

Country Name	the Project for Ground Water Investigation and Development of Deep Ground Water Source in Urban and Rural Areas
People's Republic of Bangladesh	

**I. Project Outline**

Background	<p>In Bangladesh, since the 1970s, approximately 97% of the population have used tube wells for water source of drinking water from shallow groundwater of less than 70-80m depth. However, according to the survey results published in 2004 by World Bank, 29.3% of the approximately 5 million wells surveyed was contaminated by arsenic exceeding the Bangladeshi standard value was confirmed in. Also, it was revealed that approximately 38,000 people were arsenic poisoned, and approximately 33 million people were potentially drinking arsenic contaminated water. As a result, the total access to safe drinking water was revised downward to 74% though it was estimated to exceed 95% in the early 2000s.</p> <p>Under such circumstances, the Government of Bangladesh set a goal of supplying safe drinking water to all people by the year of 2010/11, and constructed approximately 210,000 of alternative water sources for measures against arsenic with the support of the donors. Of these alternative water sources, 84% were deep wells with a depth of more than 200m. Since those deep wells were utilizing deep aquifer, which is separated by clay layer from shallow aquifers contaminated with arsenic, the arsenic concentration was low and the maintenance was easy, so the operating rate was as high as 90% or more. However, depending on the area, due to the existence of the gravel layer, it was difficult to drill the clay layer that separates the aquifer by the conventional manual drilling method. In addition, it was not possible to install other alternative water sources. For this reason, as of 2010, approximately 5.9 million local residents in the areas with gravel layers had been forced to drink arsenic-contaminated water.</p>			
Objectives of the Project	<p>To improve the technical capacity of the Department of Public Health Engineering (DPHE) staff in deep well drilling in the ten districts of the western Bangladesh where there were difficulties in obtaining safe water in shallow aquifers using existing tube wells due to arsenic contamination as well as in excavating deep wells by using conventional manual drilling method due to the presence of gravel layers, through provision of technical guidance for the introduction of drilling rigs and smooth operation and maintenance, thereby contributing to improvement in accessibility of safe water in the target areas.</p>			
Contents of the Project	<ol style="list-style-type: none"> <li>1. Project Site: 10 districts of the western Bangladesh (Faridpur, Manikganj, Rajbari, Chuadanga, Jessore, Jhenaidah, Kushtia, Meherpur, Nawabganj, Pabna) and Cox's Bazar District (Kutupalong camp).</li> <li>2. Japanese side <ol style="list-style-type: none"> <li>a) Procurement of equipment <ul style="list-style-type: none"> <li>• Drilling Rig (Truck-mounted drilling rig: 2 units, Truck-mounted air lift/pumping test unit: 2 units)</li> <li>• Vehicle (5-ton cargo truck with crane: 1 unit, 3-ton cargo truck with crane: 3 units, Pick-up truck: 1 unit)</li> <li>• Geographical survey equipment (Resistivity survey and logging equipment and software: 2 units)</li> <li>• Materials and equipment for workshop: 1 set</li> <li>• Well construction materials for technical assistance: 1 set</li> <li>• Arsenic test kit (additional): 10 sets</li> <li>• Portable metal detector (additional): 2 sets</li> <li>• Vehicle endoscope (additional): 2 sets</li> </ul> </li> <li>b) Technical Assistance (Soft component) <ul style="list-style-type: none"> <li>• Technical instruction of drilling plan and management</li> <li>• Technical instruction of geophysical survey</li> </ul> </li> </ol> </li> <li>3. Bangladesh side: <ul style="list-style-type: none"> <li>Preparation of workshop and stockyard for procured equipment</li> </ul> </li> </ol>			
Project Period	E/N Date	February 20, 2013 July 12, 2016 (1 <sup>st</sup> revision) October 19, 2017 (2 <sup>nd</sup> revision)	Completion Date	March 29, 2018 (Completion of soft component)
	G/A Date	February 20, 2013 March 5, 2014 (1 <sup>st</sup> revision) July 27, 2016 (2 <sup>nd</sup> revision) April 17, 2016 (3 <sup>rd</sup> revision) December 18, 2017 (4 <sup>th</sup> revision) April 30, 2018 (5 <sup>th</sup> revision)		
Project Cost	E/N Grant Limit / G/A Grant Limit: 728 million yen    Actual: 686 million yen			
Executing Agency	Department of Public Health Engineering (DPHE), Local Government Division, Ministry of Local Government, Rural Development and Cooperatives			

Contracted Agencies	Main Contractor: Mitsubishi Corporation Main Consultant: Earth System Science Co., Ltd.
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## II. Result of the Evaluation

