

ANNEXES

ANNEX-01

SITE CLEARANCE CERTIFICATE

Government of the People's Republic of Bangladesh
Department of Environment
www.doe-bd.org
Head Office, Paribesh Bhaban
E-16 Agargaon, Dhaka-1207

Memo No : DoE/Clearance/5024/2010/ ৩৭১

Date: 10/2010

Subject: **Site Clearance in favor of Khulna Water Supply Improvement Project.**

Ref: Your Application dated 08/09/2010.

With reference to the above mentioned subject, the Department of Environment (DOE) hereby accords Site Clearance to the Khulna Water Supply Improvement Project subject to fulfilling the following terms and conditions.

1. This site clearance shall only be applicable for the said project only.
2. The project authority shall submit a comprehensive Environmental Impact Assessment (EIA) report considering the overall activity of the said Project in accordance with the TOR and time schedule indicated in the Initial Environmental Examination (IEE) Report.

1. ENVIRONMENTAL BASELINE DATA

1.1 Project Data Sheet

| | |
|----|---|
| a. | Project location and area The location of the project and area involved |
| b. | Project Concept An outline of description of the concept and objectives of the project, the types of activities expected, and the development plans for achieving the objectives. |
| c. | Project Components Components of the project concerning the types of activities proposed to be located in the area, the number and distribution of underground and overhead tanks, other infrastructure, utilities and service requirements. |
| d. | Project Activities A list of the main project activities to be undertaken during: site clearing and construction, operation of activities and associated developments. |
| e. | Project schedule The phase and timing for development of the surface water treatment plant, transmission line, underground and overhead tanks in Khulna, infrastructure and other facilities required. |
| f. | Resources and utilities demand Resources required to develop the project, such as soil and construction material and demand for utilities (water, electricity, sewerage, waste disposal and others), as well as infrastructure (road, drains, and others) to support the project. |

1.2. Physical and chemical components

| | |
|----------|---|
| a | Map and survey information |
| | Location map |
| | Cadastral map showing land plots (project and adjacent area) |
| | Topographic map for identifying catchment boundaries, general land use and terrain |
| | survey map showing contour information |
| | Aerial photograph |
| b | Geology and soil |
| | Geological map showing geological units, fault zone, and other natural features |
| | Soil map and soil profile analysis. This may only be established from soil survey and geotechnical investigation (important for analysis for soil stability, cut and fill) |
| | Soil properties and composition |
| c | Hydrology and drainage |
| | Catchment boundaries of rivers/lakes/canals which drain the project |
| | Hydrological characteristics of rivers in and around the project area, including flow, salinity and sediment load for varies return period |
| | Flood characteristics and historical records of flood events covering areas affected, height of flood and frequency |
| | Ground water potential and aspects of aquifer, such as recharge zones, ground water abstraction etc. |
| | Drainage system and drainage characteristics in the project area |
| | Coastal zone characteristics |
| d | Water quality and use |
| | Water quality of the receiving water bodies likely to be affected by the project |
| | Beneficial uses of the water need to be established for rivers or any other water bodies likely to be impacted by the development. The locations of these water utilization should be identified in the map |
| | Sources of pollutants from existing and known future activities within the catchment of the rivers |
| e | Air quality and noise |
| | Baseline data of the project site with respect to air quality and noise level |
| | Air pollutant and noise sources from existing and known sources |

1.3. Ecological components

| | |
|----------|---|
| a | Habitats |
| | Aquatic habitat likely to be impacted by the project |
| | Terrestrial habitat likely to be impacted by the project |
| b | Species and Population |
| | Identification of population of flora and fauna to assess their conservation status of being rare, endemic and endangered |
| | Identification of population of flora and fauna to assess their conservation status of being rare, endemic and endangered |
| | Biodiversity of the project site |

1.4. Social and Economic Factors

| | |
|----------|---|
| a | Population |
| | Population within and around the project area |
| | Organizational structure of communities and the degree of public awareness and response to the proposed project |

| | |
|---|--|
| b | Human settlement |
| | Size and distribution of human settlement |
| | Community infrastructure, utilities and services available |
| | <i>Housing and future requirements within the impacted area</i> |
| | Historical/archaeological features of significance |
| c | Economic activities |
| | Economic activities of population in and around the project area. Activities should include those that are dependent on resources which may be impacted by the project |
| | Income dependence on economic activities impacted directly or indirectly by the project |
| | Employment and economic returns to the population by the project |

1.5. Infrastructure and utilities

| | |
|---|---|
| a | Availability of infrastructure to support the proposed project. Attention should focus on different transportation requirements due to project increase in traffic to and from the project area |
| b | Availability of utilities and services, especially water, gas and electricity supply, sewerage and waste disposal facilities to cater to the projected demand for such utilities and services |

2. PREDICTION OF IMPACTS

- 2.1 Soil erosion and sedimentation
- 2.2 Floods
- 2.3 Water quality
- 2.4 Air quality
- 2.5 Noise
- 2.6 Solid, Toxic and Hazardous waste
- 2.7 Ecology
- 2.8 Traffic
- 2.9 Socio-Economy

3. EVALUATION OF IMPACTS

The judgment of significance of impacts can be based on one or more of the following, depending on the environmental factor being evaluated. These are :

- i. comparison with laws, regulation or accepted national or international standards
- ii. reference to pre-set criteria such as conservation or protected status of a site, feature or species
- iii. consistency with pre-set policy objectives
- iv. consultation and acceptability with the relevant decision makers, local community or the general public.

4. MITIGATION OF IMPACTS

Mitigation measures which may be considered including:

- i. changing project layout, transport routes, disposal routes or locations, timing or engineering design
- ii. introducing pollution controls, waste treatment, phased implementation and construction, engineering measures, monitoring, landscaping, social services or public education;
- iii. compensation to restore, relocate or provision of concession for damage

| Sl. | ITEM | REQUIREMENT |
|-----|---------------------------|---|
| a | Soil erosion prevention | An outline of measures to control soil erosion and river sedimentation. |
| b | water pollution | Treatment of sewage water. The concept of centralized treatment of sewage should be the preferred option to be adopted. |
| c | Air pollution | During construction: measures to minimize fugitive dust from exposed soil surface and those caused by motor vehicles. During operations: measures to minimize air pollution through selection of types of industries allowed in the area |
| d | Noise | During construction: measures to minimize noise from traffic and construction activities During operation: application of buffer zones to minimize noise as well as that due to traffic |
| e | Solid and hazardous waste | Management options need to be identified. The need for centralized waste collection, treatment and disposal facilities need to be given due consideration. |
| f | Flood/Tidal surge | An outline of measures to minimize flooding. A diagram to show likely drainage system and flood retention sites and diversion channels, etc. |
| g | Land use | The project area should be effectively zoned for different categories of activities and types of recommendation should be outlined. A diagram showing land use distribution for the project activities and buffer zones. |
| h | Habitat and species | Measures to protect or conserve habitat and species with recommended buffer zones. A diagram showing conservation areas. |
| i | Socio-economic issues | Outline of steps or measures to be taken to resolve social conflicts and related socio-economic issues |
| j | Utilities and services | A diagram to show additional utilities and services required to satisfy projected demands of the project area. |
| k | Road and traffic | Road access and improvements required to meet projected traffic densities |

5. ENVIRONMENTAL MANAGEMENT PLAN

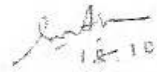
The responsibilities and actions required of the project initiator or implementing body should be identified in the EMP. Some of those responsibilities and actions include: allocation of institutional responsibilities for planning and management of environmental requirements, allocate responsibility to execute mitigation action, implement a programme of monitoring to check the effectiveness of mitigation measures, and if necessary, taking additional measures to correct or overcome the impact in question, in-house monitoring capacity building and allocation of budget.

The EMP should recognize and include the following:

- i) Management of soil erosion, land slides and siltation during site clearance and earth work
- ii) Management of runoff
- iii) Regulation of the types of activities allowed in the project area
- iv) Management of liquid, solid and gaseous wastes generated from the project area
- v) Environmental monitoring requirements
- vi) Responsibilities and role of the project proponent for protection of environment

The program for monitoring should generally identify:

- i. the type of monitoring required
 - ii. the location of monitoring
 - iii. the types of measures to be undertaken (e.g. dissolve oxygen, if fisheries is important in a river)
6. Without obtaining approval of EIA report by the Department of Environment, the project authority shall not be able to start the physical activity of the project and also not be able to open L/C in favor of importable machineries.
 7. Rehabilitation of human settlement or compensation for any sort of activity which will incur damage or loss of public or private property shall be addressed as per Government of Bangladesh rules and regulations.
 8. Appropriate permission would be required to obtain from the forest department in favor of cutting/felling of any plant/tree/sapling forested by any individual or government before doing such type of activity.
 9. The project authority shall submit the EIA to the divisional office of DOE in Khulna along with a filled-in application for Environmental Clearance in prescribed form, the feasibility report, the applicable fee in a treasury Chalan, the no objection certificates (NOCs) from the local authorities, NOC from forest department (if it is required in case of cutting any forested plant/trees-private or public) and NOC from other relevant agencies for operational activity of the project.
 10. A soft copy of the image data as well as the maps to be generated from the image shall be submitted to DOE Head Office along with the EIA.
 11. This clearance is valid for one year from the date of issuance and the project authority shall apply for renewal to the Divisional Office of DOE in Khulna with a copy to Head Office in Dhaka at least 30 days ahead of expiry.


18.10.2010

(Syed Nazmul Ahsan)
Deputy Director (Environmental Clearance)
&
Member Secretary
Environmental Clearance Committee

Mr. Md. Abdullah P. Eng.
Managing Director
Khulna WASA
1062/1 Ka, Khan-A-Sabur Road
Khulna-9100, Bangladesh.

Copy Forwarded to :

- 1) Private Secretary to the Hon'ble Secretary, Ministry of Environment and Forests, Bangladesh Secretariat, Dhaka.
- 2) Director, Department of Environment, Khulna Division, Khulna.
- 3) Staff Officer to the Director General, Department of Environment, Head Office, Dhaka.

ANNEX-04

PART-1 LAND INFORMATION

PART-2 RIVER WATER QUALITY AND RIVER FLOW

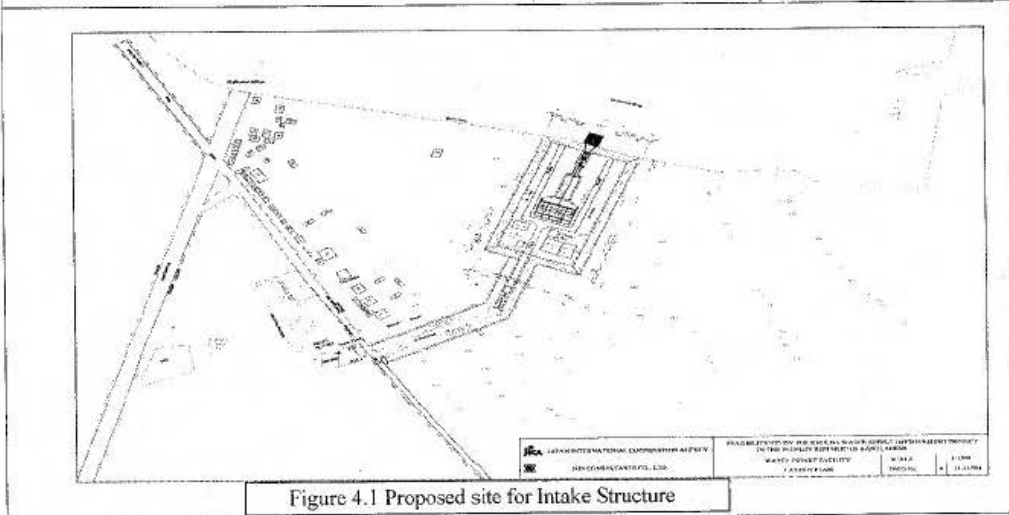
**PART-3 UPAZILA MAP OF MOLLARHAT & RUPSHA AND
KHULNA CITY CORPORATION AREA**

Part-1 Land information

Appendix-I

A. Land details for proposed Water Intake Point

| Sl. No. | District | Thana | Mouza | JL. # | Sheet # | SA | Area (acre) | Proposed land Area (acre) |
|--|----------|----------|-------|-------|---------|-----|-------------|---------------------------|
| 1 | Bagerhat | Mollahat | Garfa | 53 | L | 665 | 0.81 | 0.436 |
| 2 | | | | | | 668 | 2.72 | 0.872 |
| 3 | | | | | | 664 | 0.81 | 0.552 |
| 4 | | | | | | 663 | 1.28 | 0.123 |
| 5 | | | | | | 658 | 0.29 | 0.001 |
| 6 | | | | | | 669 | 0.69 | 0.025 |
| 7 | | | | | | 680 | 0.14 | 0.051 |
| 8 | | | | | | 678 | 0.36 | 0.15 |
| 9 | | | | | | 673 | 0.3 | 0.132 |
| 10 | | | | | | 689 | 0.88 | 0.038 |
| 11 | | | | | | 681 | 1.86 | 0.1 |
| 12 | | | | | | 672 | - | 0.008 |
| 13 | | | | | | 679 | - | 0.033 |
| For Water Intake Point Total required land Area | | | | | | | | 2.521 |




 Engr. S. M. Jafar, Project Director
 Deputy Managing Director (Engg)
 Khulna WASA


 MD ABDULLAH, Peng
 Managing Director
 Khulna WASA

Appendix-I

B. Land details proposed for Surface Water Treatment Plant and Impounding Reservoir

| Sl. No. | District | Thana | Mouza | JL. # | Sheet # | SA | Area (acre) | Proposed land Area (Acre) |
|---------|----------|--------|---------------------|---------|----------|------|-------------|---------------------------|
| 1 | Khulna | Rupsha | Patharghata & Tilak | 36 & 35 | 1, 2 & 4 | 219 | 0.59 | |
| 2 | | | | | | 170 | 0.41 | |
| 3 | | | | | | 1818 | 0.26 | |
| 4 | | | | | | 3774 | 0.13 | |
| 5 | | | | | | 3775 | 0.26 | |
| 6 | | | | | | 3776 | 0.23 | |
| 7 | | | | | | 3777 | 0.23 | |
| 8 | | | | | | 3778 | 0.93 | |
| 9 | | | | | | 3783 | 0.23 | |
| 10 | | | | | | 3784 | 0.2 | |
| 11 | | | | | | 158 | 0.36 | |
| 12 | | | | | | 162 | 0.94 | |
| 13 | | | | | | 163 | 1.44 | |
| 14 | | | | | | 164 | 0.56 | |
| 15 | | | | | | 165 | 1.03 | |
| 16 | | | | | | 166 | 0.91 | |
| 17 | | | | | | 168 | 2.92 | |
| 18 | | | | | | 169 | 0.5 | |
| 19 | | | | | | 174 | 0.43 | |
| 20 | | | | | | 217 | 0.9 | |
| 21 | | | | | | 218 | 1.1 | |
| 22 | | | | | | 220 | 0.73 | |
| 23 | | | | | | 221 | 0.29 | |
| 24 | | | | | | 222 | 0.33 | |
| 25 | | | | | | 223 | 0.22 | |
| 26 | | | | | | 224 | 1.66 | |
| 27 | | | | | | 225 | 0.96 | |
| 28 | | | | | | 226 | 1.02 | |
| 29 | | | | | | 227 | 0.65 | |
| 30 | | | | | | 228 | 0.56 | |
| 31 | | | | | | 230 | 0.16 | |
| 32 | | | | | | 231 | 0.65 | |
| 33 | | | | | | 234 | 1.06 | |
| 34 | | | | | | 1502 | 1.01 | |
| 35 | | | | | | 1503 | 3.85 | |
| 36 | | | | | | 1504 | 1.69 | |
| 37 | | | | | | 1505 | 1.69 | |
| 38 | | | | | | 1506 | 0.52 | |
| 39 | | | | | | 1509 | 1.11 | |
| 40 | | | | | | 1510 | 0.78 | |

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[Signature]
S. M. Jigul & Co. Ltd.
Project Director
Khulna WASA, Khulna

[Signature]
M. ABDULLAH, P. Eng.
Managing Director
Khulna WASA

Appendix-1

| Sl. No. | District | Thana | Mouza | JL.# | Sheet # | SA | Area (acre) | Proposed land Area (Acre) |
|---------|----------|-------|-------|------|---------|------|-------------|---------------------------|
| 41 | | | | | | 1516 | 0.45 | |
| 42 | | | | | | 1517 | 3.51 | |
| 43 | | | | | | 1518 | 0.44 | |
| 44 | | | | | | 1519 | 0.7 | |
| 45 | | | | | | 1520 | 0.65 | |
| 46 | | | | | | 1521 | 0.48 | |
| 47 | | | | | | 1522 | 0.69 | |
| 48 | | | | | | 1523 | 0.55 | |
| 49 | | | | | | 1524 | 0.6 | |
| 50 | | | | | | 1525 | 0.26 | |
| 51 | | | | | | 1526 | 0.71 | |
| 52 | | | | | | 1527 | 0.48 | |
| 53 | | | | | | 1528 | 0.38 | |
| 54 | | | | | | 1530 | 0 | |
| 55 | | | | | | 1788 | 0 | |
| 56 | | | | | | 1789 | 0.26 | |
| 57 | | | | | | 1802 | 0.07 | |
| 58 | | | | | | 161 | 0.19 | |
| 59 | | | | | | 171 | 0.89 | |
| 60 | | | | | | 214 | 1.1 | |
| 61 | | | | | | 159 | 0.37 | |
| 62 | | | | | | 1531 | 1.26 | |
| 63 | | | | | | 1507 | 0.18 | |
| 64 | | | | | | 155 | 0.17 | |
| 65 | | | | | | 216 | 1.06 | |
| 66 | | | | | | 233 | 1.19 | |
| 67 | | | | | | 179 | 0.15 | |
| 68 | | | | | | 199 | 1.33 | |
| 69 | | | | | | 197 | 0.15 | |
| 70 | | | | | | 233 | 0.3 | |
| 71 | | | | | | 1529 | 1.92 | |
| 72 | | | | | | 1530 | 0.23 | |
| 73 | | | | | | 1532 | 0.53 | |
| 74 | | | | | | 1533 | 0 | |
| 75 | | | | | | 1554 | 3.18 | |
| 76 | | | | | | 1555 | 0.96 | |
| 77 | | | | | | 160 | 0.76 | |
| 78 | | | | | | 231 | 0.65 | |
| 79 | | | | | | 1511 | 1.9 | |
| 80 | | | | | | 1816 | 0.46 | |
| 81 | | | | | | 172 | 0.23 | |

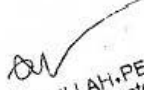
4-iii *[Signature]*
 Engr. S. M. Jaglul Haider
 Project Director
 Managing Director (Engg.)
 WSA, Khulna

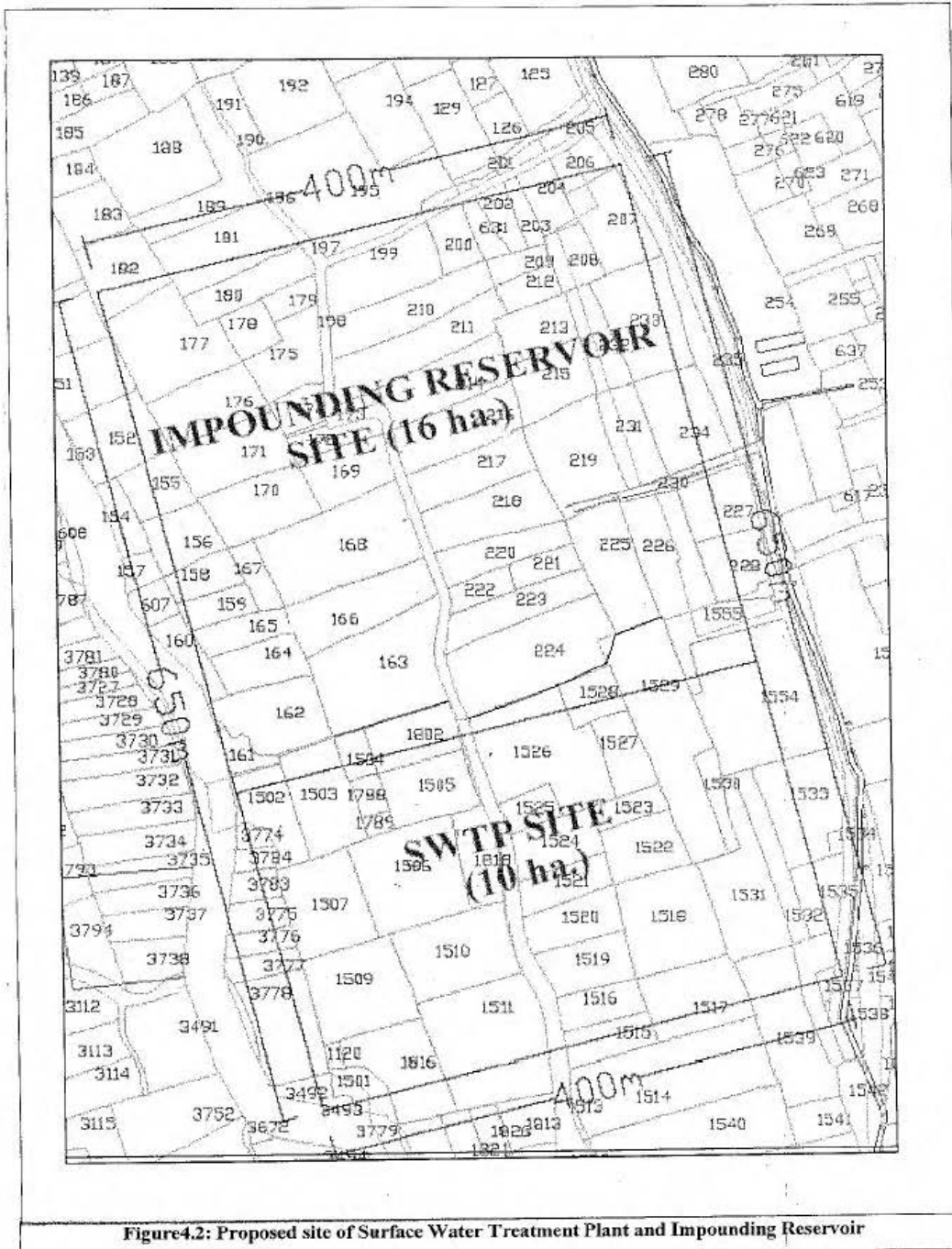
[Signature]
 Mr. ABDULLAH, P. Eng
 Managing Director
 Khulna WASA.

Appendix-1

| Sl. No. | District | Thana | Mouza | JL.# | Sheet # | SA | Area (acre) | Proposed land Area (Acre) |
|--|----------|-------|-------|------|---------|------|-------------|---------------------------|
| 82 | | | | | | 173 | 0.06 | |
| 83 | | | | | | 217 | 0.9 | |
| 84 | | | | | | 232 | 0.7 | |
| 85 | | | | | | 1535 | 0.63 | |
| 86 | | | | | | 215 | 0.72 | |
| 87 | | | | | | 167 | 0.29 | |
| 88 | | | | | | 177 | 1.31 | |
| 89 | | | | | | 178 | 0.34 | |
| 90 | | | | | | 200 | 0.69 | |
| 91 | | | | | | 156 | 0.44 | |
| 92 | | | | | | 158 | 0.43 | |
| 93 | | | | | | 202 | 0.15 | |
| 94 | | | | | | 152 | 0.81 | |
| 95 | | | | | | 175 | 0.71 | |
| 96 | | | | | | 203 | 0.22 | |
| 97 | | | | | | 204 | 0.61 | |
| 98 | | | | | | 207 | 0.87 | |
| 99 | | | | | | 155 | 0.49 | |
| 100 | | | | | | 208 | 0.41 | |
| 101 | | | | | | 213 | 0.56 | |
| 102 | | | | | | 1501 | 0.2 | |
| 103 | | | | | | 1515 | 0.56 | |
| 104 | | | | | | 209 | 0.21 | |
| 105 | | | | | | 180 | 0.55 | |
| 106 | | | | | | 198 | 0.56 | |
| 107 | | | | | | 210 | 0.93 | |
| 108 | | | | | | 211 | 1 | |
| 109 | | | | | | 212 | 0.2 | |
| 110 | | | | | | 3492 | 0.58 | |
| 111 | | | | | | 3493 | 0.35 | |
| Land available in the listed SA | | | | | | | 79.37 | |
| Total Proposed land for surface water treatment plant and Impounding reservoir | | | | | | | | 64.25 |


 Eng. S. M. Jaglal, Director
 Project Director
 Deputy Managing Director (Engg)
 Khulna WASA, Khulna


 MD ABDULLAH, PENG
 Managing Director
 Khulna WASA



[Signature]
4 May 2011
S. M. Javed A. Siddiq
Project Director
&
Deputy Managing Director (Engineering)
Khulna WASA, Khulna

[Signature]
MD. ABDULLAH PENG
Managing Director
Khulna WASA

Appendix-1

C. Land details of proposed Over Head Tank (OHT) and Underground Reservoir

| Sl. No. | Name | District | Thana | Mouza | JL# | Sheet # | SA# | Area (Acre) | Proposed Area (Acre) |
|--------------|--|----------|----------------|--------------|-----|---------|--------------|-------------|----------------------|
| 1 | Deana West Pan Reservoir and Over Head Tank | Khulna | Doulatpur | Deyana | 8 | 2 | 1386 | 0.3 | 1.7 |
| | | | | | | | 1387 | 0.3 | |
| | | | | | | | 1254 | 0.23 | |
| | | | | | | | 1255 | 0.12 | |
| | | | | | | | 1256 | 0.14 | |
| Total | 1.09 | | | | | | | | |
| 2 | Ward # 16 Councilor office Reservoir and Over Head Tank | Khulna | Sonadanga | Choto Boira | 1 | 4 | 1711 | 1.02 | 1.7 |
| | | | | | | | 1712 | 0.67 | |
| | | | | | | | Total | 1.69 | |
| 3 | Sonadanga Moha Sarak Reservoir and Over Head Tank (Women Stadium) | Khulna | Sonadanga | Choto Boira | | | 2157 | 0.98 | 2.2 |
| | | | | | | | 2155 | 0.79 | |
| | | | | | | | Total | 1.78 | |
| 4 | Beside of 7 No. Ward Councilor Office Reservoir and Over Head Tank | Khulna | Khalishpur | Goalpara | 14 | 1 | 261 | 0.17 | 1.7 |
| | | | | | | | 262 | 0.33 | |
| | | | | | | | 263 | 0.59 | |
| | | | | | | | Total | 1.09 | |
| 5 | Khalishpur Chorerhat River Ghat Reservoir and Over Head Tank | Khulna | Khalishpur | Goalpara | 14 | 2 | 3284 | 0.1 | 2.2 |
| | | | | | | | 3286 | 0.27 | |
| | | | | | | | 3287 | 0.17 | |
| | | | | | | | 3283 | 0.31 | |
| | | | | | | | 3285 | 0.19 | |
| | | | | | | | 3288 | 0.1 | |
| | | | | | | | 3227 | 0.77 | |
| | | | | | | | 3355 | 0.22 | |
| | | | | | | | Total | 2.13 | |
| 6 | Rab Sarani Over Head Tank (Word # 2) | Khulna | Khan Jahan Ali | MireeDanga | | 3 | 140 | 0.4 | 0.33 |
| | | | | | | | 141 | | |
| | | | | | | | Total | 0.4 | |
| 7 | Mujgunni Over Head Tank (Word # 9) | Khulna | Khalishpur | Boira | 12 | 1 | 1051 | 0.63 | 0.33 |
| | | | | | | | Total | 0.63 | |
| 8 | Ferry Ghat Power House More (KCC Garage) Over Head Tank | Khulna | Khulna Sadar | Baniakh amar | 4 | 3 | 2405 | 0.83 | 0.33 |
| | | | | | | | Total | 0.83 | |
| 9 | Andir Pukur Over Head Tank | Khulna | Khulna Sadar | Baniakh amar | 3 | 9 | 5659 | 0.24 | 0.43 |
| | | | | | | | 5658 | 0.14 | |
| | | | | | | | 5657 | 0.1 | |
| | | | | | | | Total | 0.48 | |

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Engr. S. M. Jagjit Singh
Project Director
Deputy Managing Director (Engg)
Khulna WASA, Khulna

MD ABULLAH PENG
Managing Director
Khulna WASA

Appendix-I

| Sl. No. | Name | District | Thana | Mouza | JL# | Sheet # | SA# | Area (Acre) | Proposed Area (Acre) |
|---|--|----------|--------------|------------|-----|---------|-------|-------------|----------------------|
| 10 | South side of Word # 31 office Labanchura Over Head Tank | Khulna | Khulna Sadar | Labanchura | | 1 | 139 | 7.92 | 0.43 |
| | | | | | | | Total | 7.92 | |
| 11 | DPHE Rupsha Over Head Tank | Khulna | Khulna Sadar | Tutpara | 5 | 5 | 1160 | 1.49 | 0.43 |
| | | | | | | | Total | 1.49 | |
| Total Proposed land for Over Head Tank (OHT) and Underground Reservoir | | | | | | | | | 11.78 |

[Signature]
Md. Jagir Uddin
Project Director
& V.P.
Deputy Managing Director (Bengal)
Khulna WASA, Khulna

