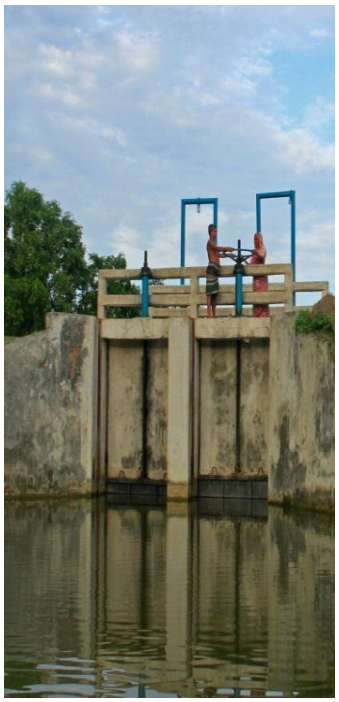
Bangladesh Water Development Board (BWDB)

Embassy of the Kingdom of the Netherlands (EKN), Dhaka, Bangladesh

Department of Agricultural Extension (DAE)

Polder Development Plan (PDP) – DRAFT

Polder 27/2

June, 2017

BETS LTD

Socioconsult Ltd. for sustainable development

FEMCONSULT

MOTT MACDONALD

Program Data

Activity Number	DHA 0116534/ Act. 24007
Project Start Date	January 2013
Project Completion Date	December 2020
Approval date DPP (BWDB component) Approval date DPP (DAE component) Signing Contribution Agreement	30 July 2013 24 July 2013 04 December 2013
Donors	Government of the Netherlands Government of Bangladesh
Contractor	Euroconsult Mott MacDonald with Socioconsult, BETS and Euroconsult Mott MacDonald Bangladesh
Implementing Partners	Bangladesh Water Development Board (BWDB) Department of Agricultural Extension (DAE) and Department of Livestock Services (DLS) and Department of Fisheries (DoF)
Contribution GoN	€ 27,320,000 to be administered by BWDB € 1,495,000 to be administered by DAE € 33,100,000 Technical Assistance
Contribution GoB	BWDB: € 13,499,000 DAE: € 535,015
Total project budget	€ 75,949,015
Exchange rate	Euro-BDT: 100 (April 2013); 81.7 (May 2017)

(Note: the program data has been updated according to revised DPP)

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Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
1.0	16/04/2017	Polder Team 27/2 Ashik Billah Shamim Alom Zahangir Alam Aminul Islam Anwar Hossain Naimul Hasan	Joynal Abedin	Alamgir Chowdhury	PDP of Polder 27/2 v-1
2.0	15/05/2017	Zonal Review Team Azizur Rahman Aminul Islam Tahmina Akter Shamim Alom Zahangir Alam	Joynal Abedin	Alamgir Chowdhury	PDP of Polder 27/2 v-2
3.0	15/06/2017	Central Review Team Mofazzal Ahmed Ashraful Islam Shahidul Haque Proteeti Masud	Joynal Abedin	Alamgir Chowdhury	PDP of Polder 27/2 v-3

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List of Abbreviations

BADC	Bangladesh Agricultural Development Corporation
BBS	Bangladesh Bureau of Statistics
BRRI	Bangladesh Rice Research Institute
BWDB	Bangladesh Water Development Board
CAHW	Community Animal Health Worker
CAWM	Community Agricultural Water Management
CBO	Community-Based Organisation
CDMP	Comprehensive Disaster Management Program
CO	Community Organizer
DAE	Department of Agricultural Extension
DLS	Department of Livestock Services
DOC	Day Old Chicks
DPP	Development Project Proforma
DoC	Department of Cooperatives
DoE	Department of Environment
DoF	Department of Fisheries
DP III	Director of Planning III of BWDB
DPHE	Department of Public Health Engineering
DRR	Disaster Risk Reduction
DTL	Deputy Team Leader
EIA	Environmental Impact Assessment
EKN	Embassy of the Kingdom of the Netherlands
FCD	Flood Control and Drainage
FCDI	Flood Control, Drainage and Irrigation
FFS	Farmers Field School
FGD	Focus Group Discussion
FO	FFS Organiser
FT	Farmer Trainers
GAP	Gender Action Plan
GIFT	Genetically Improved Farm Tilapia GIFT
GoB	Government of Bangladesh
GoN	Government of Netherlands
GPWM	Guidelines for Participatory Water Management
Ha	Hectare
HH	Household
HYV	High Yielding Variety
IGA	Income Generating Activity
IAPP	Integrated Agriculture Productivity Project
IPM	Integrated Pest Management
IPs	Input Providers
IPSWAM	Integrated Planning for Sustainable Water Management

IPSWARM	Integrated Planning for Sustainable Water Resources Management
IRRI	International Rice Research Institute
KII	Key Informant Interview
KJDRP	Khulna-Jessore Drainage Rehabilitation Project
LCS	Landless/Labour Contracting Societies
LGED	Local Government Engineering Department
LGI	Local Government Institutions
M&E	Monitoring and Evaluation
MFI	Microfinance Institutions
MFS	Market Oriented Farmers Field School
NGO	Non-Governmental Organisation
O&M	Operation and Maintenance
PCD	Program Coordinating Director at BWDB
PD	Program Director at DAE
PDP	Polder Development Plan
PSF	Pond Sand Filter
PTO	Power Tiller Operator
PWMR 2014	Participatory Water Management Rules 2014
RF	Resources Farmers
SAAO	Sub-Assistant Agricultural Officer
SaFaL	Sustainable Agriculture, Food Security and Linkages
SMART	Specific Measurable Attainable Relevant Time Bound
SRDI	Soil Resources Development Institute
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TA	Technical Assistance Team of Blue Gold Program
TL	Team Leader
TOT	Training of Trainers
UP	Union Parishad
VC	Value Chain
VCA	Value Chain Analysis
VCD	Value Chain Development
VCS	Value Chain Selection
WASH	Water Sanitation and Hygiene education
WMA	Water Management Association
WAP	Water Management Group Action Plan
WMF	Water Management Federation
WMG	Water Management Group
WMO	Water Management Organisation
XEN	Executive Engineer
ZSE	Zonal Socio Economist

Glossary

Arotdar	Service provider to Bepari and Pikers in wholesale markets. Facilitates the buy/sell process. May provide purchase negotiation assistance, storage space, selling space, short term and seasonal credit, and arrange truck transport of goods purchased by Bepari to markets.
Beel	Naturally depressed land inundated under water for at least one season
Bepari	Key wholesaler in the supply chain. Moves goods between markets buying in source markets and selling in destination markets. Exerts the main influence on price earned by farmers.
BKash	BKash Limited is a joint venture between BRAC Bank Limited, Bangladesh, and Money in Motion LLC, USA. Less than 15% of Bangladeshis are connected to the formal banking system whereas over 68% have mobile phones. BKash utilize these mobile devices and the omnipresent telecom networks to extend financial services to the under-served remote population of Bangladesh.
Business service	Service that is sustainable through private sector transactions and that improves the performance of the value chain, its access to markets, and its ability to compete.
Capture Fisheries	Capture fisheries refer to open water fisheries resources in both marine and freshwater environments. Capture fisheries is exploitation of aquatic organisms without stocking the seed. Recruitment of the species occurs naturally. This is carried out in the sea, rivers, reservoirs, khal, beel, floodplain etc.
Climate Change	Climate change refers to any change in climate (average weather) over time, whether due to natural variability or as a result of human activity. Average weather includes temperatures, wind patterns and precipitation.
Cross-cutting issues	Issues that affect all areas of concern within their context.
Culture Fisheries	Culture fisheries are the cultivation of selected fishes in confined areas with utmost care to get maximum yield. The seed is stocked, nursed and reared in confined waters, and then the crop is harvested. Culture takes place in ponds, ditches, rice fields which are fertilized and supplementary feeds are provided to fish to get maximum yield.
Disaster Risk Reduction (DRR)	DRR is a conceptual framework intended to systematically avoid (prevent) and limit (prepare/mitigate) disaster risks with regard to losses in lives and the social, economic and environmental assets of communities and countries.
Embankment	An embankment is a high earthen dike surrounding an area in order to protect it from external floods and salinity.
Enabling environment	Environment favourable to working, participating and demonstrating potentials.

Farmers Field School (FFS)	FFS is a participatory group based learning approach where farmers can learn by doing and share their experiences.
Governance	Description of the dynamic distribution of power, learning, and benefits among participants in a value chain.
Inlet	Inlets are small structures across the embankment to take in fresh water for irrigating high lands along the periphery of the polder. Outlets are small structures across an embankment to drain out local pockets in the polder.
Landless/Labour Contracting Societies	It is an approach to engage local poor people/labourers as a group for construction of rural infrastructures. The group is treated by the development authorities/project as a contractor for the work allocated.
Local Governmental Institutions (LGIs)	The institutions formulated under different Acts/Ordinances to run the different administrative unites of Local Government system by the Government.
Kharif-I	Pre-monsoon season, from March to half July.
Kharif-II	Monsoon and post-monsoon season, from July to October.
Khal	Excavated or natural routes across any land area for draining out excess water and flushing in required water.
Market Actor	Smallholder, input supplier and output market players directly participating the value chain.
Market development based	Activities that try to make the interaction between demand and supply more effective.
Market transaction	The exchange between demand and supply is at full market price (the price at which suppliers are prepared to sell and consumers are prepared to buy, in an unsubsidized situation).
Market	A set of arrangements by which buyers and sellers are in contact to exchange goods or services—the interaction of demand and supply.
Needs Assessment	It is an assessment of the needs and priorities of local population in a polder.
Piker	Buys directly from various farmers to ensure a bulk. Bulk is sold to Arotder or to destination market. Exerts the main influence on price earned by farmers.
Polder	A polder is an area protected by embankment all around, having necessary structures across the embankment to drain out excess rain water and flush in required fresh water for irrigation.
Rabi	Dry season, from November to March.
Standing Committees of UP	Standing Committee means the Standing Committee formulated under the Local Government (Union Parishad) Act, 2009.