### < Special Perspectives Considered in the Ex-Post Evaluation >

- Initially, the project was aimed at supporting DPHE in deep well drilling in the ten target districts of the western Bangladesh. However, in response to the demand of DPHE, JICA and DPHE extended its project scope to Kutupalong camp in Cox's Bazar District for displaced persons from Myanmar as a humanitarian support, and a deep well was developed in Kutupalong camp by utilizing the equipment procured under this grant aid project.
- In the ex-ante evaluation of this project, it was assumed that the ex-post evaluation would be conducted 3 years after the completion of the project (2017). However, since the project was delayed for 4 years completed in March 2018, the target year was set to the third year after the completion of the project (2021) for verification.

### 1 Relevance

#### <Consistency with the Development Policy of Bangladesh at the Time of Ex-Ante Evaluation>

The project was consistent with the national development policies of Bangladesh such as "The Sixth 5 Year National Development Plan (2011-2015)", which positions safe water supply and sanitation as one of the priority areas, and "The National Policy for Arsenic Mitigation (2004)", National Policy for Safe Water Supply and Sanitation 1998 and "The National Water Policy (1999)" aiming at provision of safe water to the people.

#### <Consistency with the Development Needs of Bangladesh at the Time of Ex-Ante Evaluation>

The project was consistent with development needs of Bangladesh such as to improve the technical capacity of DPHE staff in deep well drilling in order to develop arsenic free deep ground water and to provide safe water to the areas where a lot of community people were left out from a safe water supply.

#### <Consistency with Japan's ODA Policy at the Time of Ex-Ante Evaluation>

The project was consistent with the "Japan's Country Assistance Policy to the People's Republic of Bangladesh" (2012) lists "Overcoming Social Vulnerability" as one of the priority areas for assistance, and states that Japan will support the policy of providing safe water to all citizens, which is consistent with the purpose of this project.

#### <Evaluation Result>

In light of the above, the relevance of the project is high.

### 2 Effectiveness/Impact

#### <Effectiveness>

The project has achieved its objectives. Regarding the quantitative effect in the ten target districts, the number of deep well drilled through the gravel layer was 25 for production wells and 35 for hand pump wells in 2021 (Indicator 1). The population with access to safe water in the target area was increased from 1,252,172 in 2012 to 1,468,597 in 2021 (Indicator 2). The water supply coverage which allows access to safe water in the target area was improved from 58.60% in 2012 to 63.60% in 2021 (Indicator 3). The above-mentioned quantitative indicators fully met their respective target figures at the time of ex-post evaluation. Regarding the quantitative effect in Kutupalong camp in 2021, the number of deep well drilled through the gravel layer was one, the population with access to safe water in the target area was 30,000, and the water supply coverage which allows access to safe water in the target area was 58.55%. Since this is an additional scope, no baseline and target figures were set at the ex-ante evaluation. However, the project was highly effective in providing safe water to about 30,000 people as the largest water supply facility in the Kutupalong camp, which was achieved through effective collaboration with International Organization for Migration (IOM). As a result, accessibility of safe water has been improved in the ten target districts as well as Kutupalong camp. At the time of ex-post evaluation, it is estimated that total 246,425<sup>1</sup> people are newly able to access to safe water.

As to the expected qualitative effect, the technical capacities of DPHE staff in deep well drilling were improved. At least 20 officials from the Mechanical Electrical Division (MED) of DPHE received the trainings on methodology of drilling deep wells using the equipment procured by the project, and were directly involved in monitoring the activities of contractors in the ten target districts. During deep well drilling, DPHE did not face major technical challenges on drilling and completed the project as expected.

#### <Impact>

It should be noted that JICA, DPHE and IOM signed a Minutes of Meeting for Shared Recognition on the Project for installation of production deep well cum drilling test and construction of water supply facilities for Camp12, Kutupalong-Balukhali extension sites, Ukiya Upazila, Cox's Bazar District in July 2018. Through collaboration among DPHE, JICA and IOM, this project drilled a well to a depth of about 400m, to which IOM constructed water supply facilities. As a result, a total of 358 water supply outlets were installed in the 9,900-meter-long water supply network, and safe water supply to the evacuees was realized.