[Signature]
MD. ABDULLAH, Peng
Managing Director
Khulna WASA

Appendix-I

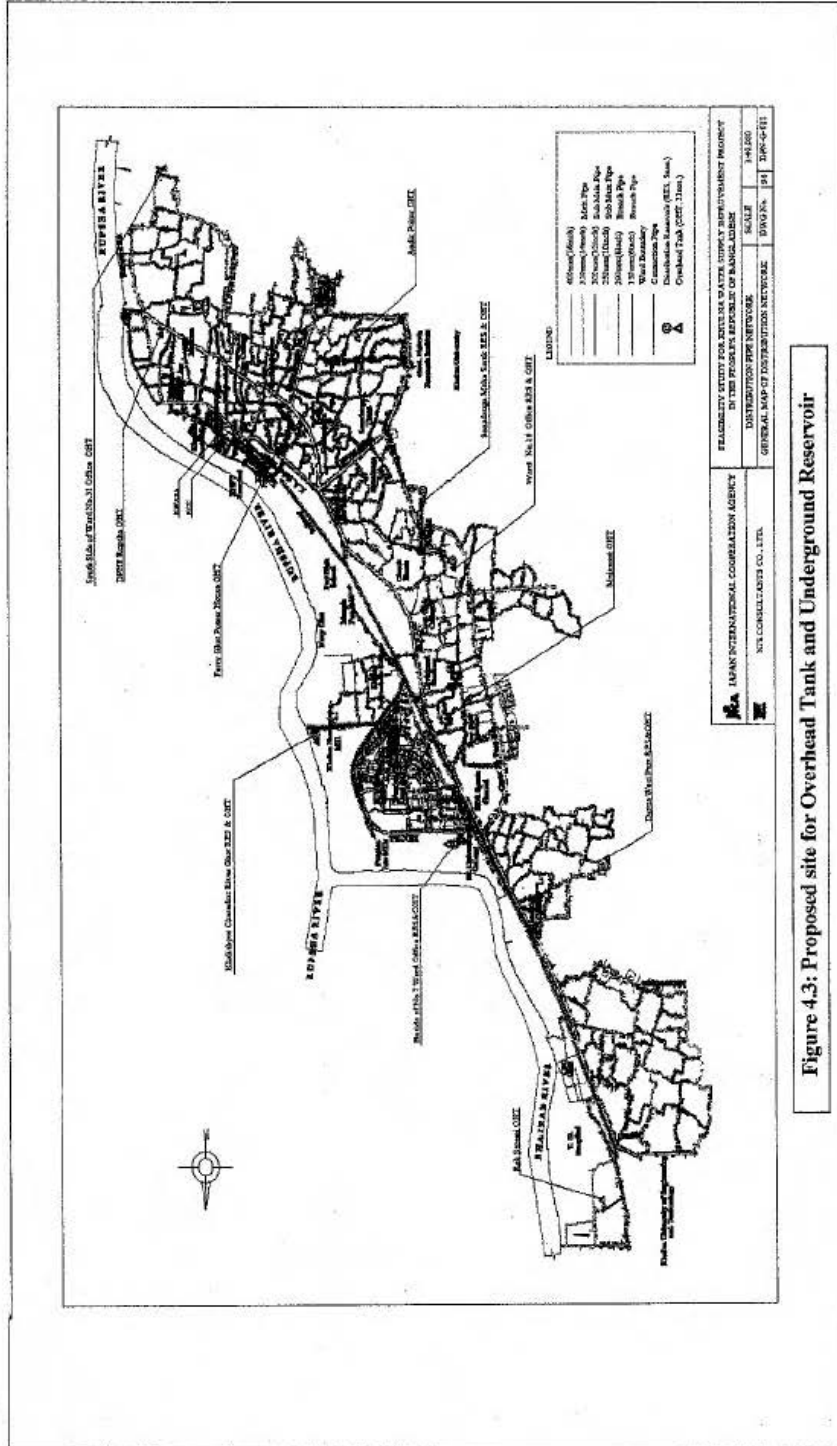
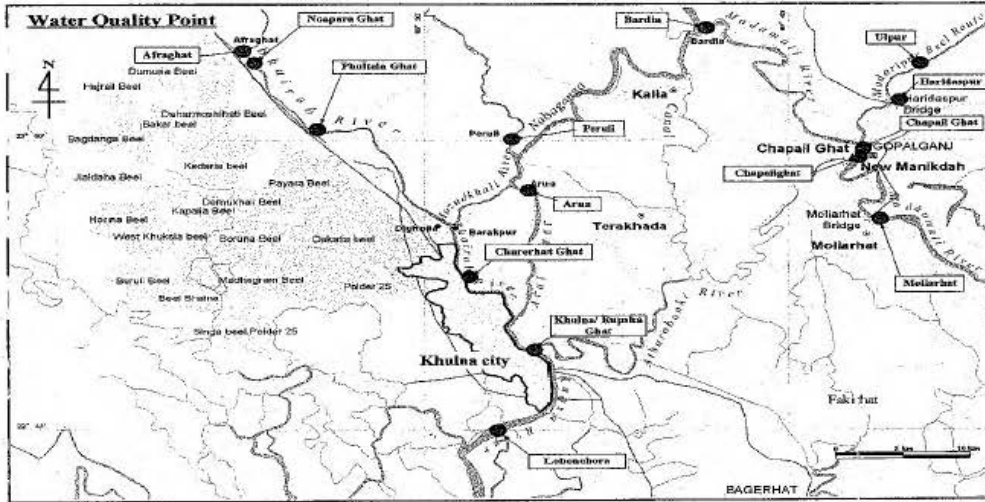


Figure 4.3: Proposed site for Overhead Tank and Underground Reservoir


 Md. G. M. M. Khan
 Project Director
 Khulna Water Supply Improvement Project
 Khulna, Bangladesh
 Mr. Abdul-Hamid
 Managing Director
 Khulna WSA

Part-2 River Water Quality and River flow

A. River water abstraction and water quality
(i) Location of Water Quality Analysis and Salinity Investigation



Source: Field Investigation

(ii) Result of Water Quality Analysis, October 2009

| Parameters | Locations | | Standard | Mollarhat | Chapalghat | Haridaspur | Khulna | Arua | Peruli | Bardia | Afraghat | Ulpur |
|--|--------------------|---------|----------|-----------|------------|------------|--------|---------|---------|---------|----------|-------|
| | Sampling Date/time | Unit | | | | | | | | | | |
| pH | - | 6.5-8.5 | 7.6 | 7.5 | 7.3 | 7.8 | 7.9 | 7.9 | 8.1 | 7.6 | 8.01 | |
| Turbidity | NTU | 10 | 72 | 87 | 101 | 270 | 207 | 85 | 152 | 55 | 240 | |
| TDS | mg/L | 1,000 | 151 | 164 | 134 | 157 | 122 | 142 | 131 | 223 | 143 | |
| SS | mg/L | 10 | 36 | 39 | 41 | 105 | 85 | 43 | 77 | 82 | 89 | |
| COD(Cr) | mg/L | 4 | 5 | 7 | 14 | <5 | <5 | <5 | <5 | 21 | 8 | |
| BOD ₅ | mg/L | 0.2 | 0.6 | 1.2 | 1.2 | 0.2 | <0.2 | <0.2 | <0.2 | 3.6 | 2 | |
| Mercury (Hg) | mg/L | 0.001 | 0.0028 | 0.002 | <0.0005 | 0.002 | 0.002 | 0.0015 | 0.0033 | 0.0038 | 0.002 | |
| Lead (Pb) | mg/L | 0.05 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | |
| Arsenic (As) | mg/L | 0.05 | 0.006 | 0.007 | 0.007 | 0.004 | 0.002 | 0.003 | 0.003 | 0.007 | 0.015 | |
| Hexavalent Chromium (Cr ⁶⁺) | mg/L | 0.05 | (0.003) | (0.007) | (0.008) | (0.01) | (0.01) | (0.003) | (0.008) | (0.007) | (0.008) | |
| Calcium (Ca ²⁺) | mg/L | 75 | 32 | 33 | 35 | 35 | 32 | 32 | 33 | 37 | 35 | |
| Copper (Cu) | mg/L | 1 | 0.04 | 0.05 | 0.06 | 0.14 | 0.05 | 0.04 | 0.04 | 0.05 | 0.04 | |
| Zinc (Zn) | mg/L | 5 | 0.08 | 0.06 | 0.14 | 0.17 | 0.05 | 0.05 | 0.05 | 0.07 | 0.06 | |
| Cadmium (Cd) | mg/L | 0.005 | 0.001 | <0.001 | 0.001 | 0.001 | 0.001 | 0.001 | <0.001 | <0.001 | 0.001 | |
| Chloride (Cl) | mg/L | 600 | 10 | 12 | 10 | 19 | 9 | 11 | 7 | 30 | 9 | |
| Sulfate (SO ₄ ²⁻) | mg/L | 400 | <7 | <7 | 9.4 | 11 | 15 | 14 | 14 | <7 | 12 | |
| Phosphate (PO ₄ ³⁻) | mg/L | 6 | 0.15 | 0.15 | 0.19 | 0.43 | 0.26 | 0.18 | 0.30 | 0.29 | 0.32 | |
| Nitrate (NO ₃) | mg/L | 10 | 1.8 | 1.8 | 1.8 | 2.2 | 1.8 | 2.2 | 2.2 | 1.3 | 2.2 | |
| Nitrite (NO ₂) | mg/L | <1 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | 0.10 | <0.03 | |
| Ammonia (NH ₄ ⁺) | mg/L | 0.5 | 0.17 | 0.36 | 0.38 | 0.05 | 0.27 | 0.36 | 0.03 | 0.18 | 0.20 | |
| Iron (Fe) | mg/L | 0.3-1.0 | 0.77 | 0.67 | 1.1 | 3.2 | 1.5 | 0.75 | 2.6 | 0.86 | 2.5 | |
| Manganese (Mn) | mg/L | 0.1 | 0.05 | 0.05 | 0.07 | 0.16 | 0.11 | 0.03 | 0.06 | 0.05 | 0.15 | |
| Dissolved Oxygen (DO) | mg/L | 6 | 5.8 | 6.3 | 6.0 | 7.4 | 6.6 | 7.0 | 7.2 | 5.3 | 6.3 | |

Note: Mercury at Haridaspur shows the data analysed at Laboratory in Tokyo. The other data is analysed by BUET.
Chromium data shows () as Total Cr.

Source: JICA Study

[Signature]
Engr. S. M. Jastul Haider
 Project Director
 Deputy Managing Director (Engr.)
 Khulna WASA, Khulna

MS. ABDULLAH, PENQ
 Managing Director
 Khulna WASA

Appendix-4.2

(iii) Water Quality Analysis, 2005 - 2008

| Date | Temp. (°C) | PH | EC | Chloride (mg/L) | P. Alka | T. Alka | Turbidity (NTU) | TS (mg/L) | TDS (mg/L) | SS (mg/L) | DO (mg/L) | BOD (mg/L) | COD (mg/L) |
|----------|------------|------|------|-----------------|---------|---------|-----------------|-----------|------------|-----------|-----------|------------|------------|
| 10/1/05 | 22.5 | 7.51 | 300 | 12.3 | 0 | 36 | 32.8 | 175 | 150 | 25 | 5.4 | 0.6 | 25 |
| 23/2/05 | 24.5 | 7.41 | 320 | 15.9 | 0 | 32 | 32.5 | 180 | 155 | 25 | 5.5 | 0.7 | 20 |
| 15/3/05 | 29.5 | 7.41 | 740 | 120.78 | 0 | 36 | 45.8 | 390 | 360 | 30 | 5.3 | 0.8 | 25 |
| 21/4/05 | 30.5 | 7.61 | 1030 | 225.9 | 0 | 36 | 52.8 | 570 | 520 | 50 | 5.2 | 0.8 | 40 |
| 20/5/05 | 32.5 | 7.61 | 1370 | 251 | 0 | 34 | 56.8 | 700 | 650 | 50 | 5.2 | 0.9 | 45 |
| 21/6/05 | 33.5 | 7.71 | 530 | 109.8 | 0 | 34 | 52.8 | 300 | 260 | 40 | 5.3 | 0.8 | 32 |
| 15/7/05 | 30.5 | 7.41 | 280 | 6.9 | 0 | 30 | 22.8 | 150 | 135 | 15 | 5.1 | 0.8 | 25 |
| 11/8/05 | 31.5 | 7.56 | 275 | 7.1 | 0 | 36 | 32.8 | 137 | 112 | 25 | 5.2 | 0.8 | 25 |
| 25/10/05 | 30.9 | 7.65 | 265 | 6.8 | 0 | 36 | 62.8 | 176 | 135 | 41 | 5.2 | 0.8 | 42 |
| 11/11/05 | 25.5 | 7.81 | 280 | 12.9 | 0 | 36 | 32.8 | 160 | 140 | 20 | 5.3 | 0.7 | 20 |
| 15/12/05 | 22.5 | 7.69 | 320 | 23.78 | 0 | 36 | 42.8 | 180 | 160 | 20 | 5.4 | 0.8 | 30 |
| 26/1/06 | 22.5 | 7.41 | 360 | 25.45 | 0 | 36 | 42.8 | 200 | 180 | 20 | 5.6 | 0.6 | 25 |
| 24/2/06 | 27.5 | 7.51 | 570 | 59.9 | 0 | 36 | 52.8 | 310 | 285 | 25 | 5.4 | 0.6 | 30 |
| 21/3/06 | 30.1 | 7.71 | 1070 | 218.9 | 0 | 36 | 57.8 | 600 | 535 | 65 | 5.3 | 0.6 | 25 |
| 25/4/06 | 30.5 | 7.81 | 1490 | 312.5 | 0 | 36 | 52.8 | 780 | 740 | 40 | 5.3 | 0.9 | 35 |
| 22/5/06 | 31.9 | 7.67 | 1590 | 380.9 | 0 | 32 | 57.8 | 830 | 790 | 40 | 5.3 | 0.8 | 55 |
| 26/6/06 | 32.5 | 7.71 | 1720 | 412.9 | 0 | 36 | 62.8 | 900 | 845 | 55 | 5.2 | 0.9 | 55 |
| 29/7/06 | 35.5 | 7.73 | 880 | 240.9 | 0 | 46 | 62.8 | 500 | 440 | 60 | 5.3 | 0.8 | 58 |
| 23/8/06 | 32.5 | 7.71 | 680 | 152 | 0 | 36 | 62.8 | 400 | 340 | 60 | 5.3 | 0.8 | 26 |
| 19/9/06 | 30.5 | 7.68 | 360 | 12.34 | 0 | 36 | 42.8 | 210 | 180 | 30 | 5.2 | 0.9 | 25 |
| 20/10/06 | 29.5 | 7.71 | 300 | 8.9 | 0 | 36 | 52.8 | 175 | 145 | 30 | 5.3 | 0.6 | 25 |
| 20/11/06 | 24.5 | 7.65 | 290 | 5.67 | 0 | 36 | 42.8 | 170 | 140 | 30 | 5.5 | 0.8 | 25 |
| 24/12/06 | 24.5 | 7.56 | 320 | 13.5 | 0 | 36 | 32.8 | 190 | 165 | 25 | 5.5 | 0.7 | 21 |
| 25/1/07 | 28.5 | 7.61 | 570 | 108.9 | 0 | 36 | 22.8 | 290 | 270 | 130 | 5.4 | 0.7 | 25 |
| 15/2/07 | 29.5 | 7.61 | 740 | 178.9 | 0 | 36 | 22.8 | 400 | 370 | 30 | 5.3 | 0.8 | 25 |
| 29/3/07 | 31.5 | 7.61 | 1380 | 270.9 | 0 | 36 | 42.8 | 720 | 690 | 30 | 5.1 | 0.8 | 45 |
| 25/4/07 | 33.5 | 7.71 | 1750 | 420 | 0 | 36 | 52.8 | 920 | 850 | 70 | 5.2 | 0.9 | 55 |
| 29/5/07 | 33.5 | 7.64 | 2140 | 470.8 | 0 | 34 | 42.3 | 1120 | 1070 | 50 | 5.3 | 0.9 | 55 |
| 28/6/07 | 34.8 | 7.68 | 2350 | 489.9 | 0 | 36 | 41.8 | 1220 | 1175 | 35 | 5.3 | 0.9 | 55 |
| 30/7/07 | 32.5 | 7.73 | 480 | 60.3 | 0 | 36 | 38.7 | 280 | 240 | 40 | 5.3 | 0.9 | 35 |
| 26/8/07 | 32.5 | 7.51 | 370 | 23.5 | 0 | 36 | 58.9 | 240 | 190 | 50 | 5.4 | 0.8 | 25 |
| 26/9/07 | 30.5 | 7.67 | 320 | 5.68 | 0 | 36 | 45.8 | 210 | 160 | 50 | 5.8 | 0.7 | 25 |
| 21/10/07 | 30.5 | 7.49 | 310 | 7.89 | 0 | 36 | 43.7 | 200 | 150 | 50 | 5.4 | 0.8 | 28 |
| 30/11/07 | 28.5 | 7.71 | 340 | 12.7 | 0 | 36 | 45.8 | 190 | 160 | 30 | 5.3 | 0.7 | 22 |
| 30/12/07 | 25.5 | 7.68 | 540 | 23.6 | 0 | 36 | 52.8 | 320 | 270 | 50 | 5.3 | 0.7 | 24 |
| 22/1/08 | 23.5 | 7.65 | 600 | 103.8 | 0 | 56 | 32.8 | 340 | 300 | 40 | 5.2 | 0.9 | 25 |
| 27/3/08 | 29.5 | 7.64 | 1380 | 318.9 | 0 | 36 | 32.8 | 740 | 690 | 50 | 5.6 | 0.9 | 35 |
| 29/5/08 | 31.9 | 7.63 | 2170 | 518.5 | 0 | 36 | 42.8 | 1140 | 1085 | 55 | 5.3 | 0.8 | 55 |
| 28/7/08 | 32.5 | 7.67 | 2450 | 538.9 | 0 | 36 | 43.8 | 1270 | 1220 | 50 | 5.4 | 0.8 | 55 |
| 05/9/08 | 32.5 | 7.68 | 480 | 13.68 | 0 | 36 | 43.8 | 280 | 240 | 40 | 5.4 | 0.9 | 28 |
| 05/12/08 | 29.5 | 7.61 | 360 | 8.98 | 0 | 36 | 32.8 | 210 | 180 | 30 | 5.3 | 0.7 | 28 |
| Ave. | 29.7 | 7.63 | 831 | 152 | 0 | 36 | 44.7 | 451 | 412 | 41 | 5.3 | 0.8 | 34 |
| Max. | 35.5 | 7.81 | 2450 | 539 | 0 | 36 | 62.8 | 1270 | 1220 | 130 | 5.8 | 0.9 | 58 |
| Min. | 22.5 | 7.41 | 265 | 5.7 | 0 | 30 | 22.8 | 137 | 112 | 15 | 5.1 | 0.6 | 20 |

Sampling Point: Modhumati River, Mollarhat, Bagerhat
Source: DOE


[Signature]
MD. ABDULLAH, PEna
Managing Director
Khulna WASA

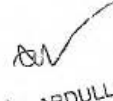
Appendix-4.2

(iv) Water Quality Results of Rupsa River (Sampling Point: 22° 49' 27" N and 89° 33' 36" E)

| Locations Parameters | | Standard | Khulna | | | | | | | |
|--|------|----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|
| Sampling Date time | Unit | | 15/03/2010 | 28/3/2010 | 15/04/2010 | 28/4/2010 | 15/05/2010 | 28/5/2010 | 15/06/2010 | 28/6/2010 |
| pH | - | 6.5-8.5 | 6.8 | 7.7 | 8 | 5.3 | 8.4 | 7.9 | 8.1 | 9 |
| Turbidity | NTU | 10 | 135 | 195 | 76 | 98 | 110 | 135 | 127 | 72 |
| TDS | mg/L | 1,000 | 5472 | 10725 | 9800 | 11500 | 12700 | 12800 | 3600 | 312 |
| SS | mg/L | 10 | 30 | 35 | 38 | 47 | 58 | 60 | 41 | 32 |
| COD(Cr) | mg/L | 4 | 95 | 138 | 141 | 149 | 135 | 102 | 90 | 67 |
| BOD ₅ | mg/L | 0.2 | 14 | 23 | 29.2 | 31 | 27 | 24 | 22 | 15 |
| Mercury (Hg) | mg/L | 0.001 | 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Lead (Pb) | mg/L | 0.05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Arsenic (As) | mg/L | 0.05 | 0.004 | 0.002 | 0.003 | 0.002 | 0.004 | 0.03 | 0.004 | 0.003 |
| Hexavalent Chromium (Cr ^{VI}) | mg/L | 0.05 | 0.06 | 0.05 | 0.042 | 0.03 | 0.032 | 0.021 | 0.02 | 0.017 |
| Calcium (Ca ²⁺) | mg/L | 75 | 379 | 388 | 506 | 614 | 817 | 588 | 111 | 31 |
| Copper (Cu) | mg/L | 1 | 0.09 | 0.06 | 0.055 | 0.1 | 0.13 | 0.11 | 0.14 | 0.1 |
| Zinc (Zn) | mg/L | 5 | 0.4 | 0.13 | 0.2 | 0.35 | 0.52 | 0.58 | 0.49 | 0.31 |
| Cadmium (Cd) | mg/L | 0.005 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chloride (Cl ⁻) | mg/L | 600 | 3842 | 5650 | 6562 | 7625 | 8256 | 8568 | 1344 | 102 |
| Sulfate (SO ₄ ²⁻) | mg/L | 400 | 24 | 29 | 27 | 32 | 38 | 35 | 54.1 | 18.4 |
| Phosphate (PO ₄ ³⁻) | mg/L | 6 | 0 | 0 | 1.2 | 1.26 | 1.42 | 1.6 | 0 | 0 |
| Nitrate (NO ₃ ⁻) | mg/L | 10 | 5.23 | 3.98 | 4.32 | 4.03 | 4.66 | 4.72 | 5.03 | 1.9 |
| Nitrite (NO ₂ ⁻) | mg/L | <1 | 0.008 | 0.006 | 0.008 | 0.009 | 0.14 | 0.17 | 0.13 | 0.085 |
| Ammonia (NH ₃ -N) | mg/L | 0.5 | 0.65 | 0.54 | 0.42 | 0.51 | 0.54 | 0.41 | 0.55 | 0.45 |
| Iron (Fe) | mg/L | 0.3-1.0 | 16.28 | 15.0 | 4.0 | 1.44 | 11.8 | 10.1 | 7.9 | 4.1 |
| Manganese (Mn) | mg/L | 0.1 | <0.05 | <0.05 | <0.05 | 0.07 | <0.13 | 0.1 | 0.11 | 0.08 |
| Dissolved Oxygen (DO) | mg/L | 6 | 4.2 | 3.3 | 6.1 | 8.2 | 6.4 | 5.9 | 6.3 | 5.8 |

Source: Field Investigation


 Engr. S. M. Jabbar
 Project Director
 Deputy Managing Director II
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 MD. ABDULLAH, PEng
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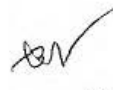
Appendix-4.2

(v) Water Quality Results of Modhumati River (Sampling Point: 22° 55' 52 N and 89° 48' 29 E)

| Locations Parameters | | Standard | Mollarhat | | | | | | | |
|--|------|----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|
| Sampling Date time | Unit | | 15.03.2010 | 28.3.2010 | 15.04.2010 | 28.4.2010 | 15.05.2010 | 28.5.2010 | 15.06.2010 | 28.6.2010 |
| pH | - | 6.5-8.5 | 7.6 | 8.1 | 8.8 | 6.9 | 7.9 | 8 | 8 | 8.7 |
| Turbidity | NTU | 10 | 8 | 14 | 5 | 30 | 11 | 30 | 5 | 38 |
| TDS | mg/L | 1,000 | 726 | 880 | 1150 | 800 | 208 | 88 | 85 | 107 |
| SS | mg/L | 10 | 9 | 15 | 19 | 21 | 12 | 13 | 9 | 7 |
| COD(Cr) | mg/L | 4 | 25 | 35.2 | 39 | 41 | 32 | 21 | 18 | 15 |
| BOD ₅ | mg/L | 0.2 | 6.2 | 8.9 | 11.5 | 12.7 | 8.2 | 6 | 5 | 4.2 |
| Mercury (Hg) | mg/L | 0.001 | 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0 | 0.000 | 0.000 |
| Lead (Pb) | mg/L | 0.05 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 |
| Arsenic (As) | mg/L | 0.05 | 0.001 | 0.001 | 0.001 | 0.002 | 0.002 | 0.001 | 0.003 | 0.002 |
| Hexavalent Chromium (Cr ⁶⁺) | mg/L | 0.05 | 0.01 | 0.03 | 0.032 | 0.027 | 0.015 | 0.01 | 0.011 | 0.013 |
| Calcium (Ca ²⁺) | mg/L | 75 | 78 | 29 | 74 | 42 | 60 | 146 | 22 | 21 |
| Copper (Cu) | mg/L | 1 | 0.07 | 0.02 | 0.04 | 0.07 | 0.09 | 0.08 | 0.11 | 0.1 |
| Zinc (Zn) | mg/L | 5 | <0.05 | 0 | <0.05 | 0.07 | 0.10 | 0.11 | 0.13 | 0.1 |
| Cadmium (Cd) | mg/L | 0.005 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 |
| Chloride (Cl ⁻) | mg/L | 600 | 373 | 554 | 1150 | 437 | 51 | 76 | 22 | 37 |
| Sulfate (SO ₄ ²⁻) | mg/L | 400 | 18 | 23 | 24 | 27 | 30 | 23 | 6.5 | 15.7 |
| Phosphate (PO ₄ ³⁻) | mg/L | 6 | 0 | 0 | 0.86 | 0.91 | 1.10 | 1.22 | 0 | 0 |
| Nitrate (NO ₃ ⁻) | mg/L | 10 | 5.89 | 5.44 | 4.81 | 4.92 | 3.25 | 4.72 | 2.7 | 0.9 |
| Nitrite (NO ₂ ⁻) | mg/L | <1 | 0.007 | 0.012 | 0.01 | 0.013 | 0.12 | 0.1 | 0.12 | 0.051 |
| Ammonia (NH ₃) | mg/L | 0.5 | 0.23 | 0.4 | 0.33 | 0.31 | 0.26 | 0.18 | 0.27 | 0.16 |
| Iron (Fe) | mg/L | 0.3-1.0 | 0.3 | 0.3 | 0.3 | 0.42 | 2.16 | 2.68 | 4.6 | 2.5 |
| Manganese (Mn) | mg/L | 0.1 | <0.05 | <0.05 | <0.05 | <0.05 | 0.02 | 0.03 | 0.05 | 0.03 |
| Dissolved Oxygen (DO) | mg/L | 6 | 3.4 | 3.6 | 7.6 | 6.2 | 6.7 | 6.4 | 5.4 | 5.5 |

Source: Field Investigation


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 MD. ABDULLAH, PENG
 Managing Director
 Khulna WASA

Appendix-4.2

(vi) Chloride Monitoring Data from 2005 to 2009

| River | Rupsa River | Madhumati River | River | Rupsa River | Madhumati River | | |
|-------|-------------|-----------------|-------|---------------|-----------------|--------|-----|
| Site: | Rupsha Ghat | Mollarhat | Site: | Rupsha Ghat | Mollarhat | | |
| Unit | mg/l | mg/l | Unit | mg/l | mg/l | | |
| 2005 | Jan | 275 | 12 | 2008 | Jan | 279 | 104 |
| | Feb | 329 | 16 | | Feb | 1,040 | |
| | Mar | 2,527 | 121 | | Mar | 2,511 | 319 |
| | Apr | 2,692 | 226 | | Apr | 6,759 | |
| | May | 4,780 | 251 | | May | 7,912 | 519 |
| | Jun | 2,383 | 110 | | Jun | 8,463 | |
| | Jul | 272 | 7 | | Jul | 2,638 | 539 |
| | Aug | 24 | 7 | | Aug | 75 | |
| | Sep | 23 | | | Sep | 57 | 14 |
| | Oct | 97 | 7 | | Oct | 55 | |
| | Nov | 135 | 13 | | Nov | 220 | |
| | Dec | 269 | 24 | | Dec | 248 | 9 |
| 2006 | Jan | 273 | 25 | 2009 | Jan | 248 | 75 |
| | Feb | 386 | 60 | | Feb | 1,510 | 125 |
| | Mar | 2,088 | 219 | | Mar | 3,846 | 225 |
| | Apr | 4,278 | 313 | | Apr | 6,714 | 467 |
| | May | 5,385 | 381 | | May | 10,779 | 894 |
| | Jun | 3,298 | 413 | | Jun | 11,274 | 944 |
| | Jul | 124 | 241 | | Jul | 5,340 | 125 |
| | Aug | 59 | 152 | | Aug | 1,813 | 24 |
| | Sep | 38 | 12 | | Sep | 175 | 23 |
| | Oct | 99 | 9 | | Oct | 39 | 37 |
| | Nov | 136 | 6 | | Nov | 59 | 13 |
| | Dec | 269 | 14 | | Dec | 59 | 13 |
| 2007 | Jan | 329 | 109 | 2010 | Jan | | |
| | Feb | 824 | 179 | | Feb | 1,268 | 13 |
| | Mar | 2,122 | 271 | | Mar | 2,945 | 133 |
| | Apr | 5,945 | 420 | Over 1000mg/l | | | |
| | May | 8,352 | 471 | | | | |
| | Jun | 6,644 | 490 | | | | |
| | Jul | 218 | 60 | | | | |
| | Aug | 46 | 24 | | | | |
| | Sep | 57 | 6 | | | | |
| | Oct | 124 | 8 | | | | |
| | Nov | 157 | 13 | | | | |
| | Dec | 269 | 24 | | | | |

