.33, item no. 1 of PWD Schedule]	Sq.m	33.00	306.00	10098.00
5	(I) Cement concrete with graded stone ballast (40 mm. size excluding shuttering) in ground floor. (A) Pakur Variety (a) (1:3:6 proportion) [Vide Page no.59, item no. 10 of PWD Schedule]	Cu.m	1.50	3813.11	5719.67
6	Brick work with 1st class bricks in cement mortar (1:6) [Vide Page no.69, item no. 22 of PWD Schedule]				
	(a) In foundation & plinth	Cu.m	9.10	3930.93	35771.46
	(b) In superstructure ground floor	Cu.m	10.50	4086.31	42906.26
7	40 mm. thick damp proof course with cement concrete (3:1½:1) (with graded stone chips 20 mm normal size) with water proofing compound of approved brand @0.2% weight of cement including cost of materials over two coats of non-toxic acrylic polymer modified cementitious water proofing slurry coat complete (Cost of water proffing & non-toxic paint to be paid separately)for underground water retaining structures.(water proffing as per item no.60 and non-toxic paint as per item no.59 (b) of Section C. [Vide Page no.99, item no. 14 of PWD Schedule]	Sq.m	5.00	261.79	1308.95

8	Ordinary Cement Concrete (mix 1:1.5:3) with graded stone chips (20 mm. nominal size) excluding shuttering and reinforcement, if any, in ground floor as per relevent IS codes. (i) Pakur Variety [Vide Page no.39, item no. 7 of PWD Schedule]	Cu.m	5.70	5429.00	30945.30
9	Hire and labour charges for shuttering with centreing and necessary staging upto 4 m. using approved stout props and thick hard wood planks of approved thickness with required bracing for concrete slabs, beams, columns, lintels curved or straight including fitting, fixing and striking out after completion of works. (upto roof of ground floor) (When the height of a particular floor is more than 4 m. the equivalent floor ht. shall be taken as 4 m. and extra for works beyond the initial 4 m. ht. shall be allowed under 16 (c) for every 4 m. or part thereof.) (a) 25 mm. to 30 mm. thick wooden shuttering as per decision & direction of Engineer-in-charge. [Vide Page no.63, item no. 12(a) of PWD Schedule]	Sq.m	40.00	278.72	11148.80
10	Reinforcement for reinforced concrete work in all sorts of structures including distribution bars, stirrups,binders etc. initial straightening and removal of loose rust (if necessary), cutting to requisite length, hooking and bending to correct shape,placing in proper position and binding with 16 gauge black annealed wire at every inter-section, complete as per drawing and direction. [Vide Page no.65, item no. 15(a)(i) of PWD Schedule] (a) For works in foundation, basement and upto roof of ground floor / upto 4m. (i) Tor steel/Mild steel	MT	0.37	59762.00	21813.13
11	Plaster (to wall, floor, ceiling etc.) with sand and cement mortar including rounding off or chamfering corners as directed and raking out joints, including throating, nosing and drip course, scaffolding/staging where necessary (ground floor) excluding cost of chipping over concrete surface. [Vide Page no.319, item no. 2 of PWD Schedule]				
	(i) with (1:6) cement mortar, (b) 20 mm. thick plaster	Sq.m	45.00	129.37	5821.65

	(ii) with (1:4) cement mortar, (b) 15 mm. thick plaster	Sq.m	78.00	129.73	10118.94
	(c) 10 mm. thick plaster	Sq.m	22.00	101.43	2231.46
12	Neat cement punning about 1.5 mm. thick in wall, dado, window, sills, floor, drain etc. NOTE : Cement 0.152 cu.m. per 100 sq.m. [Vide Page no.323, item no. 8 of PWD Schedule]	Sq.m	35.00	31.36	1097.60
13	M.S. gate of Jail type as per approved design made of strong M.S. frame work, intermediate stiffeners and round / square bars or angles. M.S. sheet (not less than 14 gauge) gussetes, cleats etc. including necessary riveting, bolting, welding, locking and hanging arrangements, fitting and fixing complete as per direction of the Engineer-in-charge. In ground floor. [Vide Page no.157, item no. 13 of PWD Schedule]	Qtl.	2.00	7761.43	15522.86
14	M.S. round or square bar grating of windows etc. fitted and fixed in holes of window frame and with intermediate flat bar stiffner(with necessary holes for the grating bars and with the ends turned and fixed to timber frame with necessary screws) complete , as directed. In ground floor. [Vide Page no.153, item no. 8 of PWD Schedule]	Qtl.	2.00	6550.71	13101.42
15	(a) M.S.or W.I. Ornamental grill of approved design joints continuously welded with M.S, W.I. Flats and bars of windows, railing etc. fitted and fixed with necessary screws and lugs in ground floor. (ii) Grill weighing above 16 Kg./sq.mtr and above (20 kg./Sq.m) (MODE OF MEASUREMENT):- The weight of grill will be detarmined by taking the physical weight of fabricated grill and dividing the same by covered area of the same. [Vide Page no.155, item no. 10 of PWD Schedule]	Qtl.	0.42	6550.71	2751.30

16	Supplying, fitting, fixing approved quality asbestos cement quality down pipe in positin with necessary clamps, nails including making holes in wall, floor etc. aand cutting trenches in any soil or through masonry, concrete structures etc. if necessary and mending good damages including jointing materials complete. (i) 76.2 mm. Dia. [Vide Page no.359, item no. 11 of PWD Schedule]	m	2.00	93.93	187.86
17	Priming one coat on steel or metalic surface with synthetic oil bound primer of approved quality approved make and brand including smoothening surface by sand preparing etc. This item is applicable to new work [Vide Page no.343, item no. 7 (b) of PWD Schedule]	Sq.m	15.00	24.98	374.70
18	(A) Painting with best quality synthetic enamel paint of approved make and brand including smoothening surface by sand papering etc. including using of approved putty etc. on the surface, if necessary : (b) On steel or other metal surface : With super gloss (hi-gloss) - (iv) Two coats (with any shade except white) [Vide Page no.345, item no. 8 of PWD Schedule]	Sq.m	15.00	59.99	899.85
19	White washing including cleaning and smoothening surface thoroughly. All floors : (c) Three coats (on new works only). [Vide Page no.329, item no. 3 of PWD Schedule]	% Sq.m	55.00	1262.50	694.38
20	Colour washing with "ELLA" with a coat of white wash priming including cleaning and smoothening surface thoroughly : (ii) External surface (ground floor) (b) Two coats [Vide Page no.329, item no. 4 of PWD Schedule]	% Sq.m	55.00	1415.01	778.26
Total :					Rs.219,062.87
Considering extra rates @ 6% allowed for all items except item no 1 and 2, Total :					Rs.12,983.14
Total=					232046.01
Contingency @ 3%			232046.01	0.03	6961.38
Say :					239007.39

239007.00

ESTIMATE FOR ELECTRICAL WIRING WORK IN KAYRAPUR-I LIFT IRRIGATION SCHEME UNDER ADMI PROGRAMME (10 HP, 35mts)

Sl. No.	Description of items	Unit	Qty.	Rate in Rs.	Amount in Rs.
1	Supply,Fitting & fixing of DPIC main switch 15/16 A 250 Volts (Havells, Surya, BPC)on Iron legs on wall including mending good the damage for light circuit of pump house (PWD elec. Sh. Page-D-1,item -A1)	Each	1	681.8	681.75
2	Supply, fitting & fixing of 250 volts, 15/16A per way iron clad BDB (2 way) with fuses on flat iron/angle iron frame on wall (Suriya/havells /BPC) (PWD elec. Sh. Page-D-2,item-6a)	each	1	511.7	511.65
3	Supply, fitting & fixing of 228 long X15.8mm dia heavy guage swan brass bracket with bakelite holder (PWD elec. Sh. Page-D-5,item-7)	each	2	125.6	251.10

4	Supply, fitting & fixing of bulk head light fitting on wall/ceiling including S/F suitable 25 wattas CFL lamps complete with glass wire guard and holder (PWD elec. Sh. Page-D-6,item-b14)	each	2	450.9	901.80
5	Wiring from 15/16A DPIC main switch to Busbar box in 1.1KV grade single core stranded 'FR' PVC insulated and unsheathed copper wire (Finolex/havells/KDK) of 2X 36/0.3(2.5 Sq. mm) + 1 X 22/0.3(1.5 Sq. mm) in PVC casing capping (Precision make) including necessary PVC clips, fittings etc incl. supply of wire.. (PWD elec. Sh. Page-E-19,,item-B1)	RMeter	1	127.5	127.50
6	Wiring from 15/16A DPIC main switch to BDB in 1.1KV grade single core stranded 'FR' PVC insulated and unsheathed copper wire (Finolex/havells/KDK) with 2X 36/0.3(2.5 Sq. mm) + 1 X 22/0.3(1.5 Sq. mm) in PVC casing capping (Precision make) including necessary PVC clips, fittings etc incl. supply of wire.. (PWD elec. Sh. Page-E-19,,item-B1)	RMeter	6	127.5	765.00
7	Distribution wiring in 1.1KV grade 2X22/0.3 (1.5 Sq. mm) single core stranded 'FR' PVC insulated and unsheathed copper wire (Finolex/havells/KDK) with 1X22/0.3 (1.5 Sq. mm) single core stranded 'FR' PVC insulated and unsheathed copper wire for ECC, including necessary PVC clips, fittings etc. to light/fan/calling bell with piano key type switch of (Anchore make) fixed on sheet steel fabricated switch board with perspex/ bakelite top cover on wall including necessary connections and making earthing attachments and mending good damages to the building works incl. supply of wire.[PVC casing capping and switch board botyh on surface] average run 5 meter (PWD elec. Sh. Page-E-19,,item-B2)	Point	4	612.5	2450.00
8	Distribution wiring in 1.1KV grade 2X22/0.3 (1.5 Sq. mm) single core stranded 'FR' PVC insulated and unsheathed copper wire (Finolex/havells/KDK) with 1X22/0.3 (1.5 Sq. mm) single core stranded 'FR' PVC insulated and unsheathed copper wire for ECC, including necessary PVC clips, fittings etc. to 5amps 3 pin flush type plug socket with piano key type switch of (Anchore make) fixed on sheet steel fabricated switch board with perspex/ bakelite top cover on wall including necessary connections and making earthing attachments and mending good damages to the building works. [PVC casing capping and switch board botyh on surface] average run 1.5 meter (PWD elec. Sh. Page-E-20,,item-B6b)	Point	1	355	355.00
MOTOR INSTALATION & WIRING:					
9	Fitting & fixing of 63 A 500 V iron clad/ sheet steel TP/ TPN main switch on iron legs on wall (PWD elec. Sh. Page-C-1,item-1)	each	1	257.9	257.85
10	Fitting & fixing of 32 A 500 V iron clad/ sheet steel TP/ TPN main switch/isolators on iron legs on wall (PWD elec. Sh. Page-C-1,item-1)	each	2	95.85	191.70

11	Fitting & fixing of only 63A 500V iron clad M.S. sheet metal busbar chamber on angle iron frame on wall for 4 bars 63Amps (PWD elec. Sh. Page-C-2,item-8)	each	1	576.5	576.45
12	Fitting & fixing of s Starters (for 10 HP motor contol) on angle iron frame on wall (PWD elec. Sh. Page-C-2,item-9b)	each	2	257.9	515.7
13	Fitting & fixing of Volt meter and Ammeter with necessary screws and other fixing materials including making holes where necessary and making connections (PWD elec. Sh. Page-C-2,item-13)	each	3	52.65	157.95
14	Fitting & fixing of Capacitor Bank(4 KVAR ,500V) and single phase preventer with necessary screws and other fixing materials including making holes where necessary and making connections	each	3	150	450
15	Drawing, supplying fitting & fixing of meter loop with 4 x 7/0.052"(Havells/ KDK, ever shine) copper wire single core 660 volt grade in 1 1/2" PVC conduit/ flexible pipe fitted and fixed with accessory bends and elbows, covers etc. with saddle on wall from 63 amp 500 volt TPN IC switch to Supply meter with all inter connectiosn conforming to IEE regulation.	RMeter	1.5	432	648.00
16	Drawing, supplying fitting & fixing of meter loop with 4 x 7/0.052"(Havells/ KDK, ever shine) copper wire single core 660 volt grade in 1 1/2" PVC conduit/flexible pipe fitted and fixed with accessory bends and elbows, covers etc. with saddle on wall from 63 amp 500 volt TPN IC switch to Busbar with all inter connectiosn conforming to IEE regulation.	RMeter	1	432	432.00
17	Drawing, supplying fitting & fixing of meter loop with 3 x 7/0.029"(Havells/ KDK, ever shine) copper wire single core 660 volt grade in 1 1/2" PVC conduit/flexible pipe fitted and fixed with accessory bends and elbows, covers etc. with saddle on wall from 32 amps 500 volt TPN IC switch to Busbar with all inter connectiosn conforming to IEE regulation.	RMeter	1	200	200.00
18	Drawing, supplying fitting & fixing of meter loop with 3 x 7/0.029"(Havells/ KDK, ever shine) copper wire single core 660 volt grade in 1 1/2" PVC conduit/ flexible pipe fitted and fixed with accessory bends and elbows, covers etc. with saddle on wall from 32 amps 500 volt TPN IC switch to Star Delta Starters with all inter connectiosn conforming to IEE regulation.	RMeter	1.5	200	300.00
19	Drawing, supplying fitting & fixing of meter loop with 6 x 7/0.029"(Havells/ KDK, ever shine) copper wire single core 660 volt grade in 1 1/2" PVC conduit pipe fitted and fixed with accessory bends and elbows, covers etc. with saddle on wall from DOL Starters to motors with all inter connectiosn conforming to IEE regulation.	RMeter	14	350	4900.00

20	Drawing, supplying fitting & fixing of meter loop with 3 x 7/0.029"(Havells/ KDK, ever shine) copper wire single core 660 volt grade in 1 1/2" PVC conduit/ flexible pipe fitted and fixed with accessory bends and elbows, covers etc. with saddle on wall from DOL Starters to Capacitor bank with all inter connectiosn conforming to IEE regulation.	RMeter	1.5	200	
21	Suppling & fitting & fixing of danger Board (mannual) 4"x6" in two distinguishing position in the door of pump house (outside) and at the palce of panel board	each	2	50	100.00
22	Suppling fitting & fixing of shock treatment chart in a wooden frame with brass.	each	1	150	150.00
23	Earthing with 50 mm (2") dia Galvanized iron pipe 3.64 mm thick X 3.04 mtr.(10ft) long and 1X4 SWG G.I.(Hot Dip) Wire (4 mtr. Long) 13 mm (1/2") dia X80 mm (3") long G.I. Bolts, double nuts and double washer including S&F 15 mm dia G.I. Pipe protection (1 mtr) long to be fitted with bitumen partly under the ground level and partly above the ground level driven to an average depth of 3.56 mtr. (12") below the ground level and restoring the surface duly rammed for Soft/Morrum soil by ISI-Medium G.I. Pipe (PWD elec. Sh. Page-G-1,item-2a)	set	2	1661	3321.60
24	Supplying and fixing earth bar of galvanized M.S. Flat 25 mm × 6 mm on wall having clearance of 6 mm. from wall including providing drilled holes (on busbar) about 3 cm. apart complete with G.I. bolts, nuts, washers etc. as required for tapping.(PWD elec. Sh. Page-G-3, item-4a)	Meter	0.3	172.8	51.84
25	Connecting the equipments to earth busbar including supplying and fixing G.I. Wire No. 10 SWG on wall/floor with stapples burried inside floor/wall as required and making connection to equipments with bolts, nuts, washers, cable, lugs etc. as required and mending good all the damages..(PWD elec. Sh. Page-G-3, item-5a)	Meter	20	7.2	144.00
26	Submission of test form in the prescribed form obtaining from WBSEB after mager test by a licenced Electrical supervisor and contractor having competency certificate in part - I,II,XI,III,IV,V,VI-A/VI-B/VIII-A and VII-B	item	1	250	250.00
27	Placing and positioning the Centrifugal pump motor set on the pump base/pump house floor, alligning properly with necessary packing and fixing the set with holding down nuts and washer including cutting holes of requisite size in the floor / base, grouting the bolts and mending good all damages- complete as per direction of Engineer-in-Charge. (WRDD Sh. (2010-11) page 147, item-1)	Each Set	2	585	1170

Rs. 19860.9

Considering contingency @3 %
Total

= 595.827
20456.7
Say Total Rs. 20179

ESTIMATE FOR UPVC PIPES, M.S. ITEMS & ELECTRICAL MATERIALS FOR KOYRAPUR-I L I SCHEME UNDER ADMI PROGRAMME (Batch-II)						
Sl.No.	Description of items	Qty.	Unit	Rate (In Rs.)	Amount (In Rs.)	Agro rates
1. PVC PIPES & ACCESSORIES						
1	140 mm. dia P.V.C. pipe Class- II (with a loose matching coupler, class-II) marking IS No. 4985/ 1988 with latest amendments with free solvent cement.	1200	Meter	402	482400.00	335
2	110 mm. dia P.V.C. pipe class-II (with a loose matching coupler,class-II) marking IS No. 4985/ 1988 with latest amending with free solvent cement.	1000	Meter	249.6	249600.00	208

3	90 mm. dia P.V.C. pipe class-II (with a loose matching coupler,class-II) marking IS No. 4985/ 1988 with latest amending with free solvent cement.	6	Meter	170	1020.00	
4	200 mm. dia P.V.C. pipe Class- I (with a loose matching coupler, class-II) marking IS No. 4985/ 1988 with latest amendments with free solvent cement for jacking of water out lets (0.6 mtr X 20 Nos)	12	Meter	522	6264.00	435
5	Coupler(cl-II) for 140 mm. dia P.V.C. pipe (extra) I.S. 10124/1988, Part- II with free solvent cement.	40	each	116.4	4656.00	97
6	Coupler(Cl-II) for 110mm. dia P.V.C. pipe (extra) I.S. 10124/1988, Part- II with free solvent cement.	20	Each	57.6	1152.00	48
7	140x140x 140. P.V.C. Tee	22	Each	922.8	20301.60	769
8	140X110 PVC reducer	20	each	265.2	5304.00	221
9	110 X 90mm PVC reducer socket	20	each	457	9140.00	
10	140 mm. dia 60 ⁰ bend(cl-II) (IS. No. 10124/ 88 Part- 8 with latest amendment)	4	Each	606	2424.00	505
11	110 mm. dia 90 ⁰ bend(cl-II) (IS. No. 10124/ 88 Part- 8 with latest amendment)	20	Each	240	4800.00	200
12	140 mm.dia IS.No.10124/88 Part-4 with latest amendment.PVC End Cap.(cl-III)	2	Each	382.8	765.60	319
13	110mm PVC Flanged Tail Piece	4	Each	300	1200.00	250
14	140mm PVC Flanged Tail Piece	2	Each	478.8	957.60	399
15	110 mm dia 90 ⁰ PVC elbow	20	Each	457	9140.00	
16	90 mm dia PVC control valve	20	Each	2500	50000.00	
17	100mm dia PVC Flexible hose pipes	100	Meter	645.6	64560.00	538
18	Solvent cement extra (Medium duty)	5	Litre	318	1590.00	265
					915274.80	

2. M.S. ACCESSORIES

1	100 mm. dia, ISI marked CI Sluice valve	2	Each	3492	6984.00	2910
4	100 mm dia 90 ⁰ M.S. priming Bend with both end flanged	2	each	2080.00	4160.00	

5	100 mm dia. C.I Foot Valve flanged type	2	each	1249.2	2498.40	1041
6	100 mm dia, 2mm thickness,30mm width Heavy Duty Hose Clamp fitted with bolts & nuts	18	each	55.00	990.00	
7	90 mm dia, 2mm thickness,30mm width Heavy Duty Hose Clamp fitted with bolts & nuts	16	each	55.00	880.00	
8	100 mm dia C.I Tail piece one End flanged other End Grooved	6	each	498.00	2988.00	
9	100 mm dia C.I. Tail Piece one end threaded other End Grooved	2	each	498.00	996.00	
10	100 mm dia C.I. combind Tail Piece with adopter both side grooved	4	each	326.00	1304.00	
11	100mm C.I Spring loaded Pressure relief Valve	2	Each	9600.00	19200.00	9600
12	125mm C.I non return Valve	2	Each	5074.00	10148.00	
13	100mm flanged G.I shortpiece(inside pump house)	2	Each	2259.00	4518.00	(430X2+856)1.2 +200(G.I)
14	M.S Foundation Bolt for Pump motor sets (1.1kg each)	8	each	132.00	1056.00	
15	100 x 125 G I Expander(flanged)	2	each	3104.00	6208.00	(430+562+1428)1.2 +200(G.I)
16	80 X 100 G I Expander(flanged)	2	each	1650.00	3300.00	
17	65 X 100 G I Expander(flanged)	2	each	1650.00	3300.00	
18	NUTS & BOLTS					
c.	M-16 X 65 mm	5	kg	143.00	715.00	
e.	M-16 X 50 mm	10	kg	143.00	1430.00	
19	Foot valve leather washer 100mm dia	2	Each	130.00	260.00	
20	Sal Sleeper(4 ft X 6 in X 4 in)	4	each	1500.00	6000.00	
21	Rubber Insertion(for raised surface of Flange as per IS-6392)					
a	100 m dia Ruber Insertion (table-17)	24	each	58.80	1411.20	49
b	80 m dia Ruber Insertion (table-17)	2	each	57.60	115.20	48
c.	65 m dia Ruber Insertion (table-17)	2	each	52.80	105.60	44
SUB TOTAL					78567.40	

3. Electrical materials

ELECTROMOTOR PUMP SETS WITH ACCESSORIES						
1	10 H.P 4 star rated Electro Motor Mono Block Pump set as per IS 9079 /2002 (with latest ammendment) having capacity of 50 cubic meter per hour discharge at 35 meter total head. The Motor shall be designed for operation at 415 V (+10%), 3 Phase, 50 Cycles per Sec (+-5%), A.C Supply 1440 r.p.m.	2	each	47400.00	94800.00	
2	Supply of Sheet metal enclosed re-wireable type Fuse, Main switch, 500 VOLTS, 3 phase, 50 Cycles A.C Supply conforming to IS/IEC:60947 (part-3)/1993 for- 63 Amps 415 volts A.C TPN Main Switch.	1	each	3130.00	3130.00	3130
3	Supply of Sheet metal enclosed re-wireable type Fuse, Main switch, 415 VOLTS, 3 phase, 50 Cycles A.C Supply conforming to IS/IEC:60947 (part-3)/1993 for- 32 Amps 415 volts A.C TPN Main Switch.	2	each	1510.00	3020.00	1510
4	Supply of 4" Round projection type Voltmeter (Pedestial type 0-500 V) MI AC, Accuracy within +- 1.5 % and conforming to IS: 1248/1968.	3	each	535.00	1605.00	535
5	Supply of 4" Round projection type Ammeter (Pedestial type 0-50A,500 V) MI AC, Accuracy within +- 1.5 % and conforming to IS: 1248/1968.	2	each	535.00	1070.00	535
6	Heavy duty, airbreak , triple pole electromagnetic Star Delta starter with single phasing preventer fitted with magnetic/thermal/solid state trip mechanism, start and stop push button and plain entries for pvc copper cables suitable for controlling induction motor operating at 415 V(+6% to -10%) , 3 phase, 50 Hz(±3%), AC supply for 10 HP motor and conforming to IS/IEC-60947(part-4/sec-I)/1.	2	each	4590.00	9180.00	4590
7	5 KVAR Capacitor bank (for 380/415 V,50 Hz supply)	2	each	1000.00	2000.00	

