

**Dholaikhal rehabilitation project – achievement of objectives***Engr Md Shehab Ullah, Bangladesh*

DHAKA THE CAPITAL of Bangladesh, is one of the most densely populated cities of the South – Asian countries having acute problems in drainage of storm water. Insufficient and improper functioning of the existing drainage system causes acute water logging in major parts of the city. Dholaikhal is one of the major drainage canals of Dhaka and previously it had an open connection with the river **Buriganga**. The canal serves an important part of the city centre as well as peripheral areas of the southern part of the city. In the monsoon period the canal discharges storm water from an urbanized area of 640 hectare of catchment. Before rehabilitation of the canal, in the southern part of the city flooding was one of the major problems. This happened due to: (a) Heavy onrush of storm water and backwater flow of river water through the canal; (b) Non-functioning of the Narinda Pumping Station located upstream for a number of years ; (c) Insufficient coverage of the catchment by tertiary and secondary drainage networks; and (d) Lack of maintenance of the existing drainage facilities. The floodwater was becoming highly polluted as large volumes of toxic water were discharged into the storm water systems, creating a severe health hazard to the affected population.

To solve the problem several projects have been carried out before, but only on a piecemeal basis. Finally in the early 1990s Dholaikhal Rehabilitation Project, jointly financed by the World Bank & Government of Bangladesh, was undertaken by the Environmental Improvement Unit (EIP) of Dhaka City Corporation (DCC). The project was to achieve objectives such as physical and environmental improvement, poverty reduction, social & private sector development.

**Scenario before rehabilitation**

Before the rehabilitation of Dholaikhal, physical and environmental problems were the major concern. The **Physical Problems** constituted the inundation of the upstream catchment area. The inundation of low-lying areas was aggravated as the storm water could not be properly discharged due to an absence of drainage networks. The **Environmental Problems** arose from the fact that the entire storm water sewers and canals were used for disposal of both domestic and industrial wastewater. Discharge of sludge water and overflow from pit/septic tanks into the open drains, urination and defaecation in open drains were common practice in those areas. As a result the water in the Dholaikhal became highly polluted and septic and constituted a serious threat to the health of the citizens living in the vicinity of the canal.

**Dholaikhal rehabilitation alternatives**

Alternative options were investigated and developed for the rehabilitation of Dholaikhal such as:

- Option 1: Open Channel - A lined channel over the full length of the Dholaikhal.
- Option 2: Partial Culverting - A culvert section from the Iron bridge to Narinda and further onwards to the existing Dholaikhal road and, in addition, a lined open channel from Narinda to the Dayaganj Railway Bridge.
- Option 3: Complete Culverting - A Culvert section from Iron bridge towards whole Dholaikhal, Debdualaikhal & Jeranikhal (canals) with a top road.

**Table 1. General development aspect**

Option 1	Option 2	Option 3
<ul style="list-style-type: none"> <li>• Reduce risk of flooding in the total catchment area.</li> <li>• Possibilities of draining stagnant water bodies and consequent reduction in health risk.</li> <li>• Gains in land value.</li> </ul>	In addition to option 1 - <ul style="list-style-type: none"> <li>• Creation of land in khal reservation for various land uses.</li> <li>• Double or single side commercial development.</li> <li>• Improvement of accessibility by a new road serving traffic volumes.</li> <li>• Using of existing GOB land adjacent to the khal for revenue earning source.</li> </ul>	In addition to option 1 & 2 - <ul style="list-style-type: none"> <li>• Employment opportunities in the project area.</li> <li>• Development of the private sector.</li> <li>• Increased income and prosperity in old Dhaka resulting in improvement of local environment.</li> <li>• Major improvement of accessibility and traffic circulation by the road on top of the culvert.</li> </ul>

**Table 2. Comparison of financial, economic and social benefits**

Option Benefit	Option 1	Option 2	Option 3
<b>Financial</b>	<ul style="list-style-type: none"> <li>Very limited.</li> </ul>	<ul style="list-style-type: none"> <li>Financial benefit is the sale, lease or rental value of public land developments.</li> </ul>	<ul style="list-style-type: none"> <li>Sale, lease of land and property value significantly higher due to construction of new roads than in option 2</li> </ul>
<b>Economic</b>	<ul style="list-style-type: none"> <li>Economic benefits result from the prevention of major flooding, which reduces the need for fill by those households and businesses wishing to build in the area.</li> </ul>	<ul style="list-style-type: none"> <li>Save transport operating cost for diverted/generated traffic using newly built Dholaikhal road in preference of existing narrow and congested roads in the area.</li> </ul>	<ul style="list-style-type: none"> <li>Generated major transport-related benefits for traffic with origin/destination in old Dhaka preferring the use of new Dholaikhal road. The benefits are in the form of vehicle operating cost, time &amp; generated traffic benefits.</li> </ul>
<b>Social</b>	<ul style="list-style-type: none"> <li>Social benefits include reduction in water borne diseases due to less possibility of flooding of the area.</li> </ul>	<ul style="list-style-type: none"> <li>Create a number of new job opportunities in the project area.</li> </ul>	<ul style="list-style-type: none"> <li>Create a number of new job opportunities, many of which will be open to existing and future low-income residents.</li> </ul>

