(*4) BWDB Related Sub-Projects*

In total, there are 176 identified potential sub-projects related to BWDB. The related sub-projects:

- Either will utilize existing BWDB embankment and sluice gates with rehabilitation if needs.
- Or will improve inner or localized drainage and water storage of sub-project area utilizing BWDB flood embankment and sluice gate.

Care has been taken to ensure avoid change or duplication of existing BWDB and planned scheme concept. The sources of BWDB projects are:

- WARPO database
- BWDB Scheme Inventory System (SIS) database
- BWDB web site
- BWDB district offices
- Union Questionnaire
- JICA inventory and enumerator surveys
- UDCC consultation meetings
- DSSWRC consultation meetings

It is envisaged that for best functioning of small scale water resources sub-projects, large rivers or khals flowing through several unions or upazilas which are the ultimate receiving water bodies of the discharges from small scale sub-projects need to be improved under large scale project. BWDB is now submitting proposals for khal re-excavation (2 khlas within 1 upazila) under Food for Work program. The JICA Study Team has collected a list of the proposed khals. While implementing the small scale sub-projects, coordination with BWDB will be required to avoid any duplication.

7.2.2 Verification of Potential Sub-Projects

The identified sub-projects were all individual. After finalizing the identification of individual sub-projects from each union, upstream-downstream relation among the individual sub-projects have been verified and sub-projects with same hydrological unit and discharge outlets have been grouped into single sub-projects. The total area and boundaries of the identified sub-projects remains the same but the total number of 694 identified sub-projects reduced down to 593 verified sub-projects. Table A7.2.5 summarizes the verified potential sub-projects. In total, there are 171 verified potential sub-projects related to BWDB

The verified sub-projects ranges from a minimum gross area of 33 ha in Ghatail of Tangail to a maximum gross area of 5,938 ha in Gaffargaon of Mymensingh with a mean gross area of 784 ha. Total sub-project area is 465,174 ha. By type, DIWC constitutes the highest portion (27%) and CAD constitutes the lowest portion (<1%). Location map of the verified potential sub-projects are shown in Fig. A7.2.3.

Table A 7.2.5 Summary of Verified Potential Sub-Projects

District Name	Number of Sub-Project by Type									Number of Sub-Project by Area (ha)				Number of BWDB Related SP
	District	FM	DI	CAD	WC	FMDI	FMWC	DIWC	FMDIWC	< 1,000	1,000 ~ 1,500	1,500 ~ 2,000	> 2,000	
Jamalpur	64	20	6	0	1	10	0	14	13	47	11	4	2	13
Kishoreganj	123	16	7	0	24	9	4	38	25	107	7	2	7	29
Mymensingh	130	12	26	1	6	20	3	42	20	91	20	9	10	36
Netrakona	112	19	18	1	8	20	13	24	9	92	11	2	7	42
Sherpur	44	9	12	0	7	1	1	14	0	35	2	3	4	17
Tangail	120	15	31	0	11	20	3	25	15	98	12	4	6	34
Greater Mymensingh	**593**	**91**	**100**	**2**	**57**	**80**	**24**	**157**	**82**	**470**	**63**	**24**	**36**	**171**
Percent (%)	100.0	15.3	16.9	0.3	9.6	13.5	4.0	26.5	13.8	79.3	10.6	4.0	6.1	28.8

District Name	Number of			Area (ha)			
	Upazila	Union	Sub-Projects	Total	Maximum	Mean	Minimum
Jamalpur	7	68	64	51,620	2,647	807	100
Kishoreganj	13	110	123	80,326	4,127	653	64
Mymensingh	12	146	130	129,624	5,938	997	116
Netrakona	10	85	112	84,396	4,386	754	72
Sherpur	5	52	44	42,553	4,318	967	53
Tangail	11	101	120	76,655	3,974	639	33
Greater Mymensingh	**58**	**562**	**593**	**465,174**	**118**	**4,816**	**438**