9	12 mm thickness busbar (63Amps, 500Volts) Unit conforming to latest IS 8623:1993 & IS/IEC: 60947, with detachable front cover and undrilled detachable end plates with 2 nos inlet holes of 1-1/4" size, suitable for mounting on wall and designed for uninterrupted duties. The units may be of 300 mm x 250 mm x105mm in size fitted with 12 mm x3 mm x230 mm copper bar (4bars) with at least 6 nos tap off points of 6mm dia at 30mm apart supplied with requisite brass nuts & bolts equivalent to bore size with spring washer including arrangement of double earthing by 10 SWG GI wires.	1	each	3500.00	3500.00
SUB TOTAL					118305.00

4. MONITORING OF INSTALLATION AND PROGRESS USING ICT TOOLS

SL No	Description of Item	Qty.	Unit	Rate (In Rs.)	Amount (In Rs.)
1	Update the progress on web and/or through a designed mobile based software along with photographs	L.S.	1 item	3000.00	3000.00

5. ENERGISATION OF THE SUB PROJECT

SL No	Description of Item	Qty.	Unit	Rate (In Rs.)	Amount (In Rs.)
1	Energization of the scheme through installation of transformer, drawing of HT Lines, laying of cables, connection of HT & LT side etc all complete through the agencies from the approved list of WBSEDCL as per specification.1	L.S.	1 item	600000.00	600000.00

6. Vertical water level guage

SL No	Description of Item	Qty.	Unit	Rate (In Rs.)	Amount (In Rs.)
1	Supply of steel / FRP plate vertical level guage of 2 m length and 150mm width	L.S.	1 item	2500	2500
2	Construction of 200mmX200mX2m RCC pole			1000	1000
				Total	3500

7. Micro level water management

SL No	Description of Item	Qty.	Unit	Rate (In Rs.)	Amount (In Rs.)
1	100 dia polyester reinforced PVC lay flat hose pipe	60	m	186	11160
3	100 MS hose clamp of 2mm thk and 30mm width with nuts +bolt @42.00(WBAIC)	1	nos	55	55
				Total	11215

155

8. Sprinkler Set

SL No	Description of Item	Qty.	Unit	Rate (In Rs.)	Amount (In Rs.)
1	QUICK CONNECT METALIC LATCH COUPLER(QC ML)HDPE JOINT PIPE 75 MM DIA X 3.2 KG/CM ² , 6M LONG	18	nos	874.50	15741.00
2	QUICK CONNECT METALIC LATCH COUPLER(QC ML)HDPE JOINT PIPE 63 MM DIA X 3.2 KG/CM ² , 6M LONG	34	nos	632.50	21505.00
3	SPRINKLER WITH PLASTIC BODY , MALE THREAD 1/2" ,FULL CIRCLE DOUBLE NOZZLE OF SIZE 2.8mmX1.8mm, Operating Pressure=1.5kg/cm ² ,Radius =9.5 m,525LPH Discharge	16	nos	224.00	3584.00

4	SPRINKLER G.I. RISER ROD 3/4" Threaded X 0.75MTR Height	16	nos	170.00	2720.00
5	GI REDUCING SOCKET, 3/4"x1/2"	16	nos	50.00	800.00
6	QUICK CONNECT METALIC LATCH COUPLER(QC ML) HDPE JOINT BEND 75 MM DIA, 90Degree	4	nos	369.00	1476.00
7	QUICK CONNECT METALIC LATCH COUPLER(QC ML) HDPE JOINT BEND 63 MM DIA, 90Degree	4	nos	281.00	1124.00
8	QUICK CONNECT METALIC LATCH COUPLER(QC ML) HDPE JOINT REDUCER, 75 MMX 63 MM	2	nos	363.00	726.00
9	QUICK CONNECT METALIC LATCH COUPLER(QC ML) HDPE JOINT REDUCER, 110 MMX 75 MM	1	nos	632.50	632.50
10	QUICK CONNECT METALIC LATCH COUPLER(QC ML) HDPE JOINT END PLUG 75 MM MALE	8	nos	110.00	880.00
11	QUICK CONNECT METALIC LATCH COUPLER(QC ML) HDPE JOINT END PLUG 63 MM MALE	4	nos	105.00	420.00
12	QUICK CONNECT METALIC LATCH COUPLER(QC ML) HDPE JOINT TEE 75 MM DIA	8	nos	534.00	4272.00
13	QUICK CONNECT METALIC LATCH COUPLER(QC ML) HDPE JOINT SERV. SADDLE 63 MM DIA, 3/4" Threaded	16	nos	451.00	7216.00
14	QUICK CONNECT METALIC LATCH COUPLER(QC ML) HDPE PUMP CONT THREAD 90 MM DIA FEMALE THREADED	1	nos	891.00	891.00
15	QUICK CONNECT METALIC LATCH COUPLER(QC ML) HDPE CONNECTOR THREAD 90 MM MALE	1	nos	808.50	808.50
TOTAL					61987.50
VAT			5%		3099.375
FITTINGS AND ACCESSORIES			5%		3099.375
TRAINING & TRANSPORTATION CHARGES			5%		3099.375
TOTAL FOR ONE NUMBER SPRINKLER SET					71286.00

GRAND TOTAL FOR FOUR NUMBER OF SPRINKLER SET

285144

Attachment 5.1

Cropping Season and Crop Calendar practiced in the main Agro-Climatic zones of West Bengal

1. TERAI TEESTA ALLUVIAL ZONE

CROP SEQ.	PRE-KHARIF			KHARIF					RABI			
	APRIL	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MARCH
1	PRE-KHARIF JUTE			KHARIF PADDY					OIL SEED/PULSE/WHEAT & Paddy /POTATO/VEG			
2	VEG/OIL SEED/PULSE			KHARIF PADDY					OIL SEED/PULSE/WHEAT/POTATO/VEG			
3	MAIZE/AUS PADDY			KHARIF PADDY					KHESARI/VEG/LATE WHEAT			
4	PRE-KHARIF JUTE			KHARIF PADDY					WHEAT/POTATO/TOBACO			

2. GANGETIC ALLUVIAL ZONE

CROP SEQ.	PRE-KHARIF				KHARIF				RABI				
	APRIL	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MARCH	
1		JUTE			KHARIF PADDY				OIL SEED/PULSE/WHEAT/POTATO/VEG				
Rabi go upto May & Pre kharif start from March & Jute continue till August													
2		VEG/OIL SEED/PULSE			KHARIF PADDY				OIL SEED/PULSE/WHEAT/POTATO/VEG				
3		AUS PADDY			KHARIF PADDY				KHESARI/VEG/ WHEAT				
4		AUS PADDY/PRE-KHARIF MAIZE			KHARIF PADDY				BORO PADDY				
		BORO PADDY			KHARIF PADDY				BORO PADDY				
		BORO PADDY			KHARIF PADDY/VEG/PULSE					OILSEED/PULSE/WHEAT/POTATO/MAIZE			

3. VINDHYAN ALLUVIAL ZONE

CROP SEQ.	PRE-KHARIF				KHARIF				RABI				
	APRIL	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MARCH	
1		PRE-KHARIF JUTE			KHARIF PADDY					Paddy/ OIL SEED/PULSE/WHEAT/POTATO/VEG			
2		PRE-KHARIF VEG/OIL SEED/PULSE			KHARIF PADDY					OIL SEED/PULSE/WHEAT/POTATO/VEG			
3		PRE-KHARIF AUS PADDY				KHARIF PADDY				KHESARI/VEG/LATE WHEAT			
4		AUS PADDY/PRE-KHARIF MAIZE				KHARIF PADDY				PULSE/OIL SEED			

4. COASTAL SALINE ZONE

CROP SEQ.	PRE-KHARIF				KHARIF				RABI				
	APRIL	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MARCH	
1	SOIL HEALTH				KHARIF PADDY					Paddy OIL SEED/PULSE/POTATO/VEG			
		VEG/OIL SEED/PULSE				KHARIF PADDY					OIL SEED/PULSE/POTATO/VEG		
2	SOIL HEALTH				KHARIF PADDY					KHESARI/VEG/W.MELON/CHILLY			

		PULSE					KHARIF PADDY					OIL SEED/PULSE			
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5. UNDULATING RED LATERITE ZONE

CROP SEQ.	PRE-KHARIF				KHARIF				RABI					
	APRIL	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MARCH		
1		PRE-KHARIF MAIZE				KHARIF PADDY				OIL SEED/PULSE/WHEAT/POTATO/VEG				
2		VEG/OIL SEED/PULSE				KHARIF PADDY				OIL SEED/PULSE/WHEAT/POTATO/VEG				
3	SOIL HEALTH				KHARIF PADDY					PULSE/VEG/LATE WHEAT/MAIZE				
		AUS PADDY				KHARIF PADDY				OIL SEED/VEG				

Source: Department of Agriculture, GOIB

Command Area Crop Planning and Irrigation Planning Frame Work

Preparation of WUA Agriculture Action Plan (AAP)

The Agricultural Action Plan will be prepared by each WUA with support of the SO, DPMU and the line department staff as part of the SDMP preparation process and which may be updated as required in subsequent crop seasons. It will be developed using a participatory approach and will take account of the existing production systems, the agro-climatic and socio-economic conditions and the water available for irrigation.

During AAP preparation the farmers will encourage to discuss collective command area interventions such as reducing staggered cultivation, advancing and shortening the kharif season, organizing to maximize the use of rainfall by planting at the right time and using high-yielding variety matching the soil and other local conditions) to save water and energy and optimize production. WUAs may also be organized and facilitated to collectively handle agricultural inputs (e.g. seeds, fertilizer, pests, diseases and weed control chemicals) and produce marketing to reduce costs and negotiate better prices. Since, the farmers would need convincing that these collective actions would be immensely beneficial and yield good results discussions may need to be supplemented with exposure to success stories through visits and multimedia materials.

Preparation of WUA Kharif and Rabi Crop and Irrigation Plan

Since MI schemes under the project are expected to be constructed in erstwhile single crop rain fed areas, the major cropping practices in these areas are also expected to be dominated by rain fed crops such as Kharif paddy and jute, which are generally grown with the help of monsoon rainfall. Some scattered areas may also cultivate Kharif pulses and vegetables. However, with the onset of the project these areas will convert to irrigate agriculture as the farmers will be assured of irrigation water for both cropping season. This will allow an increase in the choice of cropping options to be followed throughout the year covering both Kharif and Rabi.

To assist the farmers to promote systematically to irrigated agriculture and two crops the project will support the WUAs in preparing seasonal crop plan for the Kharif and Rabi. For this a Crop and Irrigation Water Requirement format will be made available to the WUA to prepare their crop and irrigation plan.

Table 1: Crop and Irrigation Water Requirement Format

Name of WUA: XXXX

Village: XXXX

District: XXXX

Cropping Season: Kharif / Rabi

Crop Plan

Spout No.	Localized command of Spout (ha)	Cropped Area (ha)					
		Paddy / Wet Crop	Irrigated Dry Crop	Annual Crop (Sugarcane / Banana)	Horticulture	Fish Rearing	Total
Sp. 1							
Sp. 2							
Sp. 3							
Sp. 4							
Sp. 5							
Total							

Irrigation Plan

Spout No.	Localized command of Spout (ha)	Water Requirement (ham)					
		Paddy / Wet Crop	Irrigated Dry Crop	Annual Crop (Sugarcane / Banana)	Horticulture	Fish Rearing	Total
Sp. 1							
Sp. 2							
Sp. 3							
Sp. 4							
Sp. 5							
Total							

A WUA will use the format to prepare its command area crop and irrigation plan by convening a WUA General Body Meeting for preparing its “Crop and Irrigation Planning”. The meeting will be convened before every cropping season and all WUA members will be invited to attend. The meeting will be initially facilitated by the agricultural experts among the SO and DPMU staff during the project period. Post withdrawal of the project the WUA will continue to prepare its seasonal crop and irrigation plan by itself. Based on the sprout wise cropping pattern and irrigation water requirement, the WUA will prepare a spout wise irrigation schedule and water distribution plan, which will then lead to the seasons MI scheme operation plan.

Attachment 5.3**Details of Crop Demonstration Technologies**

(i) **Integrated Crop Management (ICM):** This particular Demonstration is projected to be used as the starting point for Agricultural Crop Demonstration Programmes to be conducted under the Project for the entire Project period. As the target groups of farmers are rain fed ones and have little experience in cultivating a particular crop under irrigated situation with total package of practices, it is planned to cover the areas which will get irrigation facility, with ICM demonstrations. A limited number of crops like kharif paddy, boro paddy, oilseeds, Wheat and pulses are included under ICM

demonstration. The demonstration package will cover a total seed to seed package of individual crops. This demonstration will enable the target group of farmers to get higher income per year from a unit piece of land.

(ii) Crop Diversification: It is planned for those areas where farmers already got the knowledge of the advantages of modern crop management methods through ICM conducted in the previous year. This is planned with a concept of Crop Planning for the particular area with an aim to resource budgeting for the farming community. This venture needs to be stressed to develop a range of cropping options model throughout the State with judicious mixture of crops requiring high, medium, low irrigation water and other inputs as well as to enable the farmers to go for high value crops having good marketing potential

(iii) Water Management; System of Rice Intensification (SRI): This is one of the most improved water saving technology, by which increased productivity of rice can be achieved with much less inputs including 40-50 % less requirement of water. However, this technology is the best to be adopted during boro, where periodical wetting-drying of the field is required, which may be difficult during Kharif. During Kharif, this technology can be adopted only in relatively uplands, where drainage of excess water will be possible. The other advantages of this technology is the requirement of 80 % less quantity of seed, 20-25 % less utilization of inorganic fertilizers, 20-25 % increment of yield of paddy and straw and overall shortening of the duration by 7-10 days

(iv) Water Management; Methods of Irrigation: It is also thought prudent to practice Water Management through different methods of application of irrigation water. In general, the West Bengal farmers, mainly the marginal and small farmers, follow flood method of irrigation which results in greater loss of water resources as majority land holdings are not properly leveled. Accordingly, different methods of irrigation like furrow method of irrigation, alternate furrow method of irrigation etc. are considered for different crops to be grown under the demonstrations.

(v) Conservation Agriculture (CA): Conservation Agriculture (CA) aims to make better use of agricultural resources through the integrated management of available soil, waters and biological resources, combined with limited external inputs. It contributes to environmental conservation and to sustainable agriculture production by maintaining a permanent or semi-permanent organic soil conservation, zero or minimum tillage, direct seeding and varied crop rotation are impotent elements of C.A. through 'Zero Tillage Machine'.

This method of cultivation has already become popular among the farming community of the State. The concept of doing this activity at WUA level is definitely having more sustainable impact as the ownership of the machine goes to one Association instead of the individual farmer.

(vi) Seed Production of Potential Crops Demonstration: Sustained increase in agriculture production and productivity is dependent to a large extent, on development of new and improved varieties of crops and an efficient system for timely supply of quality seeds to farmers. Hence, this Project proposes to conduct D.Cs of popular and potential field crops for Seed Production in a cluster approach . During training of farmer regarding production of quality seed farmers will be taught on how to store the seeds for the sowing in the next year. For maintaining quality parameter during seed production, the involvement of the WUA will assume community monitoring which in turn, will bring more involvement from the community as a whole .For popular crops like Rice, Wheat, Pulses and Oilseeds farmers will be given Foundation Seeds for multiplication and Departmental Seed Certification Agency will be involved in the entire process.

O.K. CARD FOR ON-FARM DEMONSTRATIONS

1. Nature of demonstrations (crop, variety and theme):
2. Implementing agency and name of the responsible extension officer:
3. Name of farmer:
4. Name of para worker/Mitar Kisan:
5. Name of support organization and its agriculture expert:
6. Name of village and WUA:
7. Name of Mandal and district:
8. Details of organizing demonstration and related activities:

Sr. No.	Activity	Completion Data
1.	Selection of farmer	
2.	Organization of related training sessions for farmers in the WUA: <ul style="list-style-type: none"> • Land preparation, critical inputs, and how these are to be procured, sowing, water management, fertilizer application, etc. • Practices like weed control, pest disease and nutrient management, etc. during crop growth 	
3.	Supply of inputs for the project (must include seed, soil-test based fertilizer dose)	
4.	Sowing of crop	
5.	Fertilizer application	
6.	Field day	
7.	Crop cutting	

9. Assessment of key activities:

Sr. No.	Activity	Yes	No
1.	Was the demonstration on a roadside plot?		
2.	Were the inputs supplied before the recommended sowing time?		
3.	Was foundation/certified seed supplied by the project?		
4.	Were 2-3 training sessions organized in which at least 20 farmers participated?		
5.	Was a field day organized at the demonstration site in which at least 50 farmers from the adjoining villages/WUAs participated?		
6.	Did the demonstration have a control plot showing the practices normally followed by the farmers in the area?		
7.	Was the cropping cutting for recording yield done by following the prescribed procedure?		

10. What were the yields (Q/ha) in the control and demonstration plots?

Control:

Demonstration:

11. What is the average yield (Q/ha) of the demonstration crop in the village?

12. What are the main requirements of the farmers for adoption of the technologies demonstrated?

Signature: _____

Name: _____

Date signed: _____

Para worker

SO Agric. Expert

WUA President

Extension Office

Operational Guidelines on Organic Nutrition Kitchen Garden by Women Members of WUA

Definition:

A garden in which vegetables, fruits and herbs are grown for household consumption

Introduction:

The project West Bengal Accelerated Development and minor irrigation (WBADMIP) has a wider objective of conservation and judicious use of water resources spreading equal benefits to the target groups of 18 districts of West Bengal. Through the systematic use of irrigational resources, the project vision is twofold: enhancing productivity of the land and at the same time promoting the income standards of the small and marginal farmers who are solely dependent on agrarian activities. Project is working with small and marginal farmers hence land holding are very small.

Under nutrition is serious problem, 40% of the World's malnourished children & 35% of the developing World's low birth weight infants live in India. Per capital per day vegetable consumption in India is 130g which is far below of recommended levels of 300g by Indian Council of Medical Research (ICMR). In order to balance the future & current societal nutritional needs, the promotion of Kitchen garden is very much essential in every rural house hold because, Kitchen gardens are one of the most efficient sources of nutrition for poor families.

Vitamins are organic food substances found only in living things, i.e. plants and animals. They are essential for our bodies to function properly, for growth, energy and for our general well-being. With very few exceptions the human body cannot manufacture or synthesize vitamins. They must be supplied in our diet or in man-made dietary supplements. Some people believe that vitamins can replace food, but that is incorrect. In fact, vitamins cannot be assimilated without also ingesting food. That is why it is best to take them with a meal. Synthetic vitamin supplements can be of varying quality, so it is a good idea to get your supplements from a reliable source.

With rapid increase in population, the demand for vegetable in India is expected to increase to 220 million tons by 2020. India ranks second only to China for vegetable production (FAO-2009); however, India's productivity of vegetables is lower (12.7 t/ha) than average global productivity (16.9 t/ha). India accounts for one-third of all pesticide poisoning cases in the world & 50-60% of vegetables are contaminated with insecticide residues (Agriculture Research Data book 2006).

Program Objectives:

- The objective of the program is to mitigate overall nutritional requirement of a HH, to overcome under nutrition.
- Focusing on underprivileged groups such as women, tribal, youth and other economically and socially backward HH.
- Build the capacity of each HH to grow vegetables through good agricultural practices & through Organic.
- Promoting "Handmade Bio-pesticides" through preparation of "Neem tonic, Magic tonic, Fish tonic & Amruth pani etc".
- Build a regular income mechanism (i.e. round the year production of healthy green vegetable) for the beneficiary to overcome current & future societal nutritional needs. Thus, 'Enabling Rural Poor to overcome under Nutrition.'

Social mobilization & Capacity building:

The program focuses on women at grassroots level through a process of social mobilization to overcome under nutrition & poverty eradication. For ease of training and monitoring a group of 20 women beneficiaries of any WUA should identified and organized in each village/cluster and form a collective of their own to do this activity. Day to day monitoring of the activity will manage by

community worker of SO and Agriculture specialist of SO and DPMU team with close linkages with District Horticulture Department and with SPMU team for technical guidance to build the capacity of farmers time to time.

Activity Approach:

Group - Maximum 20 members of any WUA.

Selection criteria of beneficiaries:

- Any women those are member of WUA could be a beneficiary under this project if they should have minimum 0.05 Ac. (200 SQM) homestead land & not more than 2.5 Acre of land, it means they should come under small & marginal farmers.
- A group of 20 women members of any WUAs shall be eligible with having homestead land of 200 SQM each & should have water source to do the nutrition garden, for getting the technical support & benefit under this program.
- WUA is the sole authority to select & recommend the list of beneficiaries with due consultation of DPMU team.
- They should have some basic knowledge on vegetable cultivation, so that they can easily understand the basic need, practices & regarding crop management issues.
- They should agree with the policy of WUA & assuring their presence, involvement & cultivation of high value vegetable crops for a period of three years minimum for their sustainability with the support of project.
- For irrigation the Nutrition Garden, project will provide four sets of TREADLE PUMP to a group of 20 members of WUA & a single pump will be use by the group of 5 members only. The assets will belong to WUA not of any individual.
- If any beneficiaries fail to manage the Nutrition garden (or) not utilize the implements in future, then WUA have power to hand over the same (benefit) to other beneficiaries, because it is the assets of WUA not of any individual.
- As a token of taking benefit from the project through WUA each beneficiaries should pay a lump sum amount decide by the WUA may be “@ Rs.500/- (or) @ Rs.750/- (or) @ Rs.1000/- per beneficiary per season” before (or) after each cultivation for avail the Nutrition Garden benefit as their user’s charges for getting the benefit freely.

Budget for each Organic Nutrition Kitchen Garden:

(One unit consists of 20 participants from one WUA)

S. N.	Component	Item	Rate	Sub - Total	Grand Total
1.	Vegetable kit	Seeds (Rs.600/), Vermi-compost (Rs.1200/-) & Crop guard (Rs.200/-)	2000/-	40,000/-	Rs.96,000/-
2.	compost unit	1 unit / household for 20 numbers (Size: 1 mt.* 15 mt.)	1500/-	10,000/-	
3.	Treadle pump	4 Pc. Per 20 farmers	11,500/-	46,000/-	

One Unit cost in word: Rs. 96,000/- (Rupees Ninety-six thousand only), i.e. the total investment per beneficiary is Rs. 4800/- only.

Farmer’s contribution:

All labour component, FYM application, Nursery Management, Transplanting, Weeding, Crop management, Staking, Water Management & Marketing.

Income per unit:

Minimum Rs.2,00,000/- per unit (i.e. of 20 members) per year.