Source: DOE

-4-


 Deputy Managing Director
 Khulna WASA


 MD. ABDULLAH PENQ
 Managing Director
 Khulna WASA

(viii) Chloride Concentration at Mollarhat, and Khulna (April)

| Mollarhat | | | Rups ha | | |
|-----------|-------|-------|---------|-------|-------|
| Date | High | Low | Date | High | Low |
| 4/1 | 570 | 650 | 4/1 | 9,600 | 9,900 |
| 4/2 | 580 | 720 | 4/2 | 8,900 | 8,900 |
| 4/3 | 630 | 880 | 4/3 | 6,200 | 5,500 |
| 4/4 | 890 | 1,000 | 4/4 | 9,500 | 8,700 |
| 4/5 | 2,750 | 2,500 | 4/5 | 7,800 | 6,100 |
| 4/6 | 3,500 | 3,000 | 4/6 | 8,200 | 7,100 |
| 4/7 | 1,600 | 1,380 | 4/7 | 7,800 | 5,900 |
| 4/8 | 1,340 | 1,200 | 4/8 | 7,600 | 4,300 |
| 4/9 | 1,420 | 1,260 | 4/9 | 7,300 | 6,500 |
| 4/10 | 1,200 | 1,000 | 4/10 | 8,100 | 6,500 |
| 4/11 | 940 | 960 | 4/11 | 7,500 | 6,200 |
| 4/12 | 1,070 | 990 | 4/12 | 8,400 | 8,900 |
| 4/13 | 1,120 | 920 | 4/13 | 7,800 | 5,900 |
| 4/14 | 840 | 1,020 | 4/14 | 6,600 | 5,700 |
| 4/15 | 990 | 1,000 | 4/15 | 6,700 | 5,500 |
| 4/16 | 1,230 | 1,120 | 4/16 | 7,500 | 6,100 |
| 4/17 | 1,340 | 1,260 | 4/17 | 7,200 | 6,500 |
| 4/18 | 1,400 | 1,180 | 4/18 | 6,800 | 5,900 |
| 4/19 | 1,260 | 1,320 | 4/19 | 6,400 | 5,600 |
| 4/20 | 1,000 | 880 | 4/20 | 7,200 | 6,700 |
| 4/21 | 940 | 760 | 4/21 | 8,900 | 6,500 |
| 4/22 | 920 | 780 | 4/22 | 8,200 | 5,700 |
| 4/23 | 840 | 870 | 4/23 | 6,500 | 5,200 |
| 4/24 | 760 | 780 | 4/24 | 6,900 | 6,100 |
| 4/25 | 360 | 410 | 4/25 | 6,800 | 5,600 |
| 4/26 | 560 | 480 | 4/26 | 7,200 | 6,100 |
| 4/27 | 520 | 420 | 4/27 | 6,900 | 5,800 |
| 4/28 | 490 | 570 | 4/28 | 7,100 | 5,700 |
| 4/29 | 420 | 360 | 4/29 | 7,500 | 5,900 |
| 4/30 | 510 | 440 | 4/30 | 7,600 | 5,600 |
| Average | 1,065 | 1,003 | Average | 7,557 | 6,353 |
| Min. | 360 | 360 | Min. | 6,200 | 4,300 |
| Max. | 3,500 | 3,000 | Max. | 9,600 | 9,900 |

(vii) Chloride Concentration at Mollarhat, Khulna (March)

| Mollarhat | | | Rups ha | | |
|-----------|------|-----|---------|-------|-------|
| Date | High | Low | Date | High | Low |
| 3/1 | 350 | 240 | 3/1 | 3,600 | 3,400 |
| 3/2 | 350 | 240 | 3/2 | 4,100 | 3,050 |
| 3/3 | 360 | 320 | 3/3 | 4,650 | 3,750 |
| 3/4 | 310 | 360 | 3/4 | 4,900 | 3,500 |
| 3/5 | 340 | 300 | 3/5 | 4,950 | 3,750 |
| 3/6 | 360 | 320 | 3/6 | 4,200 | 4,100 |
| 3/7 | 340 | 360 | 3/7 | 4,050 | 3,650 |
| 3/8 | 380 | 360 | 3/8 | 3,950 | 3,450 |
| 3/9 | 360 | 380 | 3/9 | 3,750 | 3,550 |
| 3/10 | 460 | 360 | 3/10 | 3,200 | 3,050 |
| 3/11 | 380 | 400 | 3/11 | 4,100 | 3,950 |
| 3/12 | 380 | 380 | 3/12 | 4,450 | 4,050 |
| 3/13 | 380 | 360 | 3/13 | 4,200 | 4,300 |
| 3/14 | 380 | 400 | 3/14 | 4,150 | 4,350 |
| 3/15 | 350 | 460 | 3/15 | 4,550 | 4,450 |
| 3/16 | 380 | 400 | 3/16 | 4,800 | 4,450 |
| 3/17 | 420 | 350 | 3/17 | 4,900 | 4,150 |
| 3/18 | 460 | 400 | 3/18 | 4,950 | 4,750 |
| 3/19 | 480 | 420 | 3/19 | 5,000 | 4,700 |
| 3/20 | 560 | 450 | 3/20 | 5,000 | 4,800 |
| 3/21 | 480 | 400 | 3/21 | 4,700 | 5,000 |
| 3/22 | 480 | 460 | 3/22 | 6,600 | 5,000 |
| 3/23 | 500 | 460 | 3/23 | 8,100 | 7,400 |
| 3/24 | 430 | 460 | 3/24 | 7,400 | 5,700 |
| 3/25 | 440 | 420 | 3/25 | 7,800 | 6,800 |
| 3/26 | 450 | 440 | 3/26 | 7,700 | 7,100 |
| 3/27 | 480 | 480 | 3/27 | 5,100 | 4,500 |
| 3/28 | 420 | 570 | 3/28 | 5,100 | 5,900 |
| 3/29 | 440 | 560 | 3/29 | 8,500 | 6,600 |
| 3/30 | 420 | 640 | 3/30 | 8,300 | 6,000 |
| 3/31 | 480 | 560 | 3/31 | 9,700 | 9,100 |
| Average | 411 | 410 | Average | 5,382 | 4,784 |
| Min. | 240 | 240 | Min. | 3,200 | 3,050 |
| Max. | 500 | 640 | Max. | 9,700 | 9,100 |

MD. ABULLAH, PENG
Managing Director
Khulna WASA

Appendix-4.2

(ix)

| Mollerhatid (C) (Khe) (Mollari) | | | Mollerhatid (C) (Khe) (Mollari) | | |
|---------------------------------|------|-----|---------------------------------|-------|-------|
| Date | High | Low | Date | High | Low |
| 5/1 | 390 | 410 | 5/1 | 7,500 | 5,800 |
| 5/2 | 430 | 280 | 5/2 | 7,800 | 5,400 |
| 5/3 | 100 | 120 | 5/3 | 7,300 | 5,900 |
| 5/4 | 110 | 60 | 5/4 | 7,800 | 5,600 |
| 5/5 | 80 | 80 | 5/5 | 8,200 | 5,600 |
| 5/6 | 100 | 70 | 5/6 | 7,400 | 5,300 |
| 5/7 | 120 | 60 | 5/7 | 7,800 | 5,400 |
| 5/8 | 150 | 170 | 5/8 | 8,100 | 6,400 |
| 5/9 | 80 | 60 | 5/9 | 7,200 | 5,900 |
| 5/10 | 110 | 60 | 5/10 | 7,400 | 5,700 |
| 5/11 | 70 | 60 | 5/11 | 6,200 | 5,500 |
| 5/12 | 80 | 50 | 5/12 | 6,700 | 5,900 |
| 5/13 | 60 | 40 | 5/13 | 7,500 | 6,600 |
| 5/14 | 70 | 50 | 5/14 | 8,200 | 6,100 |
| 5/15 | 120 | 150 | 5/15 | 7,900 | 5,700 |
| 5/16 | 210 | 200 | 5/16 | 7,900 | 6,500 |
| 5/17 | 410 | 390 | 5/17 | 8,300 | 6,300 |
| 5/18 | 340 | 300 | 5/18 | 7,600 | 6,200 |
| 5/19 | 260 | 310 | 5/19 | 7,900 | 5,900 |
| 5/20 | 180 | 150 | 5/20 | 8,200 | 6,800 |
| 5/21 | 70 | 60 | 5/21 | 8,500 | 6,100 |
| 5/22 | 60 | 50 | 5/22 | 7,800 | 6,900 |
| 5/23 | 50 | 60 | 5/23 | 8,500 | 7,200 |
| 5/24 | 50 | 40 | 5/24 | 8,800 | 6,800 |
| 5/25 | 50 | 40 | 5/25 | 8,300 | 6,900 |
| 5/26 | 50 | 50 | 5/26 | 7,900 | 6,300 |
| 5/27 | 60 | 50 | 5/27 | 8,900 | 5,900 |
| 5/28 | 50 | 80 | 5/28 | 8,800 | 9,400 |
| 5/29 | 100 | 90 | 5/29 | 8,300 | 7,900 |
| 5/30 | 60 | 60 | 5/30 | 8,100 | 7,200 |
| 5/31 | 50 | 50 | 5/31 | 8,100 | 6,500 |

(x)

| Mollerhatid (C) (Khe) (Mollari) | | | Mollerhatid (C) (Khe) (Mollari) | | |
|---------------------------------|------|-----|---------------------------------|-------|-------|
| Date | High | Low | Date | High | Low |
| 6/1 | 60 | 50 | 6/1 | 7,800 | 7,100 |
| 6/2 | 50 | 60 | 6/2 | 7,900 | 7,100 |
| 6/3 | 50 | 40 | 6/3 | 7,800 | 6,900 |
| 6/4 | 60 | 50 | 6/4 | 8,100 | 7,300 |
| 6/5 | 50 | 50 | 6/5 | 7,900 | 7,100 |
| 6/6 | 50 | 40 | 6/6 | 8,200 | 7,300 |
| 6/7 | 50 | 60 | 6/7 | 7,900 | 7,300 |
| 6/8 | 50 | 50 | 6/8 | 6,700 | 7,800 |
| 6/9 | 60 | 50 | 6/9 | 6,800 | 5,900 |
| 6/10 | 50 | 60 | 6/10 | 6,200 | 5,700 |
| 6/11 | 50 | 50 | 6/11 | 7,300 | 5,900 |
| 6/12 | 60 | 50 | 6/12 | 6,900 | 6,100 |
| 6/13 | 50 | 50 | 6/13 | 6,300 | 5,700 |
| 6/14 | 50 | 50 | 6/14 | 6,300 | 5,600 |
| 6/15 | 50 | 50 | 6/15 | 6,100 | 4,900 |
| 6/16 | 50 | 50 | 6/16 | 5,700 | 4,900 |
| 6/17 | 50 | 50 | 6/17 | 3,100 | 1,900 |
| 6/18 | 50 | 50 | 6/18 | 3,700 | 3,100 |
| 6/19 | 50 | 50 | 6/19 | 4,100 | 2,900 |
| 6/20 | 50 | 50 | 6/20 | 4,300 | 2,300 |
| 6/21 | 50 | 50 | 6/21 | 4,200 | 2,700 |
| 6/22 | 50 | 50 | 6/22 | 2,700 | 850 |
| 6/23 | 50 | 50 | 6/23 | 1,150 | 750 |
| 6/24 | 60 | 50 | 6/24 | 800 | 650 |
| 6/25 | 50 | 50 | 6/25 | 600 | 450 |
| 6/26 | 50 | 50 | 6/26 | 550 | 450 |
| 6/27 | 50 | 50 | 6/27 | 450 | 300 |
| 6/28 | 50 | 50 | 6/28 | 250 | 200 |
| 6/29 | 50 | 50 | 6/29 | 400 | 200 |
| 6/30 | 50 | 50 | 6/30 | 250 | 250 |
| Average | 52 | 50 | Average | 4,682 | 3,967 |
| Min. | 50 | 40 | Min. | 250 | 200 |
| Max. | 60 | 60 | Max. | 8,200 | 7,800 |

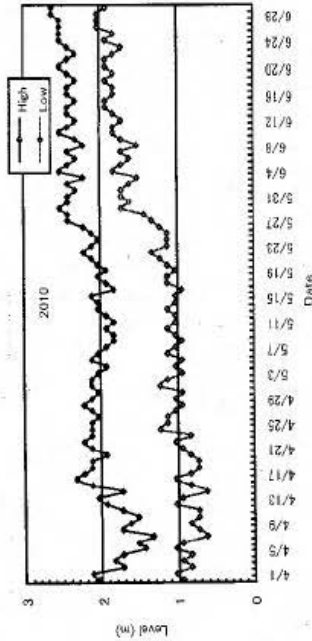
MD. ABDULLAH, PENQ
Managing Director
Khulna WASA

Engr. S. M. Jaglul Kaiser
Project Director
&
Deputy Managing Director (Engrg.)
Khulna WASA, Khulna

Source: Field investigation

Appendix-4.2

(xii) Variation of Water Level at Modhumoti River, 2010



(xii)

(xi) Water level at Modhumoti River, 2010

| Water level of Modhumoti (April) | | | | Water level of Modhumoti (May) | | | | Water level of Modhumoti (June) | | | | | | | | | | | | | | |
|----------------------------------|--------------------|-----|----------------------|--------------------------------|------------|--------------------|-----|---------------------------------|-------|------------|--------------------|-----|----------------------|-----|---|---|---|---------|---|---|---|---|
| Month/Date | Gauge Reading High | Low | Water Level (m) High | Low | Month/Date | Gauge Reading High | Low | Water Level (m) High | Low | Month/Date | Gauge Reading High | Low | Water Level (m) High | Low | | | | | | | | |
| 4/1 | 3.7 | 2.6 | 3.7 | 2.6 | 5/1 | 3.7 | 2.6 | 3.700 | 2.800 | 6/1 | 4.1 | 3.4 | 4.1 | 3.4 | | | | | | | | |
| 4/2 | 3.8 | 2.7 | 3.8 | 2.7 | 5/2 | 3.8 | 2.8 | 3.800 | 2.800 | 6/2 | 4.0 | 3.4 | 4.0 | 3.4 | | | | | | | | |
| 4/3 | 3.4 | 2.5 | 3.4 | 2.5 | 5/3 | 3.8 | 2.8 | 3.800 | 2.800 | 6/3 | 4.1 | 3.3 | 4.1 | 3.3 | | | | | | | | |
| 4/4 | 3.5 | 2.6 | 3.5 | 2.6 | 5/4 | 3.7 | 2.6 | 3.700 | 2.800 | 6/4 | 3.9 | 3.2 | 3.9 | 3.2 | | | | | | | | |
| 4/5 | 3.4 | 2.5 | 3.4 | 2.5 | 5/5 | 3.6 | 2.7 | 3.600 | 2.700 | 6/5 | 4.2 | 3.4 | 4.2 | 3.5 | | | | | | | | |
| 4/6 | 3.1 | 2.2 | 3.1 | 2.2 | 5/6 | 3.8 | 2.6 | 3.800 | 2.600 | 6/6 | 4.1 | 3.4 | 4.1 | 3.4 | | | | | | | | |
| 4/7 | 3.2 | 2.6 | 3.2 | 2.6 | 5/7 | 3.7 | 2.8 | 3.700 | 2.800 | 6/7 | 4.0 | 3.3 | 4.0 | 3.3 | | | | | | | | |
| 4/8 | 3.0 | 2.3 | 3.0 | 2.3 | 5/8 | 3.5 | 2.7 | 3.500 | 2.700 | 6/8 | 4.1 | 3.4 | 4.1 | 3.4 | | | | | | | | |
| 4/9 | 3.4 | 2.4 | 3.4 | 2.4 | 5/9 | 3.5 | 2.6 | 3.5 | 2.6 | 6/9 | 3.9 | 3.2 | 3.9 | 3.2 | | | | | | | | |
| 4/10 | 3.3 | 2.5 | 3.3 | 2.5 | 5/10 | 3.5 | 2.7 | 3.5 | 2.7 | 6/10 | 4.0 | 3.4 | 4.0 | 3.4 | | | | | | | | |
| 4/11 | 3.2 | 2.4 | 3.2 | 2.4 | 5/11 | 3.6 | 2.8 | 3.6 | 2.8 | 6/11 | 4.2 | 3.5 | 4.2 | 3.5 | | | | | | | | |
| 4/12 | 3.4 | 2.4 | 3.4 | 2.4 | 5/12 | 3.5 | 2.7 | 3.5 | 2.7 | 6/12 | 4.2 | 3.5 | 4.2 | 3.5 | | | | | | | | |
| 4/13 | 3.6 | 2.7 | 3.6 | 2.7 | 5/13 | 3.6 | 2.7 | 3.6 | 2.7 | 6/13 | 4.0 | 3.4 | 4.0 | 3.4 | | | | | | | | |
| 4/14 | 3.7 | 2.8 | 3.7 | 2.8 | 5/14 | 3.7 | 2.8 | 3.7 | 2.8 | 6/14 | 4.2 | 3.5 | 4.2 | 3.5 | | | | | | | | |
| 4/15 | 3.4 | 2.3 | 3.4 | 2.3 | 5/15 | 3.7 | 2.7 | 3.7 | 2.7 | 6/15 | 4.1 | 3.6 | 4.1 | 3.6 | | | | | | | | |
| 4/16 | 3.8 | 2.5 | 3.8 | 2.5 | 5/16 | 3.8 | 2.7 | 3.8 | 2.7 | 6/16 | 4.0 | 3.6 | 4.0 | 3.6 | | | | | | | | |
| 4/17 | 4.0 | 2.7 | 4.0 | 2.7 | 5/17 | 3.5 | 2.6 | 3.5 | 2.6 | 6/17 | 4.1 | 3.5 | 4.1 | 3.5 | | | | | | | | |
| 4/18 | 3.9 | 2.5 | 3.9 | 2.5 | 5/18 | 3.6 | 2.8 | 3.6 | 2.8 | 6/18 | 4.1 | 3.5 | 4.1 | 3.5 | | | | | | | | |
| 4/19 | 3.8 | 2.4 | 3.8 | 2.4 | 5/19 | 3.7 | 2.8 | 3.7 | 2.8 | 6/19 | 4.0 | 3.6 | 4.0 | 3.6 | | | | | | | | |
| 4/20 | 3.8 | 2.4 | 3.8 | 2.4 | 5/20 | 3.6 | 2.7 | 3.6 | 2.7 | 6/20 | 4.1 | 3.5 | 4.1 | 3.5 | | | | | | | | |
| 4/21 | 3.6 | 2.5 | 3.6 | 2.5 | 5/21 | 3.7 | 2.8 | 3.7 | 2.8 | 6/21 | 4.2 | 3.6 | 4.2 | 3.6 | | | | | | | | |
| 4/22 | 3.8 | 2.6 | 3.8 | 2.6 | 5/22 | 3.8 | 2.9 | 3.8 | 2.9 | 6/22 | 4.1 | 3.6 | 4.1 | 3.6 | | | | | | | | |
| 4/23 | 3.9 | 2.7 | 3.9 | 2.7 | 5/23 | 3.5 | 3.0 | 3.5 | 3.0 | 6/23 | 4.0 | 3.5 | 4.0 | 3.5 | | | | | | | | |
| 4/24 | 3.8 | 2.5 | 3.8 | 2.5 | 5/24 | 3.8 | 2.8 | 3.8 | 2.8 | 6/24 | 4.1 | 3.4 | 4.1 | 3.4 | | | | | | | | |
| 4/25 | 3.8 | 2.9 | 3.8 | 2.9 | 5/25 | 3.7 | 2.8 | 3.7 | 2.8 | 6/25 | 4.2 | 3.6 | 4.2 | 3.6 | | | | | | | | |
| 4/26 | 3.8 | 2.8 | 3.8 | 2.8 | 5/26 | 3.8 | 2.8 | 3.8 | 2.8 | 6/26 | 4.2 | 3.5 | 4.2 | 3.5 | | | | | | | | |
| 4/27 | 3.7 | 2.9 | 3.7 | 2.8 | 5/27 | 3.9 | 2.9 | 3.9 | 2.9 | 6/27 | 4.2 | 3.7 | 4.2 | 3.7 | | | | | | | | |
| 4/28 | 3.8 | 2.7 | 3.8 | 2.7 | 5/28 | 4.1 | 3.0 | 4.1 | 3.0 | 6/28 | 4.2 | 3.7 | 4.2 | 3.7 | | | | | | | | |
| 4/29 | 3.9 | 2.4 | 3.9 | 2.5 | 5/29 | 4.1 | 3.1 | 4.1 | 3.1 | 6/29 | 4.3 | 3.7 | 4.3 | 3.7 | | | | | | | | |
| 4/30 | 3.8 | 2.7 | 3.8 | 2.7 | 5/30 | 4.2 | 3.4 | 4.2 | 3.4 | 6/30 | 4.3 | 3.0 | 4.3 | 3.6 | | | | | | | | |
| Average | | | | | | | | | | | | | | 4 | 3 | 4 | 3 | Average | 4 | 3 | 4 | 3 |
| Min. | | | | | | | | | | | | | | 3 | 2 | 3 | 2 | Min. | 3 | 2 | 3 | 2 |
| Max. | | | | | | | | | | | | | | 4 | 3 | 4 | 3 | Max. | 4 | 3 | 4 | 3 |

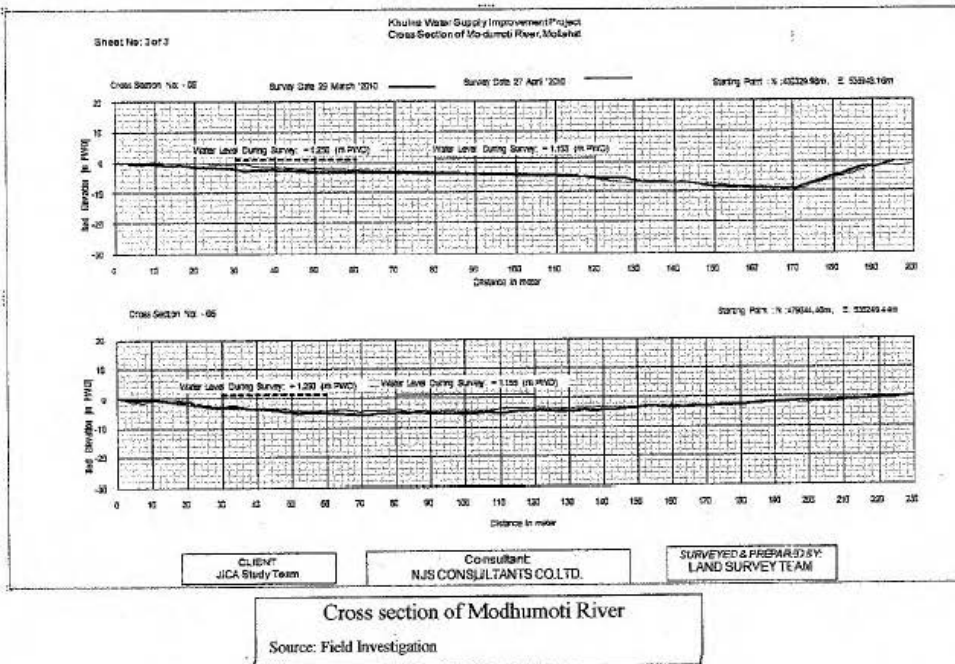
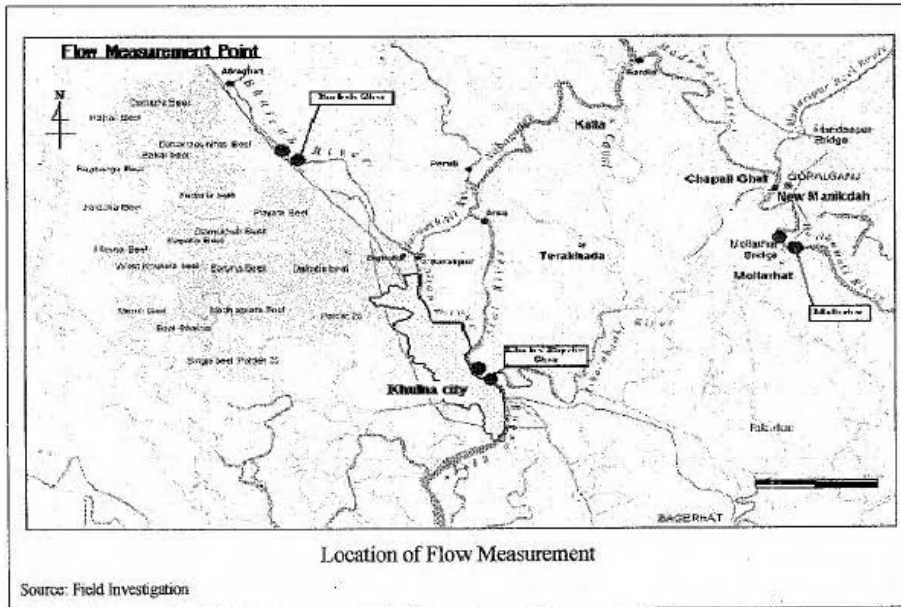
Source: Field Investigation

Md. Abdur Rahman
 Project Director
 Khulna WASA

Engr. S. M. Jagu
 Project Director
 Deputy Managing Director
 Khulna WASA, Khulna

Appendix-4.2

(xiii) River Waetr Flow



Water discharge of Phase-I Rupsha, Madhumati & Bhairab River (31st March 2010 to 2nd April 2010)

S.M. Jagdul Hossain
 Project Director
 & Director of
 Khulna

M.D. ABDULLAH Peng
 Managing Director
 Khulna WASA

Appendix-4.2

| | Cross Section | Mollarhat | | Phultala | | Rupsha | | |
|-------------------------------|---------------|-----------|---------|----------|---------|--------|---------|-------|
| | | Mollarhat | Up 1 km | Phultala | Up 1 km | Rupsha | Up 1 km | |
| Velocity (m/s) | Ebbing | CS-1 | 0.374 | 0.474 | 0.292 | 0.277 | 0.991 | 0.932 |
| | | CS-2 | 0.374 | 0.474 | 0.292 | 0.277 | 0.991 | 0.932 |
| | Flooding | CS-1 | 0.535 | 0.434 | 0.198 | 0.194 | 1.298 | 1.203 |
| | | CS-2 | 0.535 | 0.434 | 0.198 | 0.194 | 1.298 | 1.203 |
| Discharge (m ³ /s) | Ebbing | CS-1 | 299 | 379 | 329 | 312 | 2,688 | 2,528 |
| | | CS-2 | 327 | 415 | 300 | 285 | 2,802 | 2,635 |
| | Flooding | CS-1 | 428 | 347 | 223 | 219 | 3,521 | 3,263 |
| | | CS-2 | 468 | 380 | 204 | 199 | 3,670 | 3,401 |

Source: Field investigation

Average water velocity; Rupsha & Madhumati River (29th April 2010 to 01st May 2010)

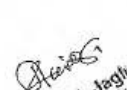
| Sl. No. | Name of Station | Name of River | Current Direction | High Tide/ Low Tide | Time | Date | Avg. Water velocity (m/s) | Remarks |
|---------|-----------------------------------|---------------|-------------------|---------------------|------|----------|---------------------------|---------|
| 1 | Khulna Khea Ghat | Rupsha Pasur | Ebbing | Low Tide | 1045 | 30.04.10 | 0.651 | (-) ve |
| 2 | 1 km U/S from Khulna Khea Ghat | Do | Do | Do | 1115 | Do | 0.739 | (-) ve |
| 3 | Khulna Khea Ghat | Do | Flooding | High Tide | 1415 | Do | 1.244 | (+) ve |
| 4 | 1 km U/S from Khulna Khea Ghat | Do | Do | Do | 1445 | Do | 1.139 | (+) ve |
| 5 | Mollarhat Khea Ghat | Madhumati | Ebbing | Low Tide | 1245 | 01.05.10 | 0.448 | (-) ve |
| 6 | 1 km U/S from Mollarhat Khea Ghat | Do | Do | Do | 1315 | Do | 0.330 | (-) ve |
| 7 | Mollarhat Khea Ghat | Do | Flooding | High Tide | 1645 | Do | 0.375 | (+) ve |
| 8 | 1 km U/S from Mollarhat Khea Ghat | Do | Do | Do | 1715 | Do | 0.415 | (+) ve |

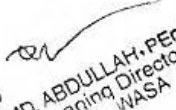
Source: Field Investigation

Water discharge of Rupsha & Madhumati River (29th April 2010 to 01st May 2010)

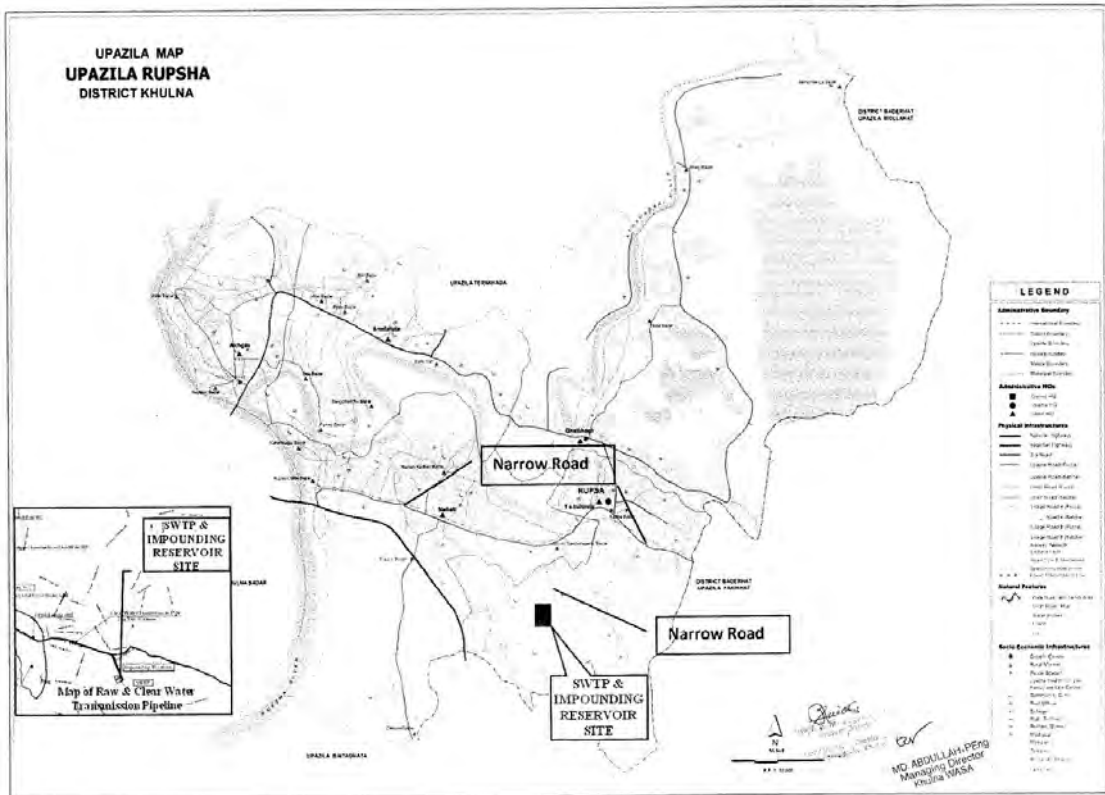
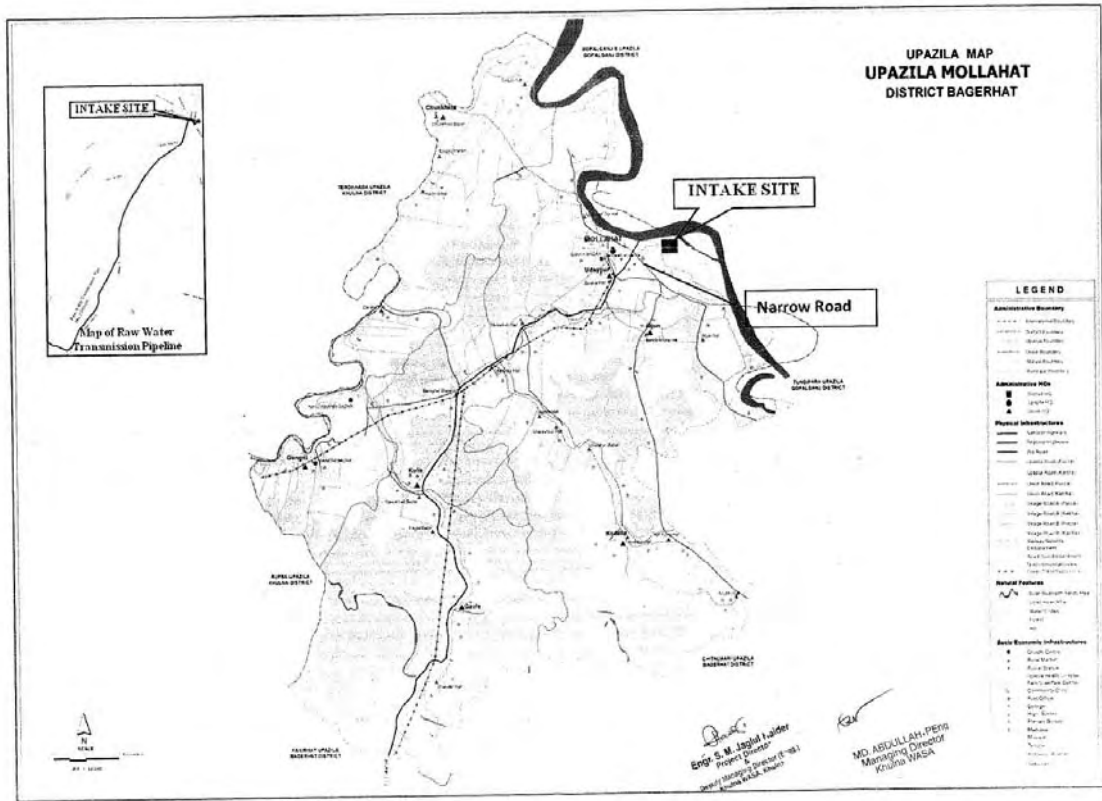
| | Cross Section | Mollarhat | | Rupsha | | |
|-------------------------------|---------------|-----------|---------|--------|---------|---------|
| | | Mollarhat | Up 1 km | Rupsha | Up 1 km | |
| Velocity (m/s) | Ebbing | CS-1 | 0.448 | 0.330 | 0.651 | 0.739 |
| | | CS-2 | 0.448 | 0.330 | 0.651 | 0.739 |
| | Flooding | CS-1 | 0.375 | 0.415 | 1.244 | 1.139 |
| | | CS-2 | 0.375 | 0.415 | 1.244 | 1.139 |
| Discharge (m ³ /s) | Ebbing | CS-1 | 464.55 | 342.19 | 1786.85 | 2028.39 |
| | | CS-2 | 414.47 | 305.30 | 1993.75 | 2263.26 |
| | Flooding | CS-1 | 388.85 | 430.33 | 3414.50 | 3126.30 |
| | | CS-2 | 346.94 | 383.94 | 3809.88 | 3488.31 |