Sluice	A sluice is a structure constructed across an embankment to drain out excess water from a polder and / or flush in required water in to the polder.
Union Parishad (UP)	Union Parishad means the Union Parishad formulated under section 10 of the Local Government (Union Parishad) Act, 2009." It is the lowest tire of the Local Government system in Bangladesh.
Value Chain	A 'value chain' can be defined as all the actors who buy and sell from each other in order to supply a particular set of products or services to final consumers.
Water Management Group Action Plan (WAP)	It is the plan and strategy of the WMG, to address issues and problems of their area at a given time as well as to implement their actions as part of the polder development planning.
Ward	Ward means the Ward of Union Parishad. Each Union Parishad consists of 9 Wards.
Water Management Organisations (WMO)	It is a common name for all organizations formed for the purpose of water management in a polder, namely WMG, WMA and WMF.
Water Management Group (WMG)	Local people organized within a hydrological unit or at village level to manage water resources are collectively called Water Management Group.
Water Management Association (WMA)	It is a higher tier of water management organization formed by representatives of WMGs.
Water Management Committee (WMC)	It is a committee to initiate and coordinate operation and maintenance activities in a catchment area. It is formed by representatives of WMGs.
Water Management Federation (WMF)	This is the highest tier of water management organization in the polder. It is formed by representatives of all WMAs.
Zonal level	Blue Gold has three field offices in Patuakhali, Khulna and Satkhira to coordinate and manage the project interventions; these are sometimes called zonal offices.

1. Introduction

1.1 Blue Gold Program Context

The overall objective of the Blue Gold Program is to reduce poverty in the coastal area by enhancing the livelihood of the rural population, through more efficient water resources management and increase productivity of mainly crops, fishery and livestock in the polders and by empowering the communities to be the driving force.

The specific objectives of the Program are to:

- Increase sustainability of the development of the polders through effective community participation. The community organizations will become the driving force for the natural resources based development, whereby environment, gender and good governance are effectively addressed in their operations;
- Protect floods and use water resources effectively;
- Increase farmers' income and strength livelihood through improved productivity (for each polder a Business Plan will be developed with the value chain analysis); and
- Improve environment, drinking water and sanitation. The living environment will be realized and sexual reproductive health rights (SRHR), balanced nutrition, and good governance issues are well understood and applied.

1.2 Definition and Objective of a Polder Development Plan

Definition of a Polder Development Plan

A Polder Development Plan (PDP) contains an integrated analysis and planning for developing a polder in relation to community mobilization, water management, agriculture, business development, environment, gender, and institutions[1].

Objectives of a Polder Development Plan

1. The provision of an internal discussion document for the Blue Gold TA team and the implementing agencies (BWDB and DAE) to plan, design and implement at polder level in an integrated manner;
2. A clear outline for WMOs what type of activities Blue Gold is providing, which helps them to develop their own WMG Action Plans (WAP);
3. A starting point for BWDB to prepare detailed rehabilitation plans and for DAE to fine-tune the FFS modules and stimulate business activities as well as a strategy to strengthen institutions like Union Parishad (UP); and
4. Linkages with Blue Gold's logical frameworks and M&E activities, to ensure that the proposed interventions at polder level are contributing to the overall program objectives and can be justified towards stakeholders and donors.

[1] An important consideration is that a polder is a multi-dimensional geographical unit delineated by water in which various and continuously changing development processes take place. Polder boundaries do not always coincide with administrative boundaries. The PDPs developed by the Blue Gold Program therefore do not capture the full picture. They zoom in on specific water and production related features of polders and try to make a dynamic analysis of the water management organisations operating in that sphere, their resources, their activities and their needs. Other Local Government Institutions (LGIs), NGOs and donors are operating in the same polders and they have their own sphere of interest, scope, analysis, plans and programs within or even beyond the physical boundaries of these polders. A Blue Gold PDP is thus not a substitute or umbrella plan for all types of activities and programs taking place in the polder.

2. Present Situation and its Challenges

2.1 Physical Features and Demography

Polder 27/2 is managed by the Bangladesh Water Development Board (BWDB) and was constructed during 1974-76 and later on was rehabilitated under the KJDRP project from 1996 to 2002. It is located in Gutudia union (part), Dumuria Sadar union (part) and Kharnia union (part) under Dumuria upazila, Khulna district. It is surrounded by Upper Shalta river in the south, Upper Shoilmari river in the east and Mora Bhadra and Hamkura river (dead) in the west (show in the map). The characteristics of the polder can be found in Table 1 and the location map of the polder with respect to Upazilla and Union headquarters is shown in Figure 1**.**

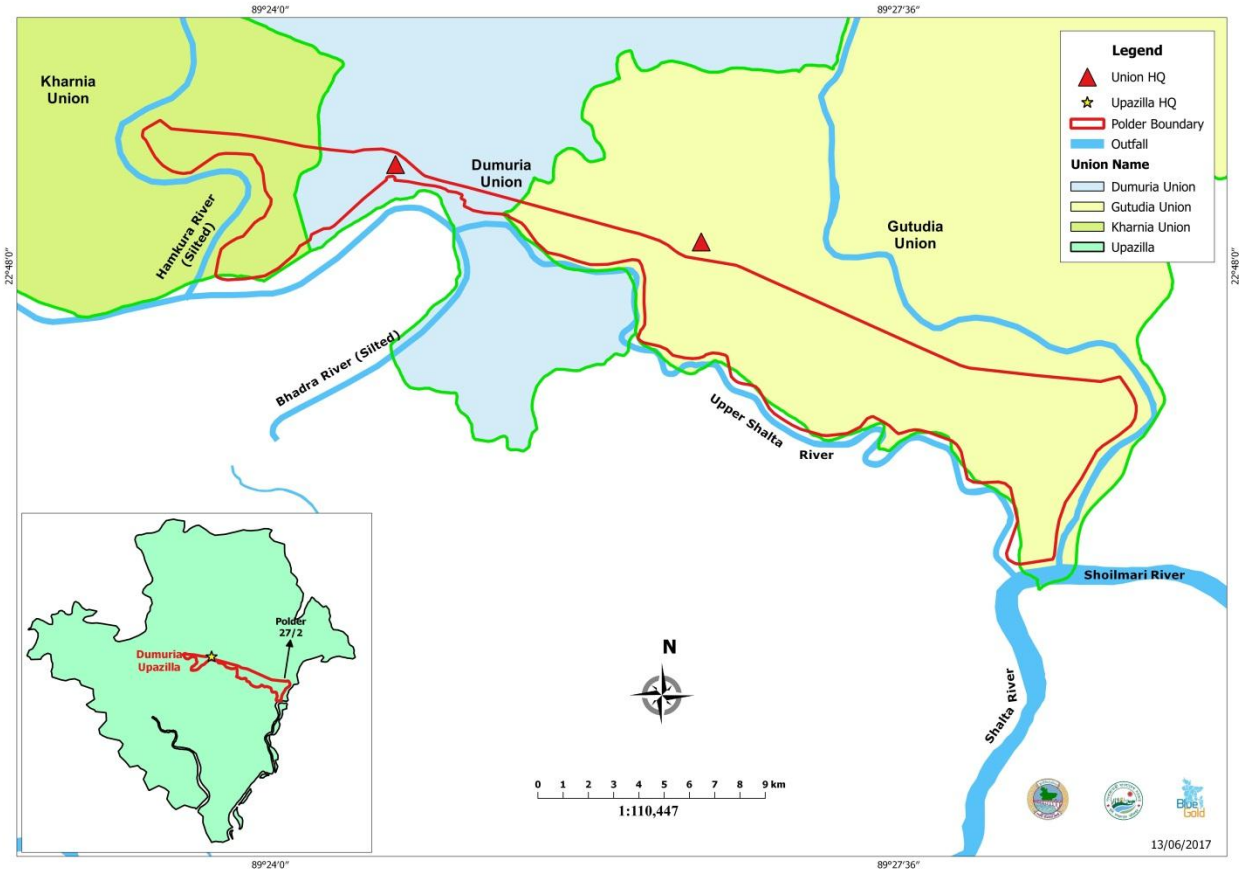

Figure 1: Location of Polder 27/2 in Dumuria Upazila under Khulna District

Table 1: Main Physical and Demographic Characteristics of polder 27/2

Characteristics	
Included Upazila(s)	Dumuria
Included Unions	Gutudia Union (part), Dumuria Sadar Union (part) and Kharnia Union (part)
Polder boundary (in km)	15.29 km