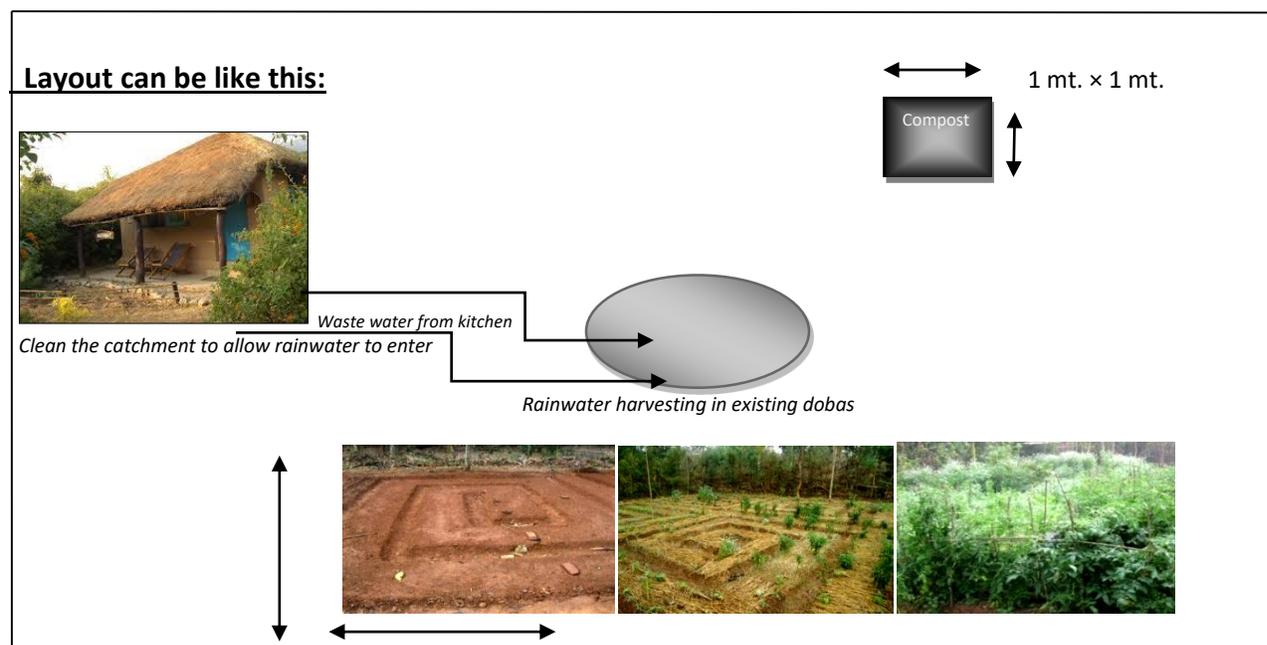
Distribution of profit:

Each members of Nutrition Garden will share their benefit of their own but they should invest their own INPUT COST for their second crops (or) for the next season, from their own benefit (or) profit to manage this Nutrition Garden effectively.

Steps to make the Spiral:

- As per availability of land number the spiral beds may be prepared for growing different types of vegetables round the year with suitable crop rotation.
- The types of vegetables like tomato, chilli, brinjal, okra, french bean, carrot, radish, potato, onion etc and spices like ginger, turmeric, garlic etc can also be grown.
- One bed must be absolutely utilized for growing leafy vegetables like spinach, coriander leaves, amaranthus, mustard leaves etc.
- Minimum three different leafy vegetables may be taken in that bed in alternative rows.
- Climber vegetables like bottle gourd, bitter gourd, pumpkin, ridge gourd, sponge gourd, cucumber etc may be grown by using locally available staking materials.
- It is advisable to use local & improved seed varieties for this activity so that beneficiaries could get these seeds easily in future to sustain & continue this program.

Layout of Organic Nutrition Kitchen Garden:



“Steps to follow to make the Spiral”

- Draw the spiral with wood ash using a string and marking sticks.
- Collect necessary materials like compost or cow dung slurry, dry and green leaves, livestock waste, aquatic weeds, crop residues & waste water etc.
- Then remove the upper layer (6 inches only) of the soil and keep in one side & again remove the bottom layer (6 inches only) of the soil and keep in another side.
- Use the crow bar to loosen the bottom of the bed.
- Sprinkle compost or cow dung slurry at the bottom.
- Spread dry and green mulch materials like weeds / aquatic weeds/ crop residues / non fruiting banana plants etc. till the soil level.
- Sprinkle water or cow dung slurry / compost on that.
- Cover with the top soil first and then the subsurface soil by adding vermin-compost (or) well decomposed FYM (Farm Yard Manure).
- Level the spiral now & the spiral is ready for seed sowing & transplanting. Series of spirals like this can be made depending on the availability of space.
- After seed germination & transplanting do mulching by covering the bed surface with dry paddy straw (or) dry green leaves to conserve moisture & control weeds.

❖ See the photographs of spiral & do accordingly.



Tips for how to select seed quantity for 200 SQM land:

- First divide the land according to selection of crop in five parts, means each part having 0.01 Ac.
- Then plan types of crops for each area.
- 70% area should be directly sown & for another 30% area nursery should raise to transplant the seedlings timely.

Dimension of Beds:

- Length: Depends upon the size of the available land, but not more than 20 feet
- Width: Maximum 3 feet.
- Depth: 6 to 9 inches
- Distance between 2 beds: 1 feet that is to be used as a walking path and for irrigation channel
- Water Management: Requires less water as moisture is preserved for longer period due to mulching and dense planting. Irrigation and manual sprinkling can be done.
- Many plants can be grown using the same water but all varieties do not require water at same interval, still it is manageable.

Planting tips:

- Many different patterns can be followed but that should be densely planted.
- Promote mixed cropping – companion crops – crops of different use – high diversity- crops of different duration.
- Promote need based & season specific crops suitable to local agro-climatic condition.

Pest, Diseases, Weeds:

Sowing (or) transplant different type of plants in a single rows (or) raised beds reduces the risk of pests spreading in the garden. Hardly any pest or disease problem if this pattern followed:

- Problem is minimized due to high diversity
- If there will be some problem, little homemade bio-pesticides could be used.
- Dense planting, turning of soil during filling up the beds and mulching control the weed growth. Even if there is little weed growth, it is easy to pull them out which are incorporated there (over the bed) mostly.

Preparation of Compost pit:

- For promotion & sustainability of this “Organic Nutritional Kitchen Garden” program, beneficiaries should do one small compost pit which is of “1 mt. × 1 mt. × 1 mt.” size which can be done at any site near to garden & each beneficiary could use this by putting all types of waste (as mentioned above) which are bio-degradable in nature. All 20 beneficiaries should do this (as shown in the layout figure) in a regular manner, so that from next season they can able to produce their decomposed materials by themselves

for their kitchen garden to minimize the cost of nutrients & which is very essential for organic as well as converting waste into wealth.

- Care should be taken when putting waste in the pit because it need water & soil to decompose fast, hence it is better to fill the pit layer by layer with waste & soil with a height of 1 feet WASTE & 6 inches SOIL followed by watering the pit with kitchen water (or) livestock waste.
- Also during rainy season for proper & quick decomposing of waste, allow to enter the rain water to decompose the materials inside the pit effectively. This technique is not new because it already exists in different villages but they are not practicing it regularly.
- Composting is a natural process in which microorganisms and earthworms convert organic matter from plants and animals into a rich plant food called humus. Humus when complete looks like soil and is rich in vital nutrients such as carbon and nitrogen.
- This composting process occurs in nature as dead leaves and other plant material combine with animal waste, soil, air and water to form a natural fertilizer that enriches top soils and promotes plant growth.
- Compost is a cheap alternative to fertilizer that converts kitchen, livestock & crop residue waste into organic matter & it gives nutrients for the soil.

Avoid using bones and scraps of meat in compost to prevent attracting animals and other pests including dogs and rats

Lifting of water to irrigate the nutrition garden:

Most of the time it has been noticed that in rural areas it is very difficult for women to lift water from dug well (or) pond etc for their domestic use from far & near distance, but we just see & ignoring their pain for such work but ultimately they are the mother (or) daughter of someone & there responsibility is to manage the house/family & preparing food for all the members with the help of water. Though it is a women centric activity, maintaining & irrigating a homestead garden of 0.05 acre (200 SQM) is also very difficult & which requires a lot of work. Hence to reduce the pain & drudgery of women members of WUA, under this activity project is providing India's best "Zero Energy based Treadle Pump" to the group for easy lifting of water for irrigate the nutritional garden effectively & timely. This is a TREADLE PUMP run through peddle ling the pump by use of both the feet only.



“It is a new generation treadle pump based on scientific proven Diaphragm technology. This product is designed especially for small-holder farmers after an extensive voice of customer exercise. This treadle pump represents a step innovation relative to historical treadle products”

Features of treadle pump:

- Small overall dimensions (weight – 22.2 kgs)

- Tilt & transport design
- Simplified maintenance
- One time investment
- Curved handle
- Optimized handle height
- Long paddles
- Life is more than 10 years
- Flow rate (25 feet=7.62 mt.) 10 gpm (38 lpm)
- Flow rate (15 feet=4.57 mt.) 15 gpm (57 lpm)
- Flow rate (ground level) 20 gpm (76 lpm)
- Each is costing Rs.11,500/-
- Local transportation cost extra
- Mostly suitable for small & marginal farmers.

Hence this treadle pump is the assets of WUA & will manage by 5 nearby women members to manage the nutrition garden effectively by irrigate the field timely & as per need. So total four numbers of TRADLE PUMP will be provide to 20 members under this program to a WUA. By planning ahead, farmers and gardeners can better utilize the limited space around a house and maximize the production of vegetables and other food crops.

Use & Preparation process of homemade bio-pesticides for Nutrition & Pest management: (A) NEEM TONIC

(1) **Requirements:** To prepare Neem tonic the following items are needed which are as follows: (a) 5 kg fresh green neem leaves paste (b) 10 litres water (c) One container to boil the water & (d) Fresh cow urine 250 ml etc.

(2) **Procedure:** Mixed the 5 kg neem paste in 10 litres of water & boil it. During boiling when the 10 litres of water comes to 5 litres then stop boiling. Cool the solution & pour it in a bottle after sieving the paste with the help of a cloth & the neem tonic is now ready for use.

(3) **Dose for spraying:** 20 ml per one litre of water & add in it 5 ml cow fresh urine per litre of water before spraying.

(4) **Time of spraying:** Before 9 am & after 4 pm.

(5) **Impact:** It protect the plants from all types of sucking insects (White fly, Aphids, Jassids & fruit fly etc.) which causes various diseases in plants such as “leaf curl, leaf spot, viral diseases & leaf blight etc. So it can be use from nursery stage to mature stage of the crop.

(6) **Spraying interval:** Once in a week & it is better to apply after each harvesting during harvesting time.

(7) **Spraying techniques:** During spraying cover both the sides of the leaves (i.e. front & back side) to get better results.

(B) MAGIC TONIC

(1) **Requirements:** To prepare Magic tonic the following items are needed which are as follows: (a) 2 kg fresh cow dung (b) 4 litres fresh cow urine (c) One earthen pot having 10 litres capacity (d) 50 grams turmeric powder (e) 50 grams garlic paste (f) 50 grams jaggery (g) 1 kg of fresh neem leaves (h) 1 kg of wild tulsi (Ban tulsi) leaves (i) 1 kg of dhatura leaves (j) Polythene sheet one square feet & (k) thread two feet etc.

(2) **Procedure:** Mixed the 2 kg fresh cow dung in 4 litres of cow urine in the earthen pot & then add all the ingredients as mentioned above properly so that it should not cross the 50% level of earthen pot. After mixing cover the mouth of the earthen pot with polythene & tie it properly so that it should be air tight. Then keep the earthen pot in shade for 20-25 days for proper decomposed. After 20-25 days when the mixture is well decomposed once again mixed it properly with a wooden stick (or) hand then pour it in a bottle after sieving the paste with the help of a cloth & the magic tonic is now ready for use.

(3) **Dose for spraying:** 20 ml per one litre of water before spraying.

(4) **Time of spraying:** Before 9 am & after 4 pm.

(5) **Impact:** It protect the plants from all types of sucking insects (White fly, Aphids, Jassids & fruit fly etc.) which causes various diseases in plants such as "leaf curl, leaf spot, viral diseases & leaf blight etc. Also it develops more resistance in plants because it provides various micro-nutrients to the plants through leaves. So it can be use from nursery stage to mature stage of the crop.

(6) **Spraying interval:** Once in a week & it is better to apply after each harvesting during harvesting time.

(7) **Spraying techniques:** During spraying cover both the sides of the leaves (i.e. front & back side) to get better results.

(C) FISH TONIC

(1) **Requirements:** To prepare Fish tonic the following items are needed which are as follows: (a) 1/2 kg waste fish intestines (b) 1 kg jaggery (c) One earthen pot having 5 litre capacity & (d) Water 2 litres etc.

(2) **Procedure:** Mixed the 1/2 kg fish intestines with 1 kg jaggery & add 2 litres of water in it. The total mixture should not cross the 50% level of earthen pot. After mixing cover the mouth of the earthen pot with polythene & tie it properly so that it should be air tight. Then keep the earthen pot in shade for 20-25 days for proper decomposed. After 20-25 days when the mixture is well decomposed once again mixed it properly with a wooden stick (or) hand then pour it in a bottle after sieving the paste with the help of a cloth & the fish tonic is now ready for use.

(3) **Dose for spraying:** 20 ml per one litre of water

(4) **Time of spraying:** After 4 pm.

(5) **Impact:** It protects the plants from all types of fruit borers such as (Heliothis & spodeptera) & also acts as a hormone. Spraying during flowering & fruiting enhances the size of fruit & vegetable & protect the flower from defoliation because it provides various micro-nutrients to the plants. Hence it is advisable to use from flowering stage to mature stage of the crop.

(6) **Spraying interval:** Once in a week & it is better to apply after each harvesting during harvesting time.

(7) **Spraying techniques:** During spraying cover both the sides of the leaves (i.e. front & back side) to get better results.

(D) AMRUTH PANI

(1) **Requirements:** To prepare Amruth Pani the following items are needed which are as follows: (a) One plastic drum (or) container having capacity of 50 liters (b) 10 kg cow dung (c) 20 liters of cow urine (b) 1 kg of jaggery (c) 1 kg of grind pulses (d) 1 kg of forest soil (in which chemical fertilizers should not added before) & (d) Water 10 liters etc.

(2) **Procedure:** Mixed all the components inside the drum thoroughly with the help of a wooden stick. After mixing it properly keep the drum in the shade & do not cover the drum. Till seven days steer the solution of the drum morning & evening for 5 minutes only with the help of wooden stick, so that all the ingredients should mixed properly.

(3) **Methods of use:** After seven days during irrigation in the field add this DRUM SOLUTION in the drainage channel so that along with water all the plants get nutrients properly known as Amruth pani. It is very useful in minimizes the application of chemical fertilizers, helps plant to get regular nutrients & it makes the soil fertile.

(4) **Time of application:** Best time early morning.

(5) **Impact:** Enhance plant growth, flowering & yield. Along with that it enhances the fertility of the soil & also increases the numbers of microorganism in the soil.

(6) **Application interval:** Once in a week & it is better to apply as per need & after each harvesting during harvesting time.

(E) USE OF CROP GUARD

Application of CROP GUARD as IPM material helps to control all types of sucking pest such as “aphids, jassids, white fly, fruit fly & grass hopper etc which causes vital loss to all types of crops:

- It is easy to use, simple technique, very low cost & very effective to control this entire pest without application of any type of spray.
- It is available in the market with a set of 50 yellow poly bags & liquid adhesive bottle as one unit.
- Just put adhesive (liquid gum) over both the sides of yellow poly bags & put just one inch above the crop height with the help of any wooden stick, you find within a few second all the pest attract to yellow colour poly bags & stick into it till they die completely.
- This CROP GUARD now-a-days very much useful by numbers of farmers in varieties of crops & very suitable for rural areas where available of pesticides is a big problem & small / marginal farmers also don't have enough money to purchase pesticides to save their crops.
- It reduces pest population in the field as results of which it controls diseases & pest effectively also save time, save labour & save money (No need to spray in the field).

Follow the process of fixing the Crop guard in the field:



Tips for Getting Started:

- Start small and expand gradually. Smaller gardens are easier to manage, especially for those without much experience.
-
- Protect the garden with enclosure to protect it from animals with available materials such as by bamboo (or) dry sticks.
-
- Start collecting materials (manure, weeds, ash, grass, crop residue, livestock waste & urine of animals) to make the compost pit early and timely.
-
- Mulching the top soil of the raised bed by covering with dry leaves (or) paddy straw to minimize the moisture loss from the soil, it also prevent weed growth and to enhance soil temperature that in turn increases nutrient absorption by the plants.
-
- To develop this type of garden the Agriculture specialist should plan for minimum 15-20 types of crops with 70% direct sowing & 30% plants should transplant after nursery depending upon season. For example: Nursery required for tomato, brinjal, chilli, onion, cauliflower, cabbage, knoll-khol etc. whereas other crops such as spinach, coriander, french beans, okra, pea, garlic, cowpea, bottle gourd, sponge gourd, bitter gourd, radish can be sown directly. In rainy season turmeric, ginger can also be taken for cultivation.
-
- Always planning should be done with consultation of beneficiaries taking in to consideration of time, season & availability of resources.

Procurement of inputs & Farmer's contribution:

- DPMU team will be held responsible to arrange all the inputs required for Kitchen garden in time.
- Project will provide all the inputs to the farmer in kinds only not in cash except cash for compost pit preparation & management.

- Beneficiaries should agree for contribution during the selection process as stated above & abide to policy of WUA.
- Quality of inputs and services will be guided by the Agriculture specialist for smooth implementation.
- Selection of crop for promotion of Kitchen garden will be decided jointly by the DPMU team & farmers.
- Farmer's contribution money will be deposited in their respective WUA group pass book for promotion of WUA.

Selection chart of vegetables according to the nutrition value:

- (1) Source of **Calcium**: Calcium necessary for bone formation & growth deficiency causes rickets & pigeon chest. It is found in green vegetables, tomato & onion.
- (2) Source of **Iron**: It is essential part of R.B.C (Red Blood Corpuscles). It is found in greens, pea, bean & tomato.
- (3) Source of **Phosphorus**: Essential for normal functioning of active tissues, part of bones, soft tissues & necessary for cell division. It also helps in the supply of energy by helping the Oxidation of Carbohydrates. It is found in tomato, capsicum, chilly, brinjal, okra, onion, carrot, turnip & radish etc.
- (4) Source of **Vitamin-A**: Necessary for development & production. It's deficiency causes- Night blindness, sore eye, exophthalmia, contamination of respiratory & digestive organs, dwarfness in children, stone formation in kidney & bladder's, rough & hard skin. It is found in carrot, pea, turnip, beet, tomato, green vegetables & chillies.
- (5) Source of **Vitamin-B**: It's deficiency causes Beri-beri, lack of appetite, fall in body weight & temperature. It is found in green vegetables, pea, green chillies, carrot & onion.
- (6) Source of **Vitamin-C**: It's deficiency causes rotting of gums & tooth, scrubby, delay in wound healing, general body resistance against ailments, enlargement & damage of heart tissues. It is easily available in greens like methi, spinach, salad, cabbage, tomato, green chillies, potato & sweet potatoes (contains ascorbic acid).
- (7) Source of **Vitamin-D**: Essential as anti-ricketic, strong bone & skeleton, healthy tooth & calcification bones. It is also found in green vegetables.
- (8) Source of **Vitamin-E**: It is an anti sterility, fat soluble vitamin & easily available in cabbage, lettuce & vegetable oils.
- (9) Source of **Vitamin-G** or **B2** or **Riboflavin**: lack of hunger or appetite, loss in weight, sour mouth, pellagra & alopecia diseases are caused due to lack of this vitamin. It can be obtained from green vegetables.
- (10) Source of **Amino acids**: This group is essential for proper development of human body & vital organism. All vegetables contain one or more members of this large group (about 18 in all).
- (11) Source of **Carbohydrates**: Sweet potato, potato, pea & beans are very rich in carbohydrates, which is a cheap & essential source for the supply of energy in body.

VEGETABLE CALENDAR SHOWING FORTNIGHTLY SOWING OF VEGETABLES SEED FOR CULTIVATION

SL.NO.	SEASON	MONTH	FIRST FORTNIGHT (SEASONAL CROPS)	SECOND FORTNIGHT (SEASONAL CROPS)
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1	RABI	OCT.	LATE CAULIFLOWER, LATE CABBAGE, POTATO, CARROT, TURNIP, RADISH, METHI, PALAK, CORIANDER, TABLE PEA, DESI PEA, ONION SEED, ONION BULB, GARLIC & KNOL-KHOL.	BOTTLE GOURD, PUMPKIN, KNOL-KHOL, RADISH, TURNIP, METHI, CORIANDER, ONION SEEDS, ONION BULB, GARLIC & PALAK.
2		NOV.	PARWAL, METHI, CORIANDER, TURNIP, RADISH, POTATO, ONION BULB, BOTTLE GOURD, CABBAGE, KNOL-KHOL, PALAK & FRENCH BEANS.	POTATO, HILL POTATO, KNOL-KHOL, RADISH, METHI, CORIANDER, TABLE PEA & PALAK.
3		DEC.	PALAK, HILL POTATO, RADISH, TURNIP, CORIANDER & METHI.	PALAK, HILL POTATO, RADISH, TURNIP, CORIANDER & METHI.
4		JAN.	POTATO, PALAK, CORIANDER, METHI, MUSK MELON & WATER MELON.	PALAK, CORIANDER, METHI, RADISH & BRINJAL.
5		FEB.	OKRA, SPONGE GOURD, CUCUMBER, BOTTLE GOURD, RADISH, PALAK, METHI, CORIANDER, CHILLI, WATER MELON, PODINA & BRINJAL.	VEGETABLES NOT SOWN IN THE PREVIOUS FORTNIGHT MAY BE SOWN IN THIS FORTNIGHT, BUT MAY NOT PRODUCE THE SAME RESULTS AS OF FIRST FORTNIGHT SOWING.
6		MAR.	SAME AS SECOND FORTNIGHT OF FEB, WITH FEW OTHER CROPS LIKE: COWPEA & TINDA MAY BE SOWN.	PODINA ROOTS, YAM, PALAK, CORIANDER & RADISH.
7	ZAID	APR.	SAME AS MARCH	SAME AS MARCH
8		MAY.	RADISH, OKRA, BOTTLE GOURD & CUCUMBER.	SAME AS FOR THE PREVIOUS FORTNIGHT.
9		JUN.	CUCUMBER, TURMERIC, GINGER, SNAKE GOURD, RADISH, CORIANDER, BRINJAL & OKRA.	CUCUMBER, BRINJAL, OKRA, RADISH, BOTTLE GOURD, SPONGE GOURD, PUMPKIN, ASH GOURD, COWPEA, PALAK & EARLY CAULIFLOWER.
10	KHARIF	JUL.	EARLY CAULIFLOWER, TOMATO, BRINJAL, OKRA, BOTTLE GOURD, PUMPKIN, TINDA, FRENCH BEAN, CHILLI & SPONGE GOURD.	EARLY CAULIFLOWER, TOMATO, BRINJAL, OKRA, BOTTLE GOURD, PUMPKIN, TINDA, FRENCH BEAN, CHILLI, SPONGE GOURD & EARLY POTATO.
11		AUG.	CHILLI, TOMATO, EARLY CAULIFLOWER, OKRA, RADISH, PALAK, CORIANDER & EARLY POTATO.	METHI, CORIANDER, RADISH & PALAK.
12		SEP.	CABBAGE, CAULIFLOWER, KNOL-KHOL, ONION BULB, ONION SEED, RADISH, TURNIP, CARROT, CORIANDER, METHI, DESI PEA, POTATO & PALAK.	LATE CAULIFLOWER, LATE CABBAGE, CORIANDER, KNOL-KHOL, RADISH, TURNIP, ONION SEED, ONION BULB, GARLIC, CARROT, POTATO, DESI PEA, METHI & PALAK.

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Operational Guidelines on

**HIGH TECH POLY GREEN HOUSE
(Naturally Ventilated System)**

World Bank funded

**West Bengal Accelerated Development of Minor Irrigation Project (WBADMIP)
WATER RESOURCES INVESTIGATION AND DEVELOPMENT DEPARTMENT
GOVERNMENT OF WEST BENGAL**

Introduction:

The project West Bengal Accelerated Development and minor irrigation (WBADMIP) has a wider objective of conservation and judicious use of water resources spreading equal benefits to the target groups of 18 districts of West Bengal. Through the systematic use of irrigational resources, the project vision is twofold: enhancing productivity of the land and at the same time promoting the income standards of the small and marginal farmers who are solely dependent on agrarian activities. With the economic aid from World Bank, under the direction of Water Resources Investigation and Development Department of the Government of West Bengal, the Departments of Agriculture and Horticulture & Food Processing Department have jointly contributed in think up the outline of the planning.