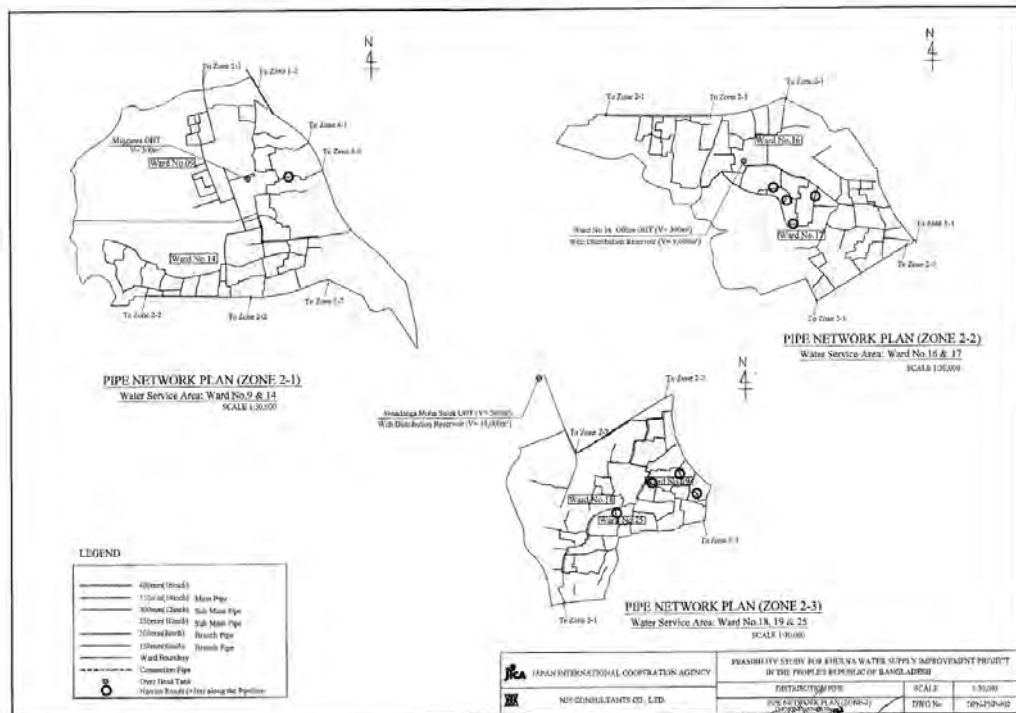
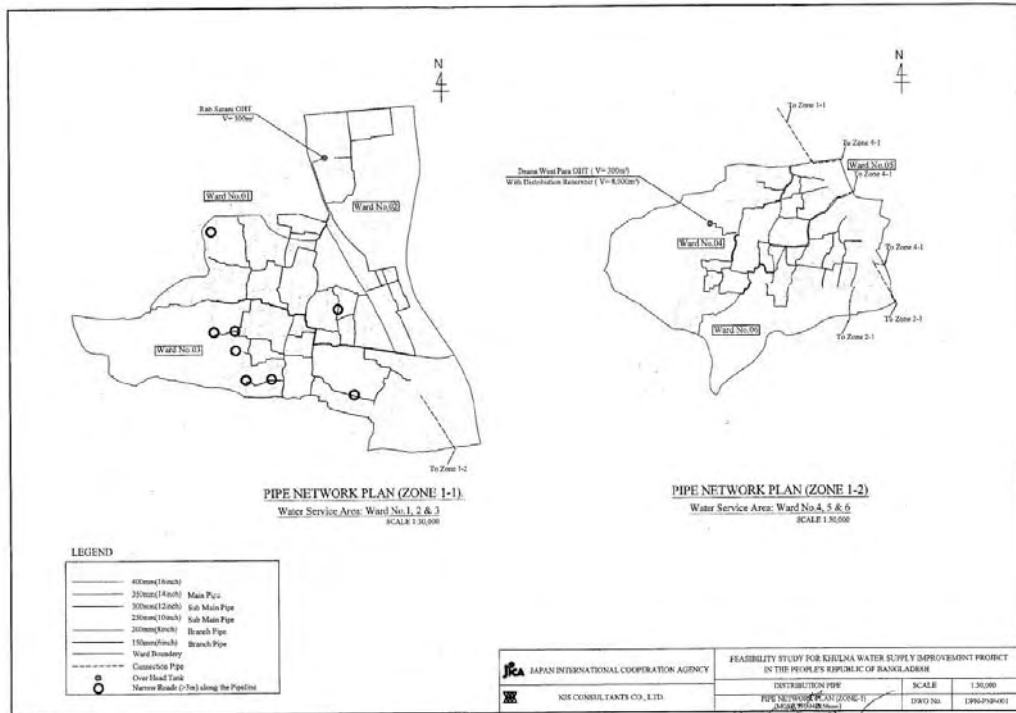
Source: Field Investigation

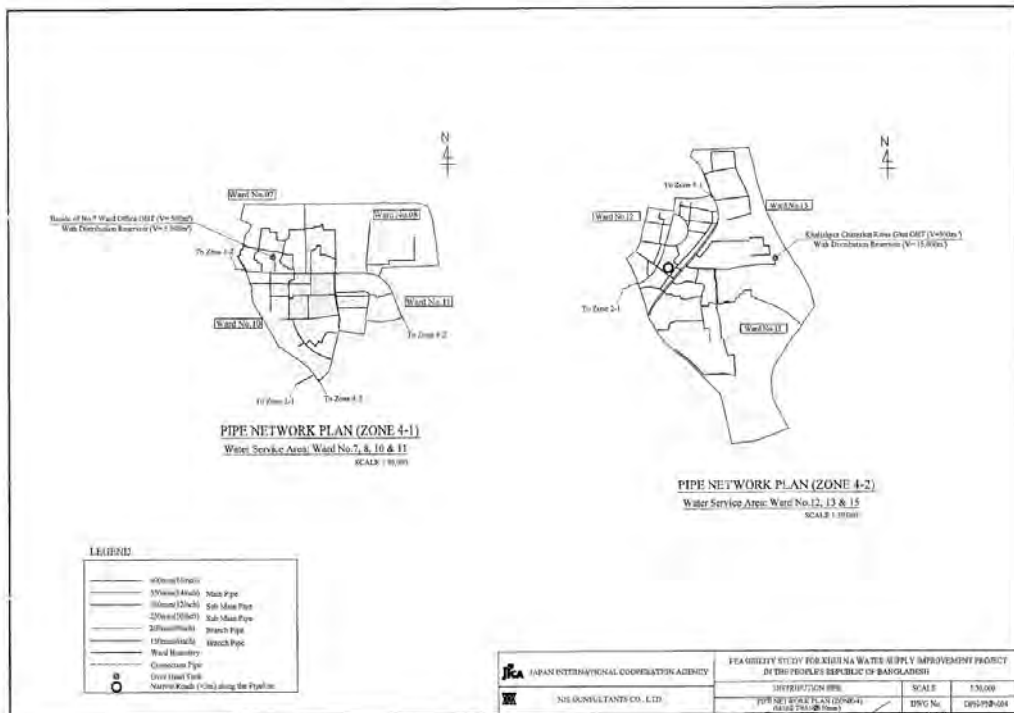
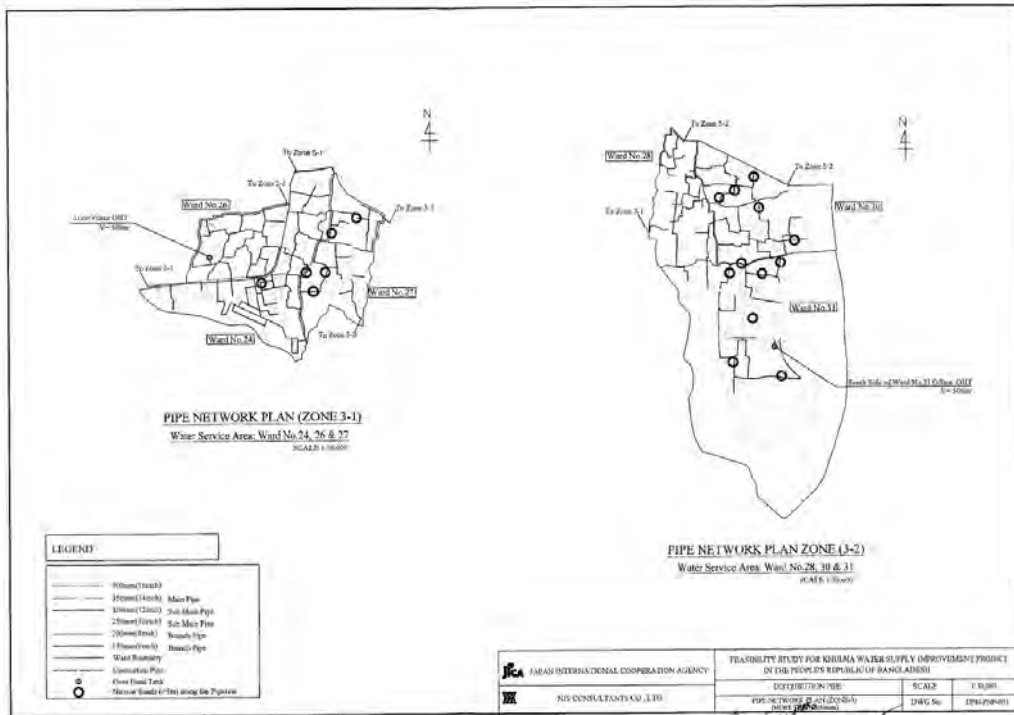

Md. Jaglal Haider
 Project Director
 Deputy Managing Director (Engg)
 Khulna WASA, Khulna

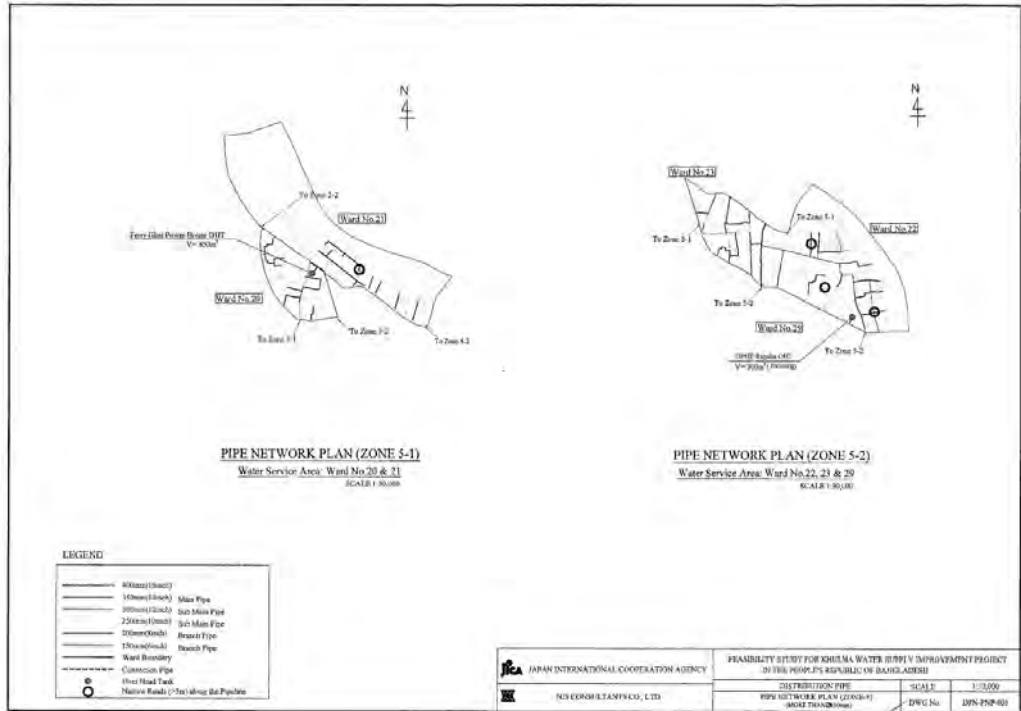

MD. ABDULLAH PENG
 Managing Director
 WASA

**Part-3 Upazila map of Mollarhat & Rupsha
and Khulna City corporation area**









ANNEX-05

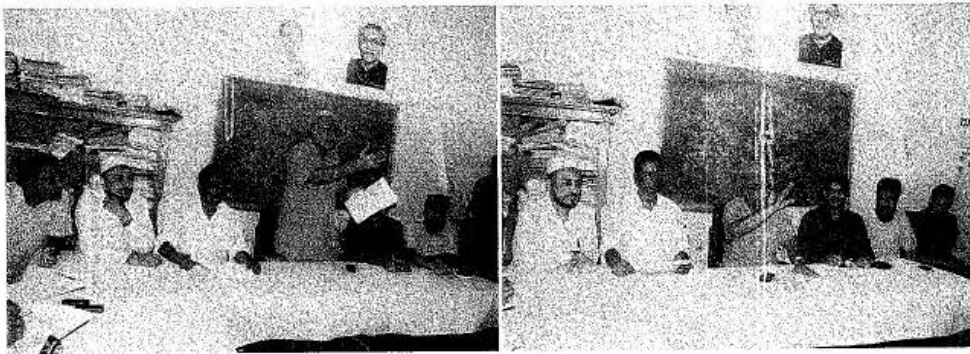
- PART-1 PHOTOGRAPHS OF PUBLIC CONSULTATION &
STAKEHOLDERS MEETING**
- PART-2 MEETING MINUTES AND PARTICIPANTS LIST**
- PART-3 QUESTIONNAIRES**

**Part-1 Photographs of public consultation &
stakeholders meeting**

PHOTOGRAPHS **ANNEX 5**



Pictures 1: Stake Holders meeting at Samonto Sena (12.08.10)



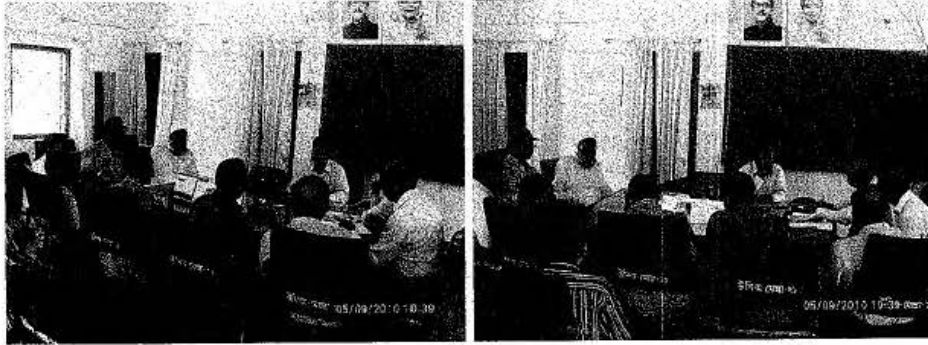
Pictures 2: Stake Holders meeting at Samonto Sena (21.08.10)

Photographs

S. M. Jagjit Halder
Engr. S. M. Jagjit Halder
Project Director
&
Deputy Managing Director (Engg.)
Khulna W.S.A. Khulna

MD. ABDULLAH PENG
MD. ABDULLAH PENG
Managing Director
Khulna W.S.A.
Page-i

Environmental Impact Assessment for Khulna
Water Supply Improvement Project



Pictures 2: Stake Holders meeting at Mollahat UNO office (05.09.10)



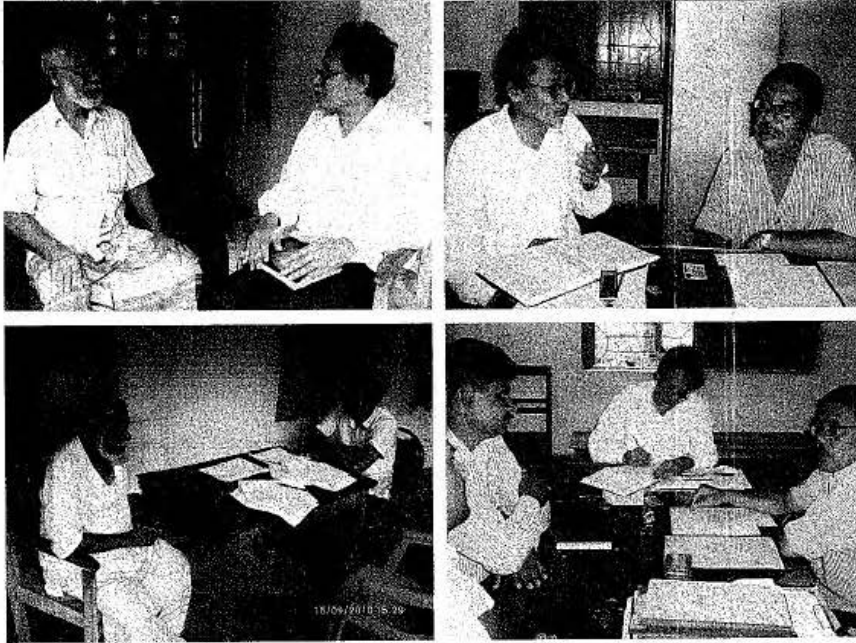
Pictures 3: Public Consultation at Samonto Sena (7.10.10)

Photographs

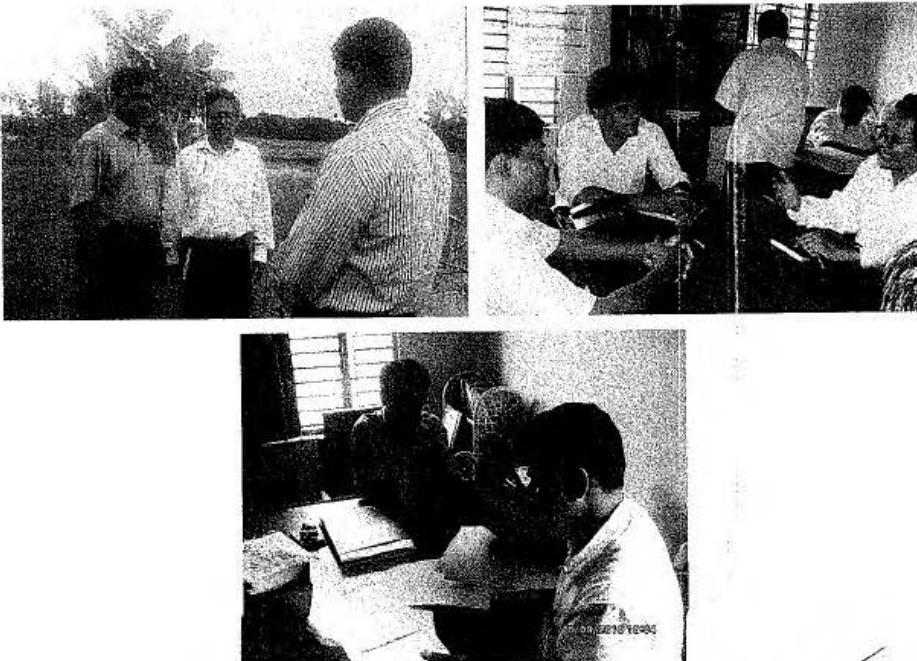
[Signature]
Engr. S. M. Habibul Kabir
Project Director
Deputy Managing Director (Engg)
Khulna WSS, Khulna

[Signature]
MD ABDULLAH PENG
Managing Director
Khulna WSS

Environmental Impact Assessment for Khulna
Water Supply Improvement Project



Pictures 4: Public Consultation at Mollahat (9.10.10)



Pictures 5: Public Consultation at Mollahat (9.10.10)

Photographs

Engf. S. M. Jagul Haider
Project Director
&
City Managing Director (Engg.)
for WASA, Khulna

MD. ABDULLAH, PENG
Managing Director
Khulna WASA
Page-iii

Part-2 meeting minutes and participants list

MINUTES OF STAKEHOLDERS'S MEETING

DATE: 12.08.2010

A Stakeholders meeting with land owners, different stakeholders were organized by KWASA was held in 12th August, 2010. First, all of the participants introduce each other. The inaugural session was started by the meeting's chairperson Honorable City Mayor Talukder Abdul Khalek. He spoke about the project of Khulna Water Supply Improvement. He said, 'since from many years ago we were trying to establish KWASA for proper water supply distribution in this region. Because the people are suffering by different diseases and health hazards due to lack of pure drinking water supply. Generally, most of the citizens are collecting drinking water by deep tube well. As a result the underground water level has been decreasing day by day. The existing water supply system is not sufficient to support the total need and future demand. In this circumstance, GOB & KWASA initiate for Khulna Water Supply Improvement Project with the funding of JICA & ADB. By this project a long term development plan will established which can meet the future demand.'

After Mayor's speech, Honorable Managing Director of KWASA Md. Abdullah started to explain about the project information to the stakeholders. He said, 'we are going to start a new project named as-Khulna Water Supply Improvement Project for proper water supply distribution in the Khulna city. For this purpose, JICA study team has been conducting a feasibility study from the October, 2009. The experts and consultants are examined the total water supply process and they are developing a plan for new project. They already chose the suitable places for project area. We will collect the surface water from the Madhumati River at Mollarhat area. There will be a surface water treatment plant and an impounding reservoir at Samanta Sena to purify the raw water which will transmit from the intake point Mollarhat. This clear water will distribute in the city through clear water transmission pipe to five distribution reservoirs and eleven over head tanks. From the over head tanks, water will distribute to the houses by service and distribution pipe. It is very large project as it cannot be implement by the funding of GOB alone. It is very good news for us that JICA & ADB has been agreed to provide 150,000 million Taka as loan.'

Ali Akbar Shaikh, Chaiman of Rupsha Upazila, had introduced the chairman of Padma beel Water Rights Protection Association, Khan Bozluur Rahman. Khan Bozluur Rahman told about some problems of land acquisition in Samanta Sena Area. He explained, 'we are very happy to know about the new project of KWASA cause, we also want the pure/clean drinking water supply in this region. The Padmabeel (Samanta Sena) area's soil is very fertile for cultivation. In the whole year different kinds of crops are cultivating in the whole area. The people of that area are mainly depending on the crop cultivation of the land. We heard that there will be two projects in that area, i.e. 1. KWASA's Project & 2. Women Cadet College (which is initiated by City Mayor). So, if these two projects will implement in that area, we will lose a lots of cultivable land by the land acquisition procedure. For this reason, we are proposing another land for KWASA's project. There is a huge land in Atharo Baki area of Alaipur Mouza.


Engr. S. M. Jaglul Haider
Project Director
&
Deputy Managing Director (Engg.)
Khulna WASA, Khulna


Md. ABDULLAH, Peng
Managing Director
Khulna WASA

These lands were created through the river erosion process of Madhumati River. These lands are known as *Char* Land (Govt. Land). If these land can be use of KWASA's project then government will not to pay any compensation for land and we will not lose any cultivable lands of Samanta Sena area. So, please consider our condition.'


Additional District Commissioner (Revenue) of Bagerhat had tried to convince the land owners. He explained them, 'JICA study team selects the lands by the different criteria of suitability. The selected lands are not using for crop cultivation mainly. These lands are using mainly for shrimp cultivation. Maximum portion of required 26 hector land is owned by Abul Hossain. So, many of land owners will not victim.'

Additional District Commissioner (Land Acquisition) of Khulna said, 'this project is of 150,000 million Taka budget. There are no obstacles to acquisition of land for government. So we have to take decision earlier without any kind of delay. This project will bring new job and opportunity for the development of the Samonto Sena area. We will consider honestly maximum compensation to the victims.'

City Mayor was said them, 'we have to think about our nation & nation's development. Sometimes small things have to sacrifice for development. The selected places are the most suitable places for this project. We are giving you the word that you will get proper compensation not only the land owners, also the employees of the lands. I will visit your proposed area in 21st August, 2010. If this place will suitable then we change the selection otherwise not. So right now KWASA consultant have some task at the Samonto Sena area, I think the people of that area will coordinate with them'

Managing Director Md. Abdullah also agreed with the Mayor's commitment. In this meeting, Chairman, UNO & Vice-chairman of Rupsha Upazila, Bio-chemist of DOE, Additional District Commissioner (Revenue) of Bagerhat & Additional District Commissioner (Land Acquisition) Khulna, Engineer of KDA, Chairman of Noihati Union Parishad, Deputy Managing Directors, Engineer of KWASA, Team Leader Tadao Funamoto, Project Co-ordination Asif Masud & Planning & Development Officer Mitun Talapatra of JICA Study Team, land owners etc. were present.


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Project Director
&
Deputy Managing Director (E-99)
Khulna WASA, Khulna


MD. ABDULLAH, PENG
Managing Director
Khulna WASA.

MINUTES OF MEETING AT SAMANTO SENA

Saturday, 21st August, 2010.

The Honorable City Mayor Talukder Abdul Khalek went to the Samanta Sena area with Managing Director of KWASA, Deputy Managing Director of KWASA, Executive Engineer of KWASA, Upazila Chairman of Rupasha, Additional District Commissioner (Land Acquisition Division), Project Coordinator of JICA Study Team, Planning & Development Officer of JICA Study Team & Surveyor of JICA Study Team.

After arriving of City Mayor, local people arranged a meeting in the nearest school with the help of local Chairman Paris. In this meeting the land owners of Samanta Sena, local people, Chairman & other members of Land Owners Association were present.

At the starting of meeting, local Chairman Paris announced the name of land owners of the selected land for KWASA's project. After that City Mayor gave a short speech. He said, 'in the last meeting at KWASA, there was a proposal of alternative land for the KWASA project. We are here to discuss with you to solve the problem/complexity about land acquisition. There is some confusion the project activities. We will acquire only 64 acre land. Maximum portion of the land is owned by Md. Abul Hossain Shaikh. We sorted out that only 28 owners from the record book will lose their land. So, don't think that large amount people will be affected by the land acquisition procedure. Even we will consider the cost for trees & others also. You will get 1.5 time better price than market price for your land. So, please tell us about your problems. It is better only listed owners will speak to us. Otherwise it will make a crowd.'

Land owners started to say about their problems. They mainly mentioned their problems as-


- These lands are their main income source;
- There are many complexities about owners' information. As a result, the original land owner may not get the compensation;
- They don't know that which lands will be acquired or not. So, everyone is worried;
- There are many rumors about land acquisition which are making them confused. Such as-If a small portion of a land lies on the project area, then will they get compensation for the whole land or for that small portion.

During the discussion, a little bit of bargaining had occurred among the land owners & City Mayor. Local people proposed to mark the selected lands by red flag or red ribbon. It will help to remove all confusions about the process.

Additional District Commissioner (Land Acquisition) of Khulna gave assurance to the land owners that they will get the proper compensation & minimum loss of wealth will be considered for this project.

At the ending session, the City Mayor said, 'some lands must be needed for each development project. In some other project a lot of land has to be acquired by government in Bangladesh. But in this project the required land amount is not too much. Another thing, 6 more alternative options were selected by the JICA Study Team. This area is the most suitable option for this project. So, we have no other option for alternate. Otherwise the project will not be sustainable.' He requested the people to help the government by their contribution.


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&
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MD. ABDULLAH, PENG
Managing Director
Khulna WASA.