Total number of Mouzas	04		
Total polder area (in ha)	495 ha		
Total number of households in the polder	2572		
Total number of catchments	03		
Total cultivable land (in ha)	435 ha	High land: 0% Medium-high land: 25%	Low land: 75%
Population	9061 M 4541 F 4520		
Literacy rate	75%	Male: 50%	Female: 45%
Major occupations	Agriculture (65%)	Agricultural labour (25%)	Business (03%) and Others (07%)
Economic condition	Rich: 10%	Middle class: 70%	Poor: 20%
Status of seasonal labour migration	In Rabi season, most of the lands are remained fallow, it means that there is no agricultural activity and as a result no scope to use agricultural labour. After harvesting T.Aman rice and before going to cultivate sesame the agricultural labours become workless. In this time (December to February) farmers migrate to other places where there is a need for agricultural labour. Approximately 02% farmers go to nearest Dumuria, Jessore and Gopalganj districts and sometimes to Barisal. They sell labour in Boro rice and winter vegetable cultivation, rickshaw-pulling, and some are engaged in small business going door to door for selling. Agriculture, brick field works and day labour are the main professions of polder inhabitants.		
Status of internal road communication	High ways 4.00 km, internal bituminous road 3.80 km, brick soling 5.50 km, muddy road 12 km. Basically this polder is near Khulna-Satkhira high way road and inhabitants are using van, rickshaw and easy bike as major transport. Internal road communication facilities fully depend on the embankment road and inside branch roads are connected with the embankment road.		

2.2 Water Resource Management and Infrastructure

In the main characteristics of the water resource management and infrastructure of polder 27/2 are highlighted at Table 2 and Figure 2 shows the locations of existing infrastructure and khals in polder 27/2. Further details can be found in Appendix 2.

Table 2: Main Water Resource Management and Infrastructure Characteristics of Polder 27/2

Characteristics			
Length of embankment (in km)	15.29 km		
No of drainage/flushing sluices	03	Partially active but poor condition: 02	Active but poor condition: 01
No of inlets	0	Good condition: N/A	Poor condition: N/A
No of (drainage) outlets	0	Good condition: N/A	Poor condition: N/A
No of Khals	7 (3 main khals and 4 secondary khals)		
Length of khals (in km)	About 15 km (main & secondary)		
Main outfall rivers and khals	Upper Shalta river is the main outfall river.		
Situation of tidal and river flooding	There is no tidal flooding in the polder. Expected depth of inundation is about 0.60m to 1.00m in monsoon. The duration of inundation about 3 to 5 months.		
Locations with water logging and siltation.	60% of Jilerdanga, Bordanga, Tiabunia and South Kata Khali beel are water logged from July to September/October. The Upper Shalta is		

	the main outfall but it is partially silted up.
Most river erosion prone area	Not yet observed.
Other relevant water issues	Major khals are blocked by cross dam. All 3 sluices are at poor condition
Key challenges in effective water management	Long term leasing of khals, cross dams, river siltation (upper Shalta)
Challenges in planning construction of water infrastructures within polder area	Not found
Current internal polder water management practices	Currently there are no water management initiatives.
Overall condition of internal polder water management	Are not good.
Opportunities for internal polder water management	Peoples are friendly, UP is cooperative and communication is good and these are opportunities for polder water management.

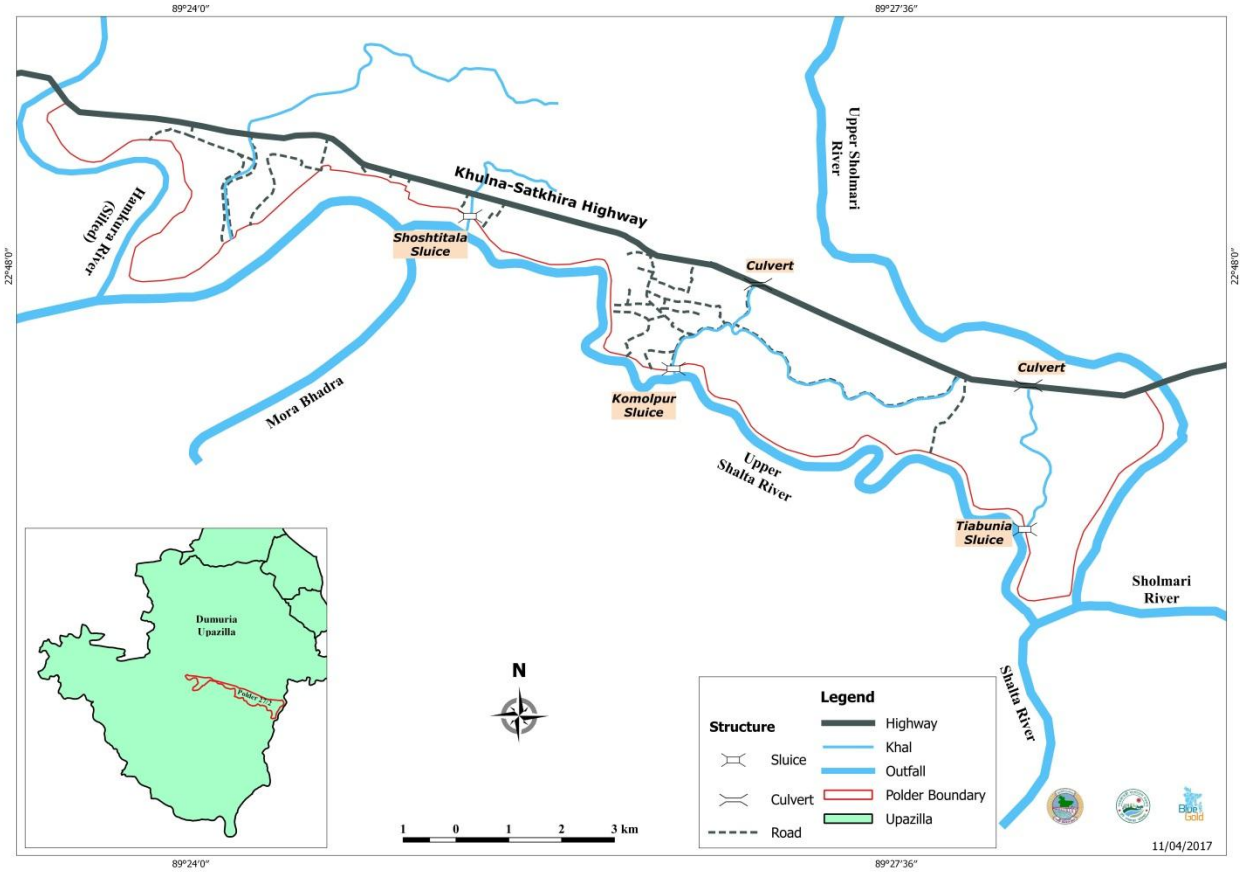

Figure 2: Map of Polder 27/2 showing the existing Khals and Water Management Infrastructure

2.3 Institutional Framework for Participatory Water Management

The main institutional actors in polder 27/2 are Union Parishad (UP), its Wards, various Local Governmental Line Departments, a number of NGOs, Micro-finance Institutions, Market Committees, Water Management Groups (WMGs), Water Management Associations (WMAs) and Union Disaster Management Committees (UDMCs). Main characteristics of the WMGs and WMAs and other institutional actors are highlighted in the table below. The boundaries and names of the WMGs and WMAs are shown in Figure 3.

Table 3: Main characteristics of the Institutional Framework of PWM in polder 27/2

Characteristic			
Number of WMGs	05	Registered: 00	Non-registered: 05
Members of WMGs	371	Female: 56	Male: 294
HHs being part of WMGs	371		
Number of WMAs	01	Registered:00	Non-registered: 01
Female representation in WMGs	20%		
Total deposited fund (BDT)	39723		
Total savings of WMGs (BDT)	0000		
Total number of WMGs with O&M fund	Not any fund		
Names of projects and organisations with similar / related activities	There are no organizations currently working in polder 27/2 with similar activities but there are many NGOs operating microfinance (i.e. CSS, Asha, TMSS, DSK, Jagorony Chakra Foundation, Grameen Bank etc.), working on agricultural sector development (i.e. BRAC) and WatSan (i.e. Caritas, Uttaran etc.) programs.		
Existing WMOs linkages with other stakeholders	Generally weak linkage with UPs, however linkages with other service providers like DAE, BWDB, LGED, NGOs and private sector actors should still be further strengthened.		
Number of WMGs member including in UP standing committee	0		
O&M agreement signed with BWDB	Not yet signed		
Current participation of WMOs in O&M	Not at all.		
Existing conflicts on water management	There is a small conflict between gher owner and agriculture farmers on cross dam.		
Key challenges in strengthening PWM	1. Internal conflict with gher owners and other farmers; 2. Cross dam remove; 3. Leasing khas lands; and 4. Some NGOs have strategy which differs and sometimes even contradicts with Blue Gold Program (e.g. providing large free inputs which could be captured by elites).		
Key challenges in relation to women participation	No challenges here in relation to women participation but still some women's those who are out of WMOs still cannot have their much mobility access.		
Key opportunities in PWM	1. SaFal program is recently over but their community groups are still exists which could be a platform for Blue Gold Program; and 2. Women farmers are very active and interested to work with WMOs		