Positive impacts on improved health condition, and improved living conditions for the population in the target districts have been observed by the improved access to safe water, according to the interviews and questionnaire with DPHE officials. Although a specific survey was not conducted, it is assumed that people in the targeted districts now can access to better quality of water from deep wells without arsenic and other contamination, which may contribute to positive impact on their health conditions. Thanks to the project, the poor, marginalized people as well as the indigenous and ethnic minority people in the target districts have been equally benefited in getting safe water. In Kutupalong camp, the morbidity rate is minimized, and the incidence of diarrheal diseases remains under control condition by using chlorinated water<sup>2</sup>. Also, from the secondary information such as reduction of complain received in municipality water supply section, it is assumed that the city dwellers had sufficient water supply even during Covid-19 pandemic period. In most of the cases, the deep wells are connected with the city piped networks or fitted with hand pumps (for small diameter wells) so that it can be used as a point source. As people in the target districts are having water nearby, the time for fetching water has been decreased, and people's life and living

<sup>1</sup> As per action plan prepared by DPHE, it is estimated that 25 production wells serves 200,000 people, 35 handpump well serves 16,425 and one deep well in the Kutupalong camp serves 30,000 people. In total, 246,425 people are covered

<sup>2</sup> After the project completion, around 100 of deep wells have been drilled in the camps for water supply.

condition have been improved through piped water supply.

No negative impact on natural environment was observed and no land acquisition and resettlement of people were implemented.

<Evaluation Result>

Therefore, the effectiveness/impact of the project is high.

#### Quantitative Effects

##### a) 10 districts

Indicators	Baseline (2012) Baseline Year	Target (2019) 5 Years after Completion	Actual (2018) Completion Year	Actual (2019) 1 Year after Completion	Actual (2020) 2 Years after Completion	Actual (2021) 3 Years after Completion
Indicator 1. Number of deep wells drilled through the gravel layer (number)	0	Production well: 25	2	11	15	25
		Hand pump well: 35	1	18	26	35
Indicator 2. Population who can access to safe water in the target area (person)	1,252,172	1,468,597	1,260,859	1,347,529	1,382,277	1,468,597
Indicator 3. Water supply coverage which allows access to safe water in the target area (%)	58.60	63.60	58.63	60.12	61.70	63.60

Source: HDPH

##### b) Kutupalong Camp

Indicators	Baseline (2012) Baseline Year	Target (2019) 5 Years after Completion	Actual (2018) Completion Year	Actual (2019) 1 Year after Completion	Actual (2020) 2 Years after Completion	Actual (2021) 3 Years after Completion
Indicator 1. Number of deep wells drilled through the gravel layer (number)			1	1	1	1
Indicator 2. Population who can access to safe water in the target area (person)			0	30,000	30,000	30,000
Indicator 3. Water supply coverage which allows access to safe water in the target area (%)			0	58.55	58.55	58.55

Source: DPHE

#### 3 Efficiency

The project cost was within the plan (ratio against the plan: 94%). However, the project period largely exceeded the plan (ratio against the plan: 186%) because of suspension of the project implementation for several times due to deterioration of safety and security condition in Bangladesh as well as the additional project scope at Kutupalong camp. In addition, a delay in procurement of consultant after the signing of Grant Agreement (GA), especially a delay on official approval process of Development Project Proposal (DPP)<sup>3</sup> by Bangladesh Government side caused a delay in implementation of project activities afterward. The project cost did not increase and remained within the plan despite the extension of the project period by about four years and the addition of an additional scope (Kutupalong Camp) because the spending of extra cost was avoided by halting all activities during suspension of project activities, and the surplus project fund was utilized for the additional scope.

Therefore, efficiency of the project is fair.

#### 4 Sustainability

<Institutional/Organizational Aspect>

After the project completion, the production wells and hand pump wells developed by the equipment procured under the project were handed over to the Local Government Institutions (LGIs) including Pourshava and Union Parishad. Therefore, each of the respective LGIs in eleven districts, which are the original ten target districts and Cox's Bazar district where Kutupalong camp is located, are responsible for operation and maintenance (O&M) of the drilled deep wells. While MED of DPHE is responsible for O&M of the equipment procured by the project such as drilling rigs, cranes and trucks. Also, Groundwater Division (GWD) and Groundwater Circle (GWC) of DPHE are responsible for providing the technical supports and guidance for O&M by LGIs. Regarding the manpower, LGIs have on average 50% shortage of manpower for O&M. For DPHE, there are 8 staffs in MED, 4 staffs in GWD and 2 staffs in GWC, which are insufficient to

<sup>3</sup> To start a project officially by the Government of Bangladesh, Development Project Proposal (DPP) needs to be approved for each project in order to secure sufficient budget and manpower. To get the DPP approved, an implementing agency needs to get approvals from their line ministry, Ministry of Finance and Planning Commission, Ministry of Planning respectively. It normally takes minimum 6 months to 1 year to get an approval on average.

conduct their designated responsible works due to lack of budget. On the other hand, the budget and human resource for DPHE have been increasing for the past few years. At the time of ex-post evaluation, DPHE is revising the organogram where additional (more than existing) manpower has been proposed, and the revised organogram is under process of approval.

