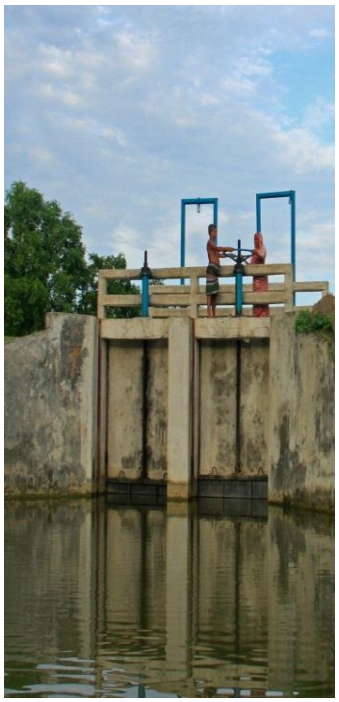
Bangladesh Water Development Board (BWDB)

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

Department of Agricultural Extension (DAE)

Polder Development Plan (PDP) – DRAFT

Polder 26

November, 2016

BETS LTD

Socioconsult Ltd. for sustainable development

FEMCONSULT

MOTT MACDONALD

Program Data

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Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
1.0	30/11/2016	Blue Gold Polder Team of Polder 26	Judith de Bruijne Niels v/d Berge Joynal Abedin	Alamgir Chowdhury	PDP of Polder 26 in revised template

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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
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 26 only covers Shovna union of Dumuria Sadar upazila, Khulna district. The polder was constructed in 1967 – 68 by the Bangladesh Water Development Board (BWDB) and was recently rehabilitated under the IPSWAM project from 2003 – 2011. The polder is located in the South-West hydrological region of Bangladesh, with administrative jurisdiction lying within the Khulna O&M Division - 1, BWDB, Khulna. 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**.**

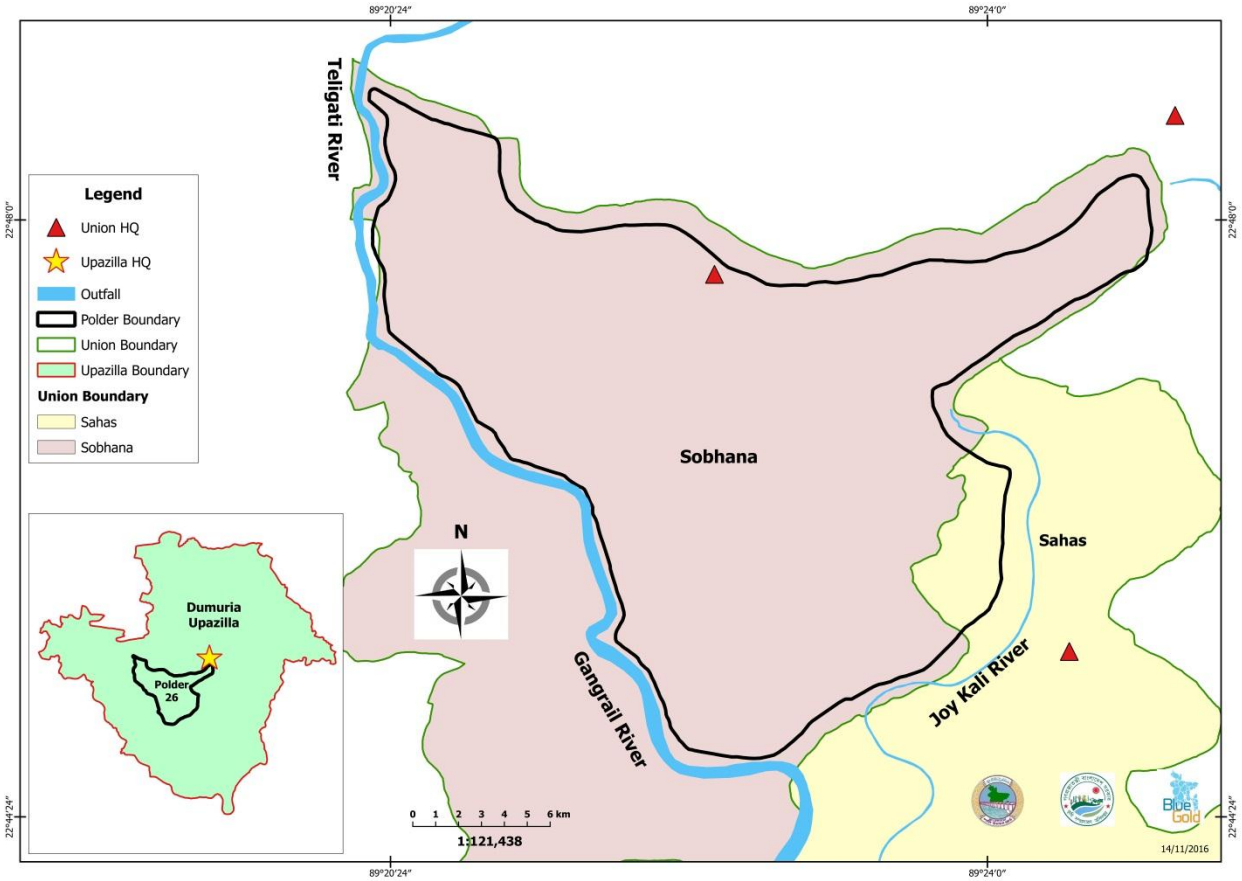

Figure 1: Location of Polder 26 in Dumuria Upazila under Khulna District

Table 1: Main Physical and Demographic Characteristics of polder 26

Characteristics	
Included Upazila (s)	Dumuria
Included Unions	Shovna
Polder boundary (in km)	28 km
Total number of Mouzas	15

Total polder area (in ha)	2696			
Total number of households in the polder	4033			
Total number of catchments	5			
Total cultivable land (in ha)	2710	High land: 15% Medium-high land: 80%	Low land: 5%	
Population	22605			
Literacy rate	51.12%			
Major occupations	Agriculture (31%)	Agricultural labour (46%)	Business (10%)	Others (13%)
Economic condition	Rich: 15%	Middle class: 32%	Poor: 53%	
Status of seasonal labour migration	After harvesting T-Aman rice and before going to cultivate sesame the agricultural labour become workless. In this time (December to February) farmers migrate to another places where need to agricultural labour. Approximately 12-15% farmers goes to nearest Dumuria, Jessore and Gopalganj districts. The activities they engage to sell labour in Boro rice and winter vegetable cultivation, rickshaw-pulling, and some are engage small business by door to door selling.			
Status of internal road communication	Internal road communication facilities are highly depends on embankment road and inside branching roads are connected with embankment road. The length of the Embankment is 28 km with a top width of 3.8 m. The crest level is 3.5 m above Mean Sea Level (MSL). Existing side slope is 2m as hypotenuse on both riverside and countryside. The entire embankment has a setback distance between 60 m to 80 m. The existing condition of the embankment is good at most parts offering protection against tidal and storm surges and salinity intrusion. In dry season, the embankment remains dry and various modes of transportations are found through it. Only 5% of the entire peripheral embankment is paved near the Sovna bazar and the rest of it is unpaved. As a result, communication system of this area is very poor. It gets even worse during monsoon. The roads become slippery and unsuitable for any kind of vehicular movement.			