Project is working with small and marginal farmers hence land holding are very small. Departments of Food Processing & Horticulture has recommended to introduce the 'Greenhouse', to provide the opportunities meant for the small and marginal farmers to get round the year cultivation under climatic uncertainties and as well as price in fluctuation. Green house Technology is an agro-system which makes important productive advantage in comparison to open air cultivation. Greenhouse protects crops from extreme climatic factors like temperature, high winds, heavy rain, storm, insects and diseases. It maximizes the productivity of per unit area. Off – season vegetable can be grown which fetch high price in the market. Green house has been used in raising healthy nurseries and quality planting material.

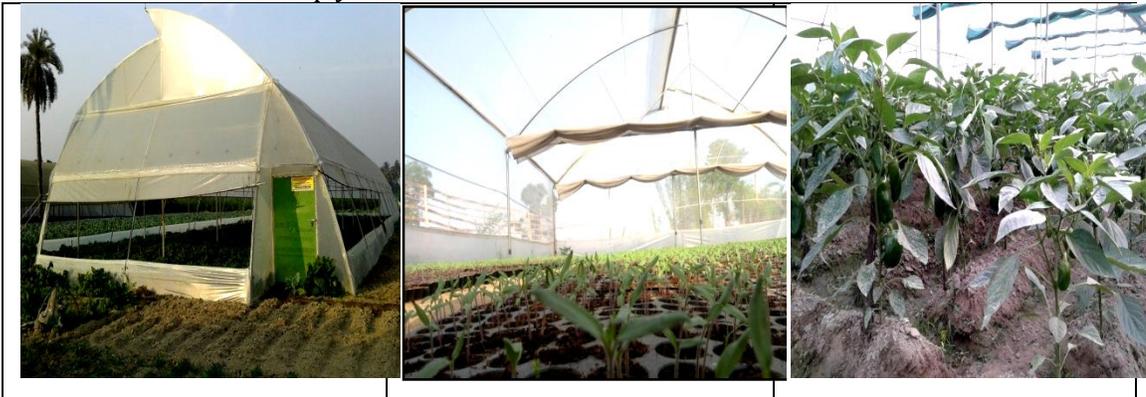
Objectives:

- To enhance horticulture production, improve nutritional security and income support to farm households;
- To promote, develop and disseminate technologies, through a seamless blend of traditional wisdom and modern scientific knowledge;
- To create opportunities for employment generation for skilled and unskilled persons, especially unemployed youth;
- Creation of livelihoods opportunities in all the districts of the state of West Bengal, focusing on underprivileged groups such as women, tribal, youth & other economically & socially backward communities;
- By adopting poly house cultivation the productivity of vegetable crops can be increased by 3-5 times as compared to open environment.
- Besides productivity, the better quality of produce is also obtained under poly house cultivation which enhances the market value of the produce.
- The Project aims to maximize the reach and impact of existing irrigation & water harvesting initiatives like Check Dams, Lift Irrigation systems, Ponds, Wells etc;
- To provide an efficient irrigation (water) management technology that empowers farmers to manage natural resources effectively;

- Build a regular income mechanism - “Round the year cash flow system for the beneficiary. Thus, **‘Enabling small & marginal farmers for self-sustainability’**’.

Advantages of Green house, Drip irrigation system & Plug tray nursery:

- The yield may be 10-12 times higher than that of outdoor cultivation depending upon the type of greenhouse, type of crop, environmental control facilities.
- Reliability of crop increases under greenhouse cultivation.
- Ideally suited for vegetables and flower crops.
- Off-season production of vegetable and fruit crops.
- Quality of the vegetable, fruit & flower fetch good market value.
- Disease-free and genetically superior transplants can be produced continuously.
- Efficient utilization of major nutrients, micronutrients & pesticides possible to control pest and diseases easily.
- Water requirement of crops very limited and easy to control.
- Labour component reduced to 60% compare to traditional practices.
- Fertilizer efficiency & productivity per unit area increases.
- Easy to monitoring and controlling the instability of various ecological system;
- This technique ensures that a large number of seedlings can be raised in minimum space under optimized and controlled conditions;
- The modern method of plug tray nursery in the green house ensures an even germination of seeds and over 90% germination rate is easily achieved;
- Due to equal distribution of water, nutrients & micronutrients the uniform growth & quality of the crop, flowering, fruiting is enhance which leads to timely harvesting of the quality production;
- Manual labour and drudgery is reduced (Easy for women);
- Uncertainties of natural damages to tender seedlings at the nursery stage are greatly minimized;
- Vigour of seedlings is increased;
- Reduces transplanting shocks and plant mortality at the farmer’s field is extremely low;
- Success rate of the planting material is high;
- Overall operating costs are less;
- Growth rates and crop yield are enhanced.



Expected Outcome:

- Increased farm productivity of participating farmers and an annual income generation of more than Rs. 1,00,000 to Rs.1,50,000/- per 500sq.m of cultivation area.
- Increased local employment opportunities in on-farm and off-farm activities leading to reduce distress migration
- Increased livelihood options to participant families (>2 options per family).
- Inclusion in basic banking facility to build a capital base for self and family.
- Wider and easier access to finance for setting up village based enterprises.
- Better realization of price of farm products through post harvest management, value addition and market linkages.
- The project learning will provide quality inputs in formulation of programme influencing the public policies addressing issues of sustainability of small & marginal farmers.

Role of Line department:

- Organize Workshops, Seminars and training program for all Greenhouse interest groups (GIG) at the SPMU/DPMU, technical expertise will be from the line department.
- DDH / DHO should provide guidance in technical matters with exposure visit.
- District level training should provide in different aspects viz. capacity building, production, post-harvest management, processing, marketing.
- Periodically Agriculture Specialists should document the progress & case studies of success stories.

Capacity building & Training:

The key to the success of this project is intensive training and practical guidance. The project implementation will begin with a baseline survey on existing markets, existing cropping patterns, practices followed by spot feasibility report, soil analysis report, water analysis report and a skill survey of selected participants from each WUAs. With the support of DDH, DHO the experienced professionals will provide training on high value vegetable, fruit & flower cultivation, practices on seed selection, crop rotation, integrated nutrient management (INM), integrated water management (IWM) and integrated pest management (IPM) etc for wide scale implementation of the project. The entire improved agriculture component will be linked to the Water Resource Management activity so that the main constraint of water for crops will be addressed.

Types of training & workshop:

- Introduction of new technology, project objectives & goal.
- Concept sharing regarding naturally ventilated green house.
- Impact of high value vegetable crop under control environmental considering the present demand of vegetable.
- Investment, outcome, contribution for the programme
- Techniques of land preparation, bed preparation & basal application
- Crop Planning & Rotation
- Modern nursery raising techniques
- Irrigation system – operations & maintenance
- Fertilizer and Nutrition management
- Integrated Pest Management
- Post-Harvest management
-

Support services:

- All types of inputs such as “seed, fertilizers, pesticides, tools & equipments will be provided to the WUA only once by ADMI project.
- Cost of tools / equipment which are more than 2.00 Lac may be kept under the custody of the department of Horticulture instead of WUA, for which WUA has to sign a ToR with the concern department for the same.

Crop Management & Monitoring:

- Field visits to monitor crop health, agronomy practices and advisory support on irrigation, fertigation and pest management will be provided to each individual farmer on a weekly basis by Agriculture specialist & DPMU team with the support of DHO.
- Assistance will be provided by DPMU team to ensure smooth availability of seed, fertilizers, pesticides and other crop related information with consultation of farmers.
- Based on proximity all the farmers should attend training periodically so that efficacy of training is maintained across every member.
- All data will be computerized and periodic analysis report will be generated & collected from DPMU on regular basis as per MIS.

Operational Part of Greenhouse:

The SO & DPMU team will facilitate WUA to identifying potential interested beneficiaries from command area & they should have sufficient exposure to horticulture activities to manage the greenhouse for raising quality nursery and cultivation of high value crop in off season. As per the design proposed by the DDH & the nodal officer, the actual area under each Green house will be 500 SQM (0.125 Ac.) of land with a plot size of “34 meter length & 15 meter width”.

Eligibility criteria for beneficiary selection:

- Any women / men those are member of WUA could be a beneficiary under this project if they have minimum 0.125 Ac. homestead land & not more than 2.5 Acre of land. It means they should come under small & marginal farmers.
- A group of 2 (or) maximum 4 women / men / mixed (both male & female members) of any WUAs shall be eligible with having homestead land of 500 SQM for getting the technical support under this program.
- WUA is the sole authority to select & recommend the list of beneficiaries with due consultation of DPMU team.
- They should have some basic knowledge on vegetable cultivation, so that they can easily understood the basic need, practices & regarding crop management issues.
- They should agree with the policy of WUA assuring their presence, involvement & cultivation of high value vegetable crops for a period of three years minimum for their sustainability with the support of project.
- If any group fail to manage the Green house (or) not utilize the Green house cultivation in future, then WUA have power to hand over the same (GREEN HOUSE) to other beneficiaries, because it is the assets of WUA not of any individual.
- As a token of taking benefit from the project through WUA the beneficiaries should pay a lump sum amount decide by the WUA “@ Rs.4,000/- (or) @ Rs.8,000/- (or) @ Rs.10,000/- per season” before (or) after EACH cultivation (or) season for avail the Green house benefit as their user’s charges for getting the benefit freely.

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Selection of Land for Green house:

While selecting the land for construction for greenhouse the following points should be taking into consideration for the optimum utilization of green house:

- The land should belong to any one of the beneficiary under the command area of any WUA. Government will not provide any compensation for that. Water User Association (WUA) will responsible for coordination with the members willing to donate land within the command area to do the activity.
- The land record of the beneficiary should properly verify by the WUA members & also by the DPMU team before finalization of spot.
- The site should be free from shadow & with adequate drainage facilities.
- The area should have assured irrigation facilities & good quality water for cultivation of vegetables and facility of electricity to run the water pump.
- The water test should be done before finalization of the spot & which should be in the range of 6.0 to 8.5 for irrigation and EC at 25^oc should be micro mhos/cm maximum 2250.
- The soil test should be done before finalization of the spot & which should be in the range of 6.5 to 7.5 for cultivation and EC should be between 0.1 to 0.3 mS / cm.
- Well connected to road to take advantages of market for inputs supply and sale of produce.

Ensure marketing:

Support organization and DPMU team along with the interested farmer(s) should initiate the discussion with the members of WUA and analyze the demand and choices of vegetable; fruits; flower; spices; aromatic plant etc for market linkages.

Record keeping:

The WUA has to maintain separate records, accounts book for this purpose. Their responsibilities are related with greenhouse management, production, marketing, purchasing of inputs / output details of any crop cultivate under the green house & sharing of profit and activities within the command area, with the help of SO & DPMU team time to time for proper monitoring & follow up the activities.

Details estimate cost & requirements for the project:

(I) Estimated cost for Design & supply, Installation, Testing & Commissioning of High tech poly Green house:

S. N.	Specification	Area of Shed in SQM	Quantity	Rate in (Rs.)	Amount in (Rs.)
1	High tech poly Green house (including Fabrication, Installation & Transportation) Details in Annexure (1)	500 SQM	1 No.	1060.00	5,30,000.00
Total Amount including All Tax					5,30,000.00
Amount in words: Five lakhs thirty thousand only					

ANNEXURE (1):**Construction part:**

S.N	Specification	Details
1	Green house type	Open vent Tropical Saw Tooth Type, Centrally ventilated (top ridge) designed structure.
2	Size	Length - 34 M, Width - 15 M
3	Construction Area	500 SQM (0.125 Acre of land)
4	Structure	Structure made by only ISI Pipes fitted with clamps, nut bolts & aluminum channels.
5	Side Ventilation	2.5 mt. covered with Bio Net.
6	Column Height	3 mt.
7	Span	6 mt. × 4 mt. grid;
8	Gutter	GI gutter in single piece of 500 mm & 1 mm thick
9	Corridor	1.5 mt. × 2 no's = 3 mt.
10	Top Height	5.2 From ground level.

❖ **Required items for Installation of Hi Tech Poly Green House for vegetable & flower cultivation: (Area: 500 SQM)**

Sl. No.	Description of goods	Qty	Units
1	Post 60 mm OD × 2.9 mm Light Quality	117	mtr
2	Bush 48 mm OD × 2.9 mm Medium Quality	35	mtr
3	Bracing 42 mm OD × 2.6 mm Light Quality	110	mtr
4	Runner 42 mm OD × 2.6 mm Light Quality	240	mtr
5	Arch 42 mm OD × 2.6 mm Light Quality	125	mtr
6	Side Arch 42 mm OD × 2.6 mm Light Quality	90	mtr
7	Tie 32 mm OD × 2.6 mm Light Quality	120	mtr
8	Rolling system 25 mm OD × 2.6 mm Light Quality	60	mtr
9	G.I Clamp of different sizes	144	nos
10	G.I Nut & Bolts of different sizes	44	kg
11	P. V. C coated G.I wire of 14 gauge	35	kg
12	Alluminium Channel 30 mm wide × 1 mm thick	290	mtr
13	G.I Lock spring of 12 gauge	385	mtr
14	G. I angle 50 mm × 50 mm × 50 mm × 300 mm long	55	nos
15	G. I elbow & tee 25 mm	14	nos
16	Stitch Roup	2	kg
17	Shade Net 75%	320	sqm
18	200 Micron poly film (Ginegger of Israil)	1021	sqm
19	P. V. C door (4' × 6'6") with frame inserting 20 mm dia G. I pipe in the frame with locking arrangement	1	nos
20	Irrigation system (Mini sprinkler)	500	sqm
21	Cement concrete (1:2:4) with graded stone chips (20 mm down) (size 30 cm × 30 cm × 60 cm)	35	nos
22	Labour charge for bending & welding of pipe as per requirement (Skilled)	90	nos

23	Labour charge fixing of pipe, including all necessary charge (Skilled)	120	nos
24	Carrying charge of materials to work site	1	unit

(2) Estimated cost for Design & supply, Installation, Testing & Commissioning of Green House Micro Irrigation System:

S. N.	Specification	Area of Shed in SQM	Quantity	Rate in (Rs.)	Amount in (Rs.)
1	Micro Irrigation System (including supply Commissioning & Transportation) Details in Annexure (2)	500 SQM	1 No.	160.00	80,000.00
Total Amount including All Tax					80,000.00
Amount in words: Eighty thousand only					

ANNEXURE (2):

❖ **Salient Features of Micro Irrigation System:**

- (1) Crop: Vegetables / Flower
- (2) Area: 500 SQM
- (3) PP & RR Spacing: 2 FT. × 2.5 FT.

❖ **Required items for Installation of Micro irrigation system (Drip & Fogger) for Hi Tech Poly Green House for vegetable & flower cultivation:**

(Area: 500 SQM, Required pump pressure should be: 3 - 3.5 kg/cm² & Water Source by delivery pipe line (PVC) - 50/63 mm)

LIST OF REQUIRED ITEMS FOR MICRO IRRIGATION SYSTEM					
SL. NO.	ITEM CODE	ITEM DESCRIPTION	STANDARD	QTY	UNIT
A	PVC PIPE:				
	P0506	PVC Pipe 50 mm x 6 kg/cm	(IS-4985)	30	M
	P0406	PVC Pipe 40 mm x 6 kg/cm	(IS-4985)	60	M
Sub Total					
B	LATERALS (LLDPE) AND DRIPPERS & FOGGERS:				
1	PT16	Drip Poly tube 16 mm	(IS:13487)	250	M
2	L12240302R500N	LINE12MM 2.4LPH 30CM CL2RD500MTR	(IS:13487)	1050	M
3	DF28TGS4LP	Fogger 28 lph LPD Low Pr. - 4 Way	(IS:13487)	80	NOS.

4	DGT001613	Gromate Take Off 16 x 13 mm		50	NOS.
5	DES0816	End stop 16 mm, 8 shape		50	NOS.
6	DJ016	Barbed Poly Joiner 16 mm		50	NOS.
7	DPMV1616	MINI VALVE 16 MM X 16 MM		24	NOS.
Sub Total					
C	FILTRATION SYSTEM:				
1	JPSF25DC	JAIN SUPER FLOW 20-25M ³ /HR 2"	(IS:12786)	1	NOS.
2	MPM20034	MANIFOLD PLASTIC 2" X 3/4" (IS:12786)		1	NOS.
3	VA34N	VENTURY ASSEMBLY COMPLETE 3/4" PLASTIC	(IS:12786)	1	NOS.
Sub Total					
D	PVC TANK, PUMP VALVES & ACCESSORIES :				
1	DBV50HFF	PVC Control Valve 50 mm		3	NOS.
2	DBV40HFF	PVC Control Valve 40 mm		1	NOS.
3	DSFV50	PVC Flush Valve 50 mm		2	NOS.
4		PVC TANK 500 LITER		1	NOS.
5		1 HP mono block pump motor set		1	NOS.
Sub Total					
Grand Total A+B+C+D					
1	FA	PVC Fitting and Accessories (TEE, ELBOW, MTA, FTA, REDUCER)		8.00%	
2	VAT	VAT		5.00%	
3	INS	Installation Charges		500	SQM
4	TC	Transportation Charge			

❖ **List of vegetables & flowers under Protected cultivation:**

(a) Name of Vegetables: Capsicum, Red Cabbage, Broccoli, China Cabbage, Tomato, Celery & Zucchini etc.

(b) Name of Flowers: Rose, Gerbera, Anthurium, Orchid, lettuce, Carnation, Alpinia & Bird of paradise etc.

(3) Tentative estimated cost of PLUG TRAY NURSERY for High value Vegetable Crops:

- (a) Plug tray – 50 piece of good quality
- (b) Coco-peat – 10 kg of good quality
- (c) Organic manure – 25 kg of good quality
- (d) Rose Cane – One piece - (Plastic)
- (e) Spray Machine – One piece
- (f) Pesticides – (LS) –
- (g) Crop Guard – 1 pc packet

(h) Seed cost (LS)

Grand Total budget (Lump sum) = Rs.10,000/-

(4) Tentative estimated cost of FERTIGATION & NUTRIENTS COST for High value Vegetable Crops:

(a) Fertigation expenditure (Lump sum) = **Rs.10,000/-** (Depending open types of vegetables, varieties & seasons such as “Annapurna, Vermicompost, Bio-fertilizers, 19:19:19, 12:61:00, 46:00:00, MgSo₄, CaNo₃, FeSo₄, ZnSo₄, Micronutrients, Hormone & pesticides etc.”)

Note: Detail fertigation chart will be given after selection of Crop.

(5) Post Harvest expenditure: Supply of Crates for vegetable supply & marketing.

(a) Lump sum @ 10 Crates minimum @ Rs.500/- per crate = Rs.5000.00

❖ Hence Overall Grand Total Investment / one unit Green House in 500 SQM will be **Rs. 6,35,000/- per Green House (One unit = 500 SQM)**

Attachment 5.7

Roles and Responsibilities and other Rules of Business for FCA Members

i) Role of General worker:

1. Common fishers will play a role of buffer to communicate each members of this group.
2. Common fishers will collect, process and supply domestic manure (compost & cow dung)
3. Actively participate during harvesting (net pulling, capture & packaging)
4. Actively participate in pond preparation, transport of raw material (feed, lime, medicine, fingerling) etc.
5. Actively participate in all FCA meeting

A. Relationship with WUA

1. 2 members of FCA will be the member of Governing Body / Managing Committee (recommended/ selected by FCA) of the WUA for smooth functioning of Fisheries work
2. Preferably representatives of FCA in Governing Body / Managing Committee of WUA be in rotational term.
3. All FCA members will be treated as general body members of WUA
4. All FCA members will be general member of WUA, hence can attend Annual General Body meeting of WUA
5. FCA will share 3% profit of production with WUA negotiable with WUA but not more than that, in some other case eg. Privately own pond owner share their 10% profit to WUA.
6. Seed money (capital/project input cost) will be with FCA for continuing fisheries cycle period.
7. Increase awareness, motivation and skill development among WUA members who are interested in fisheries

B. Sharing of profit:

1. A part of profit will be kept as revolving fund of FCA
2. 3% profit of production will be shared with WUA negotiable with WUA but not more than that except for privately own pond owner share 10% of their profit.

3. The amount of profit left after deducting the amount mentioned in above two points (1 & 2) of the profit amount of production will be distributed equally among the members of FCA.
4. FCA members who are involved in daily basis of work like pond security and feeding worker/maintaining accounts may claim nominal wages from FCA and that will be decided by the FCA.
5. Few common works of fisheries like pond preparation/fingerling transport/purchase of bond paper/arrangement of net/tea-snacks/misc. expenditure etc. may be reimbursed from the profit of production/can spend from one time contribution by the FCA. So in this case President, Secretary and Treasurer of the FCA will take care to arrange it.

C. Kind of supports FCA will receive from WUA:

1. WUA will facilitate in selection of FCA members and formation of FCA
2. If any conflict arises during Fisheries cycle FCA may take the support of WUA to resolve. If the conflicts cannot be resolved or turns detrimental to the interest of FCA, WUA have the right to dissolve the FCA body and form a new FCA to continue the cycle. In that case there will be no refund of membership and the whole capital of the fisheries will go to WUA.
3. If any mal practice takes place (theft etc.) during culture period then primarily FCA will address the problem. But WUA can call all the FCA members to mitigate it.
4. If seasonal pond is available near homestead area suitable aquaculture may be encouraged to FCA.
5. Two (2) Lead fishers must be selected from each FCA group who will be trained by the project for the fisheries activity.

D. Expulsion & removal of FCA members:

Frequent action of any members, if found by the Managing committee is detrimental to the interest and in violation of the rules, regulation of the FCA, FCA may inform WUA. Then on the basis of complain put up by FCA, WUA Governing Body / managing committee may be after due enquiry, ensured, suspended or expelled the person/s from the membership of FCA. In that case the WUA Governing Body / managing committee shall first serve the member concerned with a show cause notice showing therein the charges framed and ask him/her to submit a statement of defense within a month. On receipt of the explanation, the WUA Governing body shall have the power to take a suitable action against the concern member after allowing him/her to defend his/her case. If no reply to the show cause notice is received within a month, the General body may take an ex-parte decision.

For any simple incidence of conflict FCA managing committee have the right to take suitable action against his/her in consensus.

For any act to expulsion or termination no such member shall be entitled to prefer any claim for compensation or damage even if proved on subsequent date that such act of expulsion or termination was wrongful and/or unlawful.

Details of Training Modules on Fisheries

i. General/Basic course 1 days (4 hrs. 30 minutes):

- (a) Aware about interested people to fishery (20 minutes)
- (b) Basic of pisciculture (10 minutes)
- (c) Selection of water area (20 minutes)
- (d) Preparation of water area (20 minutes)
- (e) Application of organic & inorganic manure (20 minutes)
- (f) Maintenance of water quality, sedimentation and depth (20 minutes)
- (g) Cultural fish species (10 minutes)
- (h) Scientific practices technology (40 minutes)
 - Composite fish culture
 - Intensive composite fish culture
 - Induced breeding
 - Hatchery & nursery making
- (i) Application of lime (10 minutes)
- (j) Release of fingerling (10 minutes)
- (k) Preparation & application of supplementary feed (20 minutes)
- (l) Netting (10 minutes)
- (m) Pathogen, disease, medicine & remedies (30 minutes)
- (n) Harvesting & marketing (10 minutes)
- (o) Post-harvest management (20 minutes)

ii. Cluster level course for PPP 2 day (4 hrs /day):

1st Day

- (a) Basics of FFS (30 minutes)
- (b) FESA (60 minutes)
- (c) Identified problems on fishery in general (60 minutes)
- (d) Innovative technology to be implement (60 minutes)
- (e) Exercise/test on FFS (30 minutes)

2nd Day

- (f) Pond preparation (30 minutes)
- (g) Maintenance of water quality, sedimentation and depth (30 minutes.)
- (h) Application of manure & liming (20 minutes)
- (i) Transport and release of fingerling (20 minutes)
- (j) Application of supplementary feed (30 minutes)
- (k) Monthly exercise of netting, health checkup of fishes (20 minutes)
- (l) Identification & control of pathogen and disease (30 minutes)
- (m) Harvesting of table fish (20 minutes)
- (n) Marketing of table fish (10 minutes)
- (o) Post-harvest technology (30 minutes)

iii. FIG level course session-wise 2-3hrs./day (6-10 days according to perennial/seasonal condition):

- (a) Pond preparation (1 day)
- (b) Maintenance of water quality, sedimentation and depth (1 day)
- (c) Application of manure & liming (1 day)

- (d) Selection of fingerling, size, quality, transport and release of fingerling (1 day)
- (e) Application of supplementary feed (1 day)
- (f) Monthly exercise of netting, health checkup of fishes (1 day)
- (g) Identification & control of pathogen and disease (1 day)
- (h) Harvesting of table fish (1 day)
- (i) Marketing of table fish (1 day)
- (j) Post-harvest technology (1 day)

iv. Community level awareness program 1 day (4 nos. of mass awareness program throughout the year): (awareness on wheel/awareness at block/awareness through leaflet/Drama etc.)