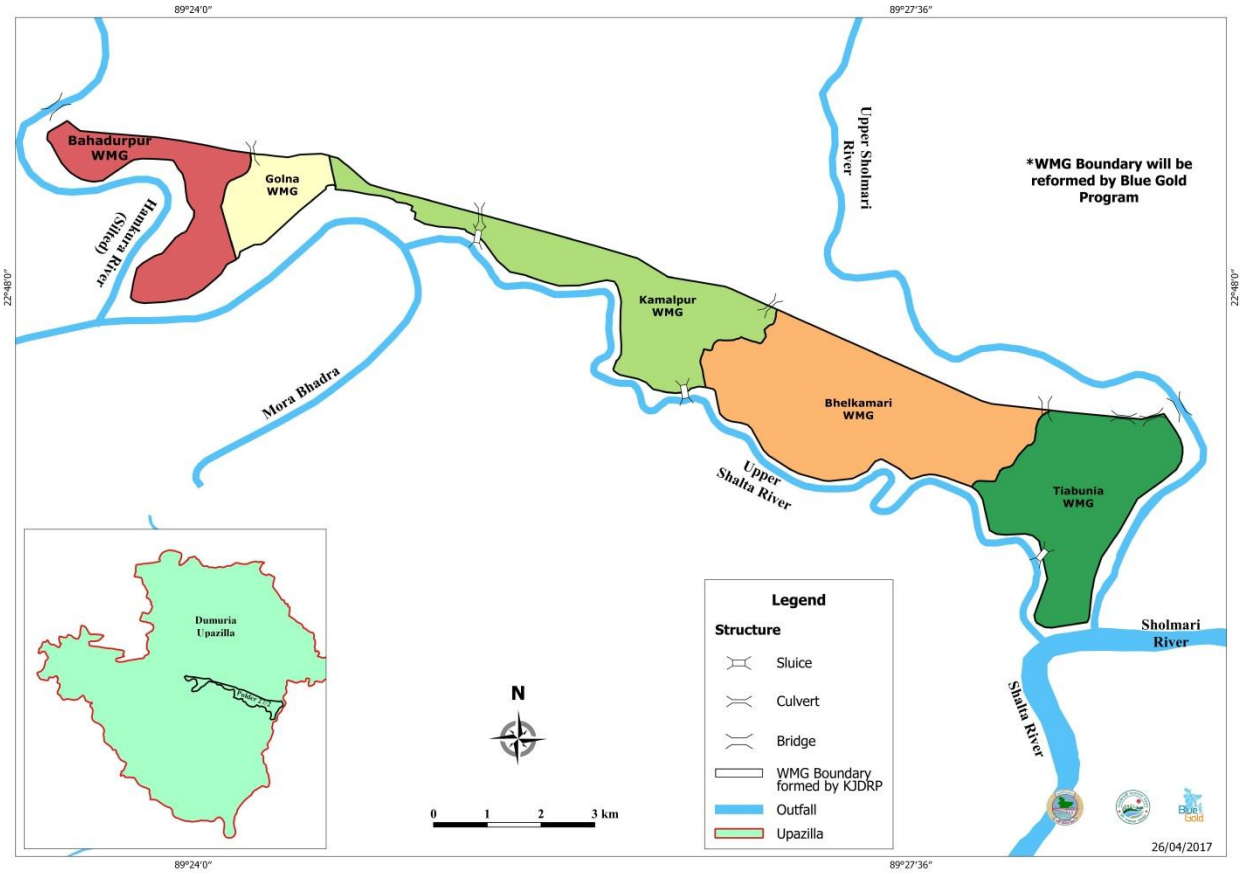

Figure 3: Name of WMG and WMA areas in Polder 27/2

2.4 Agricultural and Marketing Services

In polder 27/2, about 80 % of the people are involved in crop production, livestock rearing and fish culture. The others are doing different jobs and business. The most important characteristics of agricultural and marketing services can be found in Table 4. The main markets of polder 27/2 are shown in Figure 4.

Table 4: Main characteristics of Agricultural and Marketing Services in polder 27/2

Characteristic			
Main crops (top three)	1. Fish	2. Boro rice	3. T.Aman
Current most common cropping calendar(s)	Fallow-Fallow-T.Aman (20%) Boro- Fish-Fish (55%) with dike vegetable Boro – Fallow – T.Aman (10%) Vegetable- Vegetable- Vegetable (5%) Potato – Vegetable- Vegetable (5%) Spices – Vegetable – Vegetable (5)		
Current cropping intensity	210% Total area (ha) 495, Total cropped area (ha) 435, Single cropped area (ha) 200, Double cropped area (ha) 230, Triple cropped area (ha) 5,		
Main vegetables	**Winter:** Tomato, Cauliflower, Cucumber, Brinjal, Ridge Gourd, Ash Gourd, Bitter Gourd, Bottle Gourd, Snack Gourd, Turnip, Radish Okra, Kohlrabi, Country Bean, Red Amaranth, Cabbage, Long Yard Bean, Pointed Gourd, Sweet Gourd, Yeard Long Bean, Spinach etc. **Summer:** Indian Spinach, Dram stick, Amaranths etc. mainly in the Homestead		

Main fruits	Main fruits are cultivated in polder 27/2 areas, are Jujube, Mango, Guava, Coconut, Jackfruit, Betel nut, Lemon, Banana.
Available agricultural machinery	Agricultural machinery like power tiller, irrigation pump, spray machine etc. are available in polder 27/2. Some farmers have their own agricultural mercenary, they use their own machine. Some entrepreneurs have been providing tillage services as rental basis. There are semi deep tube well 378, power pump 290, power tiller 30 in this polder.
Present irrigation practices	Polder 27/2 is focused as pond fish ((gher), in the dyke of the gher lots of vegetables are cultivating by the farmers. This polder is also vegetables producing zone and crop productions are fully depends on irrigation systems Approximately 80-90% lands come under the irrigation facilities especially to cultivate Boro rice and winter vegetables. But Boro rice is being cultivating by using the gher water. Mainly surface water (khal, gher and pond water) and deep water is using for irrigation.
Availability of inputs	Seed, fertilizer, pesticide, farm machineries, irrigation facilities and technology & information is the main input of agriculture sector. Most of the input company and private sector have been working in this Upazila and also they are established close connection with farmers through the dealership system. Dumuria is fully developed and recognised on input market system where dealers, retailer and companies have been providing their input related service to the farmers and here also access our polder dwellers. But in polder area, 3 Seed and fertilizer dealer and 8 retailers' are available for providing input related services.
Current knowledge on proper input use	In this polder some farmers have less knowledge of quality seed. In rice production, farmers do not follow the line sowing method and not using proper dose of fertilizer. Beside farmer always use high number of seedlings (8-10 seedlings) for T.Aman rice production. Farmers not using any fertilizers for the cultivation of sesame.
Important business trend in crop production	There are a total of two hats, one is inside the polder and other one is besides polder 27/2. There are two big arot for fish and vegetables. There is also one regular market in Dumuria. Farmers are cultivating fish in gher and vegetables in the dyke of gher commercially. They sell the products to the hats and arot nearby.
Key challenges in agriculture	1. Water logging 2. In availability of quality seed 3. There are pest and rodents problems in case of field crops 4. Poor drainage facilities
Percentage of households owning livestock	Cattle :50-60 % Goats : 20-30 % Poultry: 60-65 %
Availability of inputs for livestock	Inputs like poultry feed and cattle feed are available with the local agents/traders. Farmers also collected feed and the chicks from Dumuria.
Important business trend in livestock	There are some local business men in the polder who buy local poultry, goats and cattle from the farmers directly. They visited home to home and procure from the farmers' house. The farmers sold eggs and broiler birds to the local agents and also in the local hat/market.
Key challenges in livestock	1. Non availability of improved breed for cattle. 2. No artificial insemination centre. 3. Lack of vaccines and medicines 4. No fodder cultivation 5. Poor housing and management of livestock.
Percentage of	30 % of the households involved in fish culture.

households involved in fish culture	
Types of fish	There are different kinds of fish cultivate in the polder, i.e. Rui, Katla, Mregel, Tilapia, Thaiputi, Grass carp, Silver carp, Prawns, Golda etc.
Availability of inputs	Inputs of fisheries like fingerlings are not fully available in the polder areas. Some patilwala (local mobile fingerling seller) sell fingerlings that not sufficient to meet the demand. Fish feed is available in the local market. There is no hatchery in the polder 27/2.
Important business trend in fisheries	The fish farmers sell their fishes and prawns, Golda etc. in Dumuria and Gollamari. Some traders also procure fishes from the farmer's pond directly by visiting the areas. The production of fishers are increasing day by day, as a result the market establishment is important.
Key challenges in fisheries	• Farmers do not have improve knowledge on fish culture • Quality fingerlings are not available • Low fish production per hectare. • Sometimes price of fingerlings is higher • Price of fish is also sometimes very less • Disease of fish
Existing extension services	There is no extension worker from the Fish and Livestock dept.in the polder area.
Name and location of markets	Basically one main market (Dumuria hat) inside the polder area, and one vegetable arot (Dumuria Hasem Ali Paikary Kacha Bazar). There are one fish arort (Dumuria Anwara Fish Arot) , there is also one regular kacha bazar (Dumuria Baro Ariya Kacha Bazar).
Products provided	Different field crops like; Rice, Sesame, Mug Bean, Sweet Gourd, and homestead vegetable and fruit like; Bottle Gourd, Country Bean, Dram Stick, Banana, Papaya, Mango and fish (capture fish, culture fish, shrimp and prawn) are the main marketable products.
Surplus destination of products outside polder	The main agricultural production of the polder is fish, Boro rice and vegetables. After family consumption; farmers sold the surplus rice through Dumuria bazar and this product directly goes to Khulna or outside the polder area.
Main value chain actors	The main value chain products in the polder are fish, Boro rice, vegetables, milk, egg, and local poultry. There are about 9 input seller, the polder farmers procure inputs like vegetables seed, pesticide and fertilizers from them. There also livestock feed seller, fish feed seller in the areas. There some egg collector working as value chain actors for strengthening the value chain activities. Among the actors someone play the supporting role and someone functioning as the main actor. Beside Union Parishad, Union level Government office like; DAE & DLS have been providing roles & regulation related enabling support services.
Key challenges in marketing	1. Limited skill and knowledge on market orientation is the big challenges to establish networking among the actors; 2. Without forming producers group, it is very big challenges to initiate collective action; 3. Unethically happened market fluctuation. 4. Lack of knowledge on improved production technology.