2.2 Water Resource Management and Infrastructure

In the main characteristics of the water resource management and infrastructure of polder 26 are highlighted in the Table 2 and Figure 2 shows the existing infrastructure and khals in polder 26. Further details can be found in Appendix 2.

Table 2: Main Water Resource Management and Infrastructure characteristics of polder 26

Characteristics			
Length of embankment (in km)	29.00		
No of drainage/flushing sluices	09	Well-conditioned: 2, Under Construction 3	Bad conditioned: 4(Outfall River Dead)
No of inlets	1 (Private)	Well-conditioned: 1	Bad conditioned
No of (drainage) outlets	2 (Private)	Well-conditioned: 2	Bad conditioned
No of canals	09 nos; Main 07 nos. Secondary 02 nos.		
Length of canals (in km)	22.500 km (main), 13.500 km (secondary)		
Main outfall rivers and khals	Teligati River (active), Gangrail river (active), Bhadra river (dead), Joykhali river (dead)		

Situation of tidal and river flooding	There is no tidal flooding in polder 26. River flooding takes place in monsoon. Expected depth of inundation is about 0.60m to 1.00m in monsoon. The duration of inundation about 3 to 4 months.
Locations with water logging and siltation.	Kakmari Drainage Sluice, Shovna Sluice, Molmolia two nos. Drainage Sluice. Water logging is observed in that inactive sluices area.
Most river erosion prone area	There is one river erosion point at Zialtola.
Other relevant water issues	Polder 26 falls in the minor wind risk zone.
Key challenges in effective water management	Khal re-excavation, 3 nos. New Structure construction & Inactive 4 nos. structures to be needed active.
Challenges in planning construction of water infrastructures within polder area	Not found during planning construction of water infrastructure within polder area.
Current internal polder water management practices	Secondary and tertiary khal to be re-excavated.
Overall condition of internal polder water management	Partly good.
Opportunities for internal polder water management	Horizontal Learning between polder-26 with another polder.

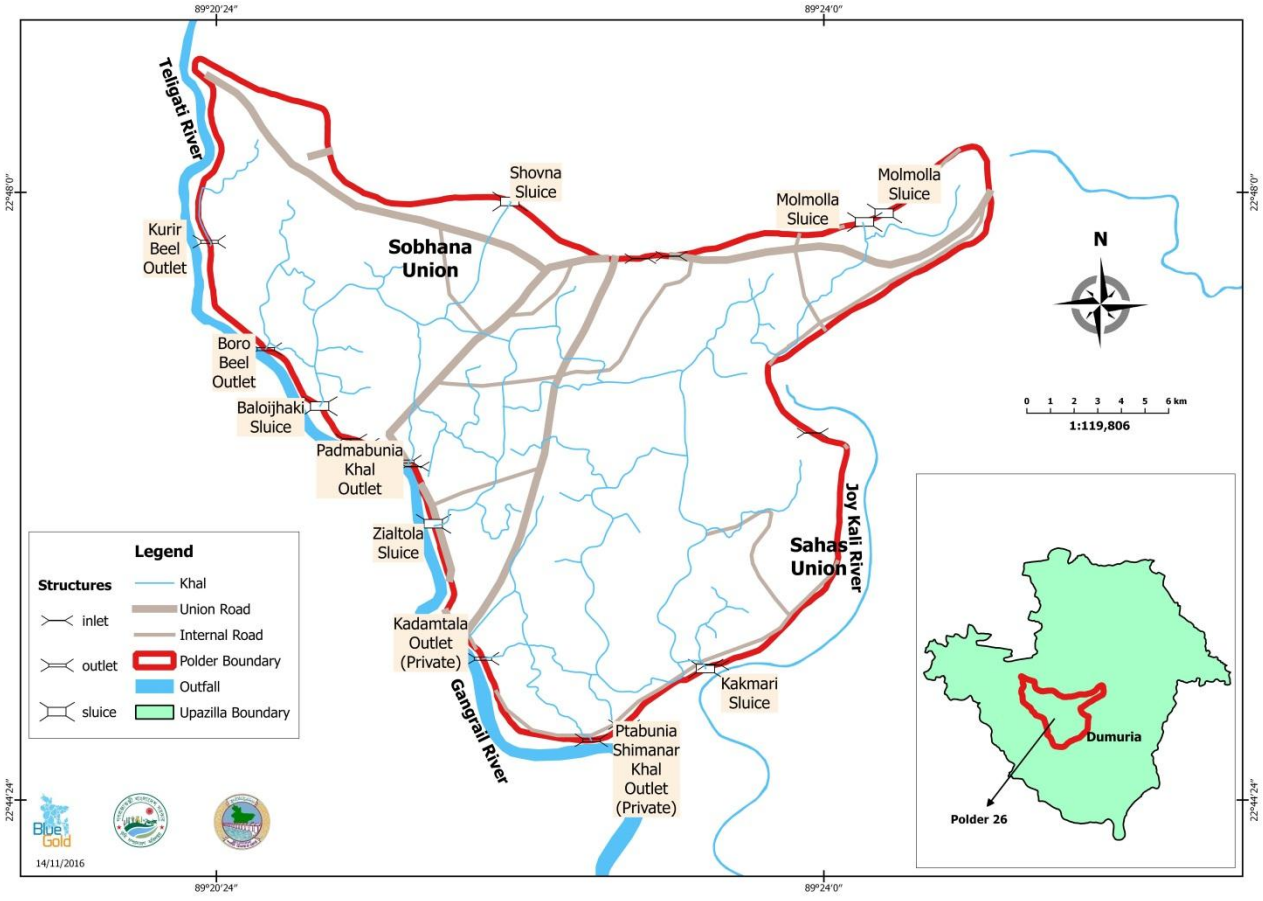

Figure 2: Map of Polder 26 showing the existing Khals and Water Management Infrastructure

2.3 Institutional Framework for Participatory Water Management

The main institutional actors in polder 26 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 (UDMC). Main characteristics of the WMGs and WMAs and other institutional actors are highlighted in the Table 3. The boundaries and names of the WMG and WMA are shown in Figure 3.

Table 3: Main characteristics of the Institutional Framework of PWM in polder 26

Characteristic			
Number of WMGs	15	Registered: 15	Non-registered: 0
Members of WMGs	4860	Female: 1897	Male: 2963
HHs being part of WMGs	3017		
Number of WMAs	2	Registered: 0	Non-registered: 02
Female representation in WMGs	39%		
Total deposited fund (BDT)	733556		
Total savings of WMGs (BDT)	91210		
Total number of WMGs with O&M fund	0		
Names of projects and organisations with similar / related activities	No similar / related activities are going on but a number of NGOs are active including ASA, Grameen Bank, BRAC, SUS, Proshika, Caritas, Prodipon, Uttaran, Gana Unnayan Sangstha, Bureau Bangladesh, CSS, HYSAWA and Rupali. All these NGOs have micro credit programs. Among others HYSAWA has a health and sanitation programme; Caritas, Prodipon and Uttaran have awareness raising programmes regarding the evils of child marriage and dowry; BRAC supplies rings and slabs for latrines at low price; Rupali has a programme of income generating activities for their group members, under which they provide cows, goats and sheep free of cost.		
Existing WMOs linkages with other stakeholders	Generally strong linkage with UPs, however linkages with other service providers like DAE, BWDB, LGED and NGOs and private sector actors could still be further strengthened.		
Number of WMGs member including in UP standing committee	10		
O&M agreement signed with BWDB	No		
Current participation of WMOs in O&M	Moderate. WMG does it as per their need.		
Existing conflicts on water management	No major conflicts		
Key challenges in strengthening PWM	1. Political influence 2. LCS budget and work order amount as well as measurement in the beginning were not the same amount in final measurement and as a result LCS members and WMG members demotivated.		
Key challenges in relation to women participation	No challenges here in polder 26 in relation to women participation, those who are out of WMOs still cannot have their much mobility access.		
Key opportunities in PWM	1. Linkages with other institutional actors could be further strengthened.		