- (a) Why utilize every water resource for fish farming practices?
- (b) Why adopt scientific fish farming practices?
- (c) How to prepare green manure and apply in fish farming?
- (d) How to prepare kitchen wastes to fish food?
- (e) Necessity of raw cow dung, lime.
- (f) Why necessary to test pond sediment and maintain water quality?
- (g) Necessity for use of supplementary feed.
- (h) What will be return after a good management practices?
- (i) How Govt./this project can help?
- (j) Wall painting on slogans, leaflets, and activity of WBADMIP

v. Institutional course:

- (a) **Pen culture:** i. construction of pen ii. Release of selected species with exact numbers iii. Feeding iv. Manuring & medicine v. harvesting
- (b) **Cage culture (reservoir):** i. construction of cage ii. Release of selected species with exact numbers iii. Feeding iv. Caring, manuring & medicine v. harvesting
- (c) **Monosex tilapia farming:** i. selection of water area ii. Release of fingerling iii. food for fingerling iv. Harvesting
- (d) **Pangus farming:** i. selection of water area ii. Release of fingerling iii. Food for fingerling iv. Harvesting
- (e) **Small scale weeds fish farming:** i. selection of water area ii. Collection & release of fry iii. food for weed fish iv. Harvesting
- (f) **Chital & Bhetki farming:** i. selection of water area ii. Release of fingerling iii. food for fingerling iv. Harvesting
- (g) **Cage culture (weir net) for jeol fish farming:** i. making of cage ii. Selection of fish species iii. No of fingerling with proportion to be release in cage iv. Food for jeol fish v. nourishment and care vi. Pathogens & disease
- (h) **Pathogens & disease:**
- (i) **Better Culture & Harvesting techniques:**
- (j) **Marketing:**

Detailed Job Description of Stakeholders in Crop Component Implementation

Position	Roles and Responsibilities
Lead farmer	<ul style="list-style-type: none"> • Conducting the demonstrations under the guidance of resource person(Agriculture Specialists of DPMU & SO) • Receipt of the inputs from DPMU well ahead of the implementation of DC • Agree to use all the inputs provided by the Project for the DC plot only • Day to day operations of the demonstration plot • Mobilizing farmers to the trainings • Periodical appraisal of the progress of DC to the WUA • Assisting the WUA in water audit based on crop planning • Make Coordination between the Trainers and Farmers • Motivating the fellow farmer in the adoption of new technology in the commend village & adjoining villages • Assist to organize Farmers Field Day • Keep data(records) of entire package of Practices (PoP) (starting from sowing to harvest) of DC & Control Plot • Provide labour for carrying out all operations towards completion of complete PoP till harvesting • Agree to sell/exchange the seed produced from the self-pollinated crop DC to other farmers in the village / adjoining villages on the term decided by the Project staff & WUA. • Agree to grow a small control plot by following farmers practice in the DC
Agriculture Specialist - SO	<ul style="list-style-type: none"> • Mobilize & sensitize the WUA regarding introduction of improved technologies • Baseline data of crops, based on existing agro-ecology • Facilitation on SDMP preparation • Mobilize & facilitate the WUA on year round crop planning • Facilitate WUA on Soil sample collection before implementation of DC • Site selection for DC & Lead farmer in consultation with WUA • Formation of Commodity Groups (CG) based on different crops • Facilitate the WUA in identification of Lead farmer & facilitate for Training • Facilitate /assist the WUA for timely receipt of the inputs for DC • Facilitate the Lead farmer for organizing DC based on project guidelines • Based on water requirement of different crop water budgeting is to be done in consultation with WUA • Motivating the farmers in adoption & dissemination of improved technology • Coordinate linkage between DPMU / line department officials with WUA • Exercise expertise towards identification of problems & immediate solution for successful implementation DC • Guiding the Lead Farmers for proper documentation of DC • Mobilize the WUA for organize Farmers Field Day • Mobilize the group for implementation of Vermi compost & Nutrition Garden • Organizing farmers for Kisan Mela • Data collection on adoption rate of improved technologies (GAP)by the adjoining farming community • Preparation of Fact sheet for DC

	<ul style="list-style-type: none"> • Identification & Mobilizing the progressive farmers for exposure visits in consultation with WUA • Identification ,formation and mobilization of Farmers Interest Group (FIG) for promotion of FPO • Any other responsibility which may be assigned from time to time.
Project Programme Promoters	<ul style="list-style-type: none"> • Mobilize & sensitize the Lead Farmers & farming community in regard to concept & participation in FFS • Training the Lead Farmer and other adjoining farmers for each demonstration at critical stages of the demonstrated crop through FFS method • Periodical supervision and monitoring of DC • Arrangement of distribution of critical inputs for conducting the DC & FFS • Maintaining the Fact Sheets and report return to the DPMU & District Officers of different Department. • Monitoring on adoption rate of GAP by the adjoining farming community • Assist DPMU for organizing Farmers' Field Days, Kisan Mela • Keeping liaison with DPMU, District offices of other line Departments, Support Organization and WUAs. • Any other responsibility which may be assigned from time to time
DPMU Agriculture Specialist	<ul style="list-style-type: none"> • Coordination with SO to mobilize & sensitize the WUA regarding introduction of improved technologies • Coordination with SO for baseline data of crops, based on existing agro ecology • Preparation of Annual action plan on agricultural and horticultural activities • Coordination with SO for mobilize & facilitate the WUA on year round crop planning • Facilitate SO for water budgeting • Procurement of inputs in consultation with DDA • Regular monitoring of the demonstrations • Identification of the resource persons / agencies in the district for Orientation / training of Lead farmers and to organize Farmers Field Day • Liaison with the WUA,SO, resource agencies, line departments • Coordinating with Lead farmers & WUA for effective implementation of training and demonstrations • Coordinating for organizing Kisan Mela • Facilitate SO for implementation of Vermi compost & Nutrition Garden • Identification of Institutions & Coordinating the exposure visits • Orientation /Training of FIG for effective implementation of Agri-business • Coordination with SO for Data collection on adoption rate of new technologies(in terms of critical inputs) by the adjoining farming community • Submission of report return to the State Nodal unit & SPMU • Any other responsibility, which may be assigned from time to time

Agriculture & Horticulture Coordinators	<ul style="list-style-type: none"> • Identification of the resource persons / agencies for training /capacity building of DPMU(including SO,PPP) personnel • Preparation of various guideline ,leaflet, chat, poster in vernacular language • Strategic intervention & policy making for effective implementation of ASS wide publicity etc • Keep close liaison with Directorate of Agriculture & Horticulture • Assist Nodal officer towards execution of DCs as per the guidelines. • Assist Nodal officer for strategic communication with DDA /DHO towards achieving output indicator • Monitoring & evaluation of the agricultural activities under the Project and recommend for review and re-orientation • Assist the DPMU for effective implementation of ASS activities well ahead before the starting of each season • Coordination with district level and sub-divisional level line department agencies for smooth implementation of project activities which includes crop demonstration, training and adoption rate studies of GAP under demonstrated technologies • Organize the State “Sammelan” • Coordinating the State level exposure visits • Arrangement for report return of the DCs’ GAP acceptability and adaptability under the project.
SPMU – Agriculture Specialist	<ul style="list-style-type: none"> • Facilitate Preparation of Annual action Plan • Organize state level Training ,Capacity building Exposure visit • Liaison with Nodal unit for facilitation on Identification of the resource persons / agencies for training /capacity building of DPMU(including SO,PPP) personnel • Facilitation on Preparation of various guideline ,leaflet, chart, poster in vernacular language in coordination with nodal unit • Strategic intervention & policy making for effective implementation of ASS wide publicity etc • Organize the State “Sammelan” • Arrangement for report return of the DCs’ GAP acceptability and adaptability under the project. • Report return to the Dept of WRID , World Bank • Monitoring of Project related activities and implementation through regular field visits of different districts • Guiding the DPMU for effective implementation of ASS activities well ahead before the starting of each season • Guiding DPMU so that soil analysis based fertilizer schedule is followed • Any other responsibility, which may be assigned from time to time.

Job Description of Contracted Staff at SPMU

Sl. No.	Position	Key Qualification and Experience	Main Responsibilities
1	Monitoring & Evaluation Coordinator/ Team Leader	<p>Qualification- Master's Degree in information technology or equivalent with major in Quantitative methods and Geographical Information systems.</p> <p>Experience- 10 year's proven experience in design of MIS and G-MIS application for monitoring and evaluation of development projects.</p> <p>Desirable to have at least 5 years of in-depth experience of MIS and G-MIS systems for projects or programs in Irrigation and Agriculture sector.</p>	<ul style="list-style-type: none"> i. Lead the design and implementation of an integrated MLE/MIS system in collaboration with External M&E consultant; ii. Be responsible for timely preparation of annual plans and quarterly progress monitoring reports. iii. Participate as secretary to Management meetings and log project issues to be tracked by the M&E/MIS system, Management response and Actions Taken on M&E reports, Audit reports and Complaints received; iv. Organize twice-yearly theme specific workshops for Project management and staff to jointly review project implementation results; v. Ensure production and dissemination of user-friendly monthly progress, Process and Results (Intermediate Outcome) reports to Project Management, highlighting issues and actions to be taken; vi. Oversee the work of M&E External consultants, including theme system, implementation of the Baseline, Mid-term and End-term surveys and lead the production of the Project Completion Report; vii. Design concurrent monitoring schedules for use by DPMU staff and SOs; viii. Introduce GIS in evaluation and monitoring the project performance and day to day activities using appropriate GIS software. ix. Work closely with MIS/G-MIS Team to design and integrated MLE/MIS system to support learning and decision-making by Project management, on all aspects of project performance including progress on financial, procurement, social and environmental issues, including continuing evaluation of project strategy and implementation; x. Help design Thematic Studies to be undertaken as needed - e.g. studies of successes and failures; performance and sustainability issues; lessons for convergence with line agencies etc; xi. Collaborate with the Project's MIS/GMIS coordinator to produce bulletins and reports for regular dissemination, via web-site and other publications;

			<ul style="list-style-type: none"> xii. Travel extensively in project areas to undertake field conditions on which MLE information is to be collected; xiii. Progress, Process and Results (Intermediate Outcome) reports to Project Management, which the MLE Coordinator will use to highlight issues and actions to be taken by Project Management; xiv. Design data entry procedures for concurrent monitoring at all project locations and train data entry operators at all levels (SPMU, DPMU/SO) on this work; xv. Work closely with MLE Team to design an integrated MLE/MIS system to support Learning and Decision making by Project management, on all aspects of project performance including progress on financial, procurement, social and environmental issues, and continuing evaluation of project strategy and implementation; xvi. Collaborate with MLE Team to produce bulletins and reports for regular dissemination, via website and other publications; xvii. Any other activities described under the key tasks in paragraph (b) 2 but not listed above. xviii. The Monitoring and Evaluation (M&E) Coordinator will also act as the Team Leader of the consultants' team, who will also act as the Team Leader of the consultants' team, who will also take the responsibilities of deliverables of other members of the team along with his own. The Monitoring and Evaluation (M&E) Coordinator will represent the Consultants' team to the DPMU/SPMU for all purpose.
2	Institutional Development Coordinator	<p>Qualification- Post Graduate in Social Science / Management or in Engineering or any other related field. Must be computer literate in the use of Work Processor, Spread sheets and any other applications used in the Social Development applications.</p> <p>Experience- 10 years general work experience and 5 years of relevant working experience,</p>	<ul style="list-style-type: none"> i. Guiding and backstopping district, field and SO teams on mobilization, registration and organization development of Water User Association. ii. Lead facilitating WUA office bearers, members on leadership and institution development activities so as to help them perform their roles and responsibilities successfully. iii. Developing, guiding and implementing a performance monitoring mechanism for annual grading of WUA. iv. Developing and implementing, learning and sharing mechanism within WUA members and among WUA. v. Guiding and lead facilitating the networking of WUAs to form higher level institutions – Farmer/Producer companies and their institutional development activities for ensuring sustainability of farmer institutions. vi. Guiding and mentoring institution development staff at district and field level.

		particularly with multi sectoral development agencies/ NGOs/ Consultants/ Govt. organizations in participatory development approaches. Experience in working in community mobilization and rural development projects preferably in water sector with external agencies like World Bank or ADB etc. is desirable.	<ul style="list-style-type: none"> vii. Assist SPMU in formation of effective institution in implementation of social resettlement plan and environmental mitigation plan in collaboration with social and environmental experts. viii. Monitor the project from community development perspective and generate reports as required.
3	Governance and Accountability Specialist	<p>Qualification- Master's Degree (or equivalent) in sociology / Social Science / Engineering.</p> <p>Experience- 5 year's relevant experience in social development or closely associated sectors and a solid background on social development skills (participatory assessment, participatory planning etc.)</p> <p>Experiences in working with a wide range of stakeholders, development agencies and NGOs would be desirable.</p>	<ul style="list-style-type: none"> i. Developing and implementing strategies, processes and implementation tools for inclusion of tribals, women, small and marginal farmers in the project activities. ii. Developing approaches, tools and methodologies for participation of project beneficiaries in all project activities including planning, implementation, operation and maintenance of schemes, implementation of agriculture, horticulture and fisheries component activities. iii. Develop manuals, guidelines and training materials on participatory aspects, governance and accountability aspects. iv. Guiding SDMP preparation for the full involvement of farmers for ensuring their active involvement during planning, designing, implementing, and operating, maintaining and sustainably managing irrigation infrastructure. v. Developing, implementing and monitoring other social safe guard aspects of the project including land acquisition aspects. vi. Developing and lead facilitating implementation of social auditing mechanism for the smooth functioning of WUAs. vii. Developing and lead facilitating implementation of a conflict resolution and grievance redress mechanism for WUA members. viii. Guiding and mentoring field level and district level staff on social, participatory, safeguards and G & A aspects of project implementation including trouble shooting and resolving thematic implementation issues.

			<ul style="list-style-type: none"> ix. Develop and implement tools and techniques for ensuring governance and accountability in all aspects of project implementation. x. Pro-actively identify all governance and accountability related risks and implement mitigation measures. xi. Institute a process monitoring mechanism for ensuring quality of implementation. xii. Any other activities described under the key tasks in paragraph VI (b) 4 but not listed above.
4	Environment Specialist	<p>Qualification- Bachelor's Degree in Engineering / Master's Degree in Science with Post Graduate Degree/ Diploma in environmental Science.</p> <p>Experiences- 10 year's experiences in environmental management with at least 5 years in carrying out Initial Environmental assessment, Environmental Impact assessment and Environmental Management Plans.</p>	<ul style="list-style-type: none"> i. Work closely with the project implementing agencies (and the consultants) and provide advice on the environmental aspects to be considered during design and implementation phase of subprojects of WBADMIP; ii. Review of Environmental Assessment Reports (EAR) and other documents, various environmental issues and the adequacy of management measures and provided necessary guidance to the SPMU/DPMU/NGOs in improving the reports prior to forwarding to the World Bank for necessary approval; iii. Co-ordinate with the statutory agencies and provide necessary support to SPMU/DPMU/NGOs in securing regulatory clearance such as Environment, Forest or consents from WBPCB and other agencies; iv. Carry out monthly visits to sub-project implementation sites to monitor as well as to provide onsite guidance to the IA and the contractors on the implementation of respective Environmental Management Plans (EMPs) of WBADMIP; v. Participate in the progress review meeting of the SPMU and DPMU and provide advice on environmental aspects of the respective projects during implementation; vi. Coordinate with the Quality Auditors and agencies of the projects (both at SPMU and at DPMU) and ensure that the environmental aspects related to the task of respective agencies are performed as per the Environment Framework. vii. Maintain a data base in a standard form, on the status of various environmental activities of WBADMIP (clearance, compliance, EA reports, progress reports etc.) and update the same on regular basis; viii. Prepare and submit monthly progress reports to the Govt. of WB and the quarterly progress reports to the World Bank, on all the aspects related to Environmental management in WBADMIP;

			<ul style="list-style-type: none"> ix. Function as a single point contact at the SPMU and for other external agencies including the World Bank, and provide all support on environmental matters of WBADMIP; x. Follow-up with the DPMU and other line departments in addressing various environmental safeguard actions agreed during the World Bank Missions from time to time and provide timely update to the PMU and the Bank; xi. Conducting environmental audit, evaluation of EMP implementation, dam safety, Bio-village publicity campaign & implementation, intensification of bio pesticides production through NGOs, etc. xii. Any other activities described under the key tasks in paragraph VI(b) 5 but not listed above
5	Dam Safety Expert*	<p>Qualification- Bachelor's Degree in Engineering/ Master's Degree in Science with Post Graduate Degree / Diploma in Environmental Science.</p> <p>Experience- 10 years' experience in environmental management with at least 5 years in carrying out initial environmental assessment, environmental impact assessment and environmental management plans.</p>	
6	Environmental Training Coordinator*	<p>Qualification- Bachelor's Degree in Engineering / Master's Degree in Science with post graduate degree / diploma in environmental science.</p> <p>Experience- 10 year's experiences in</p>	

		environmental management with at least 5 years in carrying out initial environmental assessment, environmental impact assessment and environmental management plans.	
7	Agriculture Specialist	Qualification- Master's Degree in Agricultural Science Experience- 10 year's experiences in planning and implementing agricultural development and multi-disciplinary projects.	<ul style="list-style-type: none"> i. Planning the agriculture support activities at State level. ii. Coordinating the resource agencies at State level. ii. Guiding the DPMUs in preparation/monitoring of district level/MI scheme level agriculture plans. v. Organizing the trainings for project staff. v. Monitoring of Project related activities and implementation through regular field visits. vi. Any other activities described under the key tasks in paragraph VI (b) 6 but not listed above.
8	Fisheries Coordinator**	Qualification- Master's Degree in Science with specialization in Fish & Fisheries aquaculture. Experience- 10 year's experiences in developing fisheries aquaculture.	<ul style="list-style-type: none"> i.Planning the fishery support activities at State level. ii.Coordinating the resource agencies at State level. iii.Guiding the DPMUs in preparation/monitoring of district level/MI scheme level fishery plans. iv.Organizing the trainings for project staff on fishery aspects. v.Monitoring of Project related activities and implementation through regular field visits. Any other activities described under the key tasks in paragraph VI (b) 6 but not listed above.
9	Financial Management Specialist	Qualification- Should be a professional accountant (CA or equivalent) with a bachelor's Degree in Accounting, Business, Finance or Economics. Experience- 5 years post qualification experience in financial management.	<ul style="list-style-type: none"> i. Assess the adequacy of the Borrower's project financial management systems and their ability to manage and monitor World Bank financed projects. This includes budgeting, policies and procedures, internal controls, accounting, financial reporting and auditing; ii. Carry out supervision work to ensure that project's financial management systems are functioning appropriately including the review of periodic interim financial reports; ii. Assess the selection and engagement of auditors, ensuring their suitability including their independence and competence to perform and ensuring that the borrower provides auditors with all the relevant information (including Terms of Reference and bank requirements) necessary to carry out their engagement; v. Review audited financial statements received, monitoring the borrower's compliance with financial covenants including audit compliance, ensure adequate communication

			<p>with the borrower and the project implementing agencies with respect to audits and advise as appropriate;</p> <p>v. Provide advice and support to Borrower and the World Bank Task Teams on matters affecting financial management;</p> <p>vi. Provide financial management guidance for the development of technical assistance programs and evaluate and monitor their implementation;</p> <p>ii. Provide guidance and advice to borrowers and bank staff on capacity building in projects and with public sector accountability institutions;</p> <p>ii. Assess the financial and operational viability of implementing entities (e.g. with respect to revenue earning entities) and to advice on the design and use of financial performance covenants.</p> <p>x. Any other activities described under the key tasks in paragraph VI (b) 8 but not listed above.</p>
10	Procurement Specialist	<p>Qualification- Bachelor's Degree in Engineering.</p> <p>Experience- 10 years of relevant professional experiences of which at least 5 years in procurement of works, goods and consulting services under World Bank procedures.</p>	<p>i. Assist to finalize and seek PMU agreement for the Procurement Plan for the project;</p> <p>ii. Draft all documents required in accordance with appropriate World Bank procedures for each of assignments (e.g. Expressions of Interest notice, Terms of Reference, request for Proposal, Contracts etc.);</p> <p>ii. Work with Procurement Unit and later the PMU Secretariat, to seek their input and approval at each stage of the process.</p> <p>v. Facilitate the procurement process including arranging public notices and establishing processes for handling submissions, seek approval for and manage the schedule of procurement processes including selection committee meetings, SPMU briefings;</p> <p>vi. Liaise between the SPMU, selection committees and the World Bank and keep them all updated on the process;</p> <p>ii. Maintain a proper filing system for all relevant procurement documents in the project and prepare needed report and documents for World Bank review mission;</p> <p>x. Assist the SPMU to establish appropriate contracts with each of the consultants;</p> <p>x. Advise the SPMU and selection committees at each stage to ensure compliance with World Bank requirements.</p> <p>xi. Any other activities described under the key tasks in paragraph VI (b) 9 but not listed above.</p>
11	Capacity Building Expert	<p>Qualification- Master's in Social Science/ Engineering/ education or</p>	<p>i. Developing and implementing capacity building plan for the project.</p> <p>ii. Co-ordinate preparation and refine project manuals, training materials.</p>

		<p>other related fields. Must be computer literate in the use of work processor, spread sheets and any other applications used in the Social Development applications.</p> <p>Experience- 10 years' experience in the coordination and administration of small projects in an international organization or non-governmental organization. Proven experience in working with international organization. Experiences in communication with different categories of people, officials, mass media and NGO representatives and skills in organizing and coordinating diverse activities.</p>	<p>iii. Identify the resource persons, resource institute for delivering capacity building plan activities.</p> <p>iv. Develop capacity building plan for WUA and higher tire farmer organizations.</p> <p>v. Develop all communication materials and briefs for the project including posters for WUAs.</p> <p>vi. Undertake job mapping for all field staff and bring about role clarity for all field staff.</p> <p>vii. Carry out periodic training need analysis for all project staff.</p> <p>viii. Review all capacity building activities and implement activities for enhancing effectiveness of programs.</p> <p>ix. Coordinate all staff exposure visits, workshops, seminars and other capacity building events.</p>
12	Sub- Assistant Engineer	<p>Qualification- Diploma or equivalent in Mechanical/ Civil/ Agriculture Engineering from a recognized institution approved under AICTE.</p> <p>Experience- 3 years experiences in the rank of SAE or equivalent rank in Govt./ Semi-Govt./ recognized organization</p>	<p>i. Be associated with the preparation of different bid documents;</p> <p>ii. Assist preparation of technical feasibility report of MI schemes covering all criteria of social, environment and hydrological as per guidelines framed by the consultant;</p> <p>ii. Assist examining sustainability of Minor Irrigation schemes based on need assessment and economic viability;</p> <p>v. Assist preparation of the training module and organizing training programs for departmental officers, staff and Water Users Association (WUA) for their capacity building;</p> <p>v. Assist in preparation of reports/returns to be submitted to World Bank and Water Resources Investigation & Development Department.</p>