Part-3 Questionnaires

Questionnaire Relating to Environmental, Socio-Economic,
Land Acquisition and Resettlement Survey
(Additional Data Collection with Respect to
Optionwise Impacts/Losses)

Part-I: Socio-Economic Condition Related Questionnaires

Survey Questionnaires on "Environmental Socio-Economic Condition
for Rehabilitation of Khulna Water Supply Improvement project

Questionnaire No-----

Socio-Economic Related Questionnaires

A. Optionwise location (Please give tick)

- (a) Option-1, (b) Option-2, (c) Option-3, (d) Option-5, (e) Option-6, (f) Option-6
(g) Option-7, (h) Option-8

Name of Affected Mouza
and Plot No.:

B. Type of the components (Please give tick)

- (a) Water Intake Point, (b) Water transmission line, (c) Impounding reservoir, (d) Water treatment plant, (e) Water
Distribution Reservoir, (f) overhead Water Tank

C. Type of Respondents (Please give tick) (a) Living in the acquired land, (b) Absentee Land owner/Living outside
the acquired land

D. Type of affected (please give tick) (a) Only homestead loser, (b) Agriculture land loser, (c) Commercial land loser, (d)
only tree loser, (e) only structure loser, (f) Loss of waterbody other than shrimp gher, (g) Land, tree and structure
loser, (h) Loss of shrimp gher, (i) squatter

E. Type of respondents regarding vulnerability (Please mark tick) (a) Women headed households, (b) Ethnic
minority, (c) Indigenous people, (d) Physically handicapped, (e) others

1.0 Identity of the Household:

1.1. Name of the Affected Person : _____

1.2. Father's Name of the Affected Person : _____

1.3. Name of the Respondent : _____

1.4. Relation of the respondent with the Affected Person: _____

1.5. Village : _____

1.6. Mouza : _____

1.7. Union : _____

1.8. Upazila : _____

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Engr. S. M. Javed Haider
Project Director
&
City Managing Director (Engr.)
Khu. WASA, Khulna

MD. ABDULLAH PING
MD. ABDULLAH PING
Managing Director
Khu. WASA.

1.9. District : _____

1.10. Religion (please give tick): Muslim 1 Hindu 2 Christian 3 Buddhists 4 Others 5

SOCIO ECONOMIC ISSUES:

2.0. Household Demographic Information

2.1. Total Family Members: Male: _____ Female: _____ Total: _____

2.2 Family Information (Starting from Family Head), please use code

| Sl. No. | Relation with Household Head | Marital Status | Age | Sex | Education | Main Occupation | Secondary Occupation | Work Place |
|---------|------------------------------|----------------|-----|-----|-----------|-----------------|----------------------|------------|
| 1. | | | | | | | | |
| 2. | | | | | | | | |
| 3. | | | | | | | | |
| 4. | | | | | | | | |
| 5. | | | | | | | | |
| 6. | | | | | | | | |
| 7. | | | | | | | | |
| 8. | | | | | | | | |
| 9. | | | | | | | | |
| 10. | | | | | | | | |

Code

| | | |
|---|--|---|
| <p>Relation: Household Head = 1 Husband/Wife = 2 Father/Mother = 3 Brother/Sister = 5 Daughter in Law/Son in Law = 6 Father in Law/ Mother in Law = 7 Maid servant = 8 Grand son/Grand daughter = 8 Other = 10</p> | <p>Occupation: Farmer = 1 Fisherman = 2 Agriculture Labor = 3 Non Agriculture Labor = 4 Service = 5 Small Business = 7 Household Work = 8 Student = 9 Child = 9 Retired/Handicapped = 11 Unemployed = 12 Service in Abroad = 13 Others = 14</p> | <p>Education: Illiterate = 99 Only Read = 91 Read and write = 92 Child (below four yrs) = 1 Primary=(class-1 to class 5) = 2 Secondary (class-6 to class 10) = 3 SSC/ Equivalent = 4 HSC/Equivalent = 6 Degree = 7 Masters, Honours = 8 Others = 9</p> |
|---|--|---|

| |
|--|
| <p>Main Place of Work: Village = 1 Union = 2 Upazila = 3 District = 4 Other district = 5 Abroad = 6</p> |
|--|

| |
|--|
| <p>Sex: Male = 1 Female = 2</p> |
|--|

| |
|---|
| <p>Marital Status: Married = 1 Unmarried = 2 Widow = 3 Widower = 4 Divorced = 5 Separated = 6 Others = 7</p> |
|---|

S. M. Jaglal Haider
Engr. S. M. Jaglal Haider
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&
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M. Abdullah Peng
M. ABDULLAH PENG
Managing Director
Khulna WASA

3.0 Asset of the households and physical facilities (please tick, where necessary)

3.1 Type of residents: 1 Own 2 Rented 3 Others

3.2 Types of Housing Structure: 1 Kutchha 2 Semi Pucca 3 Pucca 4 Others

3.3 Types of roof: 1 Straw/Chan/Golpata 2 Tiles 3 Tin 3 Pucca 4 Others

3.4 Total land of households (in decimals): Homestead: _____ Agriculture: _____
Water body: _____ Total: _____; Share in _____ Share Out _____ Mortgage in _____
Mortgage Out _____

3.5 Electricity: 1 Yes 2 No

3.6 Cooking Fuel: 1 Natural Pipe Gas 2 Cylinder Gas 3 Kerosene Stove
 4 Electricity 5 Wood/Leaf/ Agriculture Waste 6 Cow dung
 7 Others

3.7 Do you have Ownership of Poultry birds: hen-----swan-----pigeon-----?

3.8 How many livestock do you own: Cow-----, buffalo-----goat-----?

4.0 Water Supply and Sanitation (please Tick):

4.1 Water Source

| Type of use | Shallow Tube Well (STW) | Deep Tube Well (DTW) | Water Supply | Well | Pond | Canal/River Mention Name |
|---------------------|-------------------------|----------------------|--------------|------|------|--------------------------|
| Drinking | | | | | | |
| Cooking/Washing | | | | | | |
| Bathing | | | | | | |
| Cattle/Goat Washing | | | | | | |

4.2 Do you have own TW? Yes, working: _____ Out of order: _____ No TW: _____

4.3 How far is the nearest TW from your house if you have no TW? _____ ft.

4.4 Do your TW free of Arsenic? Yes 1 No 2 Not Examine 3

4.5 Type of latrine?
 1 Sanitary 2 Pit 3 Hanging 4 Open Place 5 Others

4.6 Hand washing after toilet use?
 1 Only water 2 Soap 3 Ash 4 Soil 5 Others

[Signature]
S.M. Javedul Karim
Project Director
&
Joint Managing Director (Engg.)
Khulna WASA, Khulna

[Signature]
VIC: ABDULLAH, PENG
Managing Director
Khulna WASA.

5.0 Health Information:

5.1 Main Disease suffered you and your Family in Last 2 Years

| Disease Code | Treatment |
|--------------|-----------|
| | |
| | |
| | |

Disease code: Diarrhoea-1, Typhoid-2, Dysentery/gastroenteric disease-3, Jaundice-4, Skin disease-5, Titanus-6, TB-7, Pneumonia-8, Asthma-9, others-10

Treatment Code: 1. Herbal, 2.Homoeopathy, 3.village doctor/Pharmacy, 4. MBBS+, 5. No treatment, 6. No ability, 7. Unknown, 8. others

5.2 Health Facilities in the area (Use Tick mark):

- 1 Government Hospital 3 Union Health complex 5 Private doctor
 2 Private clinic 4 NGO clinic 6 Good Pharmacy
 7 Village doctor 8 Others

6.0 Agriculture Related Information

6.1 Last year Cultivated

| Sl. No. | Name of Crop | Area of Land (Decimals) | Production (kg) | Price/ Kg | Sl. No. | Name of Crop | Area of Land (Decimals) | Production (kg) | Price/ Kg |
|---------|--------------|-------------------------|-----------------|-----------|---------|-------------------------|-------------------------|-----------------|-----------|
| 1 | R. Aman | | | | 11 | Chilli | | | |
| 2 | B. Aman | | | | 12 | Coriander Seed (Dhania) | | | |
| 3 | Aus | | | | 13 | Turmeric | | | |
| 4 | Upshi Boro | | | | 14 | Zinger | | | |
| 5 | Jute | | | | 15 | Sugarcane | | | |
| 6 | Potato | | | | 16 | Mustard | | | |
| 7 | Sweet Potato | | | | 17 | Nut | | | |
| 8 | Pulse | | | | 18 | Betal Nut | | | |
| 9 | Onion | | | | 19 | Others | | | |
| 10 | Garlic | | | | | | | | |

- 6.2 Type of Farmer (Use tick mark): 1 Cultivation own land 2 Own and other's land
 3 Only owner of land 4 Share Cropper

6.3 If the land is not cultivated by the owner, please mention name of the sharecropper and his address


6.4 Mention land use practice and conditions in your area e.g rent, mortgage and share cropping

6.5 Cropping pattern in the area: Single crop _____ % Double Crop _____ % Tripple Crop _____ %

6.6 (i) Irrigated land in your area _____ % (ii) fallow land _____ %

6.7 Land under Shrimp/fish Culture _____ % (only Shrimp/Paddy, Please Tick)


 S. M. Jagjit J. Aider
 Project Director
 Managing Director (Engineering)
 Khulna WASA


 MD. ABDULLAH PENG
 Managing Director
 Khulna WASA

7.0 Trees/Vegetables

7.1 Trees will be affected

| Sl. No. | Name of the Trees | Qty | Sl. No. | Name of the Trees | Qty | Sl. No. | Name of the Trees | Qty | Sl. No. | Name of the Trees | Qty |
|---------|-------------------|-----|---------|---------------------|-----|---------|---------------------------|-----|---------|-------------------|-----|
| 1. | Banana | | 7. | Guava (Peara) | | 13. | Col | | 19. | Lemon | |
| 2. | Jackfruit | | 8. | Black Bery (jum) | | 14. | Sofeda | | 20. | Orange | |
| 3. | Mango | | 9. | Jambora | | 15. | Emblie myrobalan (Amloky) | | 21. | Pineapple | |
| 4. | Lichi | | 10. | Wood Apple (Bel) | | 16. | Pomegranate (Dalim) | | 22. | Others Wood | |
| 5. | Papeya/Paw | | 11. | Katbel | | 17. | Acid Fruit(Chalta) | | 24. | | |
| 6. | Coconut | | 12. | Custard Apple (Ata) | | 18. | Kamranga | | 25. | | |

7.2. Vegetables will be affected (Use tick mark)

| | | | | | | | |
|----|-----------------------|-----|------------------------|-----|-----------------------|-----|------------------|
| 1. | Gourd(Lau) | 9. | Snake Gourd (Chicinga) | 17. | Koikambar | 25. | Turnip (Shalgam) |
| 2. | Pumpkin (Komra) | 10. | Luffa Gourd (Dondal) | 18. | Bean(Shim) | 26. | Arum (Kachu) |
| 3. | Sweet Pumpkin (Komra) | 11. | Basil (Puishak) | 19. | French(Barbati) | 27. | Karella (Ostra) |
| 4. | Data | 12. | Calery (Lalshak) | 20. | Kakrul | 28. | Others ----- |
| 5. | Radish | 13. | Sagina | 21. | Tomato | | |
| 6. | Brinjal | 14. | Arhar | 22. | Cauliflower (Fulcapi) | | |
| 7. | Purbal(Patal) | 15. | Lady's Finger (Darash) | 23. | Cabbage (Badacapi) | | |
| 8. | Luffa(Jingga) | 16. | Kholrabi (Olcap) | 24. | Karat | | |

8.0 Economic Information

8.1 No of Income earning member in the family: Male: _____ Female: _____ Total: _____

8.2 Monthly Average Income of the Family: Tk _____

8.3 Monthly Expenditure of the Family: Tk _____

8.4 Last year loan +Interest (principle+interest?) 1 Yes 2 No

8.5 Last year loan received if any: _____ Tk. Source: (1) Bank (2) NGO (3) Others

(Bank/NGO Name?) _____

8.6 Total cumulative Family Loan Tk: _____

9.0 Fish Culture in the Affected Pond?

(Signature)
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Project Director &
Managing Director (E & S)
WASA, Khulna

(Signature)
MD. ABDULLAH PING
Managing Director
Khulna WASA

9.1 When you have started fish culture? _____

9.2 Probable time for harvesting fish: _____

9.3 Amount of loss of fish culture?

| Name of the Fish | Qty | Rate |
|------------------|-----|------|
| 1. | | |
| 2. | | |
| 3. | | |
| 4. | | |
| 5. | | |

9.4 Type of Water body (dec): Paddy Field (dec.) _____ Pond (dec.): _____

Fish in Paddy Field (dec.): _____

9.5 Name of of co- owners/ co- sharer of Fish Culture land:

9.6 How many people work under your fish project: _____

9.7 Type of Fishes in your area: _____

10.0 Historical sites/ Monuments /Culture in and around the project site: Use separate FORM: Plot Number for affected area _____

10.1 Have any aborigines in your area? Yes 1 No 2

10.2 If yes of 10.1

Name & number Aborigines (specify):- _____

10.3 Have any historical sites/monuments in your area? Yes 1 No 2

10.4 If yes

Name and location _____

10.5 Have any old Mosque, Temple, Pagoda, Church, and Graveyard in your area?
Plot Number for affected area _____ Yes 1 No 2

10.6 If any

Name and location _____

10.7. Do have any community place or right of common in the affected land e.g Park, playground, pasture land, dighi, pond or fishing area, road etc? Please mention, ownership, -impacts: _____

11.0 About Project

11.1 Do you know project will likely affect your land?

Yes 1 No 2

11.2 What are your Comments (please tick):

Yes 1 No 2 Cause: _____

11.3 Do you like to co-operate the construction? Yes 1 No 2


 S. M. Jaglul I. side
 Project Director
 Deputy Managing Director
 Khulna WASA, Khulna


 MD. ABDULLAH, Peng
 Managing Director
 Khulna WASA

11.4 Do you have any suggestions or conditions for co-operating the project?

Yes 1 No 2 Condition 3

Specify _____

11.4.1 Types of conditions (If condition apply)

(a) If appropriate compensation provided 1
(b) If it is short time based 2
(c) If houses are not affected 3

11.5 Any comments on compensation

Yes 1 No 2

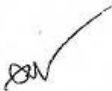
11.5.1 If yes

What is it? _____

12.6 Any suggestion for reducing the cost of project?

12.6.1 If any Suggestion that is _____


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MD. ABDULLAH, PENG
Managing Director
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Questionnaire No-----

Part-II: Economic, Land Acquisition & Resettlement Related Questionnaires

1.0 Do you have any experience of Land Acquisition? Please explain

1.1 Do you have any suggestion regarding land acquisition related practice in the DC office or law?

1.2 If problem, what are the mitigation measures? _____

2.0 Type of affected land under your possession: (Put ✓ Mark)

2.1 (1) Cultivated land (2) Uncultivated land (3) Water body (Under fish Culture) (4) Fallow land (5) Abandoned

Plot/Dag no..... Mouza:

2.1 Option (Put ✓ Mark) 1 2 3 4 5 6 7 8 9

2.2. Type of affected Land

| Type of Loss | Area of Land Owned (decimals) | Affected Land Decimals | Price/acre (Tk) | Permanent Loss in decimals | Temporary Loss amount in decimals | Plot No of acquired Land |
|------------------|-------------------------------|------------------------|-----------------|----------------------------|-----------------------------------|--------------------------|
| Homestead land | | | | | | |
| Agriculture Land | | | | | | |
| Commercial land | | | | | | |
| Water body | | | | | | |
| Total Land (dec) | | | | | | |

2.3 Is there any co- share of the above land, please mention

| Serial | Name, Father's Name and Adress | Amount of Sharecropping land | Mouza and plot no(if available) | Present and use | Condition |
|--------|--------------------------------|------------------------------|---------------------------------|-----------------|-----------|
| | | | | | |
| | | | | | |
| | | | | | |

S. M. Jaglal Haider
Engr. S. M. Jaglal Haider
Project Director
&
Asst. Director (F. & G.)
WASA, Khulna

Mr. ABDULLAH, Peng
Managing Director
Khulna WASA.

- 4.1 Type of Business and capital? _____
- 4.2 Daily income Loss from the affected business (Taka)
- 4.3 Total income loss from business amount in Taka
- 5.0 Type of crops if damaged: permanent/temporary (Put tick)
- 5.1 (1) Paddy (2) Wheat (3) Pluse (4) Vegetables (5) Betel Leaf (Pan) (6) Maize (7) Others
- a) Damaged crops.....Production per decimal (kg)..... Price per kg.....
- b) Damaged crops.....Production per decimal (kg)..... Price per kg.....
- c) Damaged crops.....Production per decimal (kg)..... Price per kg.....
- d) Damaged crops.....Production per decimal (kg)..... Price per kg.....
- 5.2 Amonut of crop loss: _____ Tk. (permanent).....
- 5.3 Type of damaged paddy:
- 5.4 Type of affected land: Single crop/Double crop/ Triple crop (put tick)
- 5.5 Type of crop circulation:
- 5.6 What percent of productive land is being lost due to the project?
- 5.7 If other income generating assets are being lost due to the project, please specify these.
- 6.0 Affected pond (if any): _____ total loss.....%
- 6.1 Length..... (Feet) Width..... (Feet)
- 6.2 Description of the pond (if aquaculture)
- _____
- 6.3 In case of Shrimp gher please mention varieties, area, production and approximat: loss-----
- _____
- 6.4 Amount of loss (Taka) _____
- 7.0 What percent of total productive assets are being lost due to project?
- 7.1 Amount of total loss Taka. _____
- 8.0 Type of training and assistance for income rehabilitation.
- Name of training: _____ Assistance: (put tick✓)
- (1) Micro credit (2) Assistance for reselling/small business (3) Poultry/livestock rearing (4)Fish culture
(5) hatchery management (6)Fish Processing (7) Driving(8) Electrical (9) solar maintenance(10)
Agriculture(11)Automobile(12) Radio/TV maintenance(13)others
- 9.0. Comments about the project: _____
- _____
- 10.0 Do you think the project will create some Socio-economic opportunity in the area?
Yes No
- If yes give description: _____

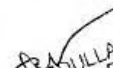
S. M. Jaglal
Engr. S. M. Jaglal i. aider
Project Director
&
Deputy Managing Director (E-99)
Khulna WASA, Khulna

Abdullah
Mr. ABDULLAH, PEng
Managing Director
Khulna WASA

- 11.0 Is there any negative impact on economic activities? Yes No
Description: _____
- 12.0 Type of social wealth/community or rights of common (if damaged)?
(1) Forest (2) Park (3) Others (playground, water, fishing etc)
(2)Area (sq. m)
(3)Amount of loss (Taka) _____
- 13.0 Others damaged/affected property: (Numbers)
(1) Well: _____ (2) Tubewell: _____ (3) Govt. Land: _____ (decimal)
(4) Percentage to total Govt. land? _____ (5) Amount of loss (taka): _____
- 14.0 Is there any law complexity in acquired land?
(1) Yes (2) NO
What type (if)? _____
- 15.0 No of floating people living in the land to be acquired (if any) in your land or adjacent areas of your land?
- 15.1 Description: _____ Plot No: _____
- 15.2 is there any social problem arises if land acquired in the middle of beel by disrupting communications, access and social linkage? Mention mitigation measures any _____
- 16.0 Describe if mosque, cultural place on land to be acquired.

Plot no. _____
- 17.0 Have any aborigine's area affected in this Mouza? Yes No
Number: _____ Amount of land: _____ Plot No. _____
Percentage to total land: _____ Amount of loss (Tk.) _____
- 18.0 Comments on the effect of the project for aborigines: _____
- 19.0 Daily labour Charge TK _____
- 20.0 Comments of information collector/Field Investigator (write comments on income and expenditure and rehabilitation if the damaged family is woman headed/Children/Vulnerable/handicapped/ethnic minority family): _____
- 21.0 Name and address of local elite introduced during the time of taking interview
Name:.....
Address:.....
Telephone:.....
Designation:.....
Occupation:.....
General comments:.....


Engr. S.M. Jaglul Haider
Project Director
&
Deputy Managing Director (E-199)
Khulna WASA, Khulna


MD ABDULLAH PENG
Managing Director
Khulna WASA

22.0 Overall Comments of the Field Investigator relating land acquisition, resettlement and other issues:

.....

.....

.....

.....

.....

Name of information collector/Field Investigator: _____

Date of information taken: _____

Signature: _____ Date: _____

Thanks


Engr. S. M. Jaglul Haider
Project Director
&
Deputy Managing Director (E-79-1)
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MD. ABDULLAH.PENG
Managing Director
Khulna WASA.

KWASA
JICA Study Team

Meeting with Stakeholders

Venue: Conference Room, KWASA, Khulna

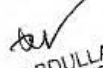
Time of meeting: 12:00pm

Date of Meeting: August 12, 2010.

Participants List

| Sl. # | Name | Designation | Organization | Communication | Signature | Remarks |
|------------------------------|-----------------------------|---|---|---------------|-----------|---------|
| 1. | Mr. Talukder Abdul Khaleq | Honorable Mayor | KCC | | | |
| Administration | | | | | | |
| 2. | Md. Zahidul Ismail | Additional District Commissioner (Land Acquisition) | Khulna DC Office | 01716-886-471 | | |
| 3. | Md. Delwar Haider | Additional District Commissioner (Revenue) | Bagerhat DC Office | 01971-067-788 | | |
| 4. | Mr. Ali Akbar Shaikh | Chairman | Rupsha Upazila | 01711-332-556 | | |
| 5. | Md. Monirul Islam | UNO | Rupsha Upazila | 01747-606-060 | | |
| 6. | Md. Ayube Mollik (Babu) | Vice-Chairman | Rupsha Upazila | 01913-460-055 | | |
| 7. | Ms. Parul Begum | Vice-Chairman | Rupsha Upazila | 01714-832-554 | | |
| 8. | Khan Shajahan Kabir Paris | Chairman | TS Bahirdia Union | | | |
| 9. | Saifur Rahman Molla | Chairman | Noihat Union | 01911-468-342 | | |
| 10. | Azizur Rahman | Member | Rupsha Union Paris | | | |
| 11. | Shaikh Firoz Mahmud | Member | Rupsha Union Paris | | | |
| 12. | Md. Zakir Hossain | Member | Rupsha Union Paris | | | |
| 13. | Shyamsundar Baishnab | Land Owner | Kazdia, Rupsha | 01553-453-735 | | |
| 14. | Khan Bazlur Rahman | President | Padma beel Water Protection Association | 01712-544-788 | | |
| JICA Study Team Participants | | | | | | |
| 15. | Tadao Funamoto | Team Leader | | | | |
| 16. | Emon Khan | Project Coordinator | | | | |
| 17. | Md. Asif Masud | Project Coordinator | | | | |
| 18. | Mitun | Planning & Development Officer | | | | |
| KDA Participants | | | | | | |
| 19. | Engr. Kazi Md. Sabirul Alam | Superintending Engineer | KDA Khulna | 01711-825-305 | | |
| DOE Participants | | | | | | |
| 20. | Sayed Ahmed Kabir | Bio-Chemist | DOE Khulna | 01712-932-380 | | |
| KWASA Participants | | | | | | |
| 21. | Md. Abdullah | MD | | | | |
| 22. | S.M. Jaglul Haider | DMD (Engr.) | | | | |
| 23. | Md. Alim Uddin | DMD (Admin.) | | | | |
| 24. | Mafiz Uddin Ahamed | Executive Engineer | | | | |


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ANNEX-06

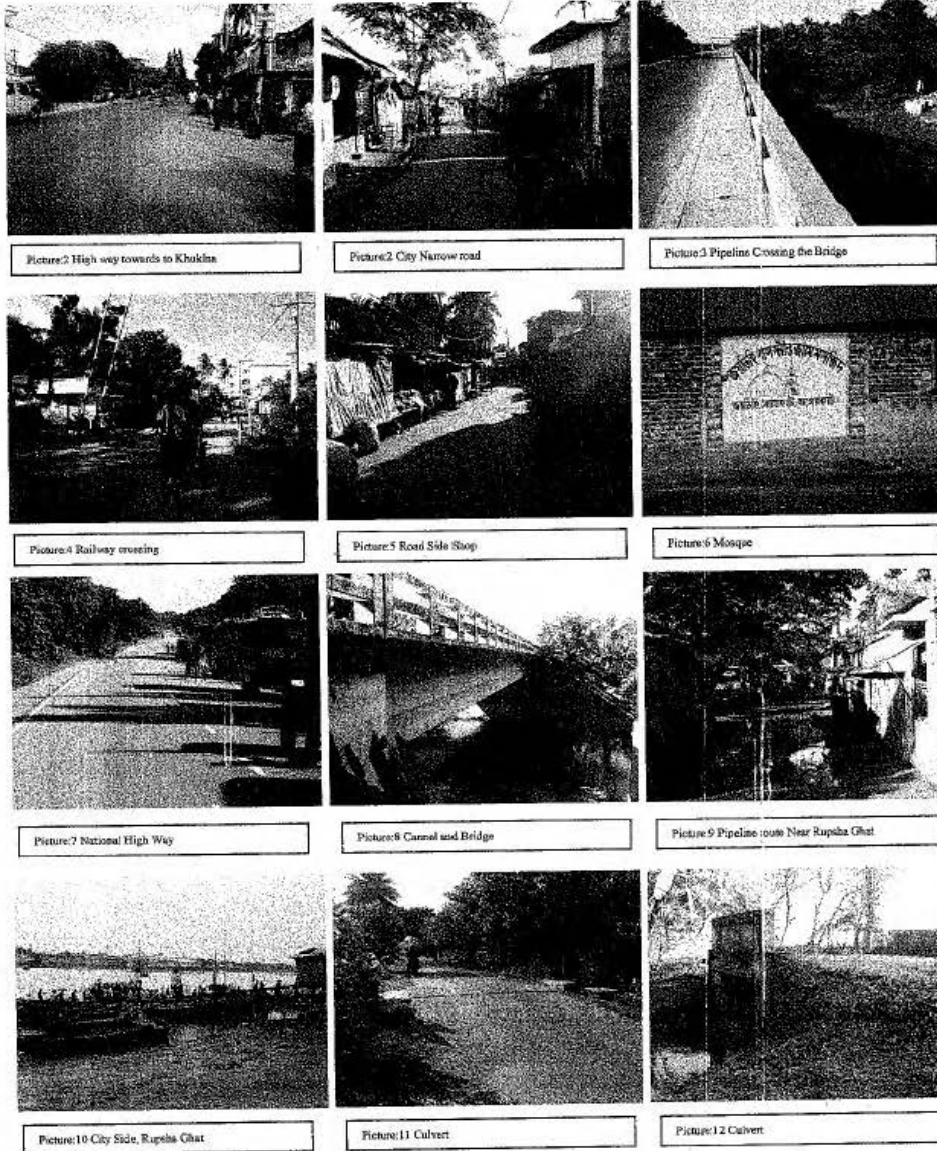
**PART-1 PHOTOGRAPHS OF BRIDGE, CULVERT AND
NARROW ROADS**

PART-2 GPS LOCATIONS OF BRIDGE AND CULVERT

Part-1 Photographs of bridge, culvert and narrow roads

Annex-6

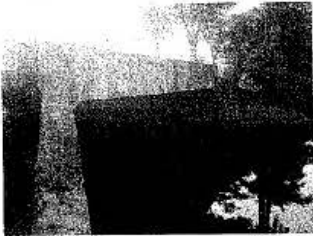
Photographs



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MO. ABDULLAH, PENG
MO. ABDULLAH, PENG
Managing Director
Khulna WASA

Annex-6



Picture:13 Culvert



Picture:14 Rural Narrow Road

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&
Deputy Managing Director (E-98)
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MD. ABDULLAH
MD. ABDULLAH, Peng
Managing Director
Khulna WASA.