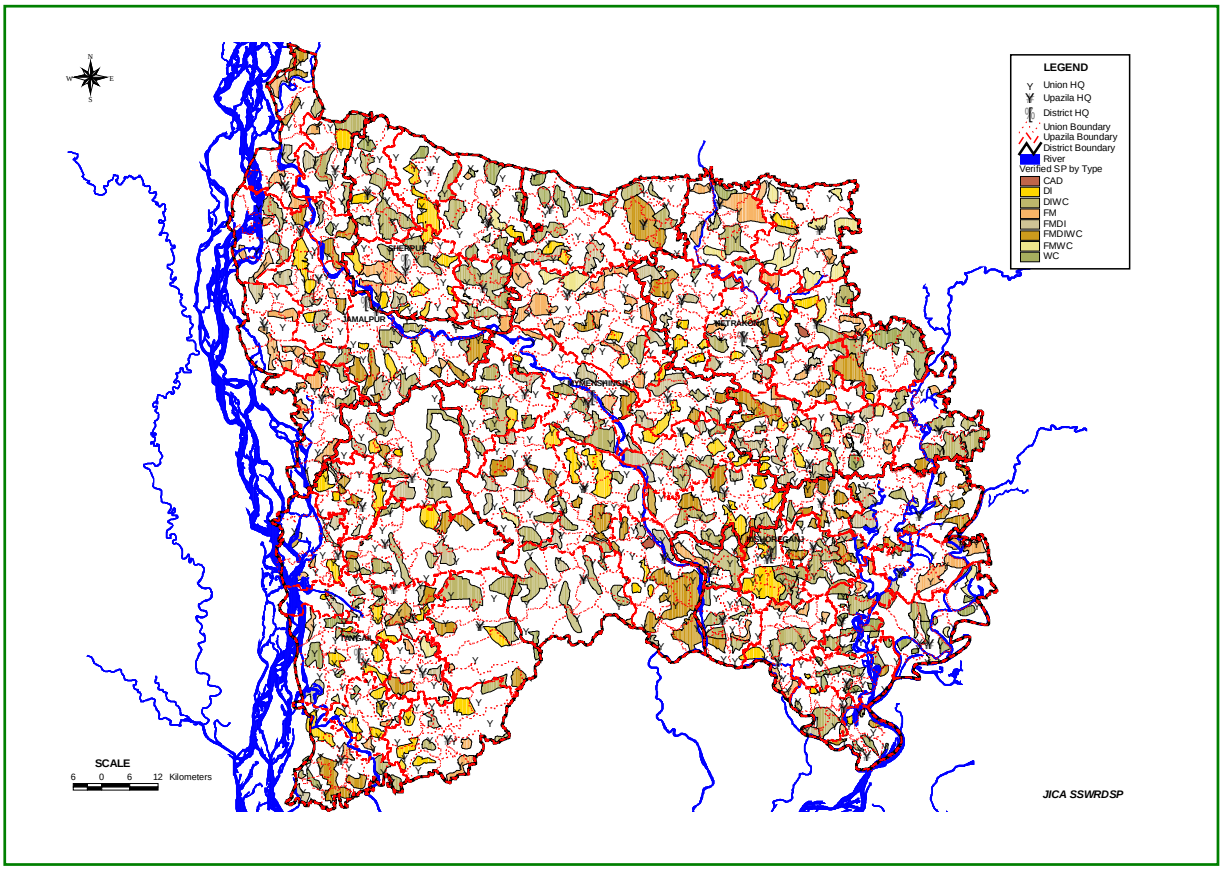


Fig. A 7.2.3 Verified Potential Sub-Projects

7.2.3 Qualification of Potential Sub-Projects

(1) Criteria for Qualification of Verified Subprojects

Under the NWPo, water resources development interventions with the benefiting are of 1,000ha or less are categorized as "Small-Scale". In this regard, all such interventions can be referred to as potential SSWRD subprojects. However, LGED has developed a set of selection criteria under the SSWRDSP-1 and 2 to qualify subprojects that are expected to be effective and efficient. This criteria covers a wide range of issues from economic viability / technical feasibility to social acceptability and environmental soundness.

In regard that the potential subprojects that are identified and prioritized under this study are to be implemented by LGED, and that the SSWRDSP-2 following its first phase is currently the only scheme under LGED to implement SSWRD subprojects, this criteria (or modified according to future needs) would be most appropriate in qualifying such potential subprojects.

However, in order to give concrete decisions on whether the potential subproject is fully qualified or not, analysis must be done in detail for each individual criteria. In regard that the Master Plan Study has not stepped in to the very details of the individual subprojects, but rather concentrated in collecting general but overall information to provide the directionality for SSWRD, it is not favorable to completely judge the potential subprojects at this stage, where those judged unqualified will be excluded from further examinations. In this regard, two fundamental criteria were applied for qualification (pre-screening) of the verified potential subprojects, while the remaining selection-criteria were considered later on for the prioritization of qualified subprojects.

The criteria applied were:

Selection Criteria for SSWRDSP-2

- The SP must be in line with district strategies and guidelines for SSWR and approved by DIAPEC
- More than 40 % of the SP benefited area will be operated by landless share croppers, marginal farmers
- No more than 30 % of the households depend on subsistence capture fisheries.
- Each SP will entail rehabilitation / upgrading of an existing water control system
- SP cost must not exceed $ 1000/ha for CAD and $ 500 for other schemes without ADB's prior approval.
- Benefited area served by the SP must be more than 50 ha and not exceed 1000 ha.
- Each subproject must be technically feasible; economically viable (EIRR > 12 %)
- Capacity of beneficiaries in ensuring the sustainability of submersible embankments must be shown for Interventions in the deeply flooded part of the Northeast Region
- The SP shall be environmentally sound and IEE/EIA study has to be undertaken and appropriately approved after consulting the beneficiaries and project affected people
- The SP shall be socially sound and require no or minimal displacement of people and land acquisition, and not involving sensitive areas
- Enrollment of 70 % of the direct beneficiary households as member of the WMA.
- Recurrent cost of subproject O&M shall be covered by beneficiaries through formulated WMA

Gross Subproject Area

National Water Policy limits 1,000 ha for small scale water resources sub-project. Since, the field survey by the JICA survey team only identified the gross areas of the sub-projects, an investigation has been made to approximate the relation between gross area and benefited area of identified potential sub-projects. Overlaying sub-project boundaries with settlement boundaries using geo-processing utility of GIS software, it is found that total settlement area comprises about 10% of total gross area of all the identified potential sub-projects. Considering other non-cultivable areas such as roads, forests and water bodies, it is inferred that for planning purpose, an area of 1,200 ha could be assumed as the limiting gross sub-

project area of which benefited area would be more or less 1,000 ha and could be considered for small scale water resources development.

Also taking into regard that the range of benefiting area as defined in SSWRDSP-2 is 50 to 1,000 ha, verified subprojects with the gross area falling outside of the range of 60 to 1,200 ha were excluded.

Overlapping with protected areas

In order to prevent obvious negative impact on the environment, implementation of subprojects in protected areas should be avoided. In this regard, verified subprojects located in Madhupur National Park and its buffer zone as defined by the Department of Forestry was excluded.

7.2.4 Prioritization of Potential Sub-Projects

(1) Prioritization Method

After qualification, the potential subprojects were prioritized and categorized into four categories (A, B, C and D) according to their priority. This was done by two approaches. One is to score the qualified subprojects by using a multi-criteria analysis method, and selecting those with higher priority based on a set of criteria. The other is to screen out and lower the priority of potential subprojects that are qualified but yet require additional information to confirm if they satisfy certain criteria for SSWRDSP-2. The potential subprojects selected in the latter process was categorized into category D, while the remaining were categorized in to A, B, and C.

(2) Screening of Category D Subprojects

Out of the set of selection criteria developed under SSWRDSP-2, two were applied in the process of qualifying the potential subprojects. The remaining criteria were not applied in consideration that the potential subprojects should not be completely screened at Master Plan level. However, based on the information collected in the study, preliminary judgment for the criteria concerning subproject construction cost can be made, where potential subprojects not satisfying the criteria at this point should be bound for further examination. In regard that such examination will require more time and resources, they should have lower priority among implementation. The potential subprojects not satisfying the criteria were categorized into “Category D”, which require further examination to clarify whether they can (with or without modification) satisfy the set of selected criteria.