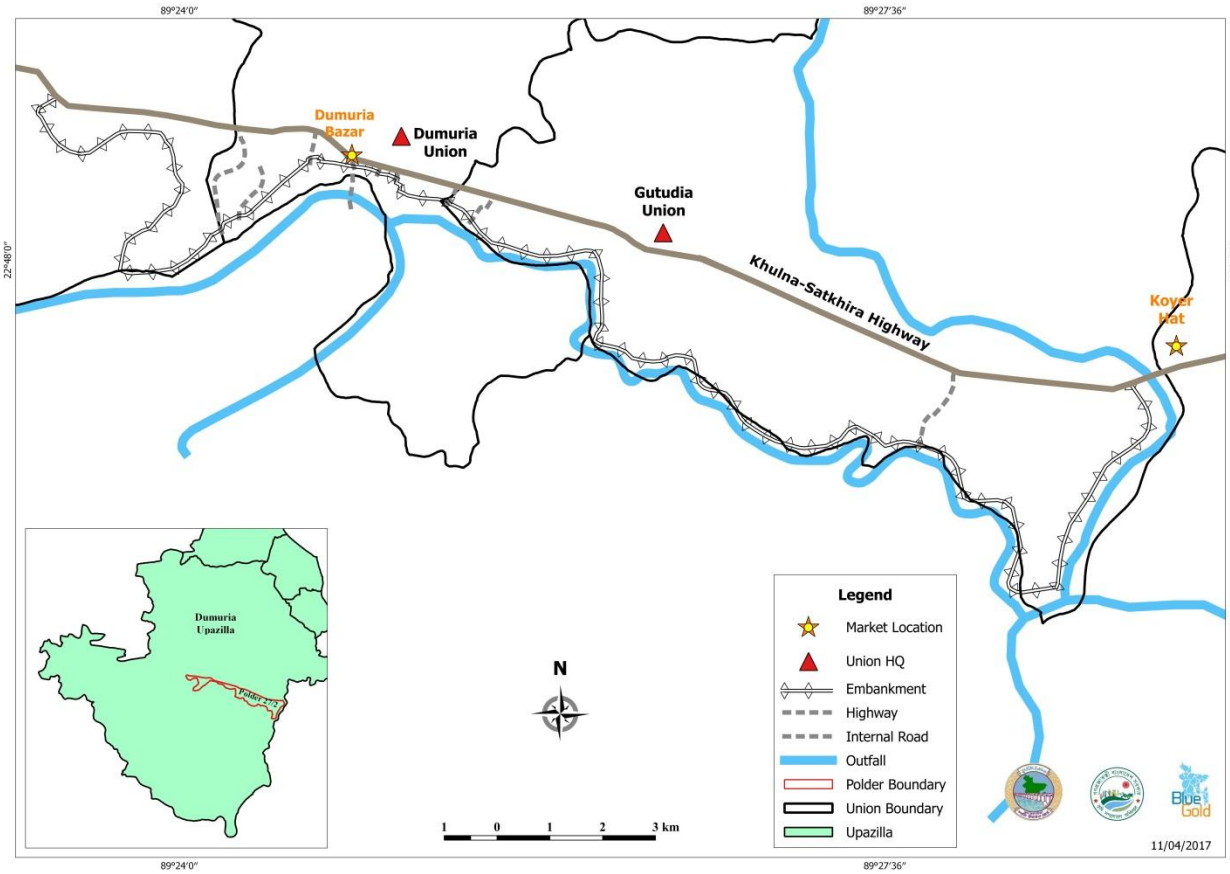

Figure 4: Markets and Union headquarters in Polder 27/2

2.5 Environmental Sustainability and Disaster Risk Reduction

Table 5: Main environmental and DRR characteristics of polder 27/2

Characteristics	
Existing environmental problems	1. Velkamari beel and Joarer beel are very much prone to water logging which effects the people for 3-4 months usually start from July and end in October. As claimed by the local farmers the T.Aman rice and seed bed for Boro rice do affect by the water logging; 2. As reported by the members of WMGs and WMA there are about 7 recognizable khals which are mostly occupied by the fish farmers for farming ghers. The Upper Shalta river contain water during monsoon and post monsoon but maximum portions are blocked by fishing trap (patha) which accelerate siltation. 3. During the April-May they enter saline water for prawn (Bagda) culture which also cause dying and cleaning water hyacinth from the rivers and khals; 4. The over and indiscriminate use of fertilizer and pesticides (cloropiryfos, cypermatrin etc.) in agriculture and horticultural crops are the major problems affect to the human health and environment health; 5. Due to the rapid urbanization, unplanned shrimp farming and indiscriminate use of pesticides few indigenous plant species (i.e. Neem, Tal, Badam, Khejur etc.) and fish species (i.e. Koi, Shing, Magur, Pabda etc.) are going to endangered.
Common hazards	Water logging comes first while norwester and thunderstorm is second according to the loos and damage in recent years.
Cyclone shelters	00
Obtained environmental clearance certificate (ECC)	Not yet done
Formulated environmental and social management plan (ESMP)	Not yet done
Formulated community based disaster risk reduction (CBDRR) plan	Not yet done
Recruited WMG environment and DRR Counselor	Not yet done
Members of WMOs included in UDMC	0
Opportunities for environmental and DRR activities	There are many I/NGOs currently active at the polder area with different programs. BRAC is working on credit and nutrition program; Asha, Caritas and TMSS on credit and nutrition program; Progoti Somaj Kollyan Sahgtha, Nice Foundation, Nijera Kori, Dolito Project are working on women health and nutrition program; Buro Bangladesh, Jagaroni Chakra Foundation, the Salvation Army, CSS and Shushilan are working for nutrition of pregnant and lactating mother. There is limited opportunity to make joint collaboration with other I/NGOs for the program on environment and DRR.

3. Development Action Plan

On the basis of the present situation and its key challenges as presented in chapter 2, a Development Action Plan has been prepared by the Blue Gold program, and is presented in this chapter.

3.1 Water Resources Management and Infrastructure

To develop a plan on Water Resource Management and Infrastructure a consultation meeting was held on 15 November, 2016 at Gutudia Union Parishad and 20 November at Dumuria Sadar Union Parishad, Dumuria. After thorough discussion and arguments with the local stakeholders the following infrastructures were identified and validated for inclusion in the Blue Gold implementation program. Embankment re-sectioning, repair of structures with gates and major khals were considered as priority-1 work while re-excavation of one khal is priority-2, re-excavation of one khal & Provision of pipes are priority-3 works[2].

3.1.1 Summary of Rehabilitation Works

SL. No.	Name of Work	Units	Quantity /Nos/Km	Estimated Total Cost, BDT
	Priority 1			
1	Re-sectioning of Embankment	km	4.00	5,200,000
2	Re-excavation of Khal	km	5.50	7,150,000
3	Repair of Sluices	nos	3	6,000,000
			Priority 1 Total=	**18,350,000**
	Priority 2			
4	Re-excavation of Khal	km	3.00	3,900,000
			Priority 2 Total=	**3,900,000**
	Priority 3			
5	Re-excavation of Khal	km	1.00	1,300,000
6	Provision of pipes	m	200	400,000
			Priority 3 Total=	**1,700,000**
			Total cost for Rehabilitation Works in Polder 27/2	**23,950,000**

Note: The items for rehabilitation works for this polder may change after WMA formation and field assessment by Zonal TA and BWDB engineers

A map showing proposed rehabilitation plan is given in Figure 5

[2] Actually all works are needed for efficient water management and to reduce health and environmental hazards in the polder. However, since fund is limited, prioritization will give a scope for phasing out the work depending on DPP provision and availability of fund. Priority-1 works include activities that are related to the safety/ immediate problem solution of the polder. Priority-2 works include activities that are required for proper functioning of the polder. If DPP allows and fund is available all works will be done.