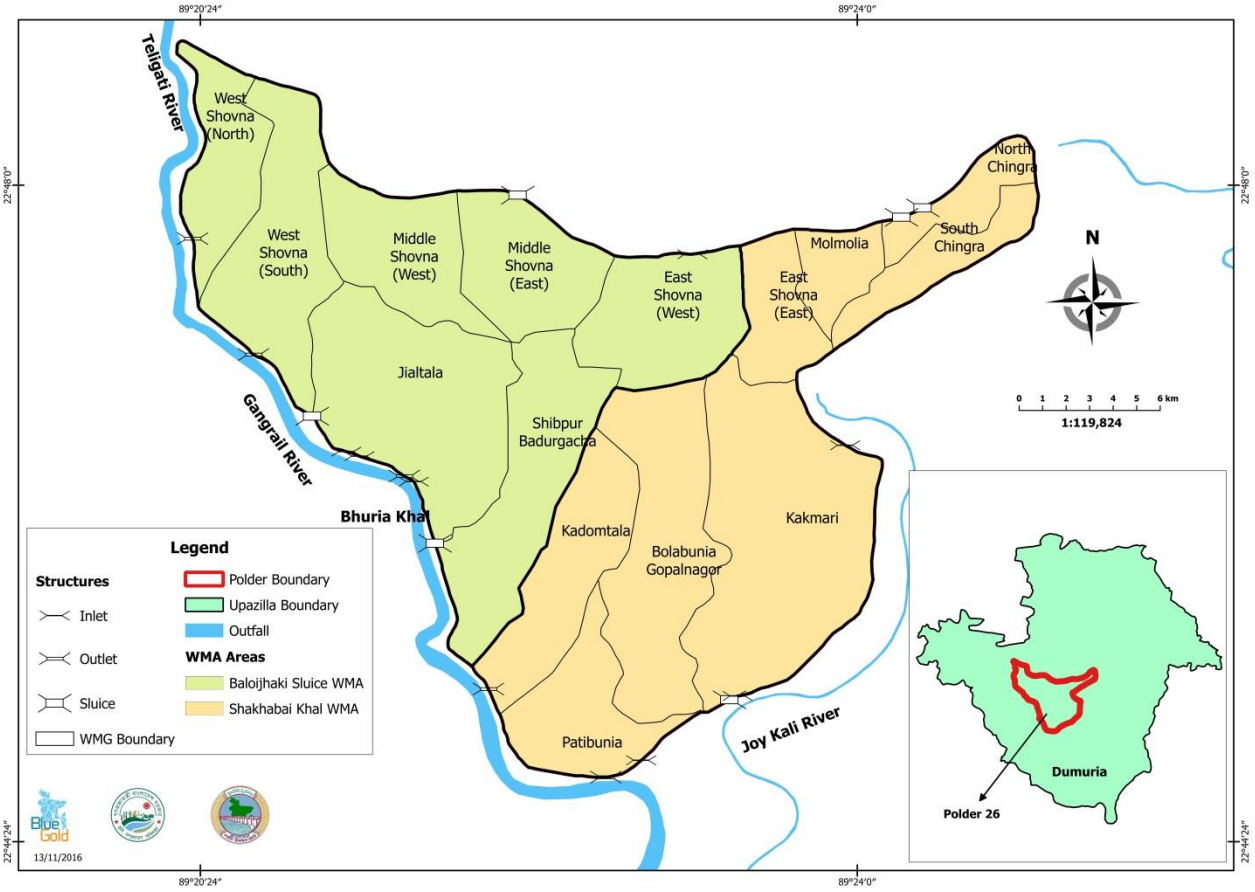

Figure 3: Name of WMG and WMA areas in Polder 26

2.4 Agricultural and Marketing Services

In polder 26, most polder dwellers are involved in crop production and fish culture. Livestock keeping is to a certain extent important. The most important characteristics and challenges of agricultural production and marketing services can be found in Table 4. The main markets of polder 26 are shown in **Figure 4**.

Table 4: Main characteristics of Agricultural and Marketing Services in polder 26

Characteristic			
Main crops (top three)	1. **Taman**	2. **Fish**	3. **Vegetables**
Current most common cropping calendar(s)	Fallow - Fallow - T-Aman Fish-Fish-Fish Fish- T-Aman-Boro Vegatables – Fallow- T-Aman T Amon-Boro-Fish		
Current cropping intensity	160%		
Main vegetables	The main vegetables in the polder 26 are Bottle gourd, Ash gourd, Better gourd, Sweet gourd, Cucumber etc. mainly in the Gher and homestead areas.		
Main fruits	In the polder areas the main fruits which are mainly cultivated in the mainly homestead areas are Mango, Sapota, jujube, coconut and Guava.		
Available agricultural machinery	A total of 20 power tillers owned by the community people. The farmers of the polder are used the hired power tillers from the outside of the polders. 20 %		

	polder farmers have shallow pump. There are 3 deep tube-wells for irrigation.
Present irrigation practices	About 30% farmers cultivate Boro rice mainly in the Gher by using shallow Pump. The others farmers get irrigation water from the deep tube well for the cultivation of Boro rice.
Availability of inputs	There are 6 traders sell vegetables seeds, rice seeds, fertilizers, pesticides and fungicides. The farmers sometimes go to the market in Khornia and also Dumuria.
Current knowledge on proper input use	The farmers have traditional knowledge on quality seed, fertilizers and use of pesticides. Maximum farmers cultivate the crops through conventional methods.
Important business trend in crop production	There are two whole sale markets in Khornia and Dumuria, where the farmers sell their products. Besides there are some hat/bazar in the polder area where they sell their products.
Key challenges in agriculture	1. The quality seed are not available 2. There are pest and rodents problems in case of field crops 3. Water logging is also a great concern 4. Poor drainage facilities
Percentage of households owning livestock	Cattle : 80-85 % Goats : 30- 35 % Poultry : 90 -95 % Ship : 15- 20%
Availability of inputs for livestock	There are only one shop in Gabtola bazar from where farmers buy cattle feed and poultry feed. Sometimes farmers buy the poultry and cattle feed from Dumuria and Khornia Bazar also.
Important business trend in livestock	There are some local buyers/business men who buy local poultry, goats and cattle from the farmers. The farmers of layer and broiler are selling eggs and broiler birds to the local agents, in the local hat/market and also in Dumuria Bazar.
Key challenges in livestock	1. No artificial insemination centre. 2. Unavailability of improved breed for cattle. 3. Lack of vaccines and medicines 4. No fodder cultivation 5. Poor housing and management of livestock.
Percentage of households involved in fish culture	90 – 95 % of the households involved in fish culture
Types of fish	There are several species of fish cultivating in the pond and Gher i.e. Golda, rui, katla, mregel, tilapia, thai puti, grass carp, silver carp etc.
Availability of inputs	Farmers in the polder areas collect inputs like fingerlings from patilwala, fish feed from the Khornia and Dumuria Bazar.
Important business trend in fisheries	The fish farmers sell their fishes in the market Dumuria and Khornia and also the local hat/bazar like Nuton Rasta.
Key challenges in fisheries	• Sometimes higher price of fingerlings; • Infectious diseases of fish; • Quality fingerlings are not available; • Price of fish is also sometimes very less; • Medicine is not available; and • Treatment facilities are less.
Existing extension services	There is no extension worker from the Fish dept. in the polder area. Blue gold Program organized FFS on pond fish culture and provides training and extension services.