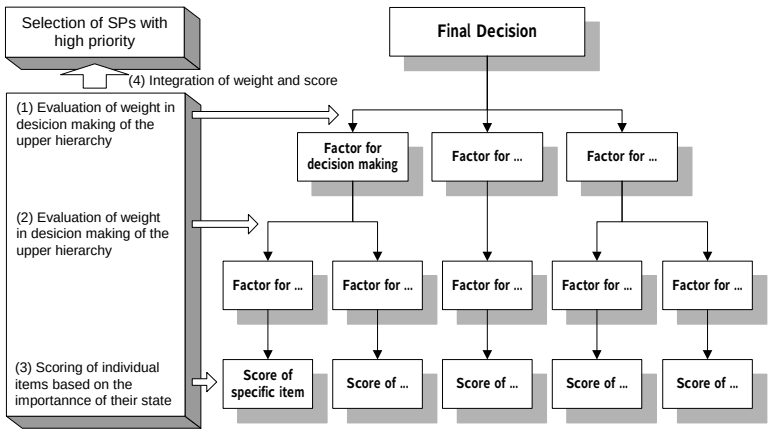
Table A.7.2.6 SSWRDSP-2 Selection Criteria and its Application for Screening "D Category" Subprojects

SSWRDSP-2 Selection Criteria	Application	Reason
The SP must be in line with district strategies and guidelines for SSWR and approved by DIAPEC	Applied for qualification	The Master Plan itself is positioned as the district strategy for SSWRD. Approval of DIAPEC will be done at the stage of implementation
More than 40 % of the SP benefited area will be operated by landless share croppers, marginal farmers	Not applied	Examination should be done based on reliable information obtained at the stage of feasibility study
No more than 30 % of the households depend on subsistence capture fisheries.	Not applied	Examination should be done based on reliable information obtained at the stage of feasibility study
Each SP will entail rehabilitation / upgrading of an existing water control system	Not applied	Examination will be done at field reconnaissance
SP cost must not exceed $ 1000/ha for CAD and $ 500 for other schemes without ADB's prior approval.	Applied	Examination will be done by checking the contents of the potential SPs
Benefited area served by the SP must be more than 50 ha and not exceed 1000 ha.	Applied for qualification	Already applied for qualification of verified subprojects
Each subproject must be technically feasible; economically viable (EIRR > 12 %)	Not applied	Detailed study should be examined at the stage of feasibility study.
Capacity of beneficiaries in ensuring the sustainability of submersible embankments must be shown for Interventions in the deeply flooded part of the Northeast Region	Not applied	Detailed study should be examined at the stage of feasibility study
The SP shall be environmentally sound and IEE/EIA study has to be undertaken and appropriately approved after consulting the beneficiaries and project affected people	Partially applied for qualification	SP areas in environmentally sensitive areas have been taken into consideration
The SP shall be socially sound and require no or minimal displacement of people and land acquisition, and not involving sensitive areas	Not applied	Detailed study should be examined at the stage of PRA
Enrollment of 70 % of the direct beneficiary households as member of the WMA.	Not applied	Detailed study should be examined at the stage of PRA – WMA formulation
Recurrent cost of subproject O&M shall be covered by beneficiaries through formulated WMA	Not applied	Detailed study should be examined at the stage of PRA – WMA formulation

(3) Methodology of Scoring

In order to ease phase-wise implementation, the 334 qualified potential sub-projects have been prioritized. Prioritization of sub-projects was done by applying Analytical Hierarchy Process (AHP) method, which is a tool for decision making with various parameters (multi-criteria analysis). The method has been developed by Thomas Saaty (1977, 1980, 1982), and is a widely used multicriteria decision-making method that is based on the decomposition of a complex discrete alternative decision problem into several smaller and easier to handle subproblems. Using pairwise comparisons, the AHP derives relative preference measures (weights) for the criteria and alternatives under consideration.

AHP can be characterized as a multi-criteria decision technique in which qualitative factors are of prime of importance. A model of the problem is developed using a hierarchical representation. At the top of the hierarchy is the overall goal or prime objective one is seeking to fulfill. The succeeding lower levels then represent the progressive decomposition of the problem. The technique can be characterized as a multi-criteria decision technique that can combine



Process of Subproject Prioritization

qualitative and quanti-tative factors in the overall evaluation of alternatives. The procedure for AHP is as indicated in the following.

Step 1.

Develop the hierarchical representation of the problem. At the top of the hierarchy is the overall objective and the decision alternatives are at the bottom. Between the top and bottom levels are the relevant attributes of the decision problem, such as selection criteria, that provides significant input on the decision process. The number of levels in the hierarchy depends on the complexity of the problem and the analyst / decision maker model of the problem hierarchy.

Step 2.

Generate relational data for comparing the alternatives. This requires the analyst (decision maker) to make pairwise comparisons of elements at each level relative to each activity at the next higher level in the hierarchy. In the system example, the importance of each criterion relative to system acceptance needs to be established.

Pairwise Comparison Scale

Relative Preference / Importance	Numerical Rating
Extremely Preferred / Important	9
Very Strong to Extremely	8
Very Strongly Preferred / Important	7
Strongly to Very Strongly	6
Strongly Preferred / Important	5
Moderately to Strongly	4
Moderately Preferred / Important	3
Equally to Moderately	2
Equally Preferred / Important	1

In AHP a relational scale of real numbers from 1 to 9 is used to systematically assign preferences. When comparing two attributes (or alternatives) A and B, with respect to U in a higher level, the following numerical relational scale is used.

Step 3.

Utilizing the pairwise comparison of Step 2 an eigenvalue method is used to determine the relative priority of each attribute to each attribute one level up in the hierarchy.