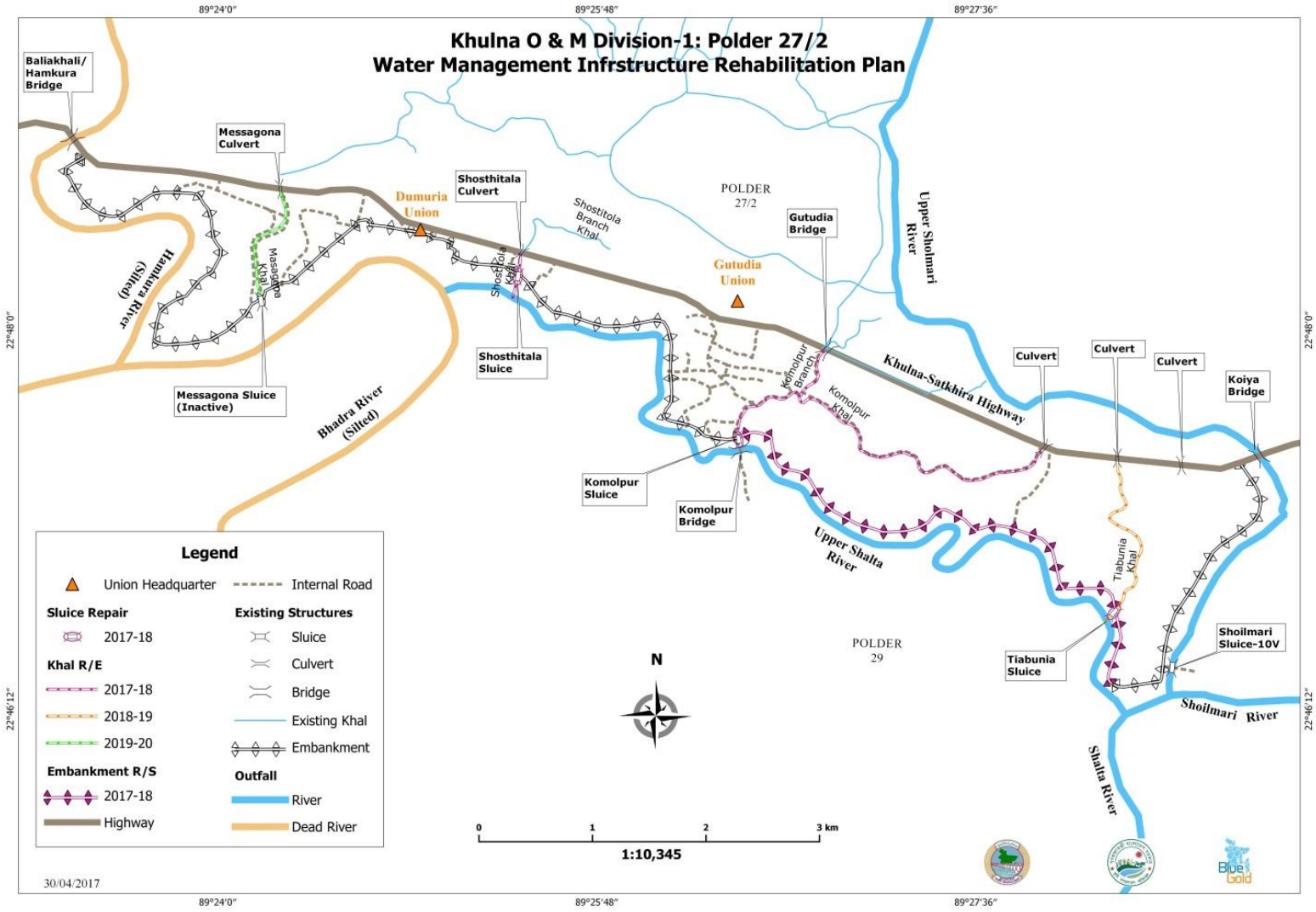

Figure 5: Proposed Rehabilitation Plan

3.1.2 Operation and Maintenance and Internal Polder Water Management

After rehabilitation the Water Management Association (WMA) will play an important role in operation and maintenance, on the basis of an agreement between the WMA and the concerned BWDB field Executive Engineer, to be finalised before the execution of the rehabilitation works. The O&M agreement will identify all operation and maintenance activities in the polder and delineate sharing of the responsibilities between BWDB and WMA. Small routine maintenance works will be implemented by WMA; and larger routine and periodic maintenance works implemented by BWDB. However, the real sharing can be anything according to the terms of agreement and mutual concurrence. The O&M agreement may also identify BWDB resources in the polder that can be used by WMA to partly or wholly mobilize resources for operation and maintenance. Technical knowledge will be provided by Blue Gold through training.

Based on this, in the first year after completion of rehabilitation, WMA's along with BWDB and TA Team will make operation and maintenance plans, implementation budget and resource mobilization plan. The WMGs will develop Internal Polder Water Management plans as part of their WMG Action Plans. All plans will be implemented by WMOs and BWDB with direct assistance from TA Team. In the second year after completion, as part of the exit strategy, WMOs and BWDB will make their plans as usual, but TA team will provide only backstopping support as and when required. At the end of the second year, there will only be TA support for monitoring of O&M and internal polder water management, and WMO's along with BWDB will continue the O&M activities in line with the agreement.

In the meantime, the TA team will continue to work with the BWDB at different levels to find an institution basis which will encourage effective commitment to and action for fulfilling the BWDB commitments under the O&M agreement with the WMA.

Sl. No.	Activity	Time Frame	Responsible Actors	People to involve
1.0	Engineering assessment and topographic surveys	2016-2018	OCWM, BWDB, TA-Socio-Economists, TA-WRM Team and CDFs	WMO members and vulnerable groups including women willing to do earthwork
1.1	Site survey, design data collection, detailed design and preparation of work packages			
1.2	Pre-work measurements			
2.0	Formation of Labour Contracting Societies (LCS)	2017-2018	OCWM, BWDB, TA- WRM Team, Social Team	LCS, WMA Monitoring Committee, WMA and WMG Executive Committee, BWDB
2.1	LCS training (WMG) and contractor orientation			
2.2	Construction monitoring training to WMAs			
3.0	Draft contract, tendering and work award	2017-2020	BWDB, TA- WRM Team, Socio-Economists, CDFs	WMA Monitoring Committee WMA and WMG Executive Committee, BWDB
3.1	Resource mobilization and implement physical works like embankment re-sectioning/ construction, khal re-excavation and repair/construction of structures			
3.2	Construction monitoring			
4.0	Polder inspection and identification of O&M requirements	Before implementation of O&M works	WMOs and BWDB	WMGs, BWDB field staffs, TA- WRM Team and Social Team
4.1	O&M agreement			
4.2	Implement catchment level water management and O&M plan			
5.0	Internal Polder Water Management	After implementation of main WRM	SAAOs (DAE), XOs (BWDB), TA-Socio-Economists, TA- WRM Team,	WMA and WMG Executive Committee
5.1	Identify WMGs interested to work along Community Agricultural Water Management (CAWM) model.			

5.2	CAWM planning	infrastructures	CDFs and PFs	
5.3	CAWM implementation			
5.4	Monitoring of CAWM			
6.0	Back-up support in the yearly joint polder inspection and assessment of O&M requirements, CAWM by BWDB and WMA	2017-2020	BWDB, TA-Socio-Economists, CDFs and TA- WRM Team	WMA and WMG Executive Committee, BWDB

3.2 Institutional Framework for Participatory Water Management

Activities to strengthen the Institutional Framework for PWM have been planned with multi-fold objectives: (i) to help the WMOs to become active and sustainable organizations, and able to participate responsibly in polder development activities (ii) stimulate effective women's participation (iii) to orient Union Parishads and other relevant stakeholders to support planned activities effectively.

Sl. No.	Activity	Time Frame	Responsible Actors	People to involve
1.0	Consultation meeting for Engineering Assessment	November 2016	Central, Zonal and Polder TA team, BWDB and DAE	WMG and WMA members UP, BWDB, DAE
2.0	Conduct UP & Upazila orientation	February 2017 to June 2017	Zonal and Polder TA team, BWDB and DAE	WMG and WMA members UP, BWDB, DAE
3.0	Identify and support existing collective actions (CA) and liaise with their leadership	January 2017 to April 2017	Zonal and Polder TA team, BWDB and DAE	WMG and WMA members UP, BWDB, DAE
4.0	Conduct walk-through, mapping with CA leadership & key informants and data collection (household survey)	January 2017 to May 2017	Zonal and Polder TA team, BWDB and DAE	WMG and WMA members UP, BWDB, DAE
5.0	Form core group of interested CA leadership and organise horizontal learning	January 2017 to April 2017	Zonal and Polder TA team, BWDB and DAE	WMG and WMA members UP, BWDB, DAE
6.0	Conduct WLUA workshop with core group	May 2017 to June 2017	Zonal and Polder TA team, BWDB and DAE	WMG and WMA members UP, BWDB, DAE
7.0	Prepare PDP and submit to BWDB	April to May 2017	Zonal and Polder TA team, BWDB and DAE	WMG and WMA members UP, BWDB, DAE
8.0	Conduct catchment-level planning meetings to define WMG boundaries and collective actions	June-August 2017	Zonal and Polder TA team, BWDB and DAE	WMG and WMA members UP, BWDB, DAE
9.0	Facilitate and expand existing CAs	January 2017 to June 2010	Zonal and Polder TA team, BWDB and DAE	WMG and WMA members UP, BWDB, DAE
10.0	WMG EC formation and Registration	May 2017 to February 2018	Zonal and Polder TA team, BWDB and DAE	WMG and WMA members UP, BWDB, DAE
11.0	Promote and implement new CAs with WMG as identified in the catchment level planning meetings	January 2017 to March 2020	Zonal and Polder TA team, BWDB and DAE	WMG and WMA members UP, BWDB, DAE
12.0	Provide selective WMG foundation	January 2017 to	Zonal and Polder	WMG and WMA