Name and location of markets	In the polder area Gabtala hat, Council hat, Kamer hat, Zialtala hat, Kadamtala hat, and Madertala hat etc sited in particular day and people have got marketing facilities in every day by round the week. Hasem ali Kacha maler Arot (fresh vegetable and fish Arot) is the biggest and famous market are situated outside of the polder but very nearest and well accessible for all. The people also goes to other market which are situated outside of the polder like; Dumuria bazer, Shahapur hat, Kharnia hat, Chulnagar hat, and Khulna bazar
Products provided	Mainly polder 26 focused as vegetable producing zone and all kinds of valuable vegetable like; Tomato, cauliflower, Cabbage, olcapi, Radish, Red amaranth, Brinjal, Country bean and Sweet Gourd are cultivated as winter vegetable etc. Other hands Ladies finger, Bitter gourd, bottle gourd, snack gourd, sweet gourd, Long yard bean, Pointed gourd Cucumber, Indian Spinach are cultivated in Kharip-1 which continue production cycle up to Kharip-2. Beside T-Aman rice cultivated all over the polder area and Boro rice cultivated in Gher area with culturing fish. So Rice, vegetable, fish is the major products of this polder and Backyard Poultry, different spices and fruits are also the minor products.
Surplus destination of products outside polder	The polder has mainly surpluses for Paddy, Vegetables, Golda and captured fish. The primary destination of products is local hat but it differs from product to product. Paddy mainly sold at Local Hats or via Dumuria to Outside polder. Vegetable directly goes to Hasem ali Arot or Sonadanga Arot, Khulna and some portion also in Local collection centers. Most produced fishes are consumed by polder dwellers, but large producers can reach Asem Ali Fish Arot.
Main value chain actors	Not selected.
Key challenges in marketing	1. Quality inputs are very important for production and all types of quality inputs are not available in polder level. Beside private sectors representative always are not available at polder level. So that unavailable of quality input and inadequate technical services is the big challenge in the polder. 2. In cases of Rice, It is the normal traditions in Bangladesh that always have low price during rice harvesting period. In this critical moment, farmers could not storage the rice for certain period for avoiding the fluctuation price due to less storage facilities and technical knowledge. 3. Farmers are not aware about the collective actions which ensure to reduce the production cost and ultimately earn the profit. So it is one of the challenges to build collective mentality among the farmers.

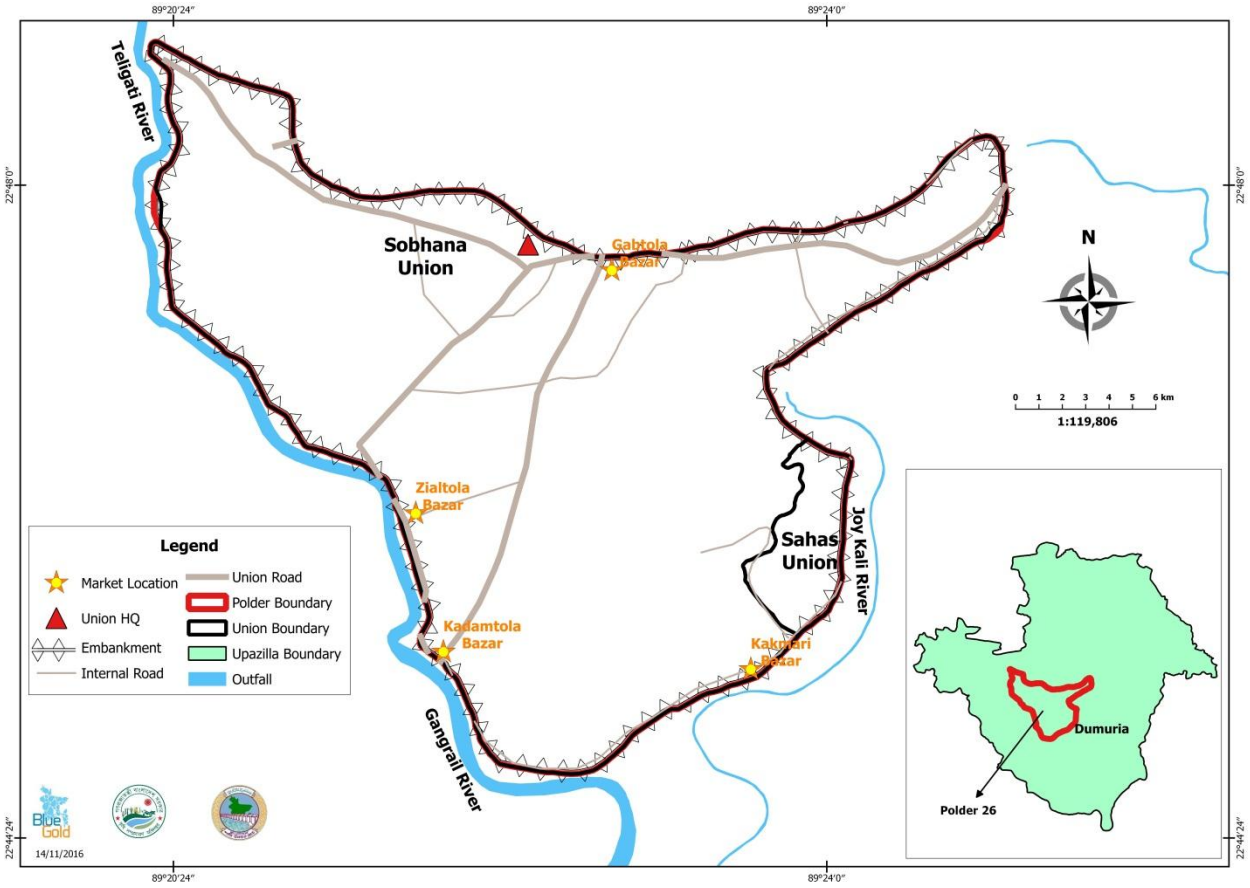

Figure 4: Markets and Union headquarters in Polder 26

2.5 Environmental Sustainability and Disaster Risk Reduction

Table 5: Main environmental and DRR characteristics of polder 26

Characteristics	
Existing environmental problems	1. This polder is surrounded by Mora Bhadra River in the north and east and the Teliganga River in the east. Mora Bhadra River has completely been silted up and converted into an agricultural field and gradually the other remaining internal khals are silted up. 2. The depth of all khals ranges from 2 to 4 ft. Only Zialtola and Shahbani khals are found perennial but a little quantity of water is found during dry season which is not suitable for fish habitation. 3. Salinity concentration in the rivers is increasing. So salinity tolerant aquatic species may dominate while fresh water aquatic species may decrease. Biodiversity of aquatic life may also decrease in the Mora Bhardra, Mora Jaykhali and Teliganga Rivers system. 4. Local people reported that pesticides coming from agriculture field especially watermelon field that causes water deterioration sometime, this affects quality of fish habitat as well as fish diseases.