Comparison of relative importance of attributes

	attribute 1	attribute 2	attribure *i*
attribute 1	a_{11}	a_{12}	a_{1i}
attribute 2	a_{21}	a_{22}	a_{1i}
attribute *i*	a_{i1}	$_{1i2}$	a_{i3}

Calculation of evaluation weight between attributes based on eigenvalue

eigenvalue	evaluation weight
$t_1 = (a_{11} \times a_{12} \times \ldots a_{1i})^{(1/i)}$	$w_1 = t_1 / (t_1+t_2+\ldots t_i)$
$t_2 = (a_{21} \times a_{22} \times \ldots a_{2i})^{(1/i)}$	$w_2 = t_2 / (t_1+t_2+\ldots t_i)$
$t_I = (a_{i1} \times a_{i2} \times \ldots a_{ii})^{(1/i)}$	$w_i = t_i / (t_1+t_2+\ldots t_i)$

Step 4.

Similarly, each alternative to be considered in the decision making process (in this case, subproject) will be scored based upon the lowest level of the attributes. The relative importance of the status expressing the fulfillment of the attribute is examined and the scores of the individual status is defined.

Comparison of relative importance of status of alternative

	status 1	status 2	status *i*
status 1	a_{11}	a_{12}	a_{1i}
status 2	a_{21}	a_{22}	a_{1i}
status *i*	a_{i1}	$_{1i2}$	a_{i3}

Calculation of score based on eigenvalue

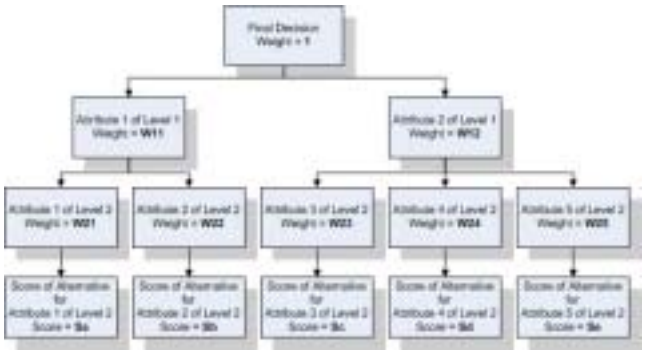
eigenvalue	evaluation weight
$t_1 = (a_{11} \times a_{12} \times \ldots a_{1i})^{(1/i)}$	$s_1 = t_1 / Max\ (t_1, t_2, \ldots t_i)$
$t_2 = (a_{21} \times a_{22} \times \ldots a_{2i})^{(1/i)}$	$s_2 = t_2 / Max\ (t_1, t_2, \ldots t_i)$
$t_i = (a_{i1} \times a_{i2} \times \ldots a_{ii})^{(1/i)}$	$s_i = t_i / Max\ (t_1, t_2, \ldots t_i)$

Step 5.

In this step, the priorities (or weights) of the lowest level alternatives relative to the top-most objective are multiplied to display the final score of the alternatives.

Final score of Alternative =

Sa * W21 * W11 * 1 +
Sb * W22 * W11 * 1 +
Sc * W23 * W12 * 1 +
Sd * W24 * W12 * 1 +
Se * W25 * W12 * 1 +



Calculation of final score

(4) Weight and Scoring used in the Master Plan

The decision tree, comprising of decision problems and attributes were developed in regard of the following criteria.

Effect on Poverty by the Subproject (applicable to all types of sub-projects)

In order to contribute to the overall goal of the Master Plan, the subprojects must be effectively implemented in poverty stricken areas. In order to attach high priority to subprojects in such areas, the subproject location is overlaid with a union-wise map of "Probability of High Level of Extreme Poverty" (Local Estimation of Poverty and Malnutrition in Bangladesh, 2004, BBS and WFP) on the GIS database prepared in the Study. The map indicates four categories of probability in poverty level, which are: Very High, High, Moderate and Low, where higher priority was attached to subprojects in areas with higher probability of poverty for all type of subprojects.

Significance of Benefit

In terms of project efficiency for best utilizing the limited resources and for selecting priority subprojects that should be implemented prior to the others, subprojects with benefits tangible and easy to recognize should be of higher priority. In this regard, the three criteria of cropping intensity, access to and from growth centers and proximity to national and regional highways were selected. Cropping intensity is related to land inundation type, where deeply inundated areas are regarded to have lower cropping intensity. In such areas, appropriate water management will increase cultivable land, thus leading to increased agricultural production.

Access to and from growth centers and proximity to national and regional highways were selected in regard of easiness to convert agricultural production to economic activities.

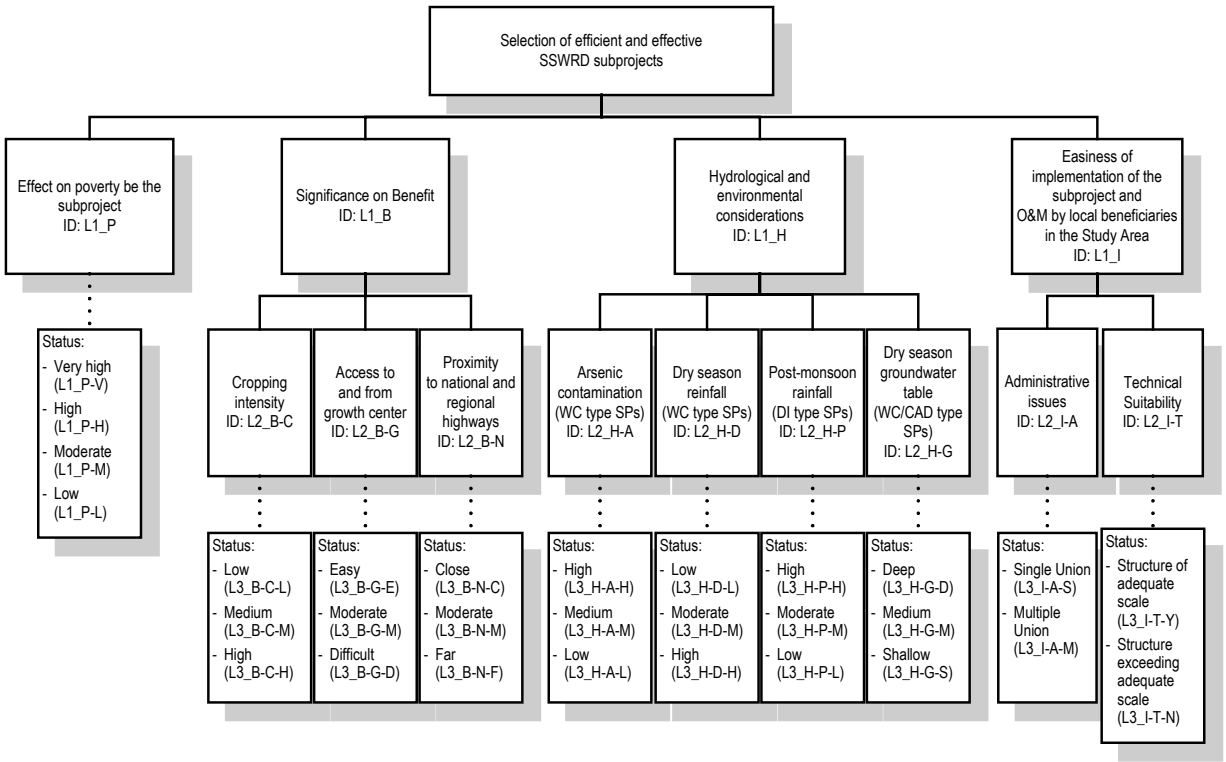
Hydrological and Environmental Considerations