	courses using experiential learning methods	April 2018	TA team, BWDB and DAE	members UP, BWDB, DAE
13.0	Support WAP formulation and implementation of CAs with relevant sub-groups	July 2017 to June 2020	Zonal and Polder TA team, BWDB and DAE	WMG and WMA members UP, BWDB, DAE
14.0	Facilitate LCS implementation with WMGs	October 2017 to June 2020	Zonal and Polder TA team, BWDB and DAE	WMG and WMA members UP, BWDB, DAE
15.0	Organise CA exchange visits/horizontal learning	July 2017 to June 2020	Zonal and Polder TA team, BWDB and DAE	WMG and WMA members UP, BWDB, DAE
16.0	Facilitate networking and partnerships	January 2017 to April 2018	Zonal and Polder TA team, BWDB and DAE	WMG and WMA members UP, BWDB, DAE
17.0	WMG Sub Committee formation(O&M Catchment Level & others in WMG Level)	January 2018 to July 2018	Zonal and Polder TA team, BWDB and DAE	WMG and WMA members UP, BWDB, DAE
18.0	Regular catchment-level water management and O&M planning	January,18 to July 2019	Zonal and Polder TA team, BWDB and DAE	WMG and WMA members UP, BWDB, DAE
19.0	Continue assisting WMGs to improve performance	July 2017 to May 2020	Zonal and Polder TA team, BWDB and DAE	WMG and WMA members UP, BWDB, DAE
20.0	Gender Workshop with LGI and other Stakeholders	January 2018 to June 2020	Zonal and Polder TA team, BWDB and DAE	WMG and WMA members UP, BWDB, DAE

3.3 Agricultural and Marketing Services

The agricultural production and business development aspects of the Development Action Plan focus on the development potentials and required actions in relation to crops, fisheries and livestock while taking into account development potentials of specific value chains.

Sl. No	Activities	Time frame	Responsible actors	People to involve
	Agricultural Services			
1.0	Vegetables production and tree plantation in homestead areas through farmers field school	2017-2019	DAE,TA-CDFs, Master trainers, Agricultural Expert	WMG and WMA members
2.0	Activities to improve crop production: a. FFS on , homestead garden (vegetables) and nutrition, b. Women focused FFS c. Demonstrations / trials on winter vegetables **d.** Field day on home garden and nutrition activities of FFS.	2017-2019	DAE,TA-CDFs, Master trainers, Agricultural Expert	WMG and WMA members
3.0	Activities to improve livestock production: a. Poultry and nutrition FFS b. Livestock vaccine cold chain at	2017-2019	DLS, TA-FOs, Master Trainers, Livestock Experts, Agricultural Expert	WMG and WMA members

	WMG/WMA level c. Community Livestock Worker training d. Community Poultry Worker Training e. Field day on livestock activities			
	Business Development			
1.0	Workshop with WMOs to promote CA, Business Planning and private company linkage	July-Aug 17	TA-BDCs	WMG/WMA
2.0	Linkage Building meeting/Workshop with VC actors	July-Aug 17,18,19	TA-BDCs	WMG/WMA
3.0	Workshop with GL/RF /FT/LF on agriculture development (FFS with market orientation) business networking and Linkage	July-Aug 17	TA-BDCs	WMG/WMA
4.0	Linkage workshop between RF/ CF/LF/FT & Market actors	June 17, 18,19	TA-BDCs	WMG/WMA/IP
5.0	Actors meeting with WMO for Linkage, Discussion negotiation and Intervention designing	Nov-17,18,19	TA-BDCs	WMG/WMA
6.0	Promote and implement new CAs with WMG as identified in the catchment level planning meetings	2017-2019	TA-BDCs	
7.0	Organise CA exchange visits/horizontal learning	Apr 17-Mar 20	TA-BDCs	BWDB/DAE/UP/DLS/
8.0	Input traders capacity building	Nov17	TA-BDCs	PS/DAE/DLS

3.4 Environmental Sustainability and Disaster Risk Reduction

The environmental sustainability and DRR aspects of the Development Action Plan focus on: i) compliance with social and environmental management regulations; and ii) strengthening DRR activities.

Sl. No	Activities	Time frame	Responsible actors	People to involve
1.0	Obtaining Environmental Clearance Certificate from DoE	2017-2018	Outsourcing SPs	BWDB, TA-Env. Expert, Zonal and Polder Team
2.0	Environmental compliance monitoring and quarterly reporting to DoE	2018-2020	BWDB field staffs, TA-Env. Expert	TA-Engineer Team, Polder Team, XEN of BWDB
3.0	Formulation of Environmental and Social Management Plan (ESMP)	2017-2018	TA-Env. Expert, Polder Team	Socio-Economists, TA-Engineer Team,
4.0	Reconstitution of UDMCs	2018-2019	Training Team, Polder Team	TA-Env. Expert, Zonal Team
5.0	Recruit WMG's Environment and DRR Counselors	2017-2018	WMGs, Polder Team	TA-Env. Expert, Zonal Team
6.0	Formulation of Community Based Disaster Risk Reduction (CBDRR) plan	2017-2018	TA-Env. Expert, Polder Team	Socio-Economists, TA-Engineer Team,
7.0	Disaster Preparedness and implementation of CBDRR plan	2017-2020	WMGs, Polder Team	TA-Env. Expert, Zonal Team
8.0	Training to Env. and DRR Counselors	2018-2019	Outsourcing	TA-Env. Expert,

	and UDMCs on Env Safeguard and Dis. Mgmt./coordination workshop with UDMCs		SPs/Training Team	Zonal and Polder Team
9.0	Orientation to LCS leaders and Contractors and WMA leaders on environmental clearance Certificate.	2017-2018	Engineer Team, TA-Env. Expert,	XEN of BWDB
10.0	Awareness raising program	March 2017 to June 2020	Env. and DRR Counselors, TA-Polder Team	Env. Expert, Zonal Socio-Economists
10.1	Discussion reducing excessive using of fertilizer and pesticide at WMG meeting, FFS & MFS session			
10.2	Observation of National and International Days			
11.0	Integrate ESMP and CBDRR with the WAP, Annual Polder Action Plan and UDMC's DRRAP	2017-2020	TA-Env. Expert, ZSEs, CDFs	WMA & WMG executive committee

4. Planning Timeline

Blue Gold Program, BWDB
Polder Completion Timeline

Polder - 27/2

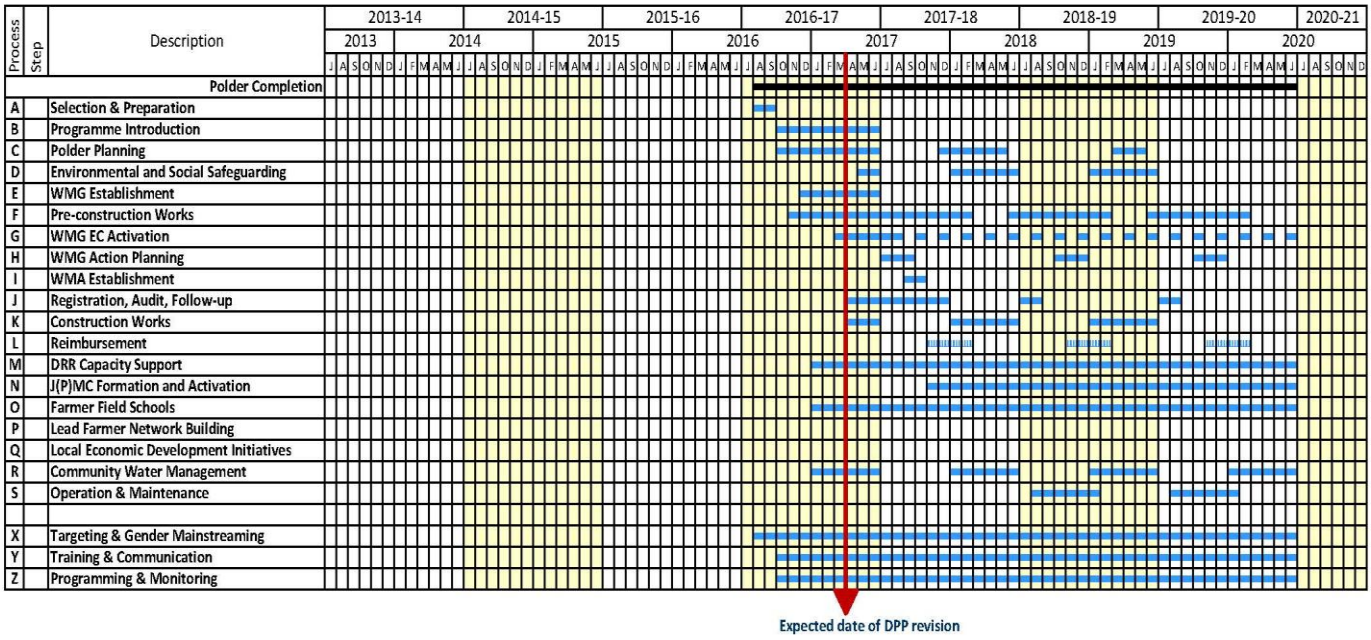

Figure 6: Polder Completion Timeline

5. Polder Budget

The overview of the estimated allocated budget for the polder activities in polder 27/2 is presented in Table 6.