Common hazards	Tropical cyclones from the Bay of Bengal accompanied by storm surges are one of the major disasters in the polder area. Cyclone, storm surge induced flooding, riverine coastal flooding, water logging, salinity intrusion and coastal erosion are the main climate and hydrologic hazards in the area.		
Cyclone shelters	There are 2 cyclone shelters among them one is under construction		
Obtained environmental clearance certificate (ECC)	Not yet received		
Formulated environmental and social management plan (ESMP)	Yes		
Formulated community based disaster risk reduction (CBDRR) plan	Yes		
Recruited WMG environment and DRR Counselor	30 Counselors	15 Environmental Counselors (female)	15 DRR Counselors (male)
Members of WMOs included in UDMC	0		
Opportunities for environmental and DRR activities	1. The continuous siltation affects the water flow as well as water availability in the internal khals. If this situation is continued, perennial khals would be converted to seasonal khal or most portion of the khal would become agriculture land in future. It is assumed that about 20% area of a khal may turn to seasonal khal. As consequences, water hyacinth will increase and would covered most of the part of a khal. 2. The excessive water hyacinth would inhibit to light penetration into the water bodies and would cause hamper to the photosynthesis activity of fish depending aquatic vegetation. On the hand, decomposition of water hyacinth would deteriorate the water quality which would cause negative impact the fisheries resources and aquatic biota. 3. Assist and empower WMG's counselors to make a strong platform in community level that will ensure strong linkage and joint collaboration with existing UDMCs. 4. To increase women's participation in DRR and environment related activities that will empower women to take DRR related initiatives and activities in case of family level.		

3. Activities as of October 2016

The achievement was made as of October 2016 on the area of Water Resources Management and Infrastructure, Institutional Framework for Participatory Water Management, Agricultural and Marketing Services, and Environmental Sustainability and Disaster Risk Reduction is summarized below in the table-

Sl. No	Activities	Time Frame	Present Status	Remarks
A. Water Resources Management and Infrastructure				
A-1	Embankment Re-Sectioning	2015-2016	10.06 km completed and remaining is on going	
A-2	Embankment Retired	2015-2016		Nil
A-3	Khal Re-excavation	2015-2016	7.23 km (on going)	
A-4	Infrastructures Rehabilitation	2015-2016	4 nos. (on going)	(1 repair of drainage sluice and 3 construction of drainage cum flushing sluice)
A-5	Formation of Labour Contracting Societies (LCS):	2014-2016	28 LCS has formed, trained and mobilized	
5.1	Formation and Training of LCS			
5.2	Mobilize for earthwork			
B. Institutional Framework for Participatory Water Management				
B-1	Stimulate WMOs to identify BWDB unutilized land and water bodies and to apply to XEN for obtaining use-right of those resources for income generation	2015-2016	On going	
B-2	Organize various training for WMO Strengthening: Organizational Management and Leadership, Accounts Keeping and Audit System (AKAS), Agro Machinaries Management (MAM), Operation and Manintainance, Svings and Credit Training, Ensure the formation of sub-committees after training: Business, Audit.	2015-2017	Only AKAS training is completed	
B-3	Actively share PDP with Union Parishad (UP), organize orientation training for UP and stimulate WMG members to participate in various UP committees to advocate for financial and in kind support	Jul-Aug 15, with regular follow-ups	Done and regular follow-up is going on	
3.1	Union Development and Coordination Committee			

3.2	UP Standing Committees			
3.3	Ward Sabhas (to contribute in planning, budgeting of UP)			
3.4	Union Disaster Management Committee			
3.5	Stimulate UP members to participate in WMO meetings			
B-4	Stimulate women participation in elections of WMA and WMG committees and increase their membership to at least 33%.	Next elections, regular follow-up	Achieved 39% stimulate women participation	
B-5	Support WMGs with WMG Action Plans (WAPs) formulation and implementation	Jan-Jun 2014, onwards	15 WAPs have been developed and regular updating is going on	
5.1	Formulation of WAPs			
5.2	Ensure incorporation of WMG strengthening plan, O&M plan, Gender action plan, Business development plan			
5.3	Organizes regular meetings with WMGs to update WAPs.			
5.4	Also invite UP members to attend meetings.			
B-6	Stimulate as much as possible participation of WMG members in Farmer Field Schools (FFS), especially females and vulnerable members, ask regular feedback on preferred FFSs.	2014-2015	Done, follow up on going	
C. Agricultural and Marketing Services				
C-1	Tree plantation at homestead garden for utilization of homestead area through farmers field school	2014-2017	Vegetable seeds and fertilizer already provided	Planned to provide saplings for 50 participants, 2 saplings for each participants
C-2	Activities to improve crop production:	2014-2017	Done	
2.1	FFS on crops (Rice and other field crops by DAE), homestead garden (vegetables) and nutrition, dyke vegetable production			
2.2	Women focused FFS			
2.3	Nursery management training			
2.4	Demonstrations / trials on summer vegetables			
2.5	Demonstration and trial on potential crops and vegetables			
2.6	Field day and farmers rally as follow-up of FFS and trials			
C-3	Activities to increase fish production:	2014-2016	Done	
3.1	Pond/ditch aquaculture FFS and trial			
3.2	Fish culture (Tilapia)			
3.3	Trial on fish culture			
3.4	Fish Field days after FFS as a follow-up			
3.5	Rice fish culture			
3.6	Fingerling production			
3.7	Refresher training for contact farmers			

C-4	Activities to improve livestock production:	2014-2017	Done, Poultry learning session is on going	
4.1	Poultry and nutrition FFS			
4.2	Livestock vaccine cold chain at WMG/WMA level			
4.3	Community Animal Health Worker training			
4.4	Polder level fodder trial			
4.5	Polder level beef fattening			
4.6	Field day on livestock activities			
C-5	**Marketing services activities yet not started in Polder 26**			
D. Environmental Sustainability and Disaster Risk Reduction				
D-1	Conduction Environmental Impact Assessment (EIA)	2015-2016	Done	Through Outsourcing
D-2	Formulation of Environmental and Social Management Plan (ESMP)	2014-2015	Done	
D-3	Orientation to LCS Leaders, contractors & WMA leaders regarding Env. Safeguards & Conditions of Env. Clearance certificates.	2015-2016	Done	
D-4	Formulation of Community Based Disaster Risk Reduction (CBDRR) plan	2014-2015	Done	
D-5	Recruit WMG's Environment and DRR Counselors	2016- 2017	Done	

4. 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 which is presented in this chapter.

4.1 Water Resources Management and Infrastructure

Special attention has been paid to plan from a catchment perspective and on the basis of hydrological boundaries as well paid attention to social-institutional (village) boundaries. A general meeting of the WMA of polder 26 was held on 28 August 2014 in Shovna UP hall room. The chairman and some members of Deluti union were also present in that meeting. 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 and repair/reconstruction of structures with gates were considered as priority-1 work. Re-excavation of major khals for drainage was considered as priority-2 work while re-excavation of branch khals to improve irrigation and drainage, and construction of new structures along with other works were considered as priority-3 works[2].