Criteria regarding hydrological and environmental considerations were selected for specific types of subprojects. These are: Arsenic contamination, dry season rainfall, post-monsoon rainfall and dry season groundwater table. Arsenic contamination was selected to prioritize WC type subprojects in regard of the potential risk for utilizing groundwater resources in Arsenic contaminated areas. Dry season rainfall was also applied to WC type subprojects in regard that such subprojects will have higher potentials in areas with higher rainfall in dry season. Post-monsoon rainfall was selected to prioritize DI type subprojects in areas likely to be inundated in post-monsoon season. Dry season groundwater table is applied to WC and CAD type projects, due to needs of surface water irrigation in areas with low groundwater table.

Easiness in Implementation of the Subproject and O&M by Local Beneficiaries

Criteria indicating the easiness of implementation and O&M are: administrative issue and technical suitability. Administrative issue refer to the administrative bodies (unions) concerned in one subproject, where there are less obstructions for implementation of subprojects lying in one union than those concerning many. Technical suitability is judged by the number and scale of mechanical structures (regulators, water retentions structures, etc.). Both implementation and O&M by local beneficiaries are regarded to be difficult for subprojects with large structures.

The decision tree is indicated in the following.



Decision Tree for Subproject Scoring

Based on this decision tree, the weight of each criterion and score of each status used for scoring of the potential SSWRD subprojects were calculated as shown in the following table.

Table A.7.2.7 Weights of Criteria for Scoring of Subprojects

Primary Criteria (Level 1)	ID	Weight	Secondary Criteria (Level 2)	ID	Weight	Tertiary Criteria (Level 3)	ID	Weight
Effect on Poverty by the Subproject (Applicable to all types of subprojects)	L1_P	0.61*	Very High Poverty Area: probability of high level of extreme poverty above 75%	L2_P-V	1.00	-	-	-
			High Poverty Area: probability of high level of extreme poverty within 50 ~ 75%	L2_P-H	0.37	-	-	-
			Moderate Poverty Area: probability of high level of extreme poverty lies within 25 ~ 50%	L2_P-M	0.21	-	-	-
			Low Poverty Area: probability of high level of extreme poverty below 25%	L2_P-L	0.12	-	-	-
Significance of Benefit (Applicable to all types of subprojects)	L1_B	0.13*	Cropping Intensity	L2_B-C	0.75	Low : 100 ~ 150% intensity area, Inundation land type F3 & F4	L3_B-C-L	1.00
						Medium: 150 ~ 200% intensity area, Inundation land type F2	L3_B-C-M	0.21
						High: above 200% intensity area, Inundation land type F0 & F1	L3_B-C-H	0.11
			Access to and from Growth Center	L2_B-G	0.18	Easy: distance within 3 km	L3_B-G-E	1.00
						Moderate: distance between 3 ~ 6km	L3_B-G-M	0.32
						Difficult: distance more than 6km	L3_B-G-D	0.15
			Proximity to National and Regional Highways	L2_B-N	0.07	Close: distance within 10km	L3_B-N-C	1.00
						Moderate: distance between 10 ~ 20 km	L3_B-N-M	0.32
						Far: distance more than 20km	L3_B-N-F	0.15
Hydrological and Environmental Considerations (Applicable to certain types of subprojects)	L1_H	0.10*	Arsenic Contamination (Applicable to WC type only)	L2_H-A	0.64*	High: above 0.05 mg/l	L3_H-A-H	1.00
						Medium: between 0.01 ~ 0.05 mg/l	L3_H-A-M	0.33
						Low: below 0.01 mg/l	L3_H-A-L	0.11
			Dry Season Rainfall: Nov – Mar (Applicable to WC type only)	L2_H-D	0.14*	Low: less than 100mm	L3_H-D-L	1.00
						Moderate: between 100 ~ 150mm	L3_H-D-M	0.35
						High: more than 150mm	L3_H-D-H	0.19
			Post Monsoon Rainfall: Sep – Oct (Applicable to DI type only)	L2_H-P	0.14*	High: more than 750mm	L3_H-P-L	1.00
						Moderate: between 500 ~ 750mm	L3_H-P-M	0.35
						Low: less than 500mm	L3_H-P-H	0.19
			Dry Season Groundwater Table: Nov – Mar (Applicable to WC/CAD type only)	L2_H-G	0.08*	Deep: deeper than 6m	L3_H-G-D	1.00
						Medium: between 3 ~ 6m	L3_H-G-M	0.35
						Shallow: shallower than 3m	L3_H-G-S	0.19
Easiness in Implementation of the subproject and O&M by Local Beneficiaries in the Subproject Area (Applicable to all types of subprojects)	L1_I	0.16*	Administrative Issues	L2_I-A	0.75	Single Union: ≥ 90% of area in one union	L3_I-A-S	1.00
						Multiple Unions: < 90% of area in one union	L3_I-A-M	0.20
			Technical Suitability (scale of structures)	L2_I-T	0.75	Adequate Scale: No. of regulators ≤ 3 and khal width ≤ 20m	L3_I-T-Y	1.00
						Exceed Adequate Scale: No. of regulators > 3 and / or khal width > 20m	L3_I-T-N	0.11

* Different weight applied for FM related SPs. For detailed figure, refer to following tables

The basis for weight / score calculation of the individual criteria are indicated as follows.