<Technical Aspect>

The DPHE staff has the capacity to make a plan and to manage a drilling site based on geophysical survey information. The DPHE staff are skilled to provide proper O&M for the equipment procured by the project and to extend technical support to LGIs for their O&M of deep wells. Once a year, DPHE has organized a basic training on geophysical investigation for their technical staff including hydrogeologist, assistant engineer, master driller, and so on. LGIs maintain deep wells by using the O&M manuals and guidelines.

<Financial Aspect>

LGIs have secured budget for O&M from their revenue earnings. But for DPHE, the budget on O&M for equipment procured by the project has been secured only up to June 2022 when the defect liability period is terminated. Currently, DPHE is requesting the government of Bangladesh to allocate sufficient O&M budget for their O&M activities.

(Unit: Bangladesh Taka (BDT) Lakh)

Item	Actual			Plan
	2018	2019	2020	2021
O&M for equipment procured by the project	15.25	13.75	18.00	15.85

<Current Status of Operation and Maintenance>

Most of the equipment procured by the project, such as truck-mounted drilling rig, cargo truck with crane, pick-up truck, geographical survey equipment, portable metal detector, vehicle endoscope have been maintained and still being used by DPHE. Consumable goods have been purchased by DPHE by their own fund.

<Evaluation Result>

Some minor problems have been observed in terms of the institutional/organizational and financial aspects, therefore, sustainability of the project effects is fair.

5 Summary of the Evaluation

The project has achieved the project objectives. The project attained the target of quantitative effect of “the number of deep wells drilled through the gravel layer”, “the population who can access to safe water in the target area”, and “the water supply coverage which allows access to safe water in the target area” in the original ten target districts as well as in Kutupalong camp in Cox’s Bazar district. At the time of ex-post evaluation, total 246,425 people are newly able to access to safe water. As to the qualitative effect, the technical capacity of DPHE staff in deep well drilling was improved. The project has brought about several positive impacts such as improved health condition and improved living conditions in the ten target districts as well as Kutupalong camp. As for efficiency, the project period significantly exceeded the plan.

Regarding sustainability, some minor problems have been observed in terms of the institutional/organizational and financial aspects of the executing agency due to shortage of staff and uncertainty of securing the necessary O&M budget after June 2022. On the other hand, DPHE staff is able to provide proper O&M for the equipment procured by the project and to extend technical support to LGIs for their O&M of deep wells. Also, most of the equipment has been maintained and still being used by DPHE.

Considering all of the above points, this project is evaluated to be satisfactory.

**III. Recommendations & Lessons Learned**

Recommendations to Executing Agency:

- After the revised organogram of DPHE is approved in which additional manpower has been proposed, DPHE should recruit the 100% required manpower. Also, DPHE needs to allocate the sufficient O&M budget required for proper maintenance of the equipment.

Lessons Learned for JICA:

- As the consultant procurement was significantly delayed due to late approval of DPP, JICA should develop realistic project implementation schedule during preparatory stage, taking into consideration of the DPP approval process which normally takes minimum 6 months to 1 year to get an approval on average.
- As per GoB procedure, concerned department could secure manpower, O&M budget and other necessary cost after approval of DPP. Thus, JICA should confirm with the recipient country for DPP approval soon after the GA signing so that necessary manpower and budget of O&M will be secured during the project to ensure sustainability of the project effects.
- To respond to urgent needs for safe water supply in Kutupalong camp, JICA conducted field survey to know the actual situation in the camp and had an in-depth discussion with relevant stakeholders on various occasions. Then, based on the actual demand, JICA, DPHE and IOM signed a Minutes of Meeting for Shared Recognition on the Project for installation of production deep well cum drilling test and construction of water supply facilities. Through collaboration among DPHE, JICA and IOM, this project drilled a well to a depth of about 400m, to which IOM constructed water supply facilities. As a result, a total of 358 water supply outlets were installed in the 9,900-meter-long water supply network, and safe water supply to approximately 30,000 people in the camp was realized. This was possible by taking on the role of fully coordinating all stakeholders by JICA, including recipient governments, other development partners, and donors, without being bound by conventional frameworks. While each stakeholder has its own modalities and constraints, multi-stakeholder partnerships can be a useful tool to overcome organizational constraints and maximize the benefits to the local population.



Drilling at Bera, Pabna



Training on Geo-physical Survey