Table 6: Polder 27/2 Budget

S.N	Task Name	Total Amount	
		BDT*x100000	**EUR****x1000
1.0	***Institutional Framework for Participatory Water Management***	7.50	8.52
2.0	***Main Infrastructure***	*239.50*	*281.76*
3.0	***Internal Water Management*** *(Polder-wise budgets are based on an average amount per CWM-site. In reality budgets will vary per CAWM-site)*	9.00	10.22
4.0	***Agriculture & Marketing Services*** (Actual polder-wise budgets will be higher as exact #FFS per polder will be determined later, estimated DAE contributions have been included in these estimations)	25.00	28.40
5.0	***Environmental & Social Management / Disaster Risk Reduction (DRR)***	32.00	37.64
6.0	***Training***	16.74	19.69
	TOTAL	***329.74***	***386.23***

Note: Exchange rate is 1 EURO=85 BDT

Appendix 1. PDP Formulation Process[3]

The Blue Gold Program makes use of the 6-step planning approach described in the Guidelines for Integrated Planning for Sustainable Water Resources Management (IPSWARM) that was adopted by the BWDB in 2008 for its medium sized existing Flood Control and Drainage schemes. Polder Development Plans are the 4th step which follows after the participatory data collection and needs assessment (step 2) and the formation of WMOs (step 3).

In the PDP Formulation Process one can distinguish the following activities/tasks and their outputs (see Figure 6)

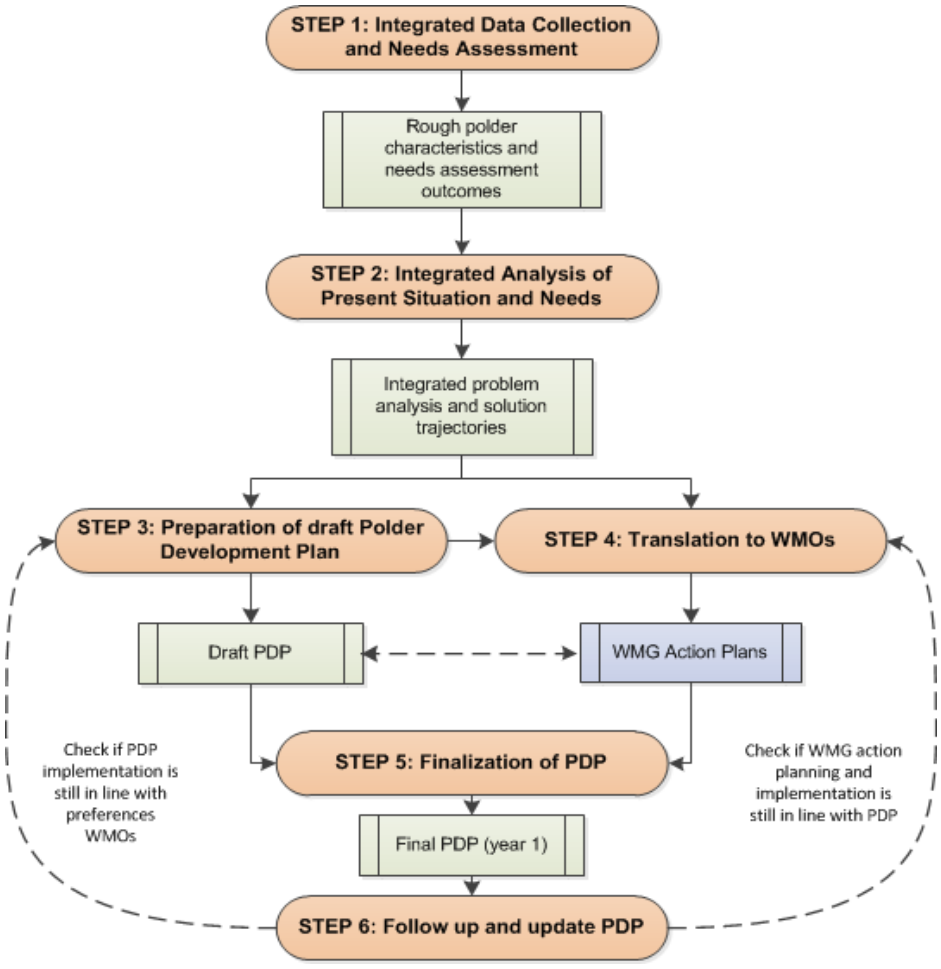

Figure 7: The steps of the PDP Formulation Process

Explanation of the different steps:

STEP 1: Integrated Data Collection and Needs Assessment: For the purpose of planning, data is collected through various methods: collection of existing information from governmental departments, observations in the field, and informal interviews with people living in the polder area and key stakeholders, focus group discussions, consultation meetings, engineering surveys, agricultural surveys and value chain mapping and analysis. The various components do their field data collection individually, but coordinate their work to avoid overlap, gaps and misunderstanding among WMOs. The results and outcomes of each

[3] For the preparation of this PDP, focus group discussions were conducted with the existing WMOs and Ups. Polder Team and Zonal Experts were actively involved to in the process of specific data collection. In the case of polder 27/2, after drafting the PDP it was shared with the representatives of WMOs and UPs for data validation and updating

field visit, meeting, interview or focus group discussion are recorded. Data among others includes the Integrated Needs Assessment executed by component 1 and 2 (WMO strengthening); engineering survey details collected by component 2 and data collected by component 4 in relation to the value chain selection and analysis. The rough data are managed by the GIS specialist and used to generate specific geo-information maps or figures, which are published on an open source website (Lizard Portal).

Outputs:

- Rough data of polder characteristics
- Needs assessment report

STEP 2: Integrated Analysis of Present Situation and Needs: The integrated data collection and needs assessment is used to describe the present situation of the polder by summarizing the collected info in tables, figures, pie charts and maps with supporting text, as one of the core chapters of a PDP. The present situation in combination with the Needs Assessment is an input for a joint SWOT (strengths, weaknesses, opportunities, threats) analysis workshop within the Blue Gold Team. The outcomes of this SWOT exercise are used in a second workshop at polder level to formulate solution trajectories and activities for polder development. Extra attention is paid to address the severity of problems and the potential of opportunities while selecting activities. The fact that Blue Gold has a limited scope and budget, and cannot address all needs, only those connecting to program objectives and those financially feasible are taken in consideration.

Output:

- An integrated problem analysis and solution trajectories

STEP 3: Preparation of draft Polder Development Plan: After the integrated analysis, a draft Development Action Plan (including actions related to strengthening WMOs; water resources management; agricultural production; business development; sustainable environmental management; community based disaster risk management; gender and institutional strengthening) is developed. The Blue Gold Team organises an internal meeting to make sure the planned activities across components are coherent and support each other and cross-cutting issues are integrated well (avoid overlaps and gaps). The draft Development Action Plan is integrated with the present situation and the integrated problem analysis and solution trajectories to result in a draft PDP.

Output:

- Draft PDP

STEP 4: Translation to WMOs: While the draft PDP is being developed, WMG Action Plan (WAP) meetings are organised for all WMGs. The proposed PDP activities of Blue Gold are presented and the potential actions for the community are discussed. The Blue Gold staff support the WMG to prepare a WAP on the basis of their preferred actions and the draft PDP.

Output:

- WMG Action Plans (WAPs)

STEP 5: Finalization of PDP: On the basis of feedback provided by the WMA and possibly other stakeholders like UP, the Blue Gold Team finalises the PDP. The PDP is forwarded to interested stakeholders and a limited campaign for awareness creation at local level is planned and carried out.

Outputs:

- Final PDP

STEP 6: Follow-up and update of PDP: Field staff of Blue Gold initiates the implementation of activities with WMOs. Regular follow-up meetings are held, participatory monitoring to keep track of implementation is stimulated and the WAPs are regularly updated by the WMGs. Furthermore the developments of specific value chains, gender issues, disaster risk reduction and environment actions, which are to be incorporated in the WAPs, are discussed. If required, PDPs are updated after 1 or 2 years.

Appendix 2: Water Management Infrastructure of Polder 27/2

Embankment
Total length of the embankment around polder 27/2 is about 15.29 km. The entire embankment is an interior embankment with a crest width of 4.27m and crest level of 4.27 m PWD.

Sluices
There are 3 Sluices in this polder. These are:

S.N.	Name of Sluices	Number of Vents	Size, (mx m)	Location, km
1.	Tiabunia Sluice	1	1.50 X 1.80	07.250
2.	Komolpur Sluice	1	1.50 X 1.80	10.950
3.	Shostitala Sluice	1	1.20 X 1.50	14.470

Drainage Outlets
There is no Outlet in this polder.

Irrigation Inlets
There is no Inlet in this polder.

Khals
There are about 7 recognizable khals with branches and having a total length of above 15.00 km which are shown in Figure 2.