Primary Level

Pairwise comparison of Primary Criteria

	Primary Criteria (Level 1)				Eigen	Weight	
	L1_P	L1_B	L1_H	L1_I	Value	All Types	FM
L1_P	1.00	3.00	7.00	5.00	3.20	0.61	0.68
L1_B	0.33	1.00	0.33	2.00	0.69	0.13	0.15
L1_H	0.14	3.00	1.00	0.20	0.54	0.10	0.00
L1_I	0.20	0.50	5.00	1.00	0.84	0.16	0.18

* Different weight used to FM type SPs because criteria under L1_H will not apply

Pairwise Comparison Scale

Relative Preference / Importance	Numerical Rating
Extremely Preferred / Important	9
Very Strong to Extremely	8
Very Strongly Preferred / Important	7
Strongly to Very Strongly	6
Strongly Preferred / Important	5
Moderately to Strongly	4
Moderately Preferred / Important	3
Equally to Moderately	2
Equally Preferred / Important	1

Secondary Level

Pairwise comparison of subproject status under L1_P

	Secondary Criteria: L1_P (Level 2)				Eigen	Primary
	L2_P-V	L2_P-H	L2_P-M	L2_P-L	Value	Score
L2_P-V	1.00	3.00	5.00	7.00	3.20	1.00
L2_P-H	0.33	1.00	2.00	3.00	1.19	0.37
L2_P-M	0.20	0.50	1.00	2.00	0.67	0.21
L2_P-L	0.14	0.33	0.50	1.00	0.39	0.12

Pairwise comparison of secondary criteria under L1_B

	Secondary Criteria: L1_B (Level 2)				Eigen	Weight
	L2_B-C	L2_B-G	L2_B-N		Value	
L2_B-C	1.00	5.00	9.00		3.56	0.75
L2_B-G	0.20	1.00	3.00		0.84	0.18
L2_B-N	0.11	0.33	1.00		0.33	0.07

Pairwise comparison of secondary criteria under L1_H								
Secondary Criteria: L1_H (Level 2)					Eigen	Weight		
	L2_H-A	L2_H-D	L2_H-P	L2_H-G	Value	DIWC, FMDIWC	WC, FMWC, CAD	DI, FMDI
L2_H-A	1.00	5.00	5.00	7.00	3.64	0.64	0.75	0.00
L2_H-D	0.20	1.00	1.00	2.00	0.80	0.14	0.16	0.00
L2_H-P	0.20	1.00	1.00	2.00	0.80	0.14	0.00	1.00
L2_H-G	0.14	0.50	0.50	1.00	0.43	0.08	0.09	0.00

* Different weight used to WC, DI, CAS type SPs because some criteria under L1_H will not apply

Pairwise comparison of secondary criteria under L1_I						
Secondary Criteria: L1_I (Level 2)					Eigen	Weight
	L2_I-A	L2_I-T			Value	
L2_I-A	1.00	3.00			1.73	0.75
L2_I-T	0.33	1.00			0.58	0.25

Tertiary Level

Pairwise comparison of subproject status under L2_B-C						
Tertiary Criteria: L2_B-C (Level 3)					Eigen	Primary
	L3_B-C-L	L3_B-C-M	L3_B-C-H		Value	Score
L3_B-C-L	1.00	5.00	9.00		3.56	1.00
L3_B-C-M	0.20	1.00	2.00		0.74	0.21
L3_B-C-H	0.11	0.50	1.00		0.38	0.11

Pairwise comparison of subproject status under L2_B-G						
Tertiary Criteria: L2_B-G (Level 3)					Eigen	Primary
	L3_B-G-E	L3_B-G-M	L3_B-G-D		Value	Score
L3_B-G-E	1.00	3.00	7.00		2.76	1.00
L3_B-G-M	0.33	1.00	2.00		0.87	0.32
L3_B-G-D	0.14	0.50	1.00		0.41	0.15

Pairwise comparison of subproject status under L2_B-N						
Tertiary Criteria: L2_B-N (Level 3)					Eigen	Primary
	L3_B-N-C	L3_B-N-M	L3_B-N-F		Value	Score
L3_B-N-C	1.00	3.00	7.00		2.76	1.00
L3_B-N-M	0.33	1.00	2.00		0.87	0.32
L3_B-N-F	0.14	0.50	1.00		0.41	0.15

Pairwise comparison of subproject status under L2_I-A						
Tertiary Criteria: L2_I-A (Level 3)					Eigen	Primary
	L3_I-A-S	L3_I-A-M			Value	Score
L3_I-A-S	1.00	5.00			2.24	1.00
L3_I-A-M	0.20	1.00			0.45	0.20

Pairwise comparison of subproject status under L2_I-T						
Tertiary Criteria: L2_I-T (Level 3)					Eigen	Primary
	L3_I-T-Y	L3_I-T-N			Value	Score
L3_I-T-Y	1.00	9.00			3.00	1.00
L3_I-T-N	0.11	1.00			0.33	0.11

Pairwise comparison of subproject status under L2_H-A						
Tertiary Criteria: L2_H-A (Level 3)					Eigen	Primary
	L3_H-A-H	L3_H-A-M	L3_H-A-L		Value	Score
L3_H-A-H	1.00	3.00	9.00		3.00	1.00
L3_H-A-M	0.33	1.00	3.00		1.00	0.33
L3_H-A-L	0.11	0.33	1.00		0.33	0.11