Part-2 GPS locations of bridge and culvert

List of GPS Locations of Bridge and Culvert

Table: List of GPS Location from Mollarhat to Rupsha Ghat

| Sl. No. | Location Name | GPS Location | |
|---------|----------------------------|--------------|-------------|
| 1 | Alimpur | 22°49'05" N | 89°34'10" E |
| 2 | Jaipur | 22°48'59" N | 89°33'50" E |
| 3 | Niklapur | 22°48'09" N | 89°35'56" E |
| 4 | Noihati | 22°47'59" N | 89°36'33" E |
| 5 | Noihati | 22°47'52" N | 89°36'52" E |
| 6 | Davipur | 22°47'49" N | 89°37'06" E |
| 7 | Davipur | 22°47'45" N | 89°37'16" E |
| 8 | Samonto Sena | 22°47'38" N | 89°37'48" E |
| 9 | Samonto Sena | 22°47'38" N | 89°37'59" E |
| 10 | Samonto Sena | 22°47'47" N | 89°38'22" E |
| 11 | Goalp Bathan | 22°47'46" N | 89°38'59" E |
| 12 | Goalp Bathan (Fultola Mor) | 22°47'46" N | 89°38'59" E |
| 13 | Goalp Bathan (Gazir Shop) | 22°47'33" N | 89°39'36" E |
| 14 | Bahirdia (Boro) | 22°47'25" N | 89°39'59" E |
| 15 | Bahirdia (Boro) | 22°47'19" N | 89°40'28" E |
| 16 | Bahirdia | 22°47'07" N | 89°41'07" E |
| 17 | Soto Bahirdia | 22°47'42" N | 89°40'56" E |
| 18 | Bahirdia | 22°46'10" N | 89°42'05" E |
| 19 | Fakir hat | 22°46'41" N | 89°42'06" E |
| 20 | Atrabaki | 22°46'36" N | 89°42'17" E |
| 21 | Atrabaki | 22°46'30" N | 89°42'30" E |
| 22 | Kazi Azhar College | 22°46'19" N | 89°42'48" E |
| 23 | Mansha Bazar | 22°47'18" N | 89°40'24" E |
| 24 | Kasdia Bazar | 22°47'52" N | 89°38'27" E |
| 25 | Rupsha ghat | 22°48'11" N | 89°33'11" E |
| 26 | Bridge-Joydih New Bazar | 22°53'33" N | 89°46'35" E |

ANNEX-07

MATERIAL SAFETY DATA SHEET

**SAMPLE
MATERIAL SAFETY DATA SHEET (MSDS)**

DATE: _____

LOCATION: _____

OBSERVATION: _____

TYPE OF PROBLEM: _____

SIGNATURE: _____

CORRECTIVE ACTION TAKEN: _____

BY WHOM: _____

DATE COMPLETED: _____

ACKNOWLEDGE BY: _____

_____ Supervisor

_____ Superintendent

_____ Safety Supervisor

Supporting Report 10.3 LAP&RAP REPORT

Government of Peoples Republic of Bangladesh
Ministry of LGRD & Cooperatives
Khulna Water Supply & Sewerage Authority (KWASA)

Consultancy Services for
Environmental Impact
Assessment (EIA) & Land
Acquisition and
Resettlement Action Plan for
Khulna Water Supply
Improvement Project



**LAND ACQUISITION AND
RESETTLEMENT ACTION
PLAN REPORT
November- 2010**



Khulna Water Supply & Sewerage Authority (KWASA)

*Land Acquisition Plan and
Resettlement Action Plan*

**LAND ACQUISITION PLAN AND RESETTLEMENT ACTION PLAN
FOR KHULNA WATER SUPPLY IMPROVEMENT PROJECT**

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*Environmental Impact Assessment for Construction of
Bakhrabad-Siddhirganj Gas Transmission Pipeline Project*

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Environmental Impact Assessment for Construction of
Bakhrabad-Siddhirganj Gas Transmission Pipeline Project

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Environmental Impact Assessment for Construction of
Bakhrabad-Siddhirganj Gas Transmission Pipeline Project

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*Land Acquisition Plan and
Resettlement Action Plan*

ABBREVIATIONS

| | | |
|--------------------|---|---|
| CCL | : | Cash Compensation under the Law |
| DOE | : | Department of Environment |
| EA | : | Executive Authority |
| EP | : | Entitled Person |
| EP File | : | Entitled Person File |
| EC | : | Entitlement Card |
| EIA | : | Environmental Impact Assessment |
| ECC | : | Environmental Clearance Certificate |
| GoB | : | Government of Bangladesh |
| GRC | : | Grievance Redress Committee |
| JICA | : | Japan International Co-operation Agency |
| JIVT | : | Joint Information Verification Team |
| KWASA | : | Khulna Water Supply and Sewerage Authority |
| IEE | : | Initial Environmental Evaluation |
| LAP | : | Land Acquisition Plan |
| LGED | : | Local Government Engineering Department |
| LAO | : | Land Acquisition Officer |
| LA Section | : | Land Acquisition Section of Deputy Commissioner |
| MARV | : | Maximum Allowable Replacement Value |
| PVAT | : | Property Valuation Advisory Team |
| PAPs | : | Project Affected Persons |
| RAC | : | Resettlement Advisory Committee |
| RAP | : | Resettlement Action Plan |
| RP | : | Resettlement Policy |
| SA | : | State Acquisition |
| SCC | : | Social Clearance Certificate |
| SES | : | Socio Economic Survey |
| SDU | : | Social Development Unit |
| Shrimp Gher | : | Large crop land used for shrimp cultivation |
| Gher of White Fish | : | Crop land used for crop and other varieties of fish cultivation |



*Land Acquisition Plan and
Resettlement Action Plan*

Executive Summary

1. Project Scope

Khulna, the third largest city in Bangladesh, is located in the southwest of the country and has a population of 1.5 million (estimated in 2008). The present water supply system in Khulna is mainly from groundwater sources drawn from both deep and shallow tube wells. To cope with current insufficient supply and increasing demand, the Khulna Water Supply and Sewerage Authority (KWASA) plans to construct a new treatment plant for surface water with assistance from the Japan International Cooperation Agency (JICA) Consequently in December 2008 the GOB requested the assistance of the Government of Japan (GOJ) with regard to the improvement of water supply for Khulna and GOJ agreed to undertake the Feasibility study. Based on the agreement, the JICA has dispatched a JICA study team consisting of various experts to KWASA for conducting a feasibility study for the Water Supply Improvement Project in Khulna.

The Feasibility Study has proposed “Khulna Water Supply Improvement Project” which includes Water Intake point, Impounding Reservoir, Water Treatment Plant, Water transmission pipe line and Overhead Tank. The project outline is the collection of raw water from Mollarhat intake point on the bank of Modhumati River in Bagherhat district. The raw water from the Modhumati river will be stored first into impounding reservoir and then transmitted to the water treatment plant at Samonto Sena opposite bank of Rupsha river and the purified water will be distributed through overhead tank to the consumer. In addition, to the Feasibility Study (i) IBE report for SCC collection, (ii) LAP/RAP report (iii) EIA report have been prepared and finally collection of ECC from Department of Environment (DOE).

KWASA has determined the project site and pipeline route in way to minimize resettlement impacts, avoiding major settlements and dense populations. The pipelines will be located within government-owned lands wherever possible. Care has been taken to avoid homestead, business areas and squatters in most cases. The LAP/RAP outlines measures and approaches necessary for land acquisition and land requisition that would reduce the resulting resettlement impacts as per guidelines of JICA within the framework of the regulations of the Government of the People’s Republic of Bangladesh. According to these guidelines, the project affected persons (PAPs) would be given all supports in regaining their previous socio economic conditions as early as possible. But here the requiring body, like to attached only on legal framework for land acquisition, so, there is no scope for implementation of all issues relating resettlement practice in Bangladesh. In this connection, all resettlement related issues in abridged and simplified style.

Land acquisition of intake point is 2.521 acre at Mollarhat (see annex-1), probable affected persons at intake point are 30 nos, at SWTP and Impounding Reservoir site area is 67.73 acre and this land falls under Pathorghata and Tilok mouza. Land owners at this point 73 nos. approx (see Annex-1). Overhead tank and underground reservoir needs 11.78 acre area and these of these five are private land and six are government land. RAW and Clear Water Transmission line will pass through existing road network of RHD, LGED and KCC road side.

Some of the major findings of the survey from consultation and field observation are given. As stated above, the total affected households are 108 identified so far. Exact figure will be

*Land Acquisition Plan and
Resettlement Action Plan*

finalized after District Commissioner's (DC) collect the land owners list through the land acquisition procedure.

Total trees in affected areas are 8,892 nos. in which mainly cocoanut trees. **(Chapter-3)**

The Khulna Water Supply Improvement project will involve land acquisition mainly of public land and some are government land. Water transmission pipeline will pass on previous line in Khulna City and in some cases on government land and no requisition land.¹ This will be a strip alignment except Water Intake point, Impounding Reservoir, Water Treatment Plant and overhead tank. Most of the acquisition will be on paddy field. In some places, there are very few trees on the land to be acquired.

The nature of disturbances in the project area is of two types; temporary and permanent, i.e. one that is very temporary in nature occurring during construction, and the other impact is on long-term basis. Efforts have been made to look into the interest of squatter, vulnerable groups and tribal and indigenous community. However, no indigenous groups have been found of the project facilities areas that are to be affected.

2. Implementation strategy

The LAP/RAP has all viable scope in compensating the Project Affected Persons (PAPs). Displaced persons would be i) compensated for their losses, ii) assisted with the resettlement in simplified form only, and iii) assisted in their efforts to regain or improve their socio economic conditions. Eligible PAPs have not been considered from resettlement viewpoint. The Simple policy matrix makes the entitlement more precise and includes operational aspects such as implementation issues and responsible agencies.

Since the provision of land for land is not feasible, cash compensation under the law (CCL) for land will be determined and paid by the concerned Deputy Commissioner (DC) using funds provided by the project executing agencies. Further, as per the existing law, the DC of the respective area shall consider CCL which includes 50% premium.

Additional grants other than DC's payment will be provided up to the maximum allowable replacement value (MARV) is not possible and this will be decided by the project authority later and there will not be any scope of hiring NGO for full fledged resettlement work. For this project KWASA only inclined to legal framework of compensation in which DC is mainly responsible. Separate market survey for determination of MARV is not possible here as there is no formal resettlement for the project. There will be a Property valuation Advisory Team (PVAT) comprising member from the requiring body, local government representative and representative of affected people will evaluate the situation if anyone is deprived for the project and they will take necessary funds from the higher authority and from donor organizations (JICA, ADB) for additional payment other than DC covering actual market price as replacement value. On the other hand Joint inventory Verification Team (JIVT) will comprise representative from KWASA, DC for primary assessment of affected land and assets. Moreover, Grievance Redress committee (GRC) will be formed in solving any grievances arisen and will be formed from elected public representative, KWASA representative as requiring body and two from affected people.

¹ Land acquisition means permanent acquisition and land requisition means temporary acquisition

*Land Acquisition Plan and
Resettlement Action Plan*

A joint inventory verification team (JIVT) has been proposed for determining the price of PAPs' assets lost in the acquired land for project proponents and water transmission pipeline, and PVAT and GRC will be formed for determining actual price of affected assets and for redressing the grievances that may arise during implementation. Video filming will be needed as a precaution to check against fake structures on the proposed alignment before serving notices for land acquisition. Adequate information campaign will be carried out for ensuring participation of the PAPs / beneficiaries in the implementation of LAP/RAP.

3. Organizational Responsibilities and Monitoring

Environmental Monitoring Function for the Project

The JICA Feasibility Study Report has proposed a new KWASA Organization as follows.

- Technical Services Division: headed by Deputy Managing Director.
- Planning and Development department: Under the Technical services division, there is a headed by Chief Engineer.
- Section of Project Management and Monitoring: Planning and Development department, there is the section headed by executive engineer. This section is responsible for the Environmental and Social monitoring.

If any observation or complaint find in the field level during the construction and operation stage, the Executive Engineer shall coordinate to the respective department or authorities (like DOE, KCC, DC and etc.).

4. Time Schedule for LAP/RAP Management

The LAP provides a series of Land Acquisition activities. Of these, a number of activities have to be executed simultaneously for smooth implementation of the LAP. As such, a time schedule for starting and finishing of each of the activities has been planned (Annex-5).



*Land Acquisition Plan and
Resettlement Action Plan (Chapter-1)*

Chapter-1 Introduction

1.1 Project objectives:

Khulna, the third largest city in Bangladesh, is located in the southwest of the country and has a population of 1.5 million (estimated in 2008). The present water supply to Khulna is mainly from groundwater sources drawn from both deep and shallow tube wells. To cope with current insufficient supply and increasing demand, the Khulna Water Supply and Sewerage Authority (KWSA) plans to construct a new treatment plant for surface water with assistance from the Japan International Cooperation Agency (JICA). Consequently in December 2008 the GOB requested the assistance of the Government of Japan (GOJ) with regard to the improvement of water supply for Khulna and GOJ agreed to undertake the study. Based on the agreement, the JICA has dispatched a JICA study team consisting of various experts to KWSA for conducting a feasibility study for the Water Supply Improvement Project in Khulna.

In this relation, the environmental legislation in Bangladesh, particularly, the Environmental Conservation Act, 1997 (recently amended-Amendment 2000) states that any development project shall require environmental clearance from the Department of Environment (DOE), Ministry of Environment and Forest (MoEF), Government of the People's Republic of Bangladesh. The proposed Project falls under the "Red Category" as per the Environmental Conservation Rules of 1997, which requires submitting an Initial Environmental Examination (IEE) report prior to an Environmental Impact Assessment (EIA) report based on previously approved to obtain both Site Clearance Certificate (SCC) and then Environmental Clearance Certificate (ECC) from the DOE.

On the other hand, JICA may provide a financial assistance for this project in Khulna as a loan scheme of the Japanese ODA (Official Development Assistance). For the implementation of the ODA loan projects, the proposed project shall meet and follow the JICA's guidelines on Environmental and Social Consideration for the loan projects for obtaining necessary clearance from JICA. Thus, in order to implement the construction of proposed water supply project, the Environmental study i.e. IEE, EIA and Land Acquisition Plan (LAP)/Resettlement Action Plan (RAP) shall be conducted accordingly.

This is the Land Acquisition Plan (LAP) and Resettlement Action Plan (RAP) for Khulna Water Supply Improvement Project.

1.2 Project Components

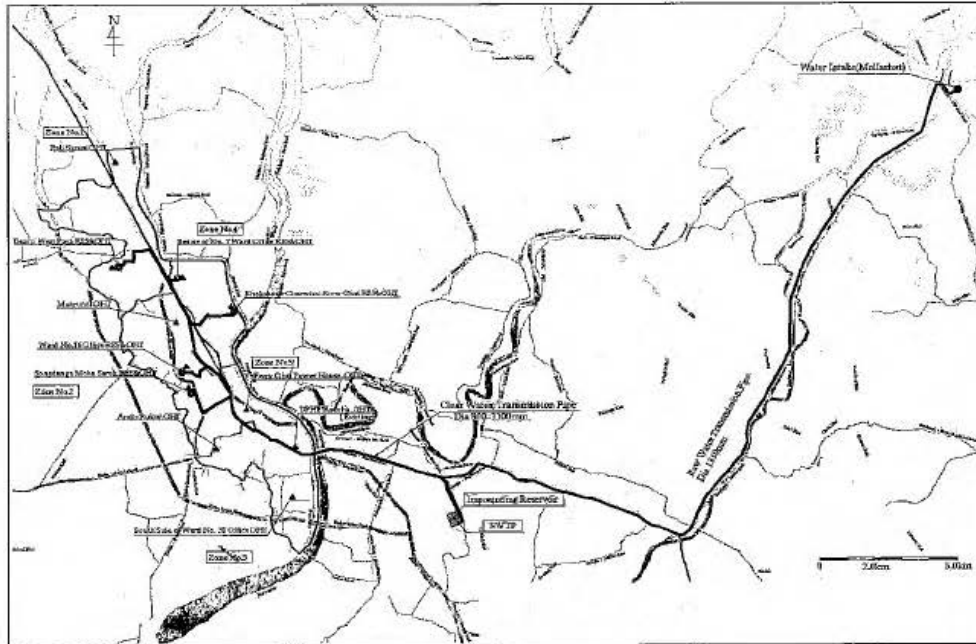
This is the simplified and revised LAP/ RAP for the proposed Khulna Water Supply Improvement Project consisting of a Water Intake Facility, Water Transmission pipes, an Impounding reservoir and a Water Treatment Plant and other necessary facilities like distribution reservoirs and overhead water tanks; and to obtain necessary clearance from DOE and JICA as applicable for construction of the proposed facilities.

1.3 Short Descriptions of the Project

The project located in two districts viz. Khulna, Bagerhat. Water will be collected from the Modhumati river at Mollarhat and by RAW Water Transmission pipeline the water will

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transfer to the Impounding Reservoir at Samonto Sena and after treatment of raw water by SWTP at Samonto Sena under Rupsha upazila then clear water will transmit through Clear water Transmission Pipeline to the KCC area and it will be distributed to the city dwellers.. This line will cross the Rupsha River (see the **Figure-1.1**).



Source: Feasibility Study for Khulna Water Supply Improvement Project, 2010 JICA Study Team

Figure 1.1 Project Location Map

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Chapter-2 Laws and Regulation

2.1. GOB Land acquisition Act Regulations

The policy framework and entitlements for the Projects for the Project are based on national law 'Acquisition and Requisition of Immovable Property Ordinance of 1982(ARIPO)':

The DC is empowered to permanently acquire or temporarily requisition of property and legal owners are eligible for compensation. The DC assesses the level of compensation, taking into consideration factors such as: land transactions in the locality over the past 12 months. The amendments to the ARIPO in 1993 increased the amount of the premium for compulsory acquisition from 25 to 50% on the assessed value of the property. The 1994 amendment provides provision for payment of crop compensation to tenants. The ARIPO does not cover compensation for loss of wage income and displacement transport cost; it also does not cover losses of non-titled persons (squatters, encroachers, etc.) aside from crop losses to tenants.

For the purpose of acquisition and requisition of immovable properties in Bangladesh, the government, taking into consideration all previous Acts, Rules, and Ordinances, has prepared 'Acquisition of Immovable Properties Manual-1997'. This manual guides all acquisition and requisition of immovable properties, for the purposes whatsoever as well as payment of compensation for all sorts of losses.

2.2 Legal framework for LAP:

(1) Legal Framework on Land Acquisition

Following Table --1 shows relevant ordinance and acts on land acquisition in Bangladesh.

Table-1- Relevant ordinance and Act on land acquisition and resettlement

| Title | Year | Outline |
|---|------|--|
| Acquisition and Requisition of Immovable Property Ordinance | 1982 | The Ordinance (Ordinance II of 1982) has replaced the Land Acquisition Act of 1894 and the East Bengal (Emergency) Requisition of Property Act of 1948. The Ordinance governs acquisition and requisition by the government of immovable property for any public purpose or in the public interest. It may be noted that contrary to the previous Acts (i.e. Act XIII of 1948), this Ordinance deals only with immovable property. Under the ordinance II of 1982, any private property(except places for religious worship, graveyard and cremation ground) can not be acquired by the government for public purpose or interest. Detailed procedures have been prescribed to ensure that a deputy commissioner proceeds systematically and on sound principles in such cases, leaving room for owners to raise objections which must be disposed of after due hearing. In addition, the Ordinance has well-defined procedures regarding payment of compensation for an acquired piece of land. If, for example, the land is used for rice growing, then an amount equivalent to approximately 1.5 times the market value of a given variety of rice (e.g., paddy) that is currently being (or could be) produced annually is fixed as a yearly lease value. In case of outright purchase (carried out on a 99-year lease), the compensation-value of acquired land varies widely according to the locality, soil fertility, and access to transportation and related infrastructure factors. The current compensation and resettlement provisions are however inadequate both in terms of timing of payments and quantum. The procedures involved are cumbersome and time consuming and often causes hindrance to the smooth execution of the project. Legal provisions covering adequate compensation to the project affected persons, particularly disadvantaged groups such as women & squatters and such other vulnerable groups are yet to be framed. |
| The Acquisition of Immovable Property Rules 1982 | 1982 | The Acquisition of Immovable Property Rules of 1982, are made for the exercise of the powers conferred upon by Section 46 of the Acquisition and Requisition of Immovable Property Ordinance 1982. |
| Land Reform Ordinance | 1984 | Under the Ordinance 1984, families owning lands up to 60 Bighas (about 6.7 ha) at a given time were to be barred from acquiring further land by purchase, inheritance, or |

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| | | |
|--|------|---|
| | | otherwise. A family or person inheriting lands in excess of 60 Bighas would have to surrender the 'surplus' land, for which due compensation was to be paid. In addition, the Ordinance is a bar on the eviction from rural homestead, even in the process of law, for non-payment of rent or tax. |
| The Movable Property Requisition (Compensation) Rules, 1990 | 1990 | The Rules makes provision for constituting a Compensation Assessment Committee in each district for determining compensation for any requisitioned vehicle, vessel or bus, truck, minibus etc. In case of requisition of a vehicle or vessel, the order of requisition should clearly state the period of requisition, purpose of requisition, and the amount of compensation to be awarded. |
| Acquisition and Requisition Act, 1994 (under determining compensation) | 1994 | In December 1994 the government passed a rule in order to amend the provisions of the Acquisition of Property on Emergency Basis Act 1989 for determining compensation under the Acquisition and Requisition Act. According to this Rule, in case of an arbitration suit lodged against the compensation determined by the Deputy Commissioner an increase of only an additional 10 % of the compensation can be awarded by the Arbitrators. Similarly, the Arbitration Appellate Tribunal should limit its award to within this additional 10 %. |

Source; Acquisition and Requisition of Immovable Property Ordinance 1982,
Land Reform Ordinance, 1984
Banglapedia "National Encyclopedia of Bangladesh", February 2006, Asiatic Society of Bangladesh

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Chapter-3 Approach, Methodology and Socio-Economic Data

3.1 Baseline Information for LAP/RAP

Baseline information for the LAP/RAP has been constructed from the survey team both land survey and socio economic survey.

3.1.1 Review of the Laws and Guidelines for Land Acquisition

In preparation of LAP/RAP the consultants has thoroughly gone through the existing laws of the land in connection with land acquisition.

3.1.2 Custom and traditions of Land Acquisition

Customs and traditions of any society are very important in implementing any large project. Here land acquisition mainly dealt with the district administration as per the laws of the country continuing from British, Pakistan and Bangladesh period. The district administration acts on behalf of requiring body.

3.2 Methodology and Survey design for preparation of LAP/RAP

Survey design for preparation of LAP/RAP was as follows. A structured questionnaire (see **Annex-4**) was developed which had been used for both socio-economic and acquisition related information. All directly affected land and tree loser and tenant living in the acquired land were interviewed. And in case of, agriculture land loss, around forty six land owners were taken for detailed survey in three project components side (intake point at Mollarhat, Impounding reservoir & SWTP and Distribution reservoir & Overhead tank). Primary identification will be done by DC's land acquisition office. No of entitlement persons (EPs) are tentative estimation as entitlement is mainly based on legal documents. So, final figure of affected will be identified before DC's payment at the implementation period.

3.2.1 Survey Methodology and Tools

The major survey tools are structured questionnaire, Key Informant's Information (KII), Focus Group Discussion (FGD). KII and FGD were held in various key spots of the project areas. In some cases, secondary data were also used for understanding project's baseline situation.

3.2.2 Land Acquisition Information

Land acquisition of intake point is about 2.521 acre at mollarhat, probable affected persons at intake point is 30 nos. SWTP and Impounding Reservoir is 69.23 acre in Pathorghata and Tilok mouza. Affected land owners at this point 73. Overhead tank and underground reservoir is 11.78 acre and the affected land owners are 5. The raw water and clear water transmission line will use basically the RHD, LGED, KCC road.

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3.2.3 Existing Socio Economic Condition

For understanding existing socio- economic condition we have to rely on basically two sources. One is socio economic sample survey of the project area. Secondly, secondary sources of information have been used.

The present project mainly comprises of three areas. These are Water intake point at Mollarhat upazila in Bagerhat district, Impounding reservoir & SWTP at Samonto Sena in Rupsha Upazila under Khulna district and distribution and overhead tank at in the Khulna city corporation area.

1. Population & Literacy rate

Khulna town consists of 38 wards and 183 mahallas spacing 20.60 sq.km areas. The town population is about 52.57% of the district population (2334285) and Rupsha & Mollarhat population data are described in **Table-3.1**.

Table: 3.1 Population scenario at Three Locations

| Location | Area (km2) | Population (No) | Density of Population (km2) | Male (%) | Female (%) |
|-------------------|------------|-----------------|-----------------------------|----------|------------|
| Khulna City | 20.60 | 1227239 | 59574 | 52.79 | 47.21 |
| Rupsha Upazila | 120.15 | 150185 | - | 51.98 | 48.02 |
| Mollarhat Upazila | 8.79 | 116729 | 1218 | 51.52 | 49.48 |

Source: Banglapedia

Table-3.2 Literacy rate of the Project Area

| Location | Literacy (%) |
|-------------------|--------------|
| Khulna City | 59.1 |
| Rupsha Upazila | 40.4 |
| Mollarhat Upazila | 31.6 |

Source: National Encyclopedia of Bangladesh

2. Health and Education

The Khulna city has the following health and educational institution and mostly the Rupsha and Mollarhat upazila people like to come to the city point in emergency cases.

Table-3.3 Khulna City health

| Sl. No. | Name | Number |
|---------|-------------------------------|--------|
| 1 | Medical college hospital | 1 |
| 2 | District sadar hospital | 1 |
| 3 | Upazila health complex | 9 |
| 4 | TB hospital | 1 |
| 5 | Infectious disease hospital | 1 |
| 6 | Christian missionary hospital | 1 |
| 7 | Chest disease niramoy centre | 1 |
| 8 | Railway hospital at kopilmuni | 1 |
| 9 | Jail hospital | 1 |
| 10 | Police hospital | 1 |

Source: National Encyclopedia of Bangladesh

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Table-3.4 Rupsha and Mollahat health and Education facilities

| Location | Primary School | | High school | College | Madrasa | Health centres | |
|------------------|---------------------------|-------------------------------|-------------|---------|---------|------------------------|-------------------------------------|
| | Government primary school | Non-government primary school | | | | Upazila health complex | Union health family planning centre |
| Rupsa Upazila | 46 | 14 | - | - | 23 | 1 | 5 |
| Mollahat Upazila | 58 | 19 | 13 | 3 | 8 | 1 | 6 |

Source: National Encyclopedia of Bangladesh

3. Socio-cultural and religious activities

People residing in the surrounding areas of the project location are of different religions; Muslims, Hindus, Christians, and Buddhist, etc. Besides the general culture and heritage of the area, culture also differs due to the difference of the communities built-up by these religions in different locations of the project. The Muslims pray in the mosques and observe their religious festivals like Eid, the Hindus observe their Pujas (Durga puja, Kali puja, etc.) in the temples and the Christians observe their prayer in the church and observe Christmas. There are special gatherings among the people where cultural events are performed and special foods are prepared. **In the project area no ethnic/tribal or indigenous people is found.**

Table-3.5 Project Areas Religious Feature

| Location | Muslim (%) | Hindu (%) | Christian (%) | Buddhist (%) | Others (%) |
|------------------|------------|-----------|---------------|--------------|------------|
| Khulna City | 73.49 | 25.74 | 0.67 | 0.04 | 0.06 |
| Rupsa Upazila | 82.28 | 17.55 | - | - | 17.55 |
| Mollahat Upazila | 75.01 | 24.87 | - | - | 0.12 |

Source: National Encyclopedia of Bangladesh

4. Livelihood practices and economic activities

In the project area the main occupation of the Khulna city and Mollahat upazila people is agriculture as cited from the data. Most of the Rupsa upazila peoples are in different types of business.

Table-3.6 professional practices of the project area

| Location | Agriculture % | Fishing % | agricultural labourer % | wage labourer % | Industries % | Commerce % | Transport % | Service % | constructions | Others % |
|------------------|---------------|-----------|-------------------------|-----------------|--------------|------------|-------------|-----------|---------------|----------|
| Khulna City | 25.11 | 1.66 | 11.3 | 7.15 | 16.38 | - | 4.09 | 18.93 | 1.53 | 12.22 |
| Rupsa Upazila | 18.02 | | 6.6 | 11.81 | 2.87 | 20.91 | 6.35 | 17.10 | 2.09 | 14.25 |
| Mollahat Upazila | 53.61 | 1.71 | 22.15 | 2.02 | 1.6 | 5.93 | 1.21 | 6.2 | - | 5.57 |

Source: National Encyclopedia of Bangladesh

5. Land Use

The land use outline of the Mollahat and Rupsha upazila are tabulated at Table-3.7.

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Table-3.7 Land use pattern of Rupsha and Mollarhat Upazila

| Location | Cultivable (ha) | Fallow (ha) | single crop (%) | double crop (%) | treble crop (%) |
|-------------------|-----------------|-------------|-----------------|-----------------|-----------------|
| Rupsa Upazila | 5805 | 2745 | - | - | - |
| Mollarhat Upazila | 14602.53 | 2287.05 | 35 | 47 | 18 |

3.2.4 Findings from the social survey:

A field study has been carried out to assess the exact situation of the probable affected persons. The main tools of survey data was structured questionnaires, consultation meeting with the stakeholders and secondary sources. Experienced field supervisor and investigators were employed for data collection. All available affected persons were interviewed. In total, 31 affected land owners at Samonto Sena, 3 in the Khulna city, 7 at Mollarhat, 5 workers and 8 tenant cultivators and one shop owners that is found in Andir Pukur and one leaseholder at Chorer hat reservoir and overhead tank side were interviewed. Information is of two types. One is overall project area socio economic condition and another is socio economic condition of affected.

1. Intake point at Mollarhat:

30 affected land owners are identified at Mollarhat intake point, among them 13 were interview.

I. Composition of Household Members

Table 3.8: Household composition by household head

| Household Surveyed | H/H No. | % |
|-------------------------|----------|---------------|
| Male Headed Household | 6 | 85.71 |
| Female Headed Household | 1 | 14.29 |
| Total | 7 | 100.00 |

[Source: Field Survey, 2010]

Table 3.9: Household composition by sex

| Sex | No. of Family Member | % of Family Member | Average HH Size |
|--------------|----------------------|--------------------|-----------------|
| Male | 20 | 57.14 | |
| Female | 15 | 42.86 | |
| Total | 35 | 100.00 | 5.00 |

[Source: Field Survey, 2010]

The data shows that the 85.71% of sample household is comprised of the male heads and in the family member 57.14% are male and 42.86% are female.

2. Age Sex Distribution

Age Sex distribution of the household members is presented in **Table-3.10**.

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Table 3.10: Age-sex distribution of households

| Age Group | Male | % | Female | % | Total | % |
|--------------|-----------|---------------|-----------|---------------|-----------|---------------|
| 1-4 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| 5-9 | 0 | 0.00 | 1 | 6.67 | 1 | 2.86 |
| 10-14 | 1 | 5.00 | 0 | 0.00 | 1 | 2.86 |
| 15-19 | 3 | 15.00 | 2 | 13.33 | 5 | 14.29 |
| 20-49 | 12 | 60.00 | 8 | 53.33 | 20 | 57.14 |
| 50-60 | 0 | 0.00 | 3 | 20.00 | 3 | 8.57 |
| Above 60 | 4 | 20.00 | 1 | 6.67 | 5 | 14.29 |
| Total | 20 | 100.00 | 15 | 100.00 | 35 | 100.00 |

[Source: Field Survey, 2010]

The table shows the distribution of the age groups of the household members by their sex. From the table we can see that children of age groups 10 to 14 is about 2.86%, household members of age groups 20 to 49 (main work force) is 57.14%, those of age group above 60 is about 14.29%.

3. Religious and Ethnic Composition

Distribution of the households by their religion is summarized in **Table-3.12**.

Table 3.12: Religious and Ethnic Composition of households

| Religion | No. of Households | % of Households |
|--------------|-------------------|-----------------|
| Muslim | 7 | 100.00 |
| Hindiu | 0 | 0.00 |
| Christian | 0 | 0.00 |
| Buddhist | 0 | 0.00 |
| Others | 0 | 0.00 |
| Total | 7 | 100.00 |

[Source: Field Survey, 2010]

It shows that the sample households are comprised of 100% Muslims

4. Educational Status of the Population

The educational status of the members of the household has been summarized in **Table-3.13**.

Table 3.13: Educational Status of the Population

| Educational status | Male | % | Female | % | Total | % |
|---------------------|-----------|---------------|-----------|---------------|-----------|---------------|
| Illiterate | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Can read only | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Can read & Write | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Children <4 years | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Primary (Class I-V) | 0 | 0.00 | 1 | 6.67 | 1 | 2.86 |
| Secondary (VI-X) | 1 | 5.00 | 0 | 0.00 | 1 | 2.86 |
| SSC Equivalent | 4 | 20.00 | 3 | 20.00 | 7 | 20.00 |
| HSC Equivalent | 0 | 0.00 | 1 | 6.67 | 1 | 2.86 |
| HSC + | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Graduate | 6 | 30.00 | 5 | 33.33 | 11 | 31.43 |
| Masters + | 9 | 45.00 | 5 | 33.33 | 14 | 40.00 |
| Others | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Total | 20 | 100.00 | 15 | 100.00 | 35 | 100.00 |

[Source: Field Survey, 2010]

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The table shows the distribution of the educational status of the household members by sex. This reveals that about 0% of the sample population is totally illiterate (who cannot read and write), primary level is 2.86%, secondary level is 2.86%, and also graduate and above is about 31.43%.