13	Administrative Officer	<p>Qualification- MBA or Post Graduate in Science / Arts/ Commerce. Diploma in Personnel Management preferable.</p> <p>Experience- 10 years experiences in Govt./ Semi-Govt./ technical institutions in senior position in administration. Must have adequate knowledge in West Bengal Service Rules.</p>	<ul style="list-style-type: none"> i. Coordinate activities of the SPMU team as a whole including personnel under consultants as well as governmental staff and assist Project Director in monitoring timely outputs; ii. Prepare on a quarterly basis, a statement of uses of funds, reflecting activity-wise expenditure (for the quarter/year/project to date) in the indicative format attached for purposes of financial monitoring; iii. Monitor office administration under Project Director; iv. Maintain liaison with Govt. in regard to service matters; v. Maintain Personnel Files of officers and staff. vi. Any other activities described under the key tasks in paragraph VI (b) 1 but not listed above.
14	MIS Manager	<p>Qualification- Must have a Bachelor's Degree in Information Technology or equivalent with major in Quantitative methods.</p> <p>Experience- 2 years proven experiences in working on the planning and implementation of development projects, including specific experience in MIS/G-MIS for development projects.</p> <p>Desirable to have extensive field experience and domain knowledge of the irrigation and Agriculture sector and GIS system.</p>	<ul style="list-style-type: none"> i. Design and implement integrated MIS system, in collaboration with external consultants; ii. Develop systems for systematically capturing data requirements to track field implementation progress, process and results; implementation issues, Management response and actions taken on M&E reports, Audit reports and Complaints received; iii. Provide technical support to ensure the timely production and dissemination of user-friendly monthly progress, Process and Results (Intermediate Outcome) reports to Project management, which the MLE Coordinator will use to highlight issues and actions to be taken by Project management; iv. Oversee the work of MIS External Consultants, including design of the MIS/G-MIS system, procurement of software, imagery and data sets as needed for Project implementation support and program evaluation; v. Design data entry procedures for concurrent monitoring at all project locations and train data entry operators at all levels (SPMU, DPMU/SO) on this work; vi. Work closely with MLE Coordinator to design an integrated MLE/MIS system to support learning and Decision making by Project management, on all aspects of project performance including progress of financial, procurement, social and environmental issues, and continuing evaluation of project strategy and implementation; vii. Collaborate with Project's MLE Coordinator to produce bulletins and reports for regular dissemination, via website and other publications.
15	Data Entry Operator	<p>Qualification- Diploma in Information Technology.</p> <p>Experience- 2 years proven technical experiences of</p>	<ul style="list-style-type: none"> i. To routinely collect, sort, check and Monitoring and Evaluation data generated by designed for the Project's MIS-GMIS system, the Project's MLE system into prescribed format;

		working in a similar capacity on MIS/GIS systems for development projects. Exposure to rural development situations, including field experience of the Agricultural/ MI sector and GIS system is preferable.	<ul style="list-style-type: none"> ii. To generate monthly, periodic and other occasional MLE/MIS reports as required, for use by the MLE Coordinator to report to Project Management; ii. To familiarize with field condition and spot check data as needs to understand and suggest modification as to how data pertaining to project performance in agricultural situation could be better collected, understood, processed and analysed to answer the queries of the MLE system.
16	Office Assistant	<p>Qualification- Graduate in Science / Arts / Commerce. Should be computer friendly and ready to work independently with MS office Packages and networking.</p> <p>Experience- 10 years' experience of working in Govt./ Semi-Govt./ reputed organization</p>	<p>Under the Administrative officer will:</p> <ul style="list-style-type: none"> i. Assist and Monitor office administration. ii. Maintain liaison with government in regard to service matter. ii. Maintain Personnel Files of Officers. v. Maintain other files as and when required. v. Undertake additional duties as reasonably assigned.
17	Office Attendant	<p>Qualification- Passed Secondary Education.</p> <p>Experience- 1 year experience of working in Govt./ Semi-Govt./ private organization office as office attendant.</p>	<p>Attending placement of files, letters, documents, etc. between office staff, maintaining files, delivery and collection of documents from other offices, photocopying documents, attending staff welfare activities and other miscellaneous jobs as directed by the Administrative officer</p>
18	Agriculture Coordinator	<p>Qualification- Bachelor Degree in Agriculture Science (Master Degree in Agriculture Science is desirable)</p> <p>Experience- 10 years in implementing agricultural extension and development</p>	<p>Will act as a support officer of the state nodal unit, visit work sites and assist the nodal officer in implementing and monitoring the project works. Compile and prepare reports that are received from the districts. Shall keep liaison with DPMU, District Agriculture Officer and support organizations and work on behalf of the nodal officer.</p>

		projects.	
19	Horticulture Coordinator	Qualification- Bachelor Degree in Agriculture/ Horticulture Science. Master Degree in Agriculture/ Horticulture Science is desirable. Experience- 10 years in implementing horticulture extension and development projects.	Will act as a support officer of the state nodal unit, visit work sites and assist the nodal officer in implementing and monitoring the project works. Compile and prepare reports that are received from the districts. Shall keep liaison with DPMU, District Horticulture Officer and support organizations and work on behalf of the nodal officer.
20	Fisheries Coordinator	Qualification- Bachelor Degree in Fishery Science / Science with Hons in Zoology having specialization in fisheries. Exposure to computer application is essential/ Master Degree. Experience- 10 years in fisheries project works, fisheries package of practices in inland fisheries / aquaculture in West Bengal or similar geographical and environmental conditions.	Will be responsible for: i. Appraisal of the details of water bodies, ii. Rendering technical services to the farming communities, ii. Liaison with SPMU and DPMU, iv. Covering backward and forward linkages, v. Collection of data on production and technological assessment, vi. Preparation of training manual and publication matters, ii. Assistance to monitoring and evaluation works, ii. Preparation of reports, returns, ix. Coordination of district level activities and program implementation, x. Documentation, economic analysis, technological refinement approach etc. xi. Support to the Nodal Officer in project implementation.
21	Accountant cum Computer Operator	Qualification- Bachelor Degree in Commerce with Degree / Diploma in Computer Application. Experience- 3 years in keeping and maintaining accounts and data operating.	Will be responsible for: i. Assisting nodal officer in computer related works, ii. Maintenance of accounts, final records, cash book entries and updating related registers, ii. Preparation of computer generated reports on line activities build up and financial analysis, iv. Coordination with SPMU, DPMU nodal state units on financial and administrative matters. v. Formation of management information system and disposal of day to day work including receipt and issue documents.

22	Geo Physicist	M.Sc. in Geo Physics. 10 years' experience in the relevant field.	<ul style="list-style-type: none"> i. Acquisition of geophysical data in the field. ii. Supervision of Geophysical Technicians in the field. iii. Preliminary reduction and processing of geophysical data. iv. Show an awareness of the implementation of project risk control and risk management. v. Collection, quality control, data processing and interpretation of the near-surface geophysical techniques. vi. To organize & carry out ground geophysical survey specially magnetic and resistivity, To interpret and facilitate interpretation of field observation data including the multichannel, aeromagnetic maps, To apply software and interpret. vii. Competent at writing technical / interpretative reports and / or papers. viii. Assist with training and development of junior staff.
23	Agri-business Specialist	B.Sc. (Agriculture) with five years' experience in marketing / Commercial agriculture.	<ul style="list-style-type: none"> i. Lead project development and strategic support in a wide variety of areas, including value chain development and upgrading strategies, improving access to agricultural inputs, agricultural extension, marketing. ii. Oversee the agricultural programs in the State, focusing on value chain upgrading. iii. Facilitate market driven linkages between agribusiness producers, wholesalers, processors. iv. Meet and liaise with Agriculture Coordinator, Horticulture Coordinator, Fisheries Coordinator in Agri Business. Interaction with interested business and coordination with concerned stake holders. v. Attend relevant meetings, technical working groups, conferences etc to share knowledge, coordinate programs to promote Agriculture produces. vi. Supervise, guide and support the District Agriculture Specialists in conducting preliminary screening of grant applications against criteria from enterprises and agri business in regional and district level. vii. Conduct workshops for agri business stakeholders in each district on the preparation requirements for agri business plans. viii. Conduct workshops for the district NGO service providers on the preparation requirements for agri business plan. ix. Based on agribusiness interest and opportunities to promote agri business trade, organize and implement regional trade fairs and product promotion events.
24	Planning & Design Engineer	Qualification and Experience- Bachelor Degree in Civil Engineering	Overall Planning and designing of surface and ground water schemes from SPMU. Quality control and Quality assurance for all ongoing works.

		<p>from a recognized institution. Experience: At least 10-12 yrs. experience in planning & designing, specification, estimation on advance technology application for developing surface and ground water minor irrigation schemes. Experience of using AutoCAD, GIS, remote sensing will be the advantage. Understanding of geohydrology and experience of working in West Bengal will be preferred.</p>	
25	<p>Planning & Design Engineer</p>	<p>Qualification and Experience- Bachelor Degree in Civil Engineering from a recognized institution. Experience: At least 6-8 yrs. experience in planning & designing, specification, estimation on advance technology application for developing surface and ground water minor irrigation schemes. Experience of using AutoCAD, GIS, remote sensing will be the necessary requirement. Understanding of geohydrology and experience of working in</p>	<p>Planning and designing of surface and ground water schemes of the designated geographical area. Quality control and Quality assurance for all ongoing works</p>

		West Bengal will be preferred.	
26	Project Program Promoters (agriculture) (36)	Minimum Qualification-BSc in Agriculture and Desirable- MBA Agribusiness	Implementation of Agriculture Support services activities in the subdivision includes Demonstrations, Farmer Field school and dissemination of good agriculture practices
27	Project Program Promoters (Fishery) (7)	Minimum Qualification-BFSc/BSc Fishery/Industrial Fishery with 2-3 years' experience and Desirable- MBA Agribusiness	Implementation of Agriculture Support services activities in the subdivision includes Demonstrations, Capacity building and dissemination of good practices

*These positions are dropped from the list as they may not be required in the present project context.

** These positions are intermittent

Job Description of Contracted Staff at DPMU

Sl. No.	Position	Key Qualification and Experience	Main Responsibilities
1	Program Coordinator	Qualification- Master Degree in Information Technology or equivalent. Experience- 10 years proven experience as management coordinator	i. Coordinate between DPD (Technical), DPD (Administration) and the consultants' team for day to day management of the project at the District level. ii. Act as distribution point for transferring various reports related to DPMU. iii. Provide effective, reliable administrative support.
2	Institutional Development Specialist	Qualification- Post Graduate in Social Science/ Science or Bachelor in Engineering or any other related field. Must be computer literate in the use of work processor, spread sheets and any other applications used in the social development applications. Experience- 10 years general work experience, particularly with multi-sectorial development agencies/ NGOs/ Consultants / Govt. organizations in participatory development approaches. Desirable- Experience of working in community mobilization and Rural development projects preferably in water sector with external agencies like World Bank or ADB etc.	i. Assist DPMU in community mobilization and formation and capacity building of community based institutions, in particular WUAs in coordination with DWRID, line departments, NGOs and SOs and the ID Coordinator of SPMU. ii. Conduct workshops, exposure visits and capacity building for representatives of DPMU and line departments as well as SOs effort in capacity building of community based institutions. iii. Identify and / or develop relevant training materials and orientation briefs on community development aspects of each sector and as required by the project. iv. Assist DPMU in formation of effective institution in implementation of social resettlement plan and environmental mitigation plan in collaboration with social and environmental experts and the ID Coordinator of SPMU. v. Monitor the project from community development perspective and generate reports as required

3	Procurement Engineer	Qualification- Bachelor Degree in Engineering. Experience- 3-5 years' experience in procurement activities like preparation of bidding documents, bid evaluation etc. Knowledge in application of World Bank procurement guide lines and consultant selection process is desirable.	i. Prepare terms of reference for procurement of works, goods and services including consultants. ii. Evaluate bids by applying procurement guidelines prepared for the project iii. Coordinate with project implementation.
4	Surveyor	Qualification- Diploma/ Certificate in Survey. Experience- 5 year's knowledge in survey works with knowledge in Auto Cad.	i. Preparation of base map of project area showing various land features. ii. Surveying of command area as well as catchment area where required for minor irrigation scheme which includes contour survey and contour map preparation, preparation longitudinal and cross sectional profile. iii. Should be well conversant with modern surveying instruments like total station, preparation of digitized of survey maps and reports. iv. Laying out of plan as per drawing in field. v. Carry out pre and post level work. vi. Any other responsibility, which may be assigned from time to time.
5	Agriculture Specialist	Qualification- Master Degree in Agriculture Science. Experience- 5 years in implementing agricultural extension and development projects. Experience in internationally funded agricultural project desirable.	i. Planning the agriculture support activities at district level in collaboration with Agricultural Specialist of SPMU. ii. Coordinating the resource agencies at district level. iii. Guiding the DPMU in preparation / monitoring of district level / MI scheme level agricultural plans. iv. Organising the trainings for project staff v. Monitoring of project related activities and implementation through regular field activities. vi. Any other responsibility, which may be assigned from time to time.
6	Environment Specialist	Qualification- Bachelor Degree in Engineering/ Master Degree in Science with Post Graduate Degree / Diploma in Environmental science. Experience- 10 years'	i. Carryout implementation of EMP and assist the Environment Specialists of SPMU in data collection and performing following tasks pertaining to the district; ii. Coordinating with the statutory agencies and provide necessary support to SPMU / DPMU / NGOs in securing regulatory clearance such as Environment, Forest or consents from WBPCB and other agencies.

		<p>experience in environmental management with at least 5 years in carrying out initial environmental assessment, Environmental impact assessment and environmental management plans.</p>	<ul style="list-style-type: none"> iii. Participating in the progress review meeting of the DPMU and provide advice on environmental aspects of the respective projects during implementation. iv. Coordinating with the Quality Auditors and consultants/ agencies of the project at DPMU and ensure that the environmental aspects related to the task of respective agencies are performed as per the Environment frame work of the project. v. Maintaining a data base in a standard form on the status of various environmental activities of WBADMIP (clearance, compliance, EA reports, progress reports etc.) and update the same on regular basis. vi. Preparing and submitting monthly progress reports to the Govt. of West Bengal and the quarterly progress reports to the World Bank, on all the aspects related to environmental management in WBADMIP. vii. Environmental capacity building and conducting training programs on Environmental code of Practices (ECoP), preparation of EMP, etc. through conducting workshop/ seminar at state and district level. iii. Conducting environmental audit, evaluation of EMP implementation, dam safety, Bio-village publicity campaign & implementation, intensification of bio pesticides production through NGOs, etc.
7	Data base Manager	<p>Qualification- Bachelor Degree in Information Technology. Experience-3 years in the relevant field.</p>	<ul style="list-style-type: none"> i. Data Manager would be responsible primarily for developing data collection and data management protocols, ensuring data quality and coordinating with DPMU staffs, support organisation and MLE team SPMU. ii. Developing protocols, tools and procedures for data collection and management; iii. Manage documentation of collected data and ensuring data quality monitoring; iv. Managing and analysing large and multiple data sets. v. Ensure field data is gathered and registered. Ensuring the quality of data entered and helping to produce initial statistical analyses. vi. Obtaining all data from primary sources as stipulated in the M& E plan for their collation and analysis at the M&E office. Analysis, extraction and computer entry of data from field reports vii. Timely and regular updating of Project MIS system. Preparing and generating reports as desired and needed by the DPMU and SPMU. iii. Maintain data backup and implement database storage procedure on regular basis. ix. Supervising and training data management and research teams under the guidance of Programme Coordinator and District project director. x. Perform any other task as assigned by the District project director.

8	Data Analyst	<p>Qualification- Graduate in Science/ Arts/ Commerce.</p> <p>Experience- 2 years in the relevant field.</p>	<ul style="list-style-type: none"> i. In collaboration with Database manager maintain databases and data systems necessary for projects and department functions. ii. Acquire and abstract primary or secondary data from existing internal or external data sources iii. In collaboration with others, develop and implement data collection systems and other strategies that optimize statistical efficiency and data quality. iv. Perform data entry, either manually or using scanning technology, when needed or required v. In collaboration with others, interpret data and develop recommendations based on findings vi. Develop graphs, reports, and presentations of project results vii. Perform basic statistical analyses for projects and reports viii. Create and present quality dashboards ix. Timely and regular updating of Project MIS system. Preparing and generating reports as desired and needed by the DPMU and SPMU. Generate routine and MIS reports. x. Perform any other task as assigned by the District project director.
9	Office Assistant	<p>Qualification- Graduate in Science/ Arts/ Commerce.</p> <p>Should be computer friendly and ready to work independently with MS packages and networking</p> <p>Experience- 5 years in Govt/ Semi Govt / Reputed Organization.</p>	<ul style="list-style-type: none"> i. Monitor office administration. ii. Maintain liaison with government in regard to service matters. iii. Maintain personal files of officers. iv. Maintain other files as and when required. v. Undertake additional duties as reasonably assigned.
10	Fisheries Specialist	<p>Qualification- master Degree in Fisheries Science with specialization in Fish and Fisheries aquaculture of any relevant field.</p> <p>Experience- 5 years in the field of aquaculture and inland fisheries extension. Experience in externally funded fisheries project desirable.</p>	<p>Capacity building of stakeholders in the fisheries sector through raising awareness and training communities on improved techniques and practices of reasonable fisheries and post-harvest management of fish at district level in collaboration with the Fisheries Coordinator of SPMU.</p>

11	GIS Specialist	<p>Qualification- Bachelor Degree in Engineering with certification / Diploma/ Post Graduate Diploma in Remote sensing and Geographical Information System from any reputed institute with 2 years' experience in the same field. Or Master Degree in Geography or Geology with Certification/ Diploma / Post Graduate Diploma in remot sensing and Geographical Information System from any reputed institute with at least 2 years' experience in same field.</p>	<ul style="list-style-type: none"> i. Responsible for developing and maintaining geographic, political and environmental databases that are pertinent to the project. ii. Collection, storing, retrieving and analyzing the spatial and temporal data, help the management with statistics and map outputs for planning and monitoring of the developmental work, visit the field area to collect spatial data from the field and execution of any other GIS related work. iii. Specialist must design and update GIS databases using various mathematics techniques, such as coordinate geometry, conversion of vectors and real analysis. iv. Ability to work on various convention, GIS environments, & Auto CAD. Correction and integration into existing mapping products. v. Data Attribution, Geo referencing, Data Collection & the database preferred. Data inter-operation with existing data/maps. vi. Creation of topology and attaching attribution, Geo referencing etc. Interprets and transfers data from source documents vii. Rectifies images including geo referencing and image manipulation, point appurtenance features and polygon lease features, including attributes of same. viii. Coordinate the use of GPS field data and mapping systems ix. Work in conjunction with other team members to ensure data files are accurately built and loaded and project schedule deadlines are meet x. Ability to complete tasks within given time frame. Ability to adjust to changing priorities and meet deadlines. xi. Ability to work independently and as part of a team.
12	Sub assistant Engineers	<p>Bachelor Degree in Mechanical/ Civil/ Agriculture Engineering from a recognized institution or Diploma or equivalent in Mechanical/ Civil/ Agriculture Engineering from a recognized institution approved under AICTE with 3 years experiences in the relevant field</p>	<ul style="list-style-type: none"> i. Selection of MI Schemes in consultation with potential beneficiaries community of the project area ii. Assist preparation of technical feasibility report of MI schemes covering all criteria of social, environment and hydrological as per guidelines framed by the consultant; iii. Assist in preparation of detailed project reports/returns to be submitted to World Bank and Water Resources Investigation & Development Department. iv. Assist examining sustainability of Minor Irrigation schemes based on need assessment and economic viability;

Standard Facilities to be provided

S No	Items	No of Units
1	Office Space	For Project team
2	Table, Chair and cabinet	For all staff
3	Computer System	For all Staff Max-6
4	Laptop	For Assistant Engineers
5	Computer Printer	2-3
6	Photocopier cum Scanner	1
7	Internet facilities	For all Computers
8	Internet Dongal	Designated Officer
9	LCD Projector	1
10	Digital Camera	1
11	GPS System	1
12	Invertor	1
13	SIM with or without handset	For all Core and Contractual except support staff
14	Mobile handset with SIM	All SO Specialist and Community Workers except Office Manager
15	Total station/Auto level	1
16	Video Conference Facility	1

**It is suggested to ensure AMC for the computer systems and other items*

Job Description of SO Staff

Sl. No.	Position	Key Qualification and Experience	Main Responsibilities
1	Community Mobilization Specialist / Team Leader	<p>Qualification</p> <ul style="list-style-type: none"> • Master's degree in Sociology or equivalent <p>Experiences</p> <ul style="list-style-type: none"> • 5 years experiences in community mobilization with a background on social development skills (participatory assessment, participatory planning etc.). Experiences in working with a wide range of stakeholders, development agencies and NGOs are necessary. 	<ul style="list-style-type: none"> i. Lead the unit team of experts and community workers in the respective district(s) for in time delivery of assigned tasks. ii. Facilitate coordination between DPMU and other stakeholders i.e. line departments, SPMU, WUAs, etc. iii. Preparing district & unit level Annual Action Plan and accordingly implement, monitor and report to DPMU/PSMU. iv. Program Management v. Networking and Linkages with and other line departments in the districts vi. Community mobilization for WUA formation vii. Strengthening WUAs through formal & informal training viii. Identification of sites/villages and schemes for new sub-projects ix. Develop data base of potential villages and sub-projects x. Organize community level consultations using participatory tools
2	Agriculture & Water Management Expert	<p>Qualification</p> <ul style="list-style-type: none"> • Master's degree in Agriculture Science/Bachelor in Agriculture Engineering <p>Experiences</p> <ul style="list-style-type: none"> • 5 years experiences in water resource management. 	<ul style="list-style-type: none"> i. Carry out all agriculture, horticulture and fisheries support and advisory services to farmers through WUA. ii. Arrange for supply of inputs like seeds. iii. Promote organic cultivation, composting vermi compost. iv. Disseminate market related information for commodities.
3	Sub Assistant Engineer	<p>Qualification</p> <ul style="list-style-type: none"> • A Diploma holder in Agricultural/Civil/Mechanical/Electrical Engineering <p>Experiences</p> <ul style="list-style-type: none"> • 5 years experiences in minor irrigation works 	<ul style="list-style-type: none"> i. Assess technical feasibility of identified sub-projects ii. Facilitate WUAs on project's technical needs iii. Coordinate with DPMU for sub-project's DLIC approval iv. Prepare necessary reports

4	Training Coordinator and Facilitator	<p>Qualification</p> <ul style="list-style-type: none"> • Master's degree in Agriculture/Social Science. <p>Experiences</p> <ul style="list-style-type: none"> • 5 years experiences as Training Coordinator and Facilitator. 	<ul style="list-style-type: none"> i. Prepare capacity building plan for WUAs as well as field staffs after assessing training needs. ii. Organize training programs for WUAs and sub-committee members ii. Provide basic orientation to community workers about the project v. Assist team leader in delivering project needs v. Coordinating with WUAs and other stakeholders facilitating convergence vi. Development training material in accordance with ADMI project.
5	Community Workers	<p>Qualification</p> <ul style="list-style-type: none"> • Higher Secondary pass in Arts, Commerce or Science. <p>Experiences</p> <ul style="list-style-type: none"> • Minimum 1 year experience in Rural Development Project with good communication and community mobilization skill. 	<ul style="list-style-type: none"> i. Initiate discussion with newly identified villages for project awareness ii. Be regularly in touch with communities and organize them for sub-projects ii. Mobilize communities by organize sessions with WUAs and community members v. Ensure participation and involvement of all WUA stakeholders v. Facilitate WUA to implement SDMP vi. Strengthen WUAs through training/hand holding support for institution development, governance, record keeping, etc. ii. Be responsible for specific sub-project throughout 4 phases
6	Office Manager-cum Computer Operator	<p>Qualification</p> <ul style="list-style-type: none"> • Graduate with knowledge in Computer operation. <p>Experiences</p> <ul style="list-style-type: none"> • Minimum 1 year experience in data entry, record keeping and general office works. 	<ul style="list-style-type: none"> i. Collate data from the field and pass it on to DPMU/SPMU ii. Prepare monthly reports from the respective districts and submit to team leader for forward communication iii. Maintain all project related records of respective unit

Scope of NGO Services

A. Preplanning Stage

- In each scheme, a SO will first identify all minor irrigation sub project stakeholders and interact with them to familiarize with the project objectives, expected outputs and outcomes, and the processes of implementation;
- Will get engaged with the village communities to objectively assess the willingness and preparedness to participate in the project and the training needs;
- Will implement a mobilization process at the village level and will assist with formation of a WUA;
- Will also facilitate the induction of fishermen into scheme development where opportunities exist;
- Involve village level functionaries of line department;
- Facilitate to have an upfront commitment whereby the WUA commits to regular MOM of its scheme post-implementation and whereby DWRID commits to provision of technical support.