Pairwise comparison of subproject status under L2_H-D						
Tertiary Criteria: L2_H-D (Level 3)					Eigen	Primary
	L3_H-D-L	L3_H-D-M	L3_H-D-H		Value	Score
L3_H-D-L	1.00	3.00	5.00		2.47	1.00
L3_H-D-M	0.33	1.00	2.00		0.87	0.35
L3_H-D-H	0.20	0.50	1.00		0.46	0.19

Pairwise comparison of subproject status under L2_H-P						
Tertiary Criteria: L2_H-P (Level 3)					Eigen	Primary
	L3_H-P-L	L3_H-P-M	L3_H-P-H		Value	Score
L3_H-P-L	1.00	3.00	5.00		2.47	1.00
L3_H-P-M	0.33	1.00	2.00		0.87	0.35
L3_H-P-H	0.20	0.50	1.00		0.46	0.19

Pairwise comparison of subproject status under L2_H-G						
Tertiary Criteria: L2_H-G (Level 3)					Eigen	Primary
	L3_H-G-D	L3_H-G-M	L3_H-G-S		Value	Score
L3_H-G-D	1.00	3.00	5.00		2.47	1.00
L3_H-G-M	0.33	1.00	2.00		0.87	0.35
L3_H-G-S	0.20	0.50	1.00		0.46	0.19

In total, 4 primary (level 1) criteria, 13 secondary (level 2) criteria and 25 tertiary (level 3) criteria have been used. Below is listed the data sources used in AHP method for sub-projects prioritization.

- Poverty Level: Union-wise data extracted from: "Local Estimation of Poverty and Malnutrition in Bangladesh", BBS in association with UNWFP, 2004.
- Cropping Intensity: Upazila-wise data from DAE for years 2001 to 2004.
- Growth Center: LGED's GIS department's data.
- Highway: LGED's GIS department's data.
- Arsenic Contamination: WARPO's NWRD and DFID (2001) Report: "Arsenic Contamination in Groundwater of Bangladesh".
- Rainfall: BWDB data for period 1981 to 2002.
- Groundwater Table: Upazila wise data from BADC for period 2002 to 2003.
- Administrative Issue: Union boundary updated using LGED's GIS department's data.
- Sub-Project Scale: Survey data updated through UDCC consultation meetings.

(5) Prioritization of Potential Subprojects

1) Screening of D Category Subprojects

Screening of Category D subprojects were done based on the costs of individual subprojects estimated from their components. Out of the 496 qualified subprojects, 145 subprojects were determined to have costs exceeding USD500/ha (USD1,000/ha for CAD type subprojects). In addition to this, one CAD type subproject was screened into category D in regard that necessity of low-lift pumps should be further examined. In total, 146 subprojects were screened into Category D. The numbers of such subprojects by district are indicated below.

Table A.7.2.8 Screening of Category D Subprojects

District	Number of qualified subprojects	Number of category D subprojects	Number of category A- C subprojects	Gross area of category A-C subprojects (ha)	Average gross area of category A-C subprojects (ha)	Total area of district (ha)	% of gross area of category A-C subprojects within the district
Jamalpur	53	14	39	26,198	671.7	203,200	12.9
Kishoreganj	110	44	66	33,420	506.4	268,900	12.4
Mymensingh	99	17	82	52,443	639.5	436,300	12.0
Netrakona	97	31	66	36,580	554.2	281,000	13.0
Sherpur	35	4	31	18,864	608.5	136,400	13.8
Tangail	102	36	66	33,437	506.6	341,400	9.8
total	496	146	350	200,942	574.1	1,667,200	12.1

Table A.7.2.9 Type-wise Number of Category D Subprojects

	FM	DI	CAD	WC	FMDI	FMWC	DIWC	FMDI &WC	District total
Jamalpur	5	0	0	0	4	0	4	1	14
Kishoreganj	9	0	0	8	3	3	10	11	44
Mymensingh	4	0	1	1	4	0	4	3	17
Netrakona	7	0	1	3	3	2	12	3	31
Sherpur	1	0	0	3	0	0	0	0	4
Tangail	6	3	0	7	11	2	2	5	36
Total by type	32	3	2	22	25	7	32	23	146

2) Prioritization of Qualified Subprojects

After screening of Category D subprojects, each of the remaining subprojects are marked with a score indicating its relative importance in the light of the set criteria. The scores varied from 0.18 to 0.98 with the average of 0.45. However, it should be noted that because of the characteristics of the AHP method, the scores do not indicate the value of actual importance of the subprojects, but represent relative importance between the subprojects.

Prioritization of the scored subprojects was done upazila-wise in regard of the capacity of the Upazila Engineer office in implementation. One subproject with the highest score was selected in each upazila for implementation under the short-term activities of the Master Plan. Such subprojects were categorized as Priority A. Furthermore, some 30% were selected from the remaining 292 subprojects for categorization in Priority B. This counted up to 99 subprojects, varying from 8 to 25 in each district. Finally, the remaining 193 subprojects were categorized into Priority C, which will be implemented under the long-term activities of the Master Plan. The prioritized subprojects have been checked upazila-wise and then district-wise so that implementations of the prioritized subprojects become distributed among the upazilas and districts. Lists of prioritized subproject in each district are shown in Table 5.4.1 to 5.4.6. The following table summarizes the number of subprojects in each category. The

distribution of prioritized subprojects are indicated in Fig. A.7.2.5.