5. Economy and Employment

Main Occupation of the Household Members

Main occupations of the household members are summarized in **Table-3.14** by their sex.

Table 3.14: Main Occupation of the Household Members

| Occupation | Male | % | Female | % | Total | % |
|------------------------|-----------|---------------|-----------|---------------|-----------|---------------|
| Farmers | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Fisher worker | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Agricultural Labor | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Non-agricultural Labor | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Service | 12 | 60.00 | 5 | 33.33 | 17 | 48.57 |
| Small Business | 1 | 5.00 | 0 | 0.00 | 1 | 2.86 |
| Households Works | 0 | 0.00 | 5 | 33.33 | 5 | 14.29 |
| Student | 3 | 15.00 | 4 | 26.67 | 7 | 20.00 |
| Children (< 5 years) | 1 | 5.00 | 1 | 6.67 | 2 | 5.71 |
| Retired/Handicapped | 3 | 15.00 | 0 | 0.00 | 3 | 8.57 |
| Unemployment | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Overseas Work | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Others | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Total | 20 | 100.00 | 15 | 100.00 | 35 | 100.00 |

[Source: Field Survey, 2010]

The table shows that the maximum of 20.00% is student, 14.29% in household work, 2.86% as small business, 48.57% in service and 5.71% are children of less than 5 years.

6. Monthly Income Patterns

Monthly income pattern of the sample households are presented in **Table-3.15**.

Table 3.15: Monthly Income Patterns

| Income Level | No. of Household | % of Income |
|-----------------------|------------------|---------------|
| Tk. 1000 - Tk. 5000 | 0 | 0.00 |
| Tk. 5001 - Tk. 10000 | 0 | 0.00 |
| Tk. 10001 - Tk. 15000 | 1 | 14.29 |
| Tk. 15001 - Tk. 20000 | 1 | 14.29 |
| Tk. 20001 - Tk. 25000 | 0 | 0.00 |
| Tk. 25001 and Above | 5 | 71.43 |
| Total | 7 | 100.00 |

[Source: Field Survey, 2010]

The Table shows that the range of monthly income of 14.297% of the sample house hold is Tk. 10001-15000, 14.29% of the sample household is 15001-20000 and 71.43% is 25,001 and above range.

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7. Quality of Life Values

House Ownership

The distribution of the sample households by types of their residential house with respect to ownership and construction is presented in **Table-3.16**.

Table 3.16: House Ownership

| House Ownership | No. of Households | % of Households |
|---------------------------|-------------------|-----------------|
| Self owned | 7 | 100.00 |
| Rented | 0 | 0.00 |
| Others | 0 | 0.00 |
| Total | 7 | 100.00 |
| Type of Housing structure | | |
| Katcha | 0 | 0.00 |
| Semi Pucca | 2 | 28.57 |
| Pucca | 5 | 71.43 |
| Others | 0 | 0.00 |
| Total | 7 | 100.00 |

[Source: Field Survey, 2010]

The table also shows that 28.57% of the houses are Semi pucca (CI sheet roof with brick wall), 71.43% is pucca and 100% houses are self owned by the land owners.

8. Water and Sanitation

Sources and Use of Water by Purpose

Sources of water and their use were investigated and the results are summarized in **Table-3.17**.

Table 3.17: Sources and Use of Water by Purpose

| Type of Sources | Drinking No. H/H | (%) H/H | Cooking/ Washing No. H/H | (%) H/H | Bathing No. H/H | (%) H/H | Cattle Washing No. H/H | (%) H/H |
|---------------------|------------------|---------------|--------------------------|---------------|-----------------|---------------|------------------------|---------------|
| Tubewell (STW) | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Deep Tubewell (DTW) | 6 | 85.71 | 6 | 85.71 | 6 | 85.71 | 6 | 85.71 |
| Supply Water | 1 | 14.29 | 1 | 14.29 | 1 | 14.29 | 1 | 14.29 |
| Well | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Pond | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Khal/River | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Total | 7 | 100.00 | 7 | 100.00 | 7 | 100.00 | 7 | 100.00 |

[Source: Field Survey, 2010]

The Table shows that around 85.71% of the households collect drinking water use water for cooking/ washing, bathing & cattle washing from deep tube wells water.

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9. Sanitation

The sanitation practice of the sample households and the types of latrines used are shown in **Table-3.18**

Table 3.18: Sanitation

| Types of Latrines Used | No. of Households | % of Households |
|------------------------|-------------------|-----------------|
| Sanitary | 7 | 100.00 |
| Pit | 0 | 0.00 |
| Hanging | 0 | 0.00 |
| Open space | 0 | 0.00 |
| Others | 0 | 0.00 |
| Total | 7 | 100.00 |

[Source: Field Survey, 2010]

The Table shows that 100% of the project affected households have sanitary latrines.

10. Health Status

Main Health Service Facilities of the Area

Responses by sample households on their main health service facilities in the area are presented in **Table-3.19**.

Table 3.19: Main Health Service Facilities of the Area

| Source | Households Coverage | % |
|----------------------------------|---------------------|-----|
| Facilities from Govt. Hospital | 7 | 100 |
| Facilities from Private Hospital | 7 | 100 |
| Union Health Clinic | 0 | 0 |
| NGO Clinic | 0 | 0 |
| Private Doctor | 0 | 0 |
| Pharmacy | 0 | 0 |
| Quack | 0 | 0 |

[Source: Field Survey, 2010]

The table shows affected household opinions on their main health service facilities in the area, where 100% of them go to the Govt. Hospital and private hospital.

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2. Impounding Reservoir and SWTP at Samonto Sena:

31 affected household are interviewed in SWTP and impounding reservoir area.

Surveyed information

1. Composition of Household Members

Table 3.20: Household composition by household head

| Household Surveyed | H/H No. | % |
|-------------------------|-----------|---------------|
| Male Headed Household | 31 | 100.00 |
| Female Headed Household | 0 | 0.00 |
| Total | 31 | 100.00 |

[Source: Field Survey, 2010]

Table 3.21: Household composition by sex

| Sex | No. of F Member | % of F Member | Average HH Size |
|--------------|-----------------|---------------|-----------------|
| Male | 74 | 58.27 | 4.10 |
| Female | 53 | 41.73 | |
| Total | 127 | 100.00 | |

[Source: Field Survey, 2010]

The data shows that the 100% of sample household is comprised of the male heads and in the family member 58.27% are male and 41.73% are female.

2. Age Sex Distribution

Age Sex distribution of the household members is presented in **Table-3.22**.

Table 3.22: Age-sex distribution of households

| Age Group | Male | % | Female | % | Total | % |
|--------------|-----------|---------------|-----------|---------------|------------|---------------|
| 1-4 | 6 | 8.11 | 1 | 1.89 | 7 | 5.51 |
| 5-9 | 1 | 1.35 | 3 | 5.66 | 4 | 3.15 |
| 10-14 | 3 | 4.05 | 1 | 1.89 | 4 | 3.15 |
| 15-19 | 5 | 6.76 | 2 | 3.77 | 7 | 5.51 |
| 20-49 | 43 | 58.11 | 34 | 64.15 | 77 | 60.63 |
| 50-60 | 12 | 16.22 | 12 | 22.64 | 24 | 18.90 |
| Above 60 | 4 | 5.41 | 0 | 0.00 | 4 | 3.15 |
| Total | 74 | 100.00 | 53 | 100.00 | 127 | 100.00 |

[Source: Field Survey, 2010]

The table shows the distribution of the age groups of the household members by their sex. From the table we can see that children of age groups 10 to 14 is about 3.15%, household members of age groups 20 to 49 (main work force) is 60.63%, those of age group above 60 is about 3.15%.

3. Religious and Ethnic Composition

Distribution of the households by their religion is summarized in **Table-3.23**.

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Table 3.23: Religious and Ethnic Composition of households

| Religion | No. of Households | % of Households |
|--------------|-------------------|-----------------|
| Muslim | 8 | 25.81 |
| Hindiu | 23 | 74.19 |
| Christian | 0 | 0.00 |
| Buddhist | 0 | 0.00 |
| Others | 0 | 0.00 |
| Total | 31 | 100.00 |

[Source: Field Survey, 2010]

It shows that the sample households are comprised of 25.81% Muslims & 74.19% Hindus

4. Educational Status of the Population

The educational status of the members of the household has been summarized in **Table-3.24**.

Table 3.24: Educational Status of the Population

| Educational status | Male | % | Female | % | Total | % |
|---------------------|-----------|---------------|-----------|---------------|------------|---------------|
| Illiterate | 5 | 6.76 | 0 | 0.00 | 5 | 3.94 |
| Can read only | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Can read & Write | 9 | 12.16 | 1 | 1.89 | 10 | 7.87 |
| Children <4 years | 6 | 8.11 | 2 | 3.77 | 8 | 6.30 |
| Primary (Class I-V) | 15 | 20.27 | 10 | 18.87 | 25 | 19.69 |
| Secondary (VI-X) | 13 | 17.57 | 17 | 32.08 | 30 | 23.62 |
| SSC Equivalent | 18 | 24.32 | 14 | 26.42 | 32 | 25.20 |
| HSC Equivalent | 4 | 5.41 | 7 | 13.21 | 11 | 8.66 |
| HSC + | 4 | 5.41 | 2 | 3.77 | 6 | 4.72 |
| Graduate | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Masters + | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Others | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Total | 74 | 100.00 | 53 | 100.00 | 127 | 100.00 |

[Source: Field Survey, 2010]

The table shows the distribution of the educational status of the household members by sex. This reveals that about 3.94% of the sample population is totally illiterate (who cannot read and write), about 0% can read and write without any formal education, primary level is 19.69%, secondary level is 23.62%, and also graduate and above is about 0%.

5. Economy and Employment

Main Occupation of the Household Members

Main occupations of the household members are summarized in **Table-3.25** by their sex.

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Table 3.25: Main Occupation of the Household Members

| Occupation | Male | % | Female | % | Total | % |
|------------------------|-----------|---------------|-----------|---------------|------------|---------------|
| Farmers | 45 | 60.81 | 0 | 0.00 | 45 | 35.43 |
| Fisher worker | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Agricultural Labor | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Non-agricultural Labor | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Service | 5 | 6.76 | 1 | 1.89 | 6 | 4.72 |
| Small Business | 3 | 4.05 | 0 | 0.00 | 3 | 2.36 |
| Households Works | 0 | 0.00 | 42 | 79.25 | 42 | 33.07 |
| Student | 11 | 14.86 | 9 | 16.98 | 20 | 15.75 |
| Children (< 5 years) | 6 | 8.11 | 1 | 1.89 | 7 | 5.51 |
| Retired/Handicapped | 1 | 1.35 | 0 | 0.00 | 1 | 0.79 |
| Unemployment | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Overseas Work | 2 | 2.70 | 0 | 0.00 | 2 | 1.57 |
| Others | 1 | 1.35 | 0 | 0.00 | 1 | 0.79 |
| Total | 74 | 100.00 | 53 | 100.00 | 127 | 100.00 |

[Source: Field Survey, 2010]

The table shows that the maximum of 15.75% is student, 33.03% in household work, 2.36% as small business, 4.72% in service and 5.51% are children of less than 5 years.

6. Monthly Income Patterns

Monthly income pattern of the sample households are presented in **Table-3.26**.

Table 3.26: Monthly Income Patterns

| Income Level | No. of Household | % of Income |
|-----------------------|------------------|---------------|
| Tk. 1000 - Tk. 5000 | 0 | 0.00 |
| Tk. 5001 - Tk. 10000 | 6 | 19.35 |
| Tk. 10001 - Tk. 15000 | 9 | 29.03 |
| Tk. 15001 - Tk. 20000 | 4 | 12.90 |
| Tk. 20001 - Tk. 25000 | 3 | 9.68 |
| Tk. 25001 and Above | 9 | 29.03 |
| Total | 31 | 100.00 |

[Source: Field Survey, 2010]

The Table shows that the range of monthly income of 19.35% of the sample house hold is Tk. 5001-10000, 12% of the sample household is 15001-20000 and 29.03% is 25,001 and above range.

7. Quality of Life Values

House Ownership

The distribution of the sample households by types of their residential house with respect to ownership and construction is presented in **Table-3.27**.

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Table 3.27: House Ownership

| House Ownership | No. of Households | % of Households |
|---------------------------|-------------------|-----------------|
| Self owned | 31 | 100.00 |
| Rented | 0 | 0.00 |
| Others | 0 | 0.00 |
| Total | 31 | 100.00 |
| Type of Housing structure | | |
| Katcha | 0 | 0.00 |
| Semi Pucca | 31 | 100.00 |
| Pucca | 0 | 0.00 |
| Others | 0 | 0.00 |
| Total | 31 | 100.00 |

[Source: Field Survey, 2010]

The table also shows that 100% of the houses are Semi Pucca (CI sheet roof with brick wall) and self owned.

8. Water and Sanitation

Sources and Use of Water by Purpose

Sources of water and their use were investigated and the results are summarized in **Table-3.28**.

Table 3.28: Sources and Use of Water by Purpose

| Type of Sources | Drinking No. H/H | (%) H/H | Cooking/ Washing No. H/H | (%) H/H | Bathing No. H/H | (%) H/H | Cattle Washing No. H/H | (%) H/H |
|---------------------|------------------|---------------|--------------------------|---------------|-----------------|---------------|------------------------|---------------|
| Tubewell (STW) | 26 | 83.87 | 26 | 83.87 | 23 | 74.19 | 23 | 74.19 |
| Deep Tubewell (DTW) | 5 | 16.13 | 5 | 16.13 | 5 | 16.13 | 4 | 12.90 |
| Supply Water | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Well | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Pond | 0 | 0.00 | 0 | 0.00 | 3 | 9.68 | 4 | 12.90 |
| Khal/River | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Total | 31 | 100.00 | 31 | 100.00 | 31 | 100.00 | 31 | 100.00 |

[Source: Field Survey, 2010]

The Table shows that around 83.87% of the households collect drinking water from swallow tube wells water and 16.33% of the households drink water from deep tube well.

9. Sanitation

The sanitation practice of the sample households and the types of latrines used are shown in **Table-3.29**

Table 3.29: Sanitation

| Types of Latrines Used | No. of Households | % of Households |
|------------------------|-------------------|-----------------|
| Sanitary | 31 | 100.00 |
| Pit | 0 | 0.00 |
| Hanging | 0 | 0.00 |
| Open space | 0 | 0.00 |
| Others | 0 | 0.00 |
| Total | 31 | 100.00 |

[Source: Field Survey, 2010]

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The Table shows that 100% of the project affected households have sanitary latrines.

10. Health Status

Main Health Service Facilities of the Area

Responses by sample households on their main health service facilities in the area are presented in **Table-3.30**.

Table 3.30: Main Health Service Facilities of the Area

| Source | Households Coverage | % |
|----------------------------------|---------------------|------------|
| Facilities from Govt. Hospital | 30 | 97 |
| Facilities from Private Hospital | 1 | 3 |
| Union Health Clinic | 0 | 0 |
| NGO Clinic | 0 | 0 |
| Private Doctor | 0 | 0 |
| Pharmacy | 0 | 0 |
| Quack | 0 | 0 |
| Total Sample Household | 31 | 100 |

[Source: Field Survey, 2010]

The table shows affected household opinions on their main health service facilities in the area, where 97% of them go to the Govt. Hospital & 3% people go to the private doctor.

11. Fish Cultivation area Information

According to the survey result, total land acquisition in the Samonto Sena is about 67.73 acre and among them 21.09 acre is for fish cultivation. **Table-3.31** shows the area of fish gher information as per the dag number.

Table 3.31: Fish Cultivation Information

| Sl. No. | Dag No. | Area (acre) |
|--------------|--------------------|--------------|
| 1 | 199, 179, 233 | 3.00 |
| 2 | 197, 198, 180 | 1.16 |
| 3 | 181 | 1.03 |
| 4 | 200, 158, 631 | 0.77 |
| 5 | 159, 156 | 0.60 |
| 6 | 167, 631 | 0.45 |
| 7 | 1501 | 0.33 |
| 8 | 213 | 0.51 |
| 9 | 214 | 1.00 |
| 10 | 1510, 1818 | 2.50 |
| 11 | 1515, 1513 | 0.85 |
| 12 | 1511, 1816 | 2.40 |
| 13 | 1529 | 1.90 |
| 14 | 1531 | 0.57 |
| 15 | 172 | 0.20 |
| 16 | 213, 209, 211, 212 | 2.07 |
| 17 | 175, 155 | 1.00 |
| 18 | 152, 155 | 0.75 |
| Total | | 21.09 |

[Source: Field Survey, 2010]

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12. Tree Information

According to the survey result, in the project facilities area in the Samonto Sena there are lot of variety of tree are found. **Table-3.32** shows the tree information with number found during the field survey.

Table 3.32: Tree Information

| Sl. No. | Tree Name in English | Local Name | Scientific Name | Size of the tree | | | |
|---------|--|--------------|---------------------------------|------------------|--------|-------|-------|
| | | | | Big | Middle | Plant | Total |
| 1 | Coconut Tree | Narical Gas | <i>Cocos nucifera</i> | 1199 | 113 | 45 | 1357 |
| 2 | Date Tree | Khajur Gas | <i>Phoenix sylvestria (L)</i> | 55 | 24 | 18 | 97 |
| 3 | Palm Tree | Tal gas | <i>Borrasus flabellifera L</i> | 16 | 34 | 27 | 77 |
| 4 | Papaya Tree | Pape gas | | 1446 | - | 100 | 1546 |
| 5 | Banana Tree | Kola gas | <i>Mysa spp.</i> | 904 | 180 | - | 1084 |
| 6 | Mango Tree | Am gas | <i>Melios agedarach</i> | 59 | 279 | 220 | 558 |
| 7 | Mahagoni Tree | Mahagoni gas | <i>Svetenia Mahagoni</i> | 164 | 145 | 50 | 359 |
| 8 | | Koroi gas | | 8 | 3 | 10 | 21 |
| 9 | Acacia Tree | Babla gas | | 8 | 8 | 3 | 19 |
| 10 | Neem Tree | Neem gas | | 12 | 172 | 279 | 463 |
| 11 | Jackfruit Tree | Kathal gas | <i>Artocarpus heterophyllus</i> | 11 | 28 | 31 | 70 |
| 12 | Guava Tree | Peara gas | <i>Psidium guajava</i> | 13 | 28 | 10 | 51 |
| 13 | Lemon Tree | Lebu gas | <i>Citrus aurantifolia</i> | 10 | 150 | - | 160 |
| 14 | Aroid Tree | Kachu gas | <i>Cyrtosperma</i> | 120 | - | - | 120 |
| 15 | | Dhunche gas | | 200 | - | - | 200 |
| 16 | Betel-Nut Tree | Supari gas | <i>Areca catechu</i> | 197 | 32 | 45 | 274 |
| 17 | Shirisa Tree | Shiris gas | | 134 | 541 | 80 | 755 |
| 18 | Bamboo | Bash gas | | 970 | - | - | 970 |
| 19 | Black-Berry Tree | Jam gas | | - | 1 | - | 1 |
| 20 | Hog-Plum Tree | Aura gas | | 6 | - | 10 | 16 |
| 21 | Emblic Tree | Amloki gas | | 6 | - | - | 6 |
| 22 | Berry Tree | Boroi gas | | 5 | 31 | - | 36 |
| 23 | Elephant Apple Tree/ Sour Wood Apple Tree | Kothal gas | <i>Aegle maronelos</i> | 2 | - | - | 2 |
| 24 | Morunga Tree | Sajna gas | | 13 | 5 | - | 18 |
| 25 | Young Tree | Kooha gas | | 600 | - | 32 | 632 |

[Source: Field Survey, 2010]

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3. Distribution Reservoir and Overhead Tank at Khulna City Corporation Area:

According to the **Table-3.33**, 6 (Six) sites are owned by Khulna City Corporation and 5 (five) sites are private land. Among the 5 (five) private lands 3 (three) household surveys was completed and other two they disagree with us to give any information. The three land owners' information is presented in the **Table-3.33**. These three household surveyed data are presented in the tabular form.

Table 3.33: Name and Location of reservoir and Overhead Tank

| Name | Proposed Location |
|---|-------------------------|
| Deana West Pana Overhead tank and Reservoir | Personal Land |
| No.16 Ward office Overhead tank and Reservoir | KCC Land |
| Sonadanga Moha Sarak Overhead tank and Reservoir | Personal Land |
| Beside of No.7 Ward office Overhead tank and Reservoir | Personal Land |
| Khalishpur Charerhat River Ghat Overhead tank and Reservoir | Government Land (BIWTA) |
| Rab Sarani Overhead tank | Personal Land |
| Mujganj Overhead tank | KCC Land |
| Ferry Ghat Power House Overhead tank | KCC Land |
| Andir Pukur Overhead tank | Personal Land |
| South Side of Ward No. 31 Office Overhead tank | Personal Land |
| DPHE Rupsa Overhead tank | Government Land (DPHE) |

1. Composition of Household Members

Distribution of household members with household heads and family members are presented in **Table-3.34** and **Table-3.35**.

Table 3.34: Household Surveyed

| Household Surveyed | H/H No. | % |
|-------------------------|----------|------------|
| Male Headed Household | 3 | 100 |
| Female Headed Household | 0 | 0 |
| Total | 3 | 100 |

[Source: Field Survey, 2010]

Table-3.35: Total Family Members

| Sex | No. of F Member | % of F Member | Average HH Size |
|--------------|-----------------|---------------|-----------------|
| Male | 12 | 63 | 6 |
| Female | 7 | 37 | |
| Total | 19 | 100 | |

[Source: Field Survey, 2010]

The data shows that the 100% of sample household is comprised of the male heads and in the family member 63% are male and 37 are female.

2. Age Sex Distribution

Age Sex distribution of the household members is presented in **Table-3.36**.

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Table-3.36: Age Structure of the Population

| Age Group | Male | % | Female | % | Total | % |
|--------------|-----------|---------------|----------|------------|-----------|------------|
| 1-4 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| 5-9 | 0 | 0.00 | 1 | 14.29 | 1 | 5.26 |
| 10-14 | 3 | 25.00 | 1 | 14.29 | 4 | 21.05 |
| 15-19 | 1 | 8.33 | 0 | 0.00 | 1 | 5.26 |
| 20-49 | 4 | 33.33 | 3 | 42.86 | 7 | 36.84 |
| 50-60 | 3 | 25.00 | 1 | 14.29 | 4 | 21.05 |
| Above 60 | 1 | 8.33 | 1 | 14.29 | 2 | 10.53 |
| Total | 12 | 100.00 | 7 | 100 | 19 | 100 |

[Source: Field Survey, 2010]

The table shows the distribution of the age groups of the household members by their sex. From the table we can see that children of age groups 10 to 14 is about 21.05%, household members of age groups 20 to 49 (main work force) is 36.84%, those of age group above 60 is about 10.53%.

3. Religious and Ethnic Composition

Distribution of the households by their religion is summarized in Table-3.37.

Table-3.37: Religious Character of the Affected Area

| Religion | No. of Households | % of Households |
|--------------|-------------------|-----------------|
| Islam | 3 | 100.00 |
| Hindu | 0 | 0.00 |
| Christian | 0 | 0.00 |
| Buddhist | 0 | 0.00 |
| Others | 0 | 0.00 |
| Total | 3 | 100.00 |

[Source: Field Survey, 2010]

It shows that the sample households are comprised of 100% Muslims.

4. Educational Status of the Population

The educational status of the members of the household has been summarized in Table-3.38.

Table-3.38: Level of Education of the Populations (city)

| Educational status | Male | % | Female | % | Total | % |
|---------------------|-----------|---------------|----------|---------------|-----------|---------------|
| Illiterate | 0 | 0.00 | 2 | 28.57 | 2 | 10.53 |
| Can read only | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Can read & Write | 1 | 8.33 | 0 | 0.00 | 1 | 5.26 |
| Children <4 years | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Primary (Class I-V) | 1 | 8.33 | 0 | 0.00 | 1 | 5.26 |
| Secondary (VI-X) | 5 | 41.67 | 4 | 57.14 | 9 | 47.37 |
| SSC Equivalent | 2 | 16.67 | 0 | 0.00 | 2 | 10.53 |
| HSC Equivalent | 2 | 16.67 | 1 | 14.29 | 3 | 15.79 |
| HSC + | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Graduate | 1 | 8.33 | 0 | 0.00 | 1 | 5.26 |
| Masters + | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Others | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Total | 12 | 100.00 | 7 | 100.00 | 19 | 100.00 |

[Source: Field Survey, 2010]

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The table shows the distribution of the educational status of the household members by sex. This reveals that about 10.53% of the sample population is totally illiterate (who cannot read and write), about 5.26% can read and write without any formal education, primary level is 5.26%, secondary level is 47.37%, and also graduate and above is about 5.26%.

5. Economy and Employment

Main Occupation of the Household Members

Main occupations of the household members are summarized in Table-3.39 by their sex.

Table-3.39: Occupational Pattern

| Occupation | Male | % | Female | % | Total | % |
|------------------------|-----------|---------------|----------|---------------|-----------|---------------|
| Farmers | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Fishermen | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Agricultural Labor | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Non-agricultural Labor | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Service | 1 | 8.33 | 0 | 0.00 | 1 | 5.26 |
| Small Business | 3 | 25.00 | 0 | 0.00 | 3 | 15.79 |
| Households Works | 0 | 41.67 | 5 | 71.43 | 5 | 26.32 |
| Student | 5 | 0.00 | 1 | 14.29 | 6 | 31.58 |
| Children (< 5 years) | 0 | 0.00 | 1 | 14.29 | 1 | 5.26 |
| Retired/Handicapped | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Unemployment | 1 | 8.33 | 0 | 0.00 | 1 | 5.26 |
| Overseas Work | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Others | 2 | 16.67 | 0 | 0.00 | 2 | 10.53 |
| Total | 12 | 100.00 | 7 | 100.00 | 19 | 100.00 |

[Source: Field Survey, 2010]

The table shows that the maximum of 31.58% is student, 26.32% in household work, 15.79% as small business, 5.26% in service, 10.53% in others work, small trade, 5.26% are children of less than 5 years and 5.26% are unemployed.

6. Monthly Income Patterns

Monthly income pattern of the sample households are presented in Table-3.40.

Table-3.40: Income Level of Household

| Income Level | No. of Household | % of Income |
|-----------------------|------------------|---------------|
| Tk. 1000 - Tk. 5000 | 0 | 0.00 |
| Tk. 5001 - Tk. 10000 | 1 | 33.33 |
| Tk. 10001 - Tk. 15000 | 0 | 0.00 |
| Tk. 15001 - Tk. 20000 | 1 | 33.33 |
| Tk. 20001 - Tk. 25000 | 0 | 0.00 |
| Tk. 25001 and Above | 1 | 33.33 |
| Total | 3 | 100.00 |

[Source: Field Survey, 2010]

The Table shows that the range of monthly income of 33.33% of the sample house hold is Tk. 5001-10000, 15001-20000 and 25,001 and above.

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7. Quality of Life Values

House Ownership

The distribution of the sample households by types of their residential house with respect to ownership and construction is presented in **Table-3.41**.

Table-3.41: Housing Pattern and Ownership in the Affected Area

| House Ownership | No. of Households | % of Households |
|----------------------------------|-------------------|-----------------|
| Self owned | 3 | 100.00 |
| Rented | 0 | 0.00 |
| Others | 0 | 0.00 |
| Total | 3 | 100.00 |
| Type of Housing structure | | |
| Katcha | 0 | 0.00 |
| Semi Pucca | 1 | 33.33 |
| Pucca | 1 | 33.33 |
| Others | 1 | 33.33 |
| Total | 3 | 100.00 |

[Source: Field Survey, 2010]

The table also shows that 33.33% of the houses are Semi Pucca (CI sheet roof with brick wall) and 33.33% are Pucca (reinforced concrete roof with brick wall) and 33.33% are staying in apartment building.

8. Water and Sanitation

Sources and Use of Water by Purpose

Sources of water and their use were investigated and the results are summarized in **Table-3.42**.

Table-3.42: Sources of Water and Uses

| Type of Sources | Drinking No. H/H | (%) H/H | Cooking/Washing No. H/H | (%) H/H | Bathing No. H/H | (%) H/H | Cattle Washing No. H/H | (%) H/H |
|----------------------|------------------|---------------|-------------------------|---------------|-----------------|---------------|------------------------|-------------|
| Tube well (STW) | 1 | 33.33 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Deep Tube well (DTW) | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Supply Water | 2 | 66.67 | 2 | 66.67 | 2 | 66.67 | 0 | 0.00 |
| Well | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Pond | 0 | 0.00 | 1 | 33.33 | 1 | 33.33 | 0 | 0.00 |
| Khal/River | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Total | 3 | 100.00 | 3 | 100.00 | 3 | 100.00 | 0 | 0.00 |

[Source: Field Survey, 2010]

The Table shows that around 33.33% of the households drink tube wells water, around 66.67% of the households drink water from supply water by KWASA.

9. Sanitation

The sanitation practice of the sample households and the types of latrines used are shown in **Table-3.43**.

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Table-3.43: Access to Sanitary Latrine

| Types of Latrines Used | No. of Households | % of Households |
|------------------------|-------------------|-----------------|
| Sanitary | 3 | 100.00 |
| Pit | 0 | 0.00 |
| Hanging | 0 | 0.00 |
| Open space | 0 | 0.00 |
| Others | 0 | 0.00 |
| Total | 3 | 100.00 |

[Source: Field Survey, 2010]

The Table shows that 100% of the project affected households have sanitary latrines.

10. Health Status

Main Health Service Facilities of the Area

Responses by sample households on their main health service facilities in the area are presented in **Table-3.44**.