B. Planning Stage

- Collect requisite data through Participatory Rural Appraisal;
- Provide initial training to WUA members on minor irrigation management plan;
- Constitute sub committees on works, finance, monitoring and evaluation and training of water management;
- Provide training to all sub-committee members in their role function and responsibilities.
- Generate awareness among groundwater user group about project ground water intervention.
- Work with the WUAs to prepare brief scheme development and management plans (SDMP) with technical support from line departments and DPMU staff, which will identify and prioritize desirable interventions as well as describe cost estimates and implementation plans. The SDMP will include:
 - i. Scheme details that will be contracted out following agreed procurement procedures following a joint walk through of the proposed benefited area with cost estimates;
 - ii. Proposed developments for field and horticulture crops, and fisheries, where applicable;
 - iii. A livelihood development plan (LDP) covering field and horticulture crops, and fisheries, where applicable;
 - iv. Plans to deal with social and environment safeguards;
 - v. Training and capacity building needs;
 - vi. Estimates of annual management operation and maintenance (MOM) requirements; and
 - vii. Indicators and arrangements for participatory monitoring of project implementation progress and impacts.
- Assist DPMU in obtaining approval of MOM by the General Body of the WUA, review and consolidation, and ultimately, formal ratification by the DLIC.

C. Implementation Stage

- Organize and implement training programs for WUA to ensure that the WUA will become financially and technically sustainable.
- (xv) Motivate and build the capacities of the farmers in strengthening of their institutions and mustering farmers' participation in the project.
- Developed capacity of the WUA in effectively performing their roles in:
 - i. Collection of water charges;
 - ii. MOM of minor irrigation system;
 - iii. Water audit and water sharing (surface water and groundwater – wherever planned);
 - iv. Promoting agricultural growth and minor irrigation based livelihoods;
 - v. Resource mobilization and management;
 - vi. Effective participation of the WUA in planning, implementation and monitoring of the project activities;
 - vii. Assessing training needs & organize training using suitable method;
 - viii. Prepare and submit Reports (monthly, half yearly, and yearly) as necessary.
- Establish modalities for maintain accounts of WUA at respective Banks;
- Also organize and implement training programs for training the staff of DWRID to be better able to provide long-term support to and monitoring of WUAs.

D. Post Implementation Stage

- The SO shall start executing the activities envisaged in the post-implementation stage immediately on completion of the implementation stage scheme-wise and complete all within closing of the contract.
- All the activities as mentioned above will have to be carried out and maintained in liaison with the DPMU and respective sub-divisions of the schemes concerned.
- SO should work intensively at least for 6 months to ensure establishing systems in place and do necessary follow up during the project period for effective functioning of WUA. Capacity building on monitoring tools/methods, importance of their role in managing WUA operation, and hand holding support will be given. It should be made clear to them that there won't be further financial support available and WUA have to manage everything by their own.
- **Warranty services and insurance of equipment:** There may be possibility of damage and theft of pumps and other equipment's being used. Contractor will give the warranty on the scheme during project period. Beside warranty services, insurance of the equipment is an important initiative. SO and DPMU needs to take up the issue to concern insurance companies that helps WUAs from major loses.
- **Operation & Maintenance:** WUA starts operating the project after handing over process is over. This would require adequate knowledge for management, operation and maintenance of the whole setup. Refresher training has to be organized by SO for the WUA members and the executive committee along with operator. SO ensures the capacity building through training or exposure visit for the purpose. Time to time FGD can be organized to understand the role/responsibility in MOM for wider acceptance. WUA will maintain the records as Annexure IX (pump/irrigation logbook, operator logbook, stock book, season wise water charge collection record, cash book, etc).
- **Fixing of Water Charge and Collection:** SO facilitates strengthening of WUAs for fixing water charges, equitable & judicious water distribution. Over the period of operating the pump as per water use by members'; calculations is made in consultation with WUA/members on the

actual expenses and an average amount is fixed for the water users to pay the amount in certain interval i.e. monthly/quarterly/half yearly/annually or on hour basis. WUA can also study other functioning WUAs expenses and accordingly fix the water charge. Judicious and equitable use of water must be the concern for the members due to depleting water resources. Common understanding is generated so that all get adequate water without losing by default or maintenance reasons.

- **Arrangement of Operational Fund:** An arrangement for operation fund would help to run the sub-project without fail and contribute to MOM. SO motivates the water users/WUAs to consider management of the scheme and think of annual or half yearly or membership fee to organize the fund.
- **Annual Plan for WUAs:** A short term training can be arranged for WUA by SO to help them preparing annual plan. The plan will consist of activities on O & M, training program, WUA annual meeting, etc and budget. The other section would present the source of fund to meet the above expenses. Annual plan strengthens the WUAs to organize them and function in systematic way.
- **Agriculture Support Service (ASS):** This activity will be same as agriculture program section and continue in post planning phase. SO need to ensure that WUA must keep record of season wise all the beneficiaries' famers for their irrigated area, crop and production related information.
- **Refresher Training and Capacity Building:** Training to Line department: SO and line department's capacity building for quality service delivery and coordination needs regular interval training. SO trains line department personnel on long-term support to and monitoring of WUAs.
- **Refresher training for WUA Members:** Members of WUAs is to be nurtured to become independent in taking up their responsibility. They need continuous support till actually take charge. SO plays an active role in building the confidence among the members. Frequent sessions and training on different training requirement would facilitate the WUAs.
- **Monitoring and Reporting:** Work of SO will be time to time monitored by DPMU/SPMU against agreed task in the contract. This could be through monthly planning & review meeting at SPMU/DPMU, monthly progress reporting, field visit by SPMU/DPMU personnel, any other form of monitoring, etc.
- SO will submit monthly progress and financial report on its activity to SPMU through DPMU. Any communications, action plans, decisions from SO has to be discussed, agreed and jointly decided at DPMU. This must be routed through nodal officer or authorized official form DPMU to SPMU. All information given to SPMU by SO should be intimated to DPMU. Similarly submit progress as against annual action plan in quarterly basis and also submit half yearly and annual report as stated in contract for progress review.

Summary of MLE Project Activities

MIS

The MIS will be an important tool for project management. It will cover primarily the input and output monitoring. The input monitoring will be linked to financial performance. The project will develop a system of voucher based monitoring of inputs. Standard reports on inputs against the annual action plans will be produced and used by the project teams to assess the progress on inputs.

ii. Field Based Monitoring

Quality Monitoring: Monitoring of civil works for quality is one of the crucial requirements. At the same time, the challenge lies in introduction of concurrent monitoring during the construction phase and ensuring the feedback in timely manner. The project has planned to hire an external agency with mobile facility of works quality checking. The project will adopt the same system.

Random Verification of Information: These reviews will focus on understanding the critical processes as well as the progress of performance indicators. Field visits will also include random verification of the information of progress reports as well as understanding the sequencing of events. The progress reports data will be used to understand overall progress

Six-Monthly Progress Reports would be prepared covering the following:

- Up-to-date physical and financial expenditure data compared to annual and end-project targets;
- Updated Key Performance Indicators (KPI) compared to annual and end-project targets;
- Successes and problems encountered during the reporting period with suggested remedial actions;
- Socio-economic and environmental impacts of the project;

Joint Reviews: Joint reviews of the project will be undertaken on a six monthly basis wherein a number of stakeholders will participate to discuss progress and achievement of results compared to the action plan. The joint review teams will use quantitative input / output data from the MIS database, supported by analysis, as well as processing monitoring and other information.

Periodic Benefit Tracking (Longitudinal Study): Impact of the project on poverty status and changes will be covered through a longitudinal study on sample Mi schemes and households tracking. The longitudinal study will focus on detail understanding of progress and changes in the identified MI scheme by special and detail monitoring of result framework indicators. Specific support will be provided for comprehensive data gathering by installing measuring devices and introducing detail record keeping of physical aspects relating to water management, etc. The household information on cropping pattern in the command area, month, cropping conditions, income generated from MI scheme based livelihoods etc. will be collected on a regular basis (six monthly) to monitor these MI schemes and gain understanding of overall project results. The households in these MI schemes will be tracked over the entire project duration. The SPMU will develop the sampling methodology for the study.

Post Project Sustainability Monitoring: Each MI scheme is projected to go through a project cycle up to 30 months. This implementation arrangement provides an opportunity to understand the issues relating to post project sustainability. The MLE team will undertake monitoring of MI schemes after completion of works for the subsequent years throughout the project duration. Monitoring of these MI schemes will be done on a half yearly basis by the implementation team. It will focus on key post project sustainability indicators developed by the MLE team and will provide an insight into WUA self-management.

Theme Based Studies: The multi-disciplinary interventions under the project as well as the multi-stakeholder partnerships created thereby needs an in-depth understanding of various issues during the project cycle. Considering this need, the project will conduct a number of issue / theme based studies to gain a better understanding of the processes and outcomes involved and to learn from experience. These studies will directly contribute to the sum of information on the results / outcomes as well as newer dimensions of the project. The project would undertake, as appropriate, a focused study on themes and issues arising out of implementation processes to generate in-depth understanding of various issues. Process documentation on a regular basis during project implementation and monitoring will help to generate learning's for the project stakeholders and other interested parties.

Baseline Survey: A baseline survey will be undertaken by the project to understand the pre-project situation on key variables covering socio-economic dimensions as well as the environmental aspects. The baseline survey will not only cover the project areas but also relevant "Control Sites" which will be used to assess the incremental impact of project interventions vis-a'-vis generic growth influences over time. The MLE specialist will finalize the sampling method and sample size for the baseline survey covering MI schemes, villages and WUAs keeping in mind issues of statistical validity and operational feasibility. The baseline survey will be completed and a draft report prepared before the end of the fourth month after effectiveness of the project.

Impact Assessment: Two full-scale impact evaluation studies will be undertaken at mid-point of project implementation (Mid-Term Assessment Report) and at completion of project implementation (Final Assessment Report). The studies would include comparative analysis of performance in project areas with those of selected "Control Sites" in non-project areas.

Mid Term Assessment: The study would include an impact assessment of the project to date but also focus on implementation processes and recommend adjustments in the project design and / or implementation arrangements to overcome identified bottlenecks. The Assessment Report would be a comprehensive overall impact assessment including quantitative and qualitative assessment of progress against project development objectives. The assessment will include socio-economic and environmental impacts of the project.

Final Assessment: The Final Assessment will be taken up towards the end of project implementation. It will focus on understanding the outcomes of project interventions and effect of the same on the target population and compare these with the baseline situation to assess the effectiveness of the project in terms of physical infrastructure development, socio-economic changes, environmental impacts as well as institutional strengthening and decentralized management of assets by community members through WUAs. The study will also compare the results with the "Control" to have a realistic picture of project outcomes. The Final Assessment Report would be a comprehensive overall impact assessment including quantitative and qualitative assessment of progress against project development objectives. The study results will be useful to define the future course of action by DWRID on participatory management of MI schemes.

Both the impact assessment studies will update the financial and economic analysis of project returns undertaken at the start of the project. These assessments will also undertake analysis of issues relating to sustainability of project outcomes and impacts.

Social and Environmental Management Audits: The MLE team will undertake two audits during the project period to assess the progress in implementation of the Social and Environment Management Framework (S&EMF) of the project. These audits will focus on understanding the implementation and outcomes of the social and environment management measures proposed in various stages of project cycle and also changes that have occurred in the project villages with respect to key concerns identified by the S&EMF during project preparation. Two audits will be undertaken, one during the mid-term assessment of the project and second at the end of project period with the final assessment. The detailed design of the audit including issues to be covered will be prepared by the MLE team and submitted to DWRID and the World Bank for consent.

iii. Participatory Monitoring and Learning (PML)

Institution building along with irrigation infrastructure development is the prime focus of the project. The former includes the capacity building of WUAs and its functionaries in the overall management of the WUA as a organization and the MI scheme as a irrigation service. It includes institution management, MI scheme management (MOM), water management and agriculture management. The WUAs are expected to take over regular MOM of their MI schemes after its construction and mobilize resources from various sources, with major portion coming from water charges collection. Against this backdrop, it is essential that WUA becomes an active partner in the overall process. Participatory Monitoring is thus proposed as an instrument for facilitating active participation of WUAs in the overall process and continuing the same beyond the project with enhanced capacities.

Input Output Monitoring: The inputs provided in the project and the outputs achieved against them are monitored through an input output monitoring linked to MIS. The participatory MLE will also get linked to the outputs part of the MIS providing a prominent space to the WUAs in the monitoring framework. The WUA functionaries comprising of the Governing Body members, Sub-committee members and other users will participate in the PML activities. Transparency, performance assessment and lesson learning will be important aspects of the PML. The following two types of PML activities are proposed.

WUA Self Rating: WUA functionaries are required to perform different roles both on day to day basis and periodically. The functions are related to institution management, MI scheme management (MOM), water management and agriculture management. The functions to be performed by different WUA functionaries are broadly defined in the earlier chapter of the PIP. The project through specific interventions will target institutional strengthening of the WUAs, which will also require specific roles to be performed by the WUA functionaries. Self-rating will enable the WUAs to assess their own performance vis-a'-vis the functions related to the aforesaid areas.

The WUA self rating will be carried out through a quantified participatory assessment (QPA) tool to be developed by the SPMU in consultation with the WUA, SO and DPMU staff. The self rating tool will be designed keeping in view the simplicity in understanding, analyzing and awarding suitable marks by the WUA functionaries and other water users to their performance assessed as measurable indicators. Clearly measurable indicators will be identified to represent the different aspects of WUA performance such as WUA administration, MI scheme MOM, water management, agriculture management, scheme sustainability, etc. WUA self rating will be carried out on a half yearly basis

during the seasonal crop and irrigation planning exercise in a WUA General Body meeting.

Participatory Assessment and Cross Learning: Institutional strengthening of WUA is expected to result in the active participation of WUA in all stages of the projects, namely, pre-planning, planning, implementation and post-implementation. There will be well defined roles of the WUA in the implementation process enunciated for the project. These process steps will be sequential and follow a step-by-step approach linking them to specific milestones of the project cycle. The processes along with the outcomes are expected to result in the overall capacity building of the WUAs to manage conflicts among all the water users and thereby maximizing the utilization of the irrigation facility provided by the MI scheme. However, capacity building through training and exposure visits alone may not bring in the required change in the farmers unless the WUAs become a part of the learning process. Participatory Assessment and Cross Learning (PACL) provides the space and scope for the WUAs to learn and improve through collective action. The PACL exercise will enable a WUA to understand the project approach and strategy with focus on the role of the WUAs in resolving issues related to stakeholder identification and the project interventions proposed. It will examine the sequence of activities and achievement of the milestones as defined in the project implementation process and the SDMP. It will also throw light on understanding the different interventions proposed under the various project component in different MI schemes.

A simple QPA tool will be developed by the SPMU in consultation with the WUA and the SO and DPMU staff to be used by the WUA to carry out the PACL exercise. The PACL tool will facilitate the understanding on critical implementation issues by providing graded answers with marks allocated to each answer. WUA members will be encouraged to understand the status, discuss on issues and processes adopted and award marks accordingly to each item.

Assessment of WUA by Other WUA: It is proposed to involve WUA from one MI scheme to evaluate the performance of other WUA on an annual basis. This arrangement will provide a cross-learning opportunity to the WUAs. It will also help them to learn about the methodologies and processes adopted by other WUAs working in similar situations as well as presenting themselves to the other WUAs. The monitoring exercise will therefore be expected to result in exchange of ideas and learning among the project WUAs, while promoting constructive competition among them.

Operational plan for Project MLE

MLE Component	Type of Monitoring	Methodology	Who Leads	Who USE the Information	Links to Other MLE Components
Participatory monitoring at community level	Self-rating by WUAs	WUAs use the pictorial posters and rate their performance as per the measurement criteria (and booklets under preparation)	WUAs with support from Facilitating organization (SO)	WUA for actions planning, Project team, Joint Review teams	Joint monitoring reviews
	Annual review by WUAs	WUA of other MI areas will review the performance through QPA methodology	WUAs with SO, (NGO) and District MLE Officer for scheduling	WUA for learning from other WUAs,	Joint monitoring reviews
Quality Monitoring of works	Civil / Mechanical / Electrical works quality monitoring	Random site selection and quality monitoring checking through a well equipped mobile van. Quality monitoring done during the construction phase % sample sites will be covered.	External MLE agency	DLIC engineering staff, WUA	
MIS & GMIS		Finance linked voucher based monitoring of inputs, reports on inputs against the annual action plans on standard formats prepared output information collected through reporting formats based on the strategic result monitoring framework Web enabled system to facilitate data entry in www.wbadmip.org and access to information at various levels	State and district monitoring teams with support from Information Team of DLIC , MIS agency	Project staff at state and district level for progress monitoring and decision making, reporting	WUA self-rating, concurrent monitoring
Field Visit based monitoring -		work progress, sequence and process monitoring	External MLE agency	Project team to understand the Status and sequencing of events	
		Six monthly project review will be taken by State and District PMU to understand	State Level team drawn from PMU along with	Project teams, PMU & DPU and World Bank	Internal review Theme based studies

MLE Component	Type of Monitoring	Methodology	Who Leads	Who USE the Information	Links to Other MLE Components
		the progress and process of work based on MIS and GMIS report after the field visits mentioned above key performance indicators of result framework as well as Input-Output monitoring will be used.	District teams, NGOs, MLE resource person and World Bank team will participate in two events per annum as planned through external MLE agency		
	Sustainability monitoring	Six monthly monitoring of installed MI schemes on WUA functioning by the implementation team	DPU MLE officer and implementation team	WUAs, PMU, WRI&DD and World Bank	
Periodic review and tracking	Field survey and tracking of identified tanks and households	MI scheme level assessment and Household level survey of identified households to understand the impact of interventions and water inflows and outflows etc.	External MLE agency	Project teams, PMU & DPU and World Bank	
Theme based Studies	Issue and theme based studies	Themes identified based on project cycle and issues emerged from the results of baseline study, on-going monitoring, which require further investigation and research, issues arising during implementation on which managers require further insight,	PMU MLE team and contracted agencies	Results from thematic studies will be used to inform management on the topics and issues being researched in order to learn lessons from the experience and to improve the approach and results being obtained at operational, and governance levels	
Process Documentation	Participatory monitoring	Implementing team and MLE team will	Project team members,	Project teams, PMU & DPU and World Bank	Theme based studies, joint monitoring reviews

MLE Component	Type of Monitoring	Methodology	Who Leads	Who USE the Information	Links to Other MLE Components
		documents the field visits reports – with reasons of success, failures, gaps, case studies, documentation of proceedings of various meetings at state and district level. Analysis of the information generate to document the processes Specific subject experts visiting the field to understand critical processes and documentation of the same	external subject experts, resource persons etc.		
Baseline and Impact Evaluation	Baseline study	Initial study to be taken up in first four months of project initiation covering baseline situation of MI schemes, scheme stakeholders with respect to livelihoods and economic levels, issues relating to water management etc Control group also to be covered in the sample	External MLE Agency	Project teams, State and District Implementation Units and World Bank to refine the implementation strategy of the project and for use in monitoring and comparing changes through results monitoring framework	Mid Term and Impact Evaluation
	Mid Term Evaluation	Mid term review and learning of accomplishments of the project, constraints, gaps to achieve the objectives. Review of strategies for Implementation through field assessment on sample basis, social and environmental audit. An external agency in consultation with State and DPU staff household surveys, analysis of	External MLE Agency	Project teams, PMU & DPU and World Bank to plan for midcourse corrections and finalizing future implementation strategies	Baseline Study Impact Assessment

MLE Component	Type of Monitoring	Methodology	Who Leads	Who USE the Information	Links to Other MLE Components
		project information and consultative workshops			
	Impact Evaluation	Study to be taken up at the end of project covering sample tanks including control group and assess changes with respect to baseline situation, identify areas for sustaining the changes and social & environmental audit	External MLE Agency	WRI&DD, WUA, and the government staff and World Bank for generating learning for future planning	Baseline study and Midterm evaluation

Results Chain

Table 1: Data Table for M&E Indicators-Activity

Sl. No.	Indicator Name	Method of Collection	Level at which Monitored	Frequency of Monitoring	Responsibilities	Whether Integrated into MIS
A	Component A					
1	No of sites identified	Progress reports	Village	Monthly	SO	Yes
2	Awareness Building Camp	Mobile App	Village	Real time	SO	Yes
3	Community Training	Mobile App	Village	Real time	SO	Yes
4	Cluster Level Training	Mobile App	Cluster	Real time	SO	Yes
5	Exposure Visit	Mobile App	Cluster	Real time	SO	Yes
6	No of Tribal Villages covered	PR format	District	Monthly	SO	Yes
7	No of women development program	PR format	District	Monthly	SO	Yes
8	Proposed no of women in Management Committee	PR format	WUA	Monthly	SO	Yes
9	Proposed no of women in Sub-Committee	PR format	WUA	Monthly	SO	Yes
10	No of WUA formed	PR format	District	Monthly	SO	Yes
11	No of Management Committee formed	PR format	District	Monthly	SO	Yes
12	No of Sub-committee formed	PR format	District	Monthly	SO	Yes
13	No of Tribal WUA formed	PR format	District	Monthly	SO	Yes
B	Component B					
1	No of Selected villages	PR format	District	Monthly	DPMU	Yes
2	No of Selected schemes	PR format	District	Monthly	DPMU	Yes
3	No of SDMP Prepared	PR format	District	Monthly	DPMU	Yes
4	No of Completed MI Scheme	PR format	District	Monthly	DPMU	Yes
5	No of Handed over schemes	PR format	District	Monthly	DPMU	Yes
C	Component C					
1	No of Agriculture Demonstration	PR format	WUA/Scheme	Monthly	SO	Yes
2	No of Horticulture Demonstration	PR format	WUA/Scheme	Monthly	SO	Yes
3	No of Fishery Demonstration	PR format	WUA/Scheme	Monthly	SO	Yes