4.1.1 Summary of Rehabilitation Works

SL. No.	Name of Work	Units	Quantity	Estimated Total Cost, BDT
	Priority 1			
1.0	Embankment Re-Sectioning	km	10.690	31112972.00
2.0	Repair of Sluices	Nos.	1	2248929.00
3.0	Re-excavation of Khals	km	14.830	17796000.00
4.0	Repair of Drainage Outlet	Nos.	1	600000.00
5.0	New Construction of Inlet	Nos.	1	1200000.00
6.0	New Construction of Sluice	Nos.	3	46000000.00
7.0	Provision of pipe	m	400	800000.00
Total cost for Priority 1				**99757901.00**
	Priority 2			
8.0	Re-excavation of Khals	km	10.206	12247200.00
9.0	Embankment Re-Sectioning	km	2.000	2600000.00
10.0	New Construction of culvert	Nos.	1	5000000.00
	Total cost for Priority 2			**19847200.00**
	Priority 3			
11.0	New Construction of culvert	Nos.	4	11000000.00
	Total cost for Priority 3			**11000000.00**
	Total cost for Rehabilitation Works in Polder 26			**130605101.00**

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. Priority-3 works are not immediately needed but are desired for further improvement of the water management and environmental conditions in the polder. If DPP allows and fund is available all works will be done.

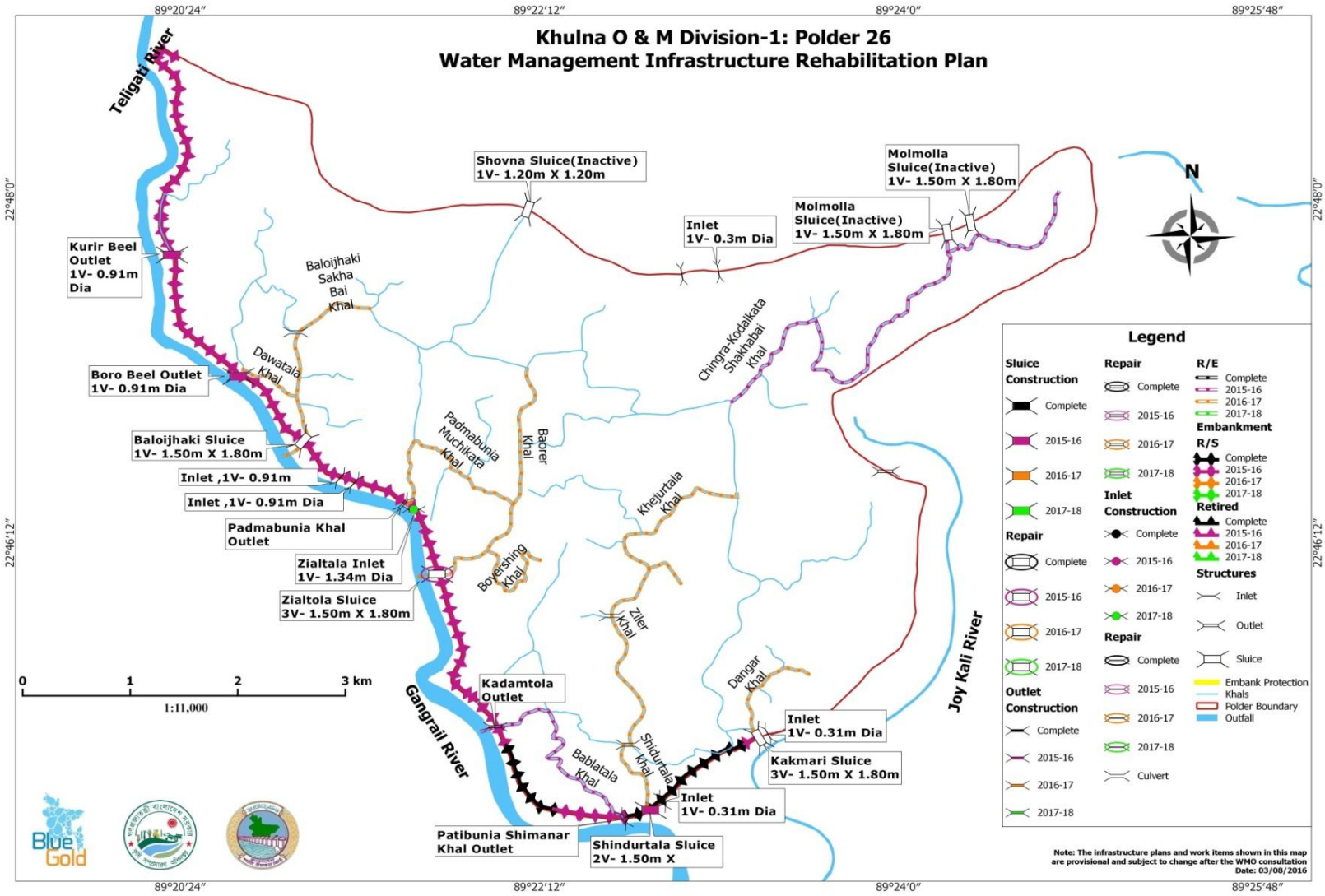

Figure 5: Proposed Rehabilitation Plan

4.1.2 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.

No.	Activity	Time Frame	Responsible Actors	People to involve
1.0	Implementation works like Embankment Re-sectioning/Construction, Khal Re-excavation and Repair/Construction of Structures	2014-2018	BWDB, TA-Engineering staff	LCS, WMA Monitoring Committee, WMA and WMG Executive Committee, BWDB
2.0	Support the monitoring of implementation works by LCS/Contractor and issue Satisfactory Completion Certificate by WMA's regulation after completion of the works.	2014-2018	TA- Engineering Staff, Socio-Economists, COs	WMA Monitoring Committee
3.0	Participation in routine O&M	After implementation of O&M works	BWDB, TA-Socio-Economists, COs and Engineering staff	WMA and WMG Executive Committee, BWDB
3.1	Signing of O&M agreement			
3.2	Follow up O&M training by Blue Gold			
3.3	Polder inspection and identification of O&M requirements			
3.4	Plan O&M activities			
3.5	Resource mobilization for O&M			
4.0	Internal Polder Water Management	After main WRM infra is implemented: 2016-2018	SAAOs (DAE), XOs (BWDB), TA-Socio-Economists, Engineering staff COs, FOs and PFs	WMA and WMG Executive Committee
4.1	Identify WMGs interested to work along Community Agricultural Water Management (CAWM) model.			
4.2	CAWM planning			
4.3	CAWM implementation			
4.4	Monitoring of CAWM			
5.0	Back-up support in the yearly joint polder inspection and assessment of O&M requirements and CAWM	2016-2018	TA-Socio-Economists, COs, FOs & PFs	WMA and WMG Executive Committee, BWDB

4.2 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.