- Installation of a dam and pumping station, at the confluence point of Dholaikhal and the river Buriganga was included in all options.

### Development aspects and impact of alternative options

The Development aspects and impact in general are shown in Table 1.

#### Selection of option from the alternatives:

By summarizing the above discussion and analysis, it was clear that option 3 was the best choice to rehabilitate and develop the Dholaikhal. Though the initial investment of option 3 was large, keeping in mind the achievement of the objectives, option 3 was finally selected for Dholaikhal rehabilitation.

#### Project description

##### The main project components were:

Installation of a composite pumping station consisting of 3 pumps of 80,000 cubic metres per hour (22 cum per sec), drainage capacity with a protection dyke, 4.04 Km of underground box culvert, 4.04 Km of top road on box culvert, with 1.56 km of approach/cross road, 291 metres of open channel, 2.4 hectare area of water reservoir with a storage capacity of 11,000 cubic metres.

The pumps are connected to the open channel, which acts as a buffer storage basin to run the pumps effectively. The upstream underground box culvert acts as a channel to carry water from the pipe/open drainage network. The function of the reservoir is to store excess storm water up

to a certain level, during short breakdowns of pumps/instant rainfall conditions. This can be discharged through a non-return flap valve.

#### Achievement of objectives

After rehabilitation of Dholaikhal, significant project objectives achieved in various aspects, such as,

##### Physical objectives

After implementation of the project, especially the pumping station, culvert, and open channel; drainage facilities have improved in the southern part of the city. Construction of the new road has resulted in significant traffic improvements, thus relieving congestion on the existing road network. It has provided access to the existing and future residential and commercial development along the Dholaikhal, which has created a positive impact on traffic flow in old Dhaka.

##### Environmental objectives

The Dholaikhal pumping station was put to an immediate test by the severe floods of 1998. It appeared that this new infrastructure worked fairly well, even though the flood was one of the worst in the country's history. It has become possible to keep the southern part of the city flood free without any environmental damage. Consequently, it is expected that these facilities will make a substantial contribution, if maintained properly, towards the environmental improvement of the city.

##### Poverty reduction and social objectives

Through rehabilitation of Dholaikhal, job opportunities have been created in the project area by establishing small-

scale shops and factories which have had a positive impact on low-income groups by improving living conditions.

#### **Private sector development objectives**

The objective of private sector development was not directly built into the project. The project was partially successful in developing some limited capacity for contractors and consultants through transfer of technology.

#### **Factors affecting the project implementation**

Implementation of the project was affected by many factors, such as:

- Delay in land acquisition due to underestimation of land cost and administrative procedural bottlenecks.
- Delay in appointment of project personnel and periodic transfer of staff.
- Lack of support for the Project Implementation Unit (PIU) from the main implementing agency; for example inadequate administrative authority of Project Director.
- Delay in procurement process.
- Delay in approval process of Project Profile (PP)/ Technical Assistance Project Profile (TAPP).
- Budget constraints.
- Lack of co-ordination between other service providing agencies such as Dhaka Water & Sewerage Authority (DWASA) Dhaka Electric Supply Authority (DESA), Telegraph & Telephone ( T&T), Titas Gas.

- Narrow access to the project site, political unrest and local terrorism also delayed the implementation.

#### **Future operation**

- Institutional arrangements and staffing are required for continued O&M (Operation & Maintenance) of the assets created under the project.
- Estimates of the additional O&M costs resulting from the operation of such assets and the source of such funding are required.
- There is a need to develop physical , operational and financial indicators to monitor the performance of these assets and to assess their development impact.

#### **Key lessons learned**

- More emphasis on institutional issues.
- Build local capacity for resettlement.
- More effective monitoring and evaluation.
- Introduce easy procedures for the procurement process.
- Allocation & release of project funds in time.
- Establish more integration among different service providing agencies.
- More beneficiary participation.

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