Table A.7.2.10 Prioritized Verified Potential Subprojects by Type

		FM	DI	CAD	WC	FMDI	FMWC	DIWC	FMDI &WC	Total	BWDB related
Category A	Jamalpur	5	0	0	0	1	0	0	1	7	3
	Kishoreganj	3	2	0	1	2	0	3	2	13	2
	Mymensingh	1	4	0	1	3	0	2	1	12	2
	Netrakona	2	5	0	1	0	0	1	1	10	5
	Sherpur	1	1	0	0	0	1	2	0	5	2
	Tangail	3	1	0	1	0	1	3	2	11	3
	Sub Total	15	13	0	4	6	2	11	7	58	17
Category B	Jamalpur	3	2	0	1	1	0	3	1	11	0
	Kishoreganj	1	0	0	7	0	0	8	3	19	1
	Mymensingh	3	7	0	2	3	0	7	3	25	6
	Netrakona	2	1	0	2	8	2	2	0	17	6
	Sherpur	3	2	0	2	1	0	0	0	8	2
	Tangail	1	9	0	1	2	0	4	2	19	6
	Sub Total	13	21	0	15	15	2	24	9	99	21
Category C	Jamalpur	6	2	0	0	3	0	3	7	21	21
	Kishoreganj	1	3	0	7	3	1	11	8	34	6
	Mymensingh	2	12	0	1	6	1	18	5	45	10
	Netrakona	6	12	0	0	7	8	5	1	39	12
	Sherpur	3	8	0	1	0	0	6	0	18	5
	Tangail	3	15	0	2	5	0	8	3	36	9
	Sub Total	21	52	0	11	24	10	51	24	193	63
Category D	Jamalpur	5	0	0	0	4	0	4	1	14	5
	Kishoreganj	9	0	0	8	3	3	10	11	44	1
	Mymensingh	4	0	1	1	4	0	4	3	17	6
	Netrakona	7	0	1	3	3	2	12	3	31	10
	Sherpur	1	0	0	3	0	0	0	0	4	2
	Tangail	6	3	0	7	11	2	2	5	36	11
	Sub Total	32	3	2	22	25	7	32	23	146	35
All categories	Jamalpur	19	4	0	1	9	0	10	10	53	29
	Kishoreganj	14	5	0	23	8	4	32	24	110	10
	Mymensingh	10	23	1	5	16	1	31	12	99	24
	Netrakona	17	18	1	6	18	12	20	5	97	33
	Sherpur	8	11	0	6	1	1	8	0	35	11
	Tangail	13	28	0	11	18	3	17	12	102	29
	Sub Total	81	89	2	52	70	21	115	59	496	136

The location map of the prioritized sub-projects is shown below. It is suggested that implementation arrangements of upazila-wise prioritized potential sub-projects should be carried out in order of Priority "A-B-C", which means in case Priority "A" sub-project of a upazila fails, then the next Priority "B" sub-project of that upazila should be looked into and this order should be maintained up to Priority "C".

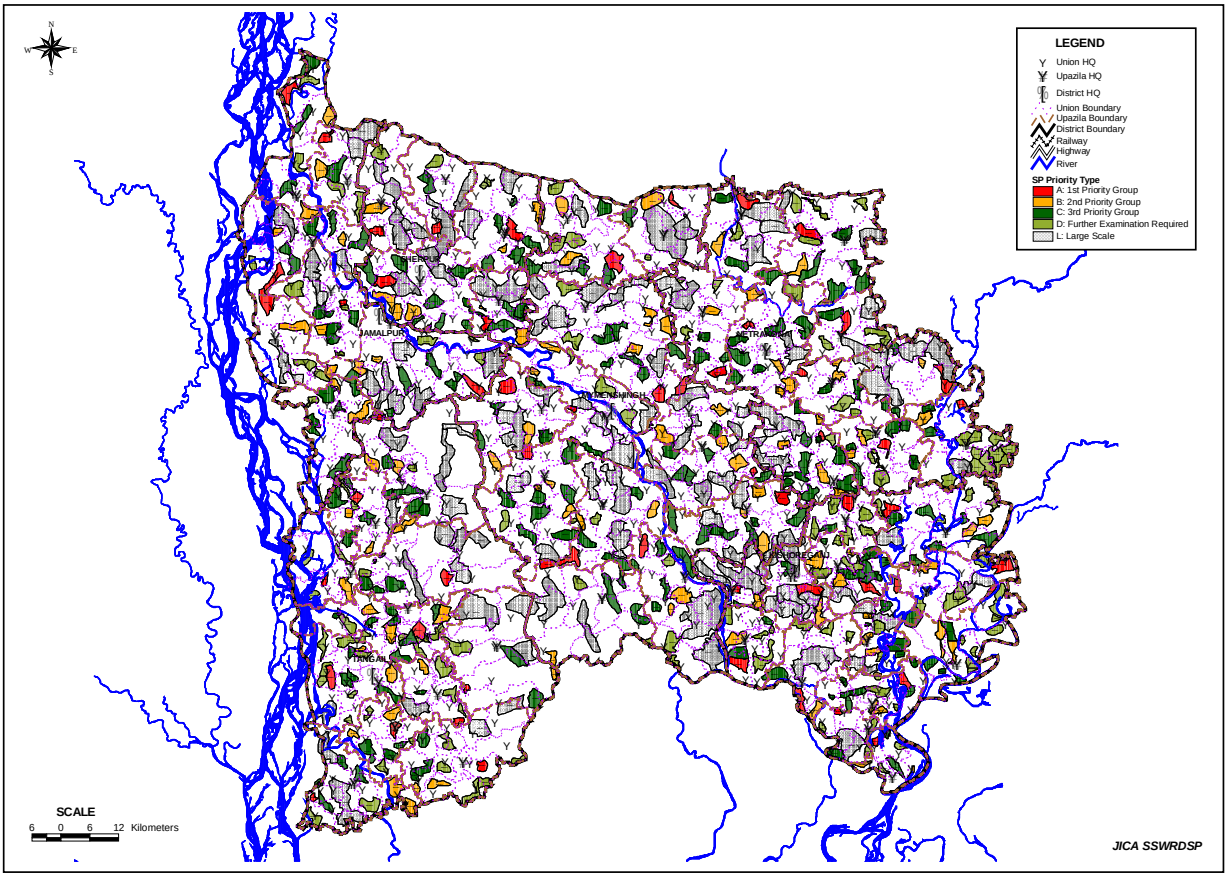


Fig. A 7.2.5 Prioritized Potential Sub-Projects