No.	Activity	Time Frame	Responsible Actors	People to involve
1.0	WMG & WMA strengthening Activities Arrange registration with BWDB and conduct new elections	2015-2017	OCWM, TA-COs, ZSEs	WMOs, BWDB
1.1	Update records/books/ ledgers			
1.2	Firming-up membership list and membership enrolment with at least 55% households represented and increase female membership to at least 40%			
1.3	Prepare and conduct new elections for Executive Committee			
1.4	Register WMAs with BWDB			
2.0	Organize various training for WMO Strengthening: Organizational Management and Leadership, Financial management, O&M, Ensure the formation of sub-committees after training: O&M, Business, and AKASt.	2015-2017	TA-COs, ZSEs. Training Team, Engineering Staff	WMOs, BWDB,
3.0	Gender & Leadership training for males and females	2016-2017	TA-COs, Gender Expert and Training Team	WMOs, OCWM
4.0	Support WMGs with WMG Action Plans (WAPs) formulation and implementation	2015-2018	OCWM, TA-COs and ZSEs Gender expert	WMGs, UP, DAE, BWDB
4.1	Updating the WAPs once in a year			
4.2	Ensure incorporation of WMG strengthening plan, O&M plan, Gender action plan, Business development plan,			
4.3	Organizes regular meetings with WMGs to review WAPs			
5.0	Organize Horizontal Learning Program with WMG members, FFS members and UP members.	2016-2018	DAE, TA-COs and FOs	WMGs, DAE
6.0	Organise regular discussion / coordination meetings with other organisations working in polder area	2014-2018	TA-Zonal team	WMOs, UP, BWDB, DAE
7.0	Up-scaling of CAWM	2016-2018	WMOs, UP, BWDB, DAE	TA-Zonal team
8.0	Participatory monitoring	2016-2018	TA-Zonal team	WMOs, UP, BWDB, DAE
9.0	WMGs Audit by BWDB	2016 November to on going	BWDB and WMGs	TA

4.3 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	A total of 2 FFS are now implementing in the polder 26. The FFS training are conducting to the FFS participants in three different training modules. The modules are homestead garden, poultry and nutrition education.	2016-2017	DLS, DAE, TA part (Agriculturist, Master trainer)	WMG, FO,CO and PF, FFS participants
2.0	Two different trials are conducting in the FFS , i.e. poultry and home garden. FFS participants are directly involved in the trial. Participants are learning the technology of poultry rearing and homestead garden by facilitating the trials.	2016-2017	DLS, DAE, TA part (Agriculturist, Master trainer)	WMG, FO,CO and PF, FFS participants
	Business Development			
3.0	Select or prioritize value chains for analysis (VCA) and consult the actors for VCA	2017-2018	TA-Project Value Chain Staff	Relevant Stakeholders
4.0	Business related capacity building for TA-Staff and extension staff	2017-2018	TA-Project Value Chain Staff	PFs, FOs, COs and DAE staffs (SAAO)
5.0	Market orientation capacity building training for market actor (RF, input-output actor)	2017-2018	TA-PFs, BDCs	RFs, IPs, PTOs
6.0	Market Linkage building w/s with different stakeholder (RF, PTO, Paiker, input retailer, WMG, etc.)	2017-2018	DAE, TA-Project Extension Staff, Project Value Chain staff	WMG and MFS members
7.0	Promote collective actions for selling high value products and purchasing bulk amount of quality input by the assistance of RF/WMG/FFS by linking with DAE/research organization.	2017-2018	TA-PFs, BDCs	WMG, private company
8.0	Follow-up agricultural and business activities on the basis of farmer's needs by RF/Actor/WMG	2017-2018	DAE, TA-Project Extension Staff, Project Value Chain staff	WMG and MFS members

4.4 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.	Activities	Time frame	Responsible actors	People to involve
1.0	Obtaining Environmental compliance clearance certificate from DoE	2016-2017	CEGIS, BWDB	TA- Env. Expert and DTL
2.0	Reconstitution of UDMCs and provide them capacity building support on disaster management	Jan-Feb, 2017	Hired SPs	TA- Env. Expert, ZSEs
3.0	Environmental compliance monitoring and quarterly reporting to DoE	Three months interval after obtaining clearance certificate from DoE	BWDB, TA-Polder Team	TA- Env. Expert and DTL
4.0	Disaster preparedness and implementation of CBDRR plan	July 2016 to June 2018 (during cyclone seasons)	Env. and DRR Counselors, WMA and WMG	Polder Team and Env. Expert
5.0	Training to Env. and DRR Counsellors and UDMCs on Env Safeguard and Dis.Mgt.	Jan 2017 to June 2017	Hired SPs/Training Team	Polder Team and Env. Expert
6.0	Organize manual removal of hyacinth by villagers (through WMA/WMGs) where there is large scale hyacinth issue.	July 2016 to June 2018 (during dry months)	WMA/WMG, Env. and DRR Counselors, UP	Polder Team, Engineer team and Env. Expert
7.0	Awareness raising program	March 2016 to June 2018	Env. and DRR Counselors, TA-Polder Team	Env. Expert, Zonal Socio-Economists
7.1	Discussion on reducing fertilizer and pesticide use, and reducing indiscriminate fishing practices from the natural wetlands at WMG meeting, FFS & MFS session and FFD			
7.2	National and International Day observance related to environment and DRR (i.e. World Environment Day, National Disaster Preparedness Day, International Day for Disaster Reduction etc.)			
8.0	Integrate ESMP and CBDRR with the WAP, Annual Polder Action Plan and UDMC's DRRAP	June – Dec 2016	TA-Env. Expert, ZSEs, COs	WMA & WMG executive committee and DRR Counselors.

5. Planning Timeline

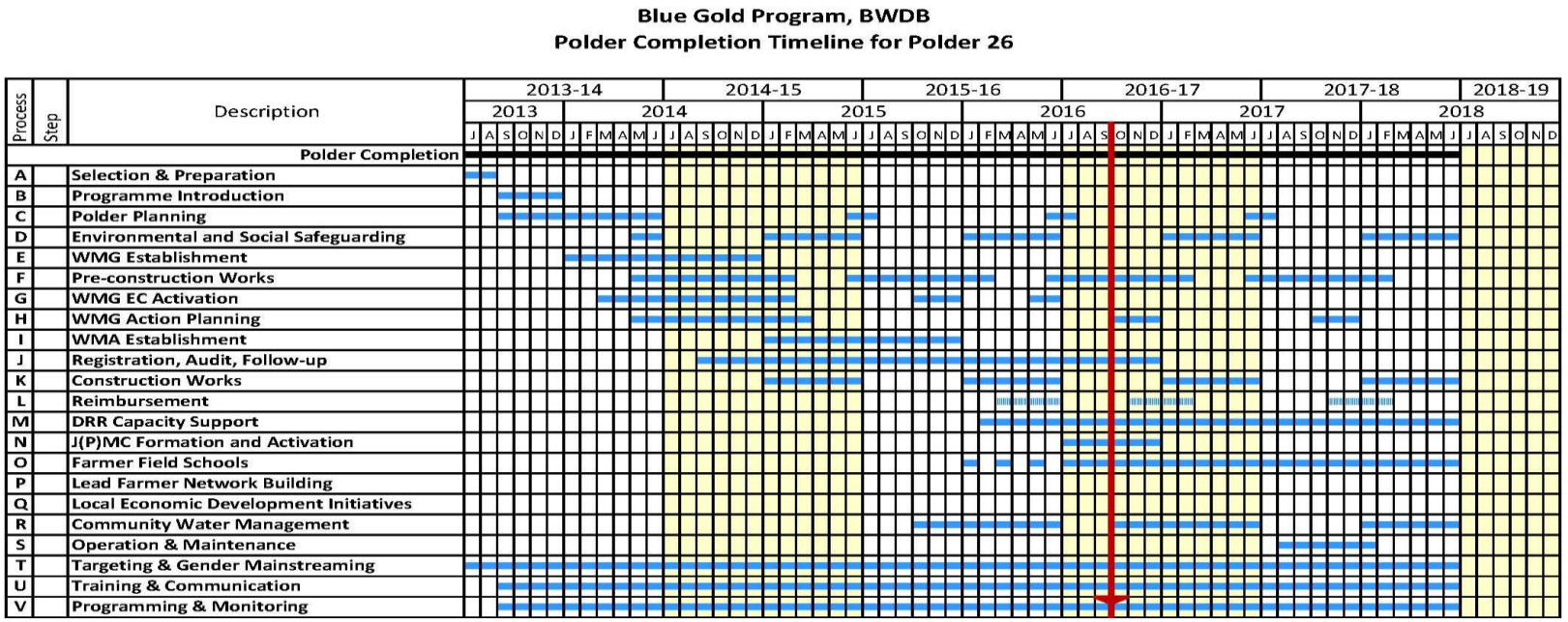

Figure 6: Polder Completion Timeline

6. Polder Budget

The overview of the estimated budget for the polder activities in polder 26 is presented in Table 6.