Sl. No.	Indicator Name	Method of Collection	Level at which Monitored	Frequency of Monitoring	Responsibilities	Whether Integrated into MIS
4	No of Demonstration Plot (Tribal)	PR format	WUA/Scheme	Monthly	SO	Yes
5	No of Farmer Field Day	PR format	WUA/Scheme	Monthly	SO	Yes
6	No of Community Training/FFS	PR format	WUA/Scheme	Monthly	SO	Yes
7	No of Lead Farmer training	PR format	WUA/Scheme	Monthly	SO	Yes
8	No of Exposure Visit	PR format	WUA/Scheme	Monthly	SO	Yes
9	No. of Producer Company formed	PR format	WUA/Scheme	Monthly	SO	Yes
D	Component D					
1	No of Contracts signed	PR format	Unit level	Monthly	DPMU /SPMU	Yes
2	No of Meetings / Workshops conducted	PR format	Unit level	Monthly	DPMU /SPMU	Yes
3	No of Trainings	PR format	Unit level	Monthly	DPMU /SPMU	Yes
4	No of Exposure visits	PR format	Unit level	Monthly	DPMU /SPMU	Yes
5	Monitoring & Documentation system developed	PR format	Unit level	Monthly	DPMU /SPMU	Yes
6	Recruitment of SPMU/DPMU Staff	PR format	Unit level	Monthly	DPMU /SPMU	Yes
7	Human Resources placement	PR format	Unit level	Monthly	DPMU /SPMU	Yes
8	Financial expenditures	PR format	Unit level	Monthly	DPMU /SPMU	Yes

Table 2: Data Table for M&E Indicators- Process

Sl. No	Indicator Name	Method of Collection	Level at which Monitored	Frequency of Monitoring	Responsibilities	Whether Integrated into MIS
A	Component A					
1	No. of Villages identified	PR format	Village	Annual	SO	Yes
2	No. of site identified	PR format	Village	Annual	SO	Yes
3	No. of farmers attended awareness program	PR format	Village	Annual	SO	Yes
4	No. of SDMP submitted	Document	WUA/Village	Once	SO	Yes
5	(Avg.)No. of farmers attended training,	PR format	WUA	Monthly	SO	Yes
6	(Avg.)No. of farmers attended exposure visits (@WUA)	PR format	WUA	Monthly	SO	Yes
7	No. of tribal dominated WUA formed	PR format	WUA	Monthly	SO	Yes
8	(Avg.)No. of tribal attended training, awareness, exposure visit	PR format	WUA	Monthly	SO	Yes
9	(Avg.)No. of women attended training, awareness, exposure visit (@ WUA)	PR format	WUA	Monthly	SO	Yes
10	(Avg.) no. of women members in sub committees (@ WUA), avg. attendance of women/tribal in meetings	PR format	WUA	Monthly	SO	Yes
11	No of WUA registered	PR format	WUA	Monthly	SO	Yes
12	Avg. no. of meeting held in a year per WUA	PR format	WUA	Monthly	SO	Yes
13	Avg. attendance @ meeting	PR format	WUA	Monthly	SO	Yes
14	No. of WUA maintaining cash book, log book, meeting register	PR format	WUA	Monthly	SO	Yes
B	Component B					
1	No of Technically feasible scheme	TFR format	Subproject	Once	DPMU	Yes
2	No of DLIC Meetings	PR format	Subproject	Once	DPMU	Yes
3	No of Procurement of Schemes Started	PR format	Subproject	Once	DPMU	Yes
4	No of Procurement Completed	PR format	Subproject	Once	DPMU	Yes
5	No of Ongoing Construction of MI Scheme	PR format	Subproject	Once	DPMU	Yes
6	No of Ongoing functional Schemes	PR format	Subproject	Once	DPMU	Yes
C	Component C					
1	(Avg.)No. of farmers involved in Demonstration plot (@ plot)	PR format	Subproject	Monthly	SO	Yes
2	(Avg.)No. of tribal involved in demonstration (@ plot)	PR format	Subproject	Monthly	SO	Yes

Sl. No	Indicator Name	Method of Collection	Level at which Monitored	Frequency of Monitoring	Responsibilities	Whether Integrated into MIS
3	(Avg.)No. of women involved in demonstration (@ plot)	PR format	Subproject	Monthly	SO	Yes
4	(Avg)No. of WUA members adopted improved Agriculture technology (@scheme)	PR format	Subproject	Monthly	SO	Yes
5	No. of tribal/ women adopted improved Agriculture technology	PR format	Subproject	Monthly	SO	Yes
6	(Avg.)No. of farmers involved in Farmers field day (@ FFD))	PR format	Subproject	Monthly	SO	Yes
7	(Avg.)No. of women involved in FFD (@ FFD)	PR format	Subproject	Monthly	SO	Yes
8	(Avg.)No. of tribal involved in FFD (@ FFD)	PR format	Subproject	Monthly	SO	Yes
9	(Avg.)Attendance of farmers in FFS (@ FFS)),	PR format	Subproject	Monthly	SO	Yes
10	(Avg) attendance of women in FFS(@ FFS	PR format	Subproject	Monthly	SO	Yes
11	(Avg) attendance of tribal in FFS(@ FFS)	PR format	Subproject	Monthly	SO	Yes
12	(Avg.)Attendance of farmers in training (@ FFS))	PR format	Subproject	Monthly	SO	Yes
13	(Avg) attendance of women in training(@ FFS)	PR format	Subproject	Monthly	SO	Yes
14	(Avg) attendance of tribal in training(@ FFS)	PR format	Subproject	Monthly	SO	Yes
15	(Avg.)No. of farmers involved in exposure visit (@ visit,	PR format	Subproject	Monthly	SO	Yes
16	(Avg.)No. of women involved in exposure visit (@ visit)	PR format	Subproject	Monthly	SO	Yes
17	(Avg.)No. of tribal involved in exposure visit (@ visit)	PR format	Subproject	Monthly	SO	Yes
18	No. of Farmers have membership in FPC	PR format	Subproject	Monthly	SO	Yes
D	Component D					
1	No of Functioning Offices	PR format	Unit wise	Monthly	DPMU	Yes
2	No of ongoing contracts	PR format	Unit wise	Monthly	DPMU	Yes
3	No. of staff trained	PR format	Unit wise	Monthly	DPMU	Yes
4	no of staff attended exposure visit	PR format	Unit wise	Monthly	DPMU	Yes
5	Systems and procedures established (Physical/Financial/Monitoring)	PR format	Unit wise	Monthly	DPMU	Yes

Table 3: Data Table for M&E Indicators- Outputs

Sl. No.	Indicator Name	Method of Collection	Level at which Monitored	Frequency of Monitoring	Responsibilities	Whether Integrated into MIS
A	Component A					
1	No of effectively Functioning WUA	WUA Self rating tool	WUA	Six monthly	SO	Y
2	No of Tribal WUA functioning	MIS	WUA	Six monthly	SO	Y
3	Involvement of Women in decision making	MIS	WUA	Six monthly	SO	Y
4	Degree of farmers involvement in Subproject management	WUA Self rating tool	WUA	Six monthly	SO	Y
5	WUA Confidence level (subcommittee members, mainly) in managing scheme	WUA Self rating tool	WUA	Six monthly	SO	Y
B	Component B					
1	No of Completed Subprojects	Mobile App & Contractor	Scheme	MONTHLY	DPMU	Y
2	No of Beneficiaries covered	PR format	Scheme	Seasonally	DPMU	Y
3	Percentage no of tribal beneficiaries covered	PR format	Scheme	Seasonally	DPMU	Y
4	Percentage of women beneficiaries covered	MIS	WUA	Six monthly	SO	Y
5	Command area created	PR format	Scheme	Seasonally	DPMU	Y
6	Cumulative command area	PR format	Scheme	Seasonally	DPMU	y
7	Percentage of total completed MI Scheme functioning	PR format	WUA	Annual	SO	Y
C	Component C					
1	Increased Irrigated area-Kharif	PR format	Scheme	Seasonally	SO	Y
2	Increased Irrigated area-Rabi	PR format	Scheme	Seasonally	SO	Y
3	Increased Irrigated area-Pre Kharif	PR format	Scheme	Seasonally	SO	Y
4	Area under new crop	PR format	Scheme	Seasonally	SO	Y
5	Area under Good Agricultural practices (GAP)	PR format	Scheme	Seasonally	SO	Y
6	Area under Water Management practices	PR format	Scheme	Seasonally	SO	Y
7	Area under Vegetable Production	PR format	Scheme	Seasonally	SO	Y
8	Area under SRI practice	PR format	Scheme	Seasonally	SO	Y
9	Farmers Benefited from FPC	PR format	Scheme	Seasonally	SO	Y
10	No. of Farmers Producer Company functioning satisfactory	PR format	Scheme	Seasonally	SO	Y
D	Component D					
1	Monitoring Systems and procedure established	PR format	Unit level	Monthly	DPMU/S PMU	Y
2	Trained Human Resources	PR format	Unit level	Monthly	DPMU/S PMU	Y

Sl. No.	Indicator Name	Method of Collection	Level at which Monitored	Frequency of Monitoring	Responsibilities	Whether Integrated into MIS
3	Financial Expenditure	PR format	Unit level	Monthly	DPMU/S PMU	Y
4	Financial Expenditure on tribal	PR format	Unit level	Monthly	DPMU/S PMU	Y
5	Efficient and effective functioning of offices	Assessment	Unit level	Annual	DPMU/S PMU	Y
6	Fund Utilization	PR format	Unit level	Quarterly	DPMU/S PMU	Y

DECLARATION BY DONOR LAND DONATION TO THE GOVERNMENT FOR COMMON USE

Date: _____(June14,2013)

(Name of Department)

(Address)

Dear _____

Further to our ongoing discussions, this is the declaration, in good faith, acknowledged the terms and conditions of a land donation agreement under which [insert full legal name of individual(s) donating the land] (the "Donor") shall donate the land for establishing the pump house under "West Bengal Accelerated Development of Minor irrigation Project" for common use of beneficiaries as described in below: in point.1. here in (the "Land") to [insert full legal name of Government organization receiving the Land] on the following terms:

Bindings: This document is subject to the negotiation and execution of a land donation agreement as reasonably required for legal land transfer (the "Agreement").

The Land to be donated is legally described as:

(full legal description of Land and the part which donor wants to donate)

1. The Donor acknowledges and agrees that:

(a) The Donor is the legal, registered owner of the Land and has the right to donate the Land to the Government and the land is free from mortgage

(b) The Donor unconditionally donates the Land to the Government for common use of WUA

(c) The Donor undertakes to donate the Land to the government freely and voluntarily without any compulsion or coercion by any individual or organization; and

d) The donation of the Land is subject to acceptance by the Government (Department name??).

Signature of the Donor (s)

Signature of witness (S)

1. _____

1. _____

Tribal Village Identified by Government of West Bengal

Sl. No.	District	Total no. of Mouza	Total Area (sq. km.)	Total Population	Tribal Moujas (No.) (Tribal population 40% or more)	Tribal Mouja Area (Sq. Km.)	Tribal Population	Tribal % to total		
								Mouja	Area	Population
1	Darjeeling	708	3149	1609172	125	489.60	204167	17.65	15.52	12.69
2	Jalpaiguri	756	6227	3401173	205	2190.00	641688	27.12	35.16	18.87
3	Coochbehar	1208	3387	2479155	3	6.10	14246	0.25	0.18	0.57
4	Uttar Dinajpur	1504	3140	2441794	73	103.64	124865	4.85	3.30	5.11
5	Dakshin Dinajpur	1638	2219	1503178	312	394.56	242317	19.04	17.80	16.12
6	Malda	1798	3733	3290468	303	428.70	227047	16.85	11.49	6.90
7	Murshidabad	2210	5324	5866569	50	81.06	75953	2.30	1.52	1.29
8	Nadia	1346	3927	4604827	22	29.04	113891	1.76	0.74	2.47
9	24-Parganas (North)	1581	4094	8934286	22	80.42	198936	1.39	1.95	2.23
10	24-Parganas (South)	2139	9960	6906689	8	16.84	84766	0.37	0.17	1.23
11	Howrah	734	1467	4273099	-	-	19168	-	-	0.45
12	Hooghly	1915	3149	5041976	55	57.51	212062	2.87	1.84	4.21
13	Burdwan	2529	7024	6895514	113	197.29	441832	4.47	2.80	6.41
14	Bankura	3830	6882	3192695	29	68.61	330783	0.76	1.00	10.36
15	Purulia	2683	6259	2536516	718	1707.15	463452	26.76	27.27	18.27
16	Birbhum	2473	4545	3015422	202	442.94	203127	8.17	9.75	6.74
17	Purba Medinipore	3035	4295	4417377	376	442.12	26504	12.39	10.29	0.60
18	Paschim Medinipore	8701	9786	5193411	1952	2311.41	772177	22.43	23.61	14.87
Total		40788	88567	75603321	4568	9046.99	4396981	11.20	10.20	5.80

Source: WBADMI Project - Social Assessment Report

Villages having 40% or more of tribal population are considered as Tribal Villages in the Project.

Attachment 7.3

Total Financial Outlay of Project Dedicated for Tribal Development (source: Tribal Development Plan Main report, WAPCOS)

Sl. No.	District	Total No. of Mouza	Total Area (km ²)	Total Population	Total No. of ST Mouza	Total Area of ST Mouza (km ²)	ST Population	%age of ST			CCA Proposed to be Developed (in ha)			Developmental Cost (in Rs. Lakh)	
								Mouza	Area	%age of Population	Total	Proposed %age for ST	Proposed CCA for ST Mouza	Total	ST Mouza
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
1	Darjeeling	708	3149	1609172	125	489.6	204167	17.65	15.52	12.69	3071	18	723	2750	495
2	Jalpaiguri	756	6227	3401173	205	2190	641688	27.12	35.16	18.87	29650	35	10919	16730	5855
3	Coochbehar	1208	3387	2479155	3	6.1	14246	0.25	0.18	0.57	21550	* (1) 6	1688	13828	829
4	Uttar Dinajpur	1504	3140	2441794	73	103.64	124865	4.85	3.30	5.11	12212	* 6	901	8708	522
5	Dakshin Dinajpur	1638	2219	1503178	312	394.56	242317	19.04	17.80	16.12	3948	20	1156	4386	877
6	Malda	1798	3733	3290468	303	428.7	227047	16.85	11.49	6.90	13052	17	2839	9857	1675
7	Murshidabad	2210	5324	5866569	50	81.06	75953	2.30	1.52	1.29	2736	* (3) 6	164	2059	123
8	Nadia	1346	3927	4604827	22	29.04	113891	1.76	0.74	2.47	3960	* (3) 6	286	3426	205
9	24-Parganas (North)	1581	4094	8934286	22	80.42	198936	1.39	1.95	2.23	1260	* (3) 6	182	2491	150
10	24-Parganas (South)	2139	9960	6906689	8	16.84	84766	0.37	0.17	1.23	1320	* (2) 6	80	786	47

11	Howrah	734	1467	4273099	-	-	19168	-	-	0.45	720	* (-) 6	44	584	35
12	Hooghly	1915	3149	5041976	55	57.51	212062	2.87	1.84	4.21	4696	* (5) 6	199	2890	173
13	Burdwan	2529	7024	6895514	113	197.29	441832	4.47	2.80	6.41	8582	7	557	7766	543
14	Bankura	3830	6882	3192695	29	68.61	330783	0.76	1.00	10.36	8636	11	1865	16850	1853
15	Purulia	2683	6259	2536516	718	1707.1 5	463452	26.76	27.2 7	18.27	4200	28	2506	8595	2406
16	Birbhum	2473	4545	3015422	202	442.94	203127	8.17	9.75	6.74	8260	10	977	9260	920
17	Purba Medinipur	3035	4295	4417377	376	442.12	26504	12.39	10.2 9	0.60	3572	13	408	2983	387
18	Paschim Medinipur	8701	9786	5193411	1952	2311.4 1	772177	22.43	23.6 1	14.87	7476	24	2117	8003	1920
West Bengal		4078 8	88567	75603321	4568	9046.9 9	439698 1	11.20 %	10.2 2	5.80	13890 1		27611	12195 2	1901 5 say 1900 0

Note : * Minimum allocation for special component plan for ST as per existing norms of Govt. of West Bengal is 6% Highest value of col. Nos.

9,10 & 11 has been rounded off and noted in col. No. 13

Source: WBADMI Project - Tribal Development Plan Final Report

Rapid Environmental Checklist for Accelerated Development of Minor Irrigation

A. Location of the Sub-project:

Agro-climatic Zone:

Basin:

Sub-basin:

District:

Block:

Mouza:

B. Type of the Sub-project:

1. Surface flow scheme
2. River lift scheme
3. Water harvesting tanks
4. Water detention structures
5. Groundwater structures(specify type)
6. Pilot schemes (Drip, sprinklers and hydrams)

(Mention CCAs against each sub-project)

C. Existing Operative Projects in the Mouza and Their Types:

D. Climatic Conditions:

1. Rainfall (average annual rainfall in mm; break down for seasons (Nov-Feb, Mar-May and June- Oct if possible)
2. Temperature (Maximum and minimum)
3. Humidity (high and low)

E. Hydrogeology and Soils:

1. Hydrogeology (Types like hill tract, piedmont zone, Older alluvium, younger alluvium, hard rock, marginal strips, lateritic should be indicated)
2. Soils (Type, depth, structure, texture, water holding capacity, infiltration rate need be mentioned)

F. Environmental Surrounds the Site and Anticipated Potential Environmental Impacts

A	Environmental setting of the project	Yes	No	Remarks
	Is the sub- project located close to or within any of this environmentally sensitive area?			
	i. Protected areas like wildlife sanctuaries and national parks			If the answer is yes, specify the distance of the boundaries of such valuable environmental components from the proposed site
	ii. Reserved and protected forests			-do-
	ii. Ramsar wetland			-do-
	iii. Wetland with good population of wetland birds including waterfowls?			-do-

A	Environmental setting of the project	Yes	No	Remarks
	iv. Areas prone to depredation by wild elephant herds?			-do-
	v. Important sacred groves with rich biodiversity.			-do-
	vi. Cultural properties like Debbotor land, religious place of worship			
	vi. Archaeological remains and historical sites			-do-
B.	Potential environmental impacts			If the answer is yes against any of the listed items, suggest mitigation measures to reduce such impacts to acceptable levels
	Will the project cause?			
	i. Loss of precious ecological values as mentioned above			
	ii. Loss of cultural sites			
	iii. Disruption to local hydrology, flood and drainage			
	iv. Increased soil erosion and siltation			
	v. Pollution of soil and ground water from polluted run-off			
	vi. Excessive pumping of ground water leading to salinisation , arsenic and fluoride contamination			
	vii .Reduction of down stream supply during lean season			
	viii. Adverse impact on fisheries and downstream users			
	ix. Saline water intrusion into downstream fresh water system			
	x. Leaching of soil nutrients and changes in soil characteristics due to excessive application of irrigation water			
	xi. Increased incidence of waterborne and water related diseases			
	xii. Risks of public health due to increased use of pesticides and insecticides			
	xiii.. Increased local air pollution due to excavation, provision of haulage roads, transportation of construction of materials, disposal of solid waste and operation of construction equipments			
	xiv. Noise and vibration due to operation of drilling machines, generators ,concrete mixers and transportation fleet etc during construction and operation			

A	Environmental setting of the project	Yes	No	Remarks
	xv. Adverse visual impact in rural unspoilt landscape because of quarrying / borrow-pits			
	xvi. Unsanitary conditions because of setting up of workers camp			

G. Public Consultation

Consultation	Yes	No	Remarks
Whether consultations have been held with; i. Primary stakeholders mainly the beneficiaries of the sub-project? ii. Panchayat functionaries? iii. Agriculture Department functionaries at the Block level?			
Was such consultation held prior to selection of a site for sub-project?			
Whether any suggestion was received during such consultation?			Suggestions received need be specified
Was such suggestion incorporated at the design phase?			If the answer is no, reasons for non-incorporation may be spelt out.

H. Clearances / Permits Required Before Project Execution

Type of permit/ clearance	Yes	No	Remarks
i. Water abstraction			Permits are required from SWID
ii. Felling and removal of trees			From the Divisional Forest Officer
iii. No objection certificate from SPCB			NOC is required under the provisions of the Water Act and the Air Act
iv. Opening up new quarries			Short term mining lease is required from DM/DLRS of the district for new quarries
v. Disposal of spoils			Permission from local Panchayat samity or Municipalities
vi. Bank protection works			Permission from competent authority under the Department of Irrigation and Waterways

Submitted by:

Signature with name, designation and official seal:

Date:

Reviewed by:

Signature with name, designation and official seal

Remarks of the Reviewing Authority:

Environmental Monitoring Plan

Surface Water Monitoring for surface water based scheme						
Sl. No.	Monitoring Parameter	Monitoring Site Id.	Phase of monitoring (Construction/Operation)	Permissible Limit	Monitoring results	Proposed Action
1	pH			6-8.5		
2	Electrical Conductivity			25°C micro mhos/cm Max.2250		Beyond this limit subproject need to excluded as per screening criteria
3	Dissolved Oxygen			6 mg/l or more		
4	BOD			30 (3 days at 27°C), mg/l, max		
4	Nitrates			45 mg/l,max		
5	Phosphate			5 mg/l,max		
6	Sodium			200mg/l max		
7	Chloride			250mg/l,max		
8	Lead			0.1 mg/l		
9	Chromium			2 mg/l		
10	Boron			2 mg/l		
11	SAR			Max. 26		Beyond this limit subproject need to excluded as per screening criteria
12	Total Coliform					

Ground Water Monitoring for ground water based scheme						
Sl. No.	Monitoring Parameter	Monitoring Site Id.	Phase of monitoring (Construction/operation)	Permissible Limit	Monitoring results	Proposed Action
1	pH			6-8.5		
2	Electrical Conductivity			25°C micro mhos/cm Max.2250		Beyond this limit subproject need to excluded as per screening criteria
3	Dissolved Oxygen			6mg/l or more		
4	Nitrates			45 mg/l		

Ground Water Monitoring for ground water based scheme						
Sl. No.	Monitoring Parameter	Monitoring Site Id.	Phase of monitoring (Construction/operation)	Permissible Limit	Monitoring results	Proposed Action
5	Phosphate			1 mg/l		
6	Sodium			200mg/l		
7	Chloride			250mg/l,max		
8	Lead			0.05mg/l		
9	Chromium			0.05mg/l		
10	Fluoride			1.5 mg/l		Beyond this limit subproject need to excluded as per screening criteria
11	Arsenic			0.05mg/l		
12	Boron			2mg/l		Beyond this limit subproject need to excluded as per screening criteria
13	SAR			Max. 26		
14	Total Coliform			MPN/100ml shall be 10.0 or less		

Soil test/monitoring report			
Sl. No	Parameters	Unit	Location
1	pH		
2	Electrical Conductivity at 250C	µs/cm	
3	Sodium as Na	mg/kg	
4	Bulk Density	gm/cc	
5	Organic Matter	%	
6	Calcium as Ca	%	
7	Magnesium as Mg	%	
8	Sand	%	
9	Silt	%	
10	Clay	%	
11	Texture		
12	Water Holding Capacity	%	
13	Organic Carbon	%	
14	Nitrogen as N	mg/kg	
15	Phosphate as PO4	mg/kg	
16	Potassium as K	mg/kg	

Ground Water Level Monitoring								
SlNo	Monitoring Site / Well Id.	Pre-Monsoon Level		Monsoon Level		Post Monsoon Level		Proposed Action
		Date	Level in m	Date	Level in m	Date	Level in m	
1								
2								
3								
4								

Sand Filling of Abandoned Bore Wells during construction phase				
Sl. No.	Site Id.	Abandoned Bore Well No.	Cause for Abandoning	Proposed Action
1				
2				
3				
4				