Table 6: Polder 26 Budget

S.N	Task Name	Total Amount	
		BDT* x100000	**EUR**** x1000
1.0	***Institutional Framework for Participatory Water Management***	2.0	2.3
2.0	***Main Infrastructure***	1294.0	1470.4
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)*	9.0	10.2
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)	26.7	30.3
5.0	***Environmental & Social Management / Disaster Risk Reduction (DRR)***	23.8	27.0
6.0	***Training***	37.0	42.0
	TOTAL	***1392.5***	***1582.3***

Note: Exchange rate is 1 EURO=88 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)

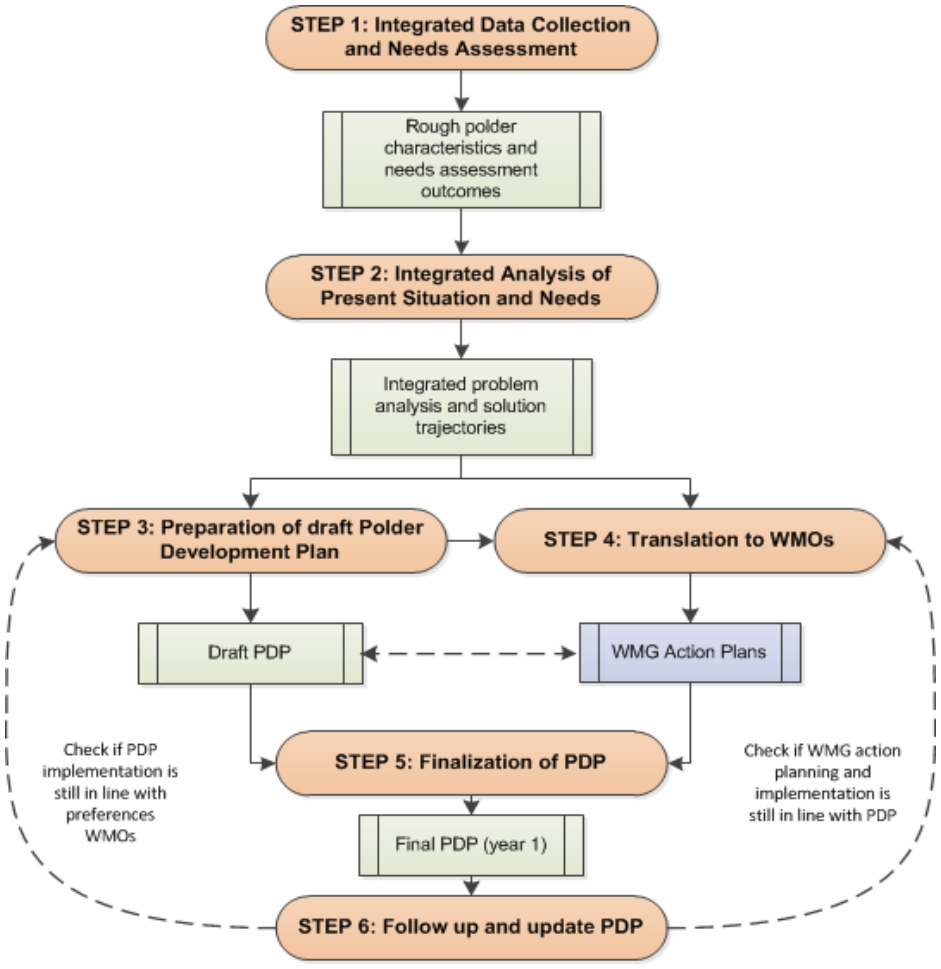

Figure 7: The steps of the PDP Formulation Process

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, 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 field visit, meeting, interview or focus group discussion are recorded. Data among others includes the

[3] This is this PDP formulation process as used in the former IPSWAM polders and polders 2, 26 and 31-part. For the polders later on selected within the BGP and after the TA team reorganisation, the process as described in Unified Working Processes is applied.

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)[4].

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.[5]

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.

[4] For the preparation of this PDP, no specific data sharing and internet platform was available yet. A so-called Master file has been developed to integrate data from different sectors for the development of value chain mapping and analysis. This has been used together with data collected by other components. By now, a part of the data has been uploaded on the internet platform.

[5] In the case of polder 26, no special meeting has been organised for the WMAs and UPs to react on the draft PDP. At the time the PDP was compiled, already 60% of the selected activities were under implementation.

Appendix 2. Water Management Infrastructure of Polder 26

Embankment

Total length of the embankment around polder 26 is about 28.040 km. The entire embankment is an interior embankment with a crest width of 4.27m, and crest level for 10.690 km is 4.50 m and 17.370 km is 4.27m PWD.

Sluices

There are 9 sluices in this polder. These are:

S.N.	Name of Sluices	Number of Vents	Size, (mxm)	Location, km
1.	Kakmari DS	3	1.5 m x 1.8 m	5.529
2.	Sindurtala DS cum FS Regulator (under construction)	2	1.5 m x 1.8 m	6.700
3.	Zialtola DS	3	1.5 m x 1.8 m	10.176
4.	Baloijakhi DS cum FS	1	1.5 m x 1.8 m	12.038
5.	Baro Beeler Khal DS cum FS (under construction)	1	0.90 mx 1.20 m	12.900
6.	Kurer Beeler Khal DS cum FS (under construction)	1	0.90 mx 1.20 m	14.940
7.	Shovna DS (Inactive)	1	1.2 m x 1.2 m	20.370
8.	Molmolia DS (Inactive)	1	1.5 m x 1.8 m	24.153
9.	Molmolia DS (Inactive)	1	1.5 m x 1.8 m	24.411

Drainage Outlets

There are two Outlets in this polder. These are:

Sl. No.	Name of Outlet	Number of Vent	Size, mm	Location, km
1.	Kadamtola Outlet (Private)	1	0.650 m	8.545
2.	Padmabunia Khal Outlet (Private)	1	0.910 m	10.912

Irrigation Inlets

There is one inlet in this polder.

Sl. No.	Name of Inlet	Number of Vent	Size, mm	Location, km
1.	Patibunia Simanar Khal Inlet (Private)	1	0.650 m	6.937

Khals

There are about 16 recognizable khals with branches and having a total length of above 36.000 km, which are shown in Figure 2.