Table-3.44: Access to Health Facilities

| Source | Households Coverage | % |
|----------------------------------|---------------------|-----|
| Facilities from Govt. Hospital | 3 | 100 |
| Facilities from Private Hospital | 2 | 67 |
| Union Health Clinic | 0 | 0 |
| NGO Clinic | 0 | 0 |
| Private Doctor | 0 | 0 |
| Pharmacy | 1 | 33 |
| Quack | 0 | 0 |
| Total Sample Household | 3 | |

[Source: Field Survey, 2010]

The table shows affected household opinions on their main health service facilities in the area, where 100% of them go to the Govt. Hospital, and 67% of them go to the Private Hospital, 33% goes to Pharmacy.

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3.2.5 Tenant and Worker Socio Economic Information

1. Tenant of Samonto Sena:

Tenant Surveyed information

1. Composition of Household Members

Table 3.45: Household composition by household head

| Household Surveyed | H/H No. | % |
|-------------------------|----------|------------|
| Male Headed Household | 8 | 100 |
| Female Headed Household | | 0 |
| Total | 8 | 100 |

[Source: Field Survey, 2010]

Table 3.46: Household composition by sex

| Sex | No. of Family Member | % of Family Member | Average HH Size |
|--------------|----------------------|--------------------|-----------------|
| Male | 16 | 64 | |
| Female | 9 | 36 | 3.13 |
| Total | 25 | 100 | |

[Source: Field Survey, 2010]

The data shows that the 100% of sample household is comprised of the male heads and in the family member 64% are male and 36% are female.

2. Age Sex Distribution

Age Sex distribution of the household members is presented in **Table-3.47**.

Table 3.47: Age-sex distribution of households

| Age Group | Male | % | Female | % | Total | % |
|--------------|-----------|---------------|----------|------------|-----------|------------|
| 1-4 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| 5-9 | 1 | 6.25 | 1 | 11.11 | 2 | 8.00 |
| 10-14 | 2 | 12.50 | 0 | 0.00 | 2 | 8.00 |
| 15-19 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| 20-49 | 9 | 56.25 | 4 | 44.44 | 13 | 52.00 |
| 50-60 | 2 | 12.50 | 4 | 44.44 | 6 | 24.00 |
| Above 60 | 2 | 12.50 | 0 | 0.00 | 2 | 8.00 |
| Total | 16 | 100.00 | 9 | 100 | 25 | 100 |

[Source: Field Survey, 2010]

The table shows the distribution of the age groups of the household members by their sex. From the table we can see that children of age groups 10 to 14 is about 8%, household members of age groups 20 to 49 (main work force) is 52%, those of age group above 60 is about 8%.

3. Religious and Ethnic Composition

Distribution of the households by their religion is summarized in **Table-3.48**.

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Table 3.48: Religious and Ethnic Composition of households

| Religion | No. of Households | % of Households |
|--------------|-------------------|-----------------|
| Islam | 5 | 62.50 |
| Hindu | 3 | 37.50 |
| Christian | 0 | 0.00 |
| Buddhist | 0 | 0.00 |
| Others | 0 | 0.00 |
| Total | 8 | 100.00 |

[Source: Field Survey, 2010]

It shows that the sample households are comprised of 62.50% Muslims and 37.50% Hindu.

4. Educational Status of the Population

The educational status of the members of the household has been summarized in **Table-3.49**.

Table 3.49: Educational Status of the Population

| Educational status | Male | % | Female | % | Total | % |
|---------------------|-----------|---------------|----------|---------------|-----------|---------------|
| Illiterate | 1 | 6.25 | 1 | 11.11 | 2 | 8.00 |
| Can read only | 1 | 6.25 | 0 | 0.00 | 1 | 4.00 |
| Can read & Write | 0 | 0.00 | 1 | 11.11 | 1 | 4.00 |
| Children <4 years | 1 | 6.25 | 0 | 0.00 | 1 | 4.00 |
| Primary (Class I-V) | 5 | 31.25 | 4 | 44.44 | 9 | 36.00 |
| Secondary (VI-X) | 7 | 43.75 | 3 | 33.33 | 10 | 40.00 |
| SSC Equivalent | 1 | 6.25 | 0 | 0.00 | 1 | 4.00 |
| HSC Equivalent | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| HSC + | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Graduate | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Masters + | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Others | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Total | 16 | 100.00 | 9 | 100.00 | 25 | 100.00 |

[Source: Field Survey, 2010]

The table shows the distribution of the educational status of the household members by sex. This reveals that about 8% of the sample population is totally illiterate (who cannot read and write), primary level is 36%, secondary level is 40%, and also graduate and above is about 0%.

5. Economy and Employment

Main Occupation of the Household Members

Main occupations of the household members are summarized in **Table-3.50** by their sex.

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Table 3.50: Main Occupation of the Household Members

| Occupation | Male | % | Female | % | Total | % |
|------------------------|-----------|---------------|----------|---------------|-----------|---------------|
| Farmers | 12 | 75.00 | 0 | 0.00 | 12 | 48.00 |
| Fishermen | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Agricultural Labor | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Non-agricultural Labor | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Service | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Small Business | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Households Works | 0 | 12.50 | 8 | 88.89 | 8 | 32.00 |
| Student | 2 | 6.25 | 1 | 11.11 | 3 | 12.00 |
| Children (< 5 years) | 1 | 0.00 | 0 | 0.00 | 1 | 4.00 |
| Retired/Handicapped | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Unemployment | 1 | 6.25 | 0 | 0.00 | 1 | 4.00 |
| Overseas Work | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Others | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Total | 16 | 100.00 | 9 | 100.00 | 25 | 100.00 |

[Source: Field Survey, 2010]

The table shows that the maximum of 12.00% is student, 32.00% in household work, 48% farmer, 48.57% in service and 4% are children of less than 5 years.

6. Monthly Income Patterns

Monthly income pattern of the sample households are presented in **Table-3.51**.

Table 3.51: Monthly Income Patterns

| Income Level | No. of Household | % of Income |
|-----------------------|------------------|---------------|
| Tk. 1000 - Tk. 5000 | 0 | 0.00 |
| Tk. 5001 - Tk. 10000 | 1 | 12.50 |
| Tk. 10001 - Tk. 15000 | 2 | 25.00 |
| Tk. 15001 - Tk. 20000 | 3 | 37.50 |
| Tk. 20001 - Tk. 25000 | 1 | 12.50 |
| Tk. 25001 and Above | 1 | 12.50 |
| Total | 8 | 100.00 |

[Source: Field Survey, 2010]

The Table shows that the range of monthly income of 12.50% of the sample house hold is Tk. 10001-15000, 37.50% of the sample household is 15001-20000 and 12.50% is in 20,001 and above range.

7. Quality of Life Values

House Ownership

The distribution of the sample households by types of their residential house with respect to ownership and construction is presented in **Table-3.52**.

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Table 3.52: House Ownership

| House Ownership | No. of Households | % of Households |
|----------------------------------|-------------------|-----------------|
| Self owned | 8 | 100.00 |
| Rented | 0 | 0.00 |
| Others | 0 | 0.00 |
| Total | 8 | 100.00 |
| Type of Housing structure | | |
| Katcha | 1 | 12.50 |
| Semi Pucca | 7 | 87.50 |
| Pucca | 0 | 0.00 |
| Others | 0 | 0.00 |
| Total | 8 | 100.00 |

[Source: Field Survey, 2010]

The table also shows that 87.50% of the houses are Semi pucca (CI sheet roof with brick wall), 12.50% is pucca and 100% houses are self owned by the land owners.

8. Water and Sanitation

Sources and Use of Water by Purpose

Sources of water and their use were investigated and the results are summarized in **Table-3.53**.

Table 3.53: Sources and Use of Water by Purpose

| Type of Sources | Drinking No. H/H | (%) H/H | Cooking/ Washing No. H/H | (%) H/H | Bathing No. H/H | (%) H/H | Cattle Washing No. H/H | (%) H/H |
|---------------------|------------------|---------------|--------------------------|---------------|-----------------|---------------|------------------------|---------------|
| Tubewell (STW) | 8 | 100.00 | 8 | 100.00 | 4 | 50.00 | 1 | 100.00 |
| Deep Tubewell (DTW) | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Supply Water | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Well | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Pond | 0 | 0.00 | 0 | 0.00 | 3 | 37.50 | 0 | 0.00 |
| Khal/River | 0 | 0.00 | 0 | 0.00 | 1 | 12.50 | 0 | 0.00 |
| Total | 8 | 100.00 | 8 | 100.00 | 8 | 100.00 | 1 | 100.00 |

[Source: Field Survey, 2010]

The Table shows that around 100% of the households collect water use water for drinkin, cooking/ washing, bathing & cattle washing from tube wells (STP) water.

9. Sanitation

The sanitation practice of the sample households and the types of latrines used are shown in **Table-3.54**

Table 3.54: Sanitation

| Types of Latrines Used | No. of Households | % of Households |
|------------------------|-------------------|-----------------|
| Sanitary | 6 | 75.00 |
| Pit | 2 | 25.00 |
| Hanging | 0 | 0.00 |
| Open space | 0 | 0.00 |
| Others | 0 | 0.00 |
| Total | 8 | 100.00 |

[Source: Field Survey, 2010]

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The Table shows that 75% of the project affected households have sanitary latrines.

10. Health Status

Main Health Service Facilities of the Area

Responses by sample households on their main health service facilities in the area are presented in **Table-3.55**.

Table 3.55: Main Health Service Facilities of the Area

| Source | Households Coverage | % |
|----------------------------------|---------------------|-----|
| Facilities from Govt. Hospital | 8 | 100 |
| Facilities from Private Hospital | 5 | 63 |
| Union Health Clinic | 0 | 0 |
| NGO Clinic | 0 | 0 |
| Private Doctor | 0 | 0 |
| Pharmacy | 5 | 63 |
| Quack | 0 | 0 |

[Source: Field Survey, 2010]

The data shows affected household opinions on their main health service facilities in the area, where 100% of them go to the Govt. Hospital and 63% total also go to private hospitals.

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2. Workers at Samonto Sena:

1. Composition of Household Members

Table 3.56: Household composition by household head

| Household Surveyed | H/H No. | % |
|-------------------------|----------|------------|
| Male Headed Household | 5 | 100 |
| Female Headed Household | 0 | 0 |
| Total | 5 | 100 |

[Source: Field Survey, 2010]

Table 3.57: Household composition by sex

| Sex | No. of Family Member | % of Family Member | Average HH Size |
|--------------|----------------------|--------------------|-----------------|
| Male | 10 | 59 | 3.4 |
| Female | 7 | 41 | |
| Total | 17 | 100 | |

[Source: Field Survey, 2010]

The data shows that the 100% of sample household is comprised of the male heads and in the family member 59% are male and 41% are female.

2. Age Sex Distribution

Age Sex distribution of the household members is presented in Table-3.58.

Table 3.58: Age-sex distribution of households

| Age Group | Male | % | Female | % | Total | % |
|--------------|-----------|---------------|----------|------------|-----------|------------|
| 1-4 | 0 | 0.00 | 1 | 14.29 | 1 | 5.88 |
| 5-9 | 1 | 10.00 | 0 | 0.00 | 1 | 5.88 |
| 10-14 | 1 | 10.00 | 1 | 14.29 | 2 | 11.76 |
| 15-19 | 1 | 10.00 | 0 | 0.00 | 1 | 5.88 |
| 20-49 | 5 | 50.00 | 4 | 57.14 | 9 | 52.94 |
| 50-60 | 2 | 20.00 | 1 | 14.29 | 3 | 17.65 |
| Above 60 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Total | 10 | 100.00 | 7 | 100 | 17 | 100 |

[Source: Field Survey, 2010]

The table shows the distribution of the age groups of the household members by their sex. From the table we can see that children of age groups 10 to 14 is about 11.76%, household members of age groups 20 to 49 (main work force) is 52.94%, those of age group above 60 is about 0%.

3. Religious and Ethnic Composition

Distribution of the households by their religion is summarized in Table-3.59.

Table 3.59: Religious and Ethnic Composition of households

| Religion | No. of Households | % of Households |
|--------------|-------------------|-----------------|
| Muslim | 4 | 80.00 |
| Hindiu | 1 | 20.00 |
| Christian | 0 | 0.00 |
| Buddhist | 0 | 0.00 |
| Others | 0 | 0.00 |
| Total | 5 | 100.00 |

[Source: Field Survey, 2010]

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It shows that the sample households are comprised of 80% Muslims and 20% Hindu.

4. Educational Status of the Population

The educational status of the members of the household has been summarized in **Table-3.60**.

Table 3.60: Educational Status of the Population

| Educational status | Male | % | Female | % | Total | % |
|---------------------|-----------|---------------|----------|---------------|-----------|---------------|
| Illiterate | 1 | 10.00 | 0 | 0.00 | 1 | 5.88 |
| Can read only | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Can read & Write | 1 | 10.00 | 1 | 14.29 | 2 | 11.76 |
| Children <4 years | 0 | 0.00 | 1 | 14.29 | 1 | 5.88 |
| Primary (Class I-V) | 1 | 10.00 | 2 | 28.57 | 3 | 17.65 |
| Secondary (VI-X) | 5 | 50.00 | 3 | 42.86 | 8 | 47.06 |
| SSC Equivalent | 2 | 20.00 | 0 | 0.00 | 2 | 11.76 |
| HSC Equivalent | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| HSC + | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Graduate | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Masters + | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Others | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Total | 10 | 100.00 | 7 | 100.00 | 17 | 100.00 |

[Source: Field Survey, 2010]

The table shows the distribution of the educational status of the household members by sex. This reveals that about 5.88% of the sample population is totally illiterate (who cannot read and write), primary level is 17.65%, secondary level is 47.06%, and also graduate and above is about 0%.

5. Economy and Employment

Main Occupation of the Household Members

Main occupations of the household members are summarized in **Table-3.61** by their sex.

Table 3.61: Main Occupation of the Household Members

| Occupation | Male | % | Female | % | Total | % |
|-------------------------|-----------|---------------|----------|---------------|-----------|---------------|
| Farmers | 2 | 20.00 | 0 | 0.00 | 2 | 11.76 |
| Fisher worker | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Agricultural Labour | 4 | 40.00 | 0 | 0.00 | 4 | 23.53 |
| Non-agricultural Labour | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Service | 1 | 10.00 | 0 | 0.00 | 1 | 5.88 |
| Small Business | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Households Works | 0 | 30.00 | 6 | 85.71 | 6 | 35.29 |
| Student | 3 | 0.00 | 0 | 0.00 | 3 | 17.65 |
| Children (< 5 years) | 0 | 0.00 | 1 | 14.29 | 1 | 5.88 |
| Retired/Handicapped | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Unemployment | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Overseas Work | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Others | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Total | 10 | 100.00 | 7 | 100.00 | 17 | 100.00 |

[Source: Field Survey, 2010]

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The table shows that the maximum of 17.55% is student, 35.29% in household work, 11.76% farmer, 23.53 is agricultural labour, 5.88% in service and children of less than 5 years.

6. Monthly Income Patterns

Monthly income pattern of the sample households are presented in **Table-3.62**.

Table 3.62: Monthly Income Patterns

| Income Level | No. of Household | % of Income |
|-----------------------|------------------|---------------|
| Tk. 1000 - Tk. 5000 | 0 | 0.00 |
| Tk. 5001 - Tk. 10000 | 5 | 100.00 |
| Tk. 10001 - Tk. 15000 | 0 | 0.00 |
| Tk. 15001 - Tk. 20000 | 0 | 0.00 |
| Tk. 20001 - Tk. 25000 | 0 | 0.00 |
| Tk. 25001 and Above | 0 | 0.00 |
| Total | 5 | 100.00 |

[Source: Field Survey, 2010]

The Table shows that the range of monthly income of 100% of the sample house hold is Tk. 10001-15000.

7. Quality of Life Values

House Ownership

The distribution of the sample households by types of their residential house with respect to ownership and construction is presented in **Table-3.63**.

Table 3.63: House Ownership

| House Ownership | No. of Households | % of Households |
|----------------------------------|-------------------|-----------------|
| Self owned | 5 | 100.00 |
| Rented | 0 | 0.00 |
| Others | 0 | 0.00 |
| Total | 5 | 100.00 |
| Type of Housing structure | | |
| Katcha | 3 | 60.00 |
| Semi Pucca | 2 | 40.00 |
| Pucca | 0 | 0.00 |
| Others | 0 | 0.00 |
| Total | 5 | 100.00 |

[Source: Field Survey, 2010]

The table also shows that 60% of the houses are Semi pucca (CI sheet roof with brick wall), 40% is pucca and 100% houses are self owned by the land owners.

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8. Water and Sanitation

Sources and Use of Water by Purpose

Sources of water and their use were investigated and the results are summarized in **Table-3.64**.

Table 3.64: Sources and Use of Water by Purpose

| Type of Sources | Drinking No. H/H | (%) H/H | Cooking/ Washing No. H/H | (%) H/H | Bathing No. H/H | (%) H/H | Cattle Washing No. H/H | (%) H/H |
|---------------------|---------------------|---------------|--------------------------------|---------------|--------------------|---------------|------------------------------|---------------|
| Tubewell (STW) | 5 | 100.00 | 5 | 100.00 | 2 | 40.00 | | 0.00 |
| Deep Tubewell (DTW) | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | | 0.00 |
| Supply Water | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | | 0.00 |
| Well | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | | 0.00 |
| Pond | 0 | 0.00 | 0 | 0.00 | 2 | 40.00 | 3 | 25.00 |
| Khal/River | 0 | 0.00 | 0 | 0.00 | 1 | 20.00 | 9 | 75.00 |
| Total | 5 | 100.00 | 5 | 100.00 | 5 | 100.00 | 12 | 100.00 |

[Source: Field Survey, 2010]

The Table shows that around 100% of the households collect water use water for drinking & cooking/ washing purpose from swallow tube wells and 40 % for bathing purpose use the pond water.

9. Sanitation

The sanitation practice of the sample households and the types of latrines used are shown in **Table-3.65**.

Table 3.65: Sanitation

| Types of Latrines Used | No. of Households | % of Households |
|------------------------|-------------------|-----------------|
| Sanitary | 5 | 100.00 |
| Pit | 0 | 0.00 |
| Hanging | 0 | 0.00 |
| Open space | 0 | 0.00 |
| Others | 0 | 0.00 |
| Total | 5 | 100.00 |

[Source: Field Survey, 2010]

The Table shows that 100% of the project affected households have sanitary latrines.

10. Health Status

Main Health Service Facilities of the Area

Responses by sample households on their main health service facilities in the area are presented in **Table-3.66**.

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| Source | Households Coverage | % |
|----------------------------------|---------------------|-----|
| Facilities from Govt. Hospital | 5 | 100 |
| Facilities from Private Hospital | 0 | 0 |
| Union Health Clinic | 0 | 0 |
| NGO Clinic | 0 | 0 |
| Private Doctor | 0 | 0 |
| Pharmacy | 5 | 100 |
| Quack | 0 | 0 |

[Source: Field Survey, 2010]

The table shows affected household opinions on their main health service facilities in the area, where 100% of them go to the Govt. Hospital.

3.2.6 Other Socio-economic information

1. A Shop Owner at Andir Pukur Overhead Tank Side:

Observation from the questionnaire survey:

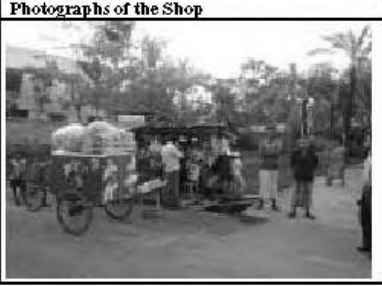
Table 3.67: Shop Owners Information

| Sl. No. | Item | Information |
|---------|-------------------|-------------|
| 1 | Family Member | 1 |
| 2 | House | Rent |
| 3 | Housing Structure | Kutchra |
| 4 | Income level | Tk.5000/- |

[Source: Field Survey, 2010]

Shop Information:

Table 3.68: Shop Information

| Sl No. | Item | Information | Photographs of the Shop |
|--------|---------------|---|--|
| 1 | Area | 10x 7 ft ² |  |
| 2 | Shop made off | Tin, Wood | |
| 3 | Selling Item | Battle leaf, Cigarettes, Ice Cream, Cake, Biscuit, chips and etc. | |

[Source: Field Survey, 2010]

The shop is basically built on the road side drainage by using some wood providing at the floor. This shop is not government approved means he did not pay any tax to the Khulna city corporation. At the construction stage for some instant the shop will move to the somewhere and after completion of the project he can to the site again and do his business.

According the Bangladesh Government Acquisition and Requisition Immoveable Property Ordinance (ARIP0) of 1982 and its subsequent amendments in 1993 and 1994, only the land owner's will be compensated and inside the project if there is any permanent structure that the project will touch then under the resettlement plan the land owners will get the compensation. But the project will not touch any permanent structure. In this case the shop is just like a squatter and only under the Involuntary Resettlement of Safeguard Policy Statement of ADB, the compensation, assistance and benefits for displaced persons can be arranged.

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2. Leaseholder at Charerhat, Khalispur Reservoir and Overhead Tank Side:

In the Khulna City Corporation area, there is five distribution reservoir and eleven overhead tanks. Among them one side is Khalishpur Chorerhat River Ghat at ward no-13. One compant are doing business at that side by taking lease from Bangladesh Inland Transport Authority (BIWTA).

Observation from the questionnaire survey:

Table 3.69: Shop Owners Information

| Sl. No. | Item | Information |
|---------|-------------------|--------------------|
| 1 | Family Member | 4 |
| 2 | House | Own |
| 3 | Housing Structure | Pucca |
| 4 | Cooking fuel | Cylinder gas |
| 5 | Water Source | Deep Tube well |
| 6 | Income level | Tk. 1,00,000/- |
| 7 | Business | Bricks, sand, etc. |

[Source: Field Survey, 2010]

Photographs of the location:



As this is government land of Bangladesh Inland Transport Authority (BIWTA), when KWASA is going to Acquisition, then he has to the compensation the Land Ministry. As there is eleven drivers and three labour/workers are working at that place and after the acquisition they may change their working place.

According the Bangladesh Government Acquisition and Requisition Immoveable Property Ordinance (ARIPO) of 1982 and its subsequent amendments in 1993 and 1994, only the land owner's will be compensated and inside the project if there is any permanent structure that the project will touch then under the resettlement plan the land owners will get the compensation, but inside the project location there is no such permanent structure. In this case the lease holder is just like a tenant, and only under the Involuntary Resettlement of Safeguard Policy Statement of ADB, the compensation, assistance and benefits for displaced persons can be arranged such as some vocational training can be provided to the leaseholder and the labour/worker.

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representatives of professional groups like businessmen, farmers, teachers, religious leaders and public representatives as well as members and chairman of the Union and Upazila Councils and the consultant.

All of the participants have carefully studied all types of impacts in the locality of the proposed water supply project as explained JICA Study Team and voiced their opinion which was duly recorded. The details of the venue of meetings, participants at different dates have been incorporated in the report in a summary format and also presented in tabular forms. The public consultation meeting minutes and participation list are presented in the **Annex-4**.

Table-4.1: Details of Public Consultation at Different Sites

a. Stakeholders meeting

| Sl. No. | Date | Places | Affected PAP & Focus Group/ Local People | KWASA Staff | JICA Staff | Others | Total |
|---------|------------|---------------------------------|--|-------------|------------|--------|-------|
| 1 | 12-08-2010 | KWASA office | 2 | 4 | 4 | 14 | 24 |
| 2 | 21-08-2010 | Patharghata High School, Rupsha | 150 | 3 | 3 | 3 | 159 |

b. Focus Group Discussion and Public Consultation

| Sl. No. | Date | Places | Affected PAP & Focus Group/ Local People | KWASA Staff | JICA Staff | Others | Total |
|---------|-----------|-----------------------------|--|-------------|------------|--------|-------|
| 1 | 7-10-2010 | Patharghata | 7 | 1 | 1 | - | 9 |
| 2 | 9-10-2010 | Samonto Sena Bazar | 7 | 1 | 1 | - | 9 |
| 3 | 9-10-2010 | Mollarhat Technical College | 7 | 1 | 1 | - | 9 |

Source: Field Survey

c. Individual Consultation

| Sl. No. | Date | Places | Affected PAP & Focus Group/ Local People | KWASA Staff | JICA Staff | Others | Total |
|---------|-----------|----------------------|--|-------------|------------|--------|-------|
| 1 | 7-10-2010 | Andir Pukur | 1 | 1 | 1 | 1 | 4 |
| 2 | 9-10-2010 | Chorerhat, Khalispur | 2 | 1 | 1 | 1 | 5 |

Source: Field Survey

Table-4.2: Focus Group Discussion at Patharghata

| Date: 7.10.2010 | | Interviewer: Mr. Humayon kabir | | Venue: Patharghata | |
|-----------------|------------------------------------|--------------------------------|------------------------------|--------------------|--|
| Sl. No. | Name and Address of Key Informants | Profession | Issues Discussed/ Suggestion | KWASA Response | |
| 1 | Md. habibur Rahman Samontosena | Farmer | Proper Compensation | Compensation | |
| 2 | Abdus sobhan, Samontosena | „ | Manage alternative land | Not beyond the Law | |
| 3 | Krisnapad roy, pathorghata | „ | Full compensation | Compensation | |
| 4 | Shubrata kumar sarke, pathorghatar | „ | Manage alternative land | Not beyond the Law | |
| 5 | Prokash halder patorghata | „ | Manage alternative land | Not beyond the Law | |
| 6 | Nani Gopal dutt, pathorghata | „ | Manage alternative land | Not beyond the Law | |
| 7 | Md. rani, Lakpur | Share cropper | Manage alternative land | Not beyond the Law | |

Source: Field Survey

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Table-4.3: Focus Group Discussion at Samontosena Bazar

Date: 09.10.2010 Interviewer: Mr. Humayon kabir Venue: Samonto Sena Bazar

| Sl No | Name and Address of Key Informants | Profession | Issues Discussed/ Suggestion | KWASA Response |
|-------|------------------------------------|-----------------|--------------------------------------|---------------------|
| 1 | Abdul majid fakir, samontosena | Ag/Shrimp | Proper compensation | Compensation |
| 2 | md. Jakir hossain Sh, samontosena | Up member | Under ground water extraction, rumor | Good response |
| 3 | Moju Shekh, Patborghata | Share cropper | Provide job | Under Consideration |
| 4 | Palash Halder, pathorghata | Ag/Sharecropper | Livelihood damage | Under Consideration |
| 5 | Jahangir Shekh, pathorghata | Shrimp gher | They will be landless | Under Consideration |
| 6 | Shawapan, pathorghata | Shrimp gher | Proper compensation | Compensation |
| 7 | Satter shekh | Farmer | Proper compensation | Compensation |

Source: Field Survey

Table-4.4: Focus Group Discussion at Mollarhat Technical College

Date: 09.10.2010 Interviewer: Mr. Humayon kabir Venue: Mollarhat Technical College

| Sl No | Name and Address of Key Informants | Profession | Issues Discussed/ Suggestion | KWASA Response |
|-------|------------------------------------|--------------------|---|---------------------|
| 1 | Shekh Mosta Gausul Hog, Garfa | Chairman, Garfa UP | Land price should be at least upto market level, previous RHD rate was Tk.18,000 per decimal Demand of pure drinking water, the area is arsenic contaminated | Under Consideration |
| 2 | Md. Jummul, Mollarhat | UP member | Proper compensation at market price | Compensation |
| 3 | Mr. Al Mamun Shimul, Mollarhat | College teacher | Full compensation and project for the community | Compensation |
| 4 | Md. Faruque, Mollarhat | businessman | Timely and proper compensation | Compensation |
| 5 | Chowdhury Ziaul Islam, Mollarhat | Local elite | Public in getting payment shouldn't be harassed | Good idea |
| 6 | Sri Amitosh, Mollarhat | Service | Proper compensation | Compensation |
| 7 | Md. Shahidul Islam, mollarhat | Service | Proper compensation, road side land price is Tk.1,00,000 | Under Consideration |

Source: Field Survey

Table-4.5: Focus Group Discussion Summary (Public Consultation)

| Sl. No. | Date | Place | Participation | | | | | | | | | | Total | Remarks | | |
|---------------|-------------------------------|-----------------------------|---------------|--------|----------|--------|-------------|-------------|-----------|-----------------|-------------|---------|-------|---------|---|---|
| | | | Male | Female | Business | Police | Shrimp gher | Shrimp gher | UP member | College teacher | Local elite | Service | | | | |
| 3 | 7 th October, 2010 | Patbarghata | | | | | | 6 | | | | | 1 | | 7 | Requested For: Proper compensation has to be given. Opportunity should be given to use water as saline free water in the locality. Shrimp cultivation is one of the major income sources of the PAP's, so need proper compensation required. Some of them wanted compensation as per market price or more. Shall co-operate if they are either properly compensated or secure good advantages. Comments: Those persons will be exclusively losers, whose total land will be damaged by the water supply project. But other than them, some of the locality will be affected due to the construction stage. Price of land will increase with water supply project passing through. There will be no disadvantage. Shall generate employment opportunity for men and women. Saline free water is needed for the Khulna dwellers. Economic problem may be solved by availing this opportunity. The water supply project will help improving social & economic conditions. |
| 4 | 9 th October, 2010 | Samonto Sena Bazar | | | | | 3 | 1 | 1 | | | 2 | | 7 | | |
| 5 | 9 th October, 2010 | Mollarhat Technical College | 1 | 1 | 1 | 2 | | | 1 | | | | 1 | 7 | | |
| Total: | | | | | | | | | | | | | | 21 | | |

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| Sl. No. | Date | Place | Profession | | | | | | | | | | Opinion Expressed | | | |
|---------|------|-------|------------|---------|----------|---------|--------|-------|--------|----------------|---------|------------|-------------------|---------|--|--|
| | | | Government | Private | Business | Service | Health | Other | Farmer | TPP/Industrial | Student | Unemployed | | Retired | | |
| | | | | | | | | | | | | | | | | In future the water supply project will be of advantage to the local people. There will not be any disadvantage. This project will create employment opportunities for the people. <u>Suggestions:</u> KWASA the project proponent will take care all the issues raises by the local and PAP's will be solved as per under GOB's rules and regulations. |

Source: Field Survey

4.3 Checklist Used for Public Consultation and Key Informant Interview

For uniformity and clarity in conducting the public consultation meetings, a checklist was devised by the consultants and was used to enable the participants to comprehend the issues easily. This has helped them so much so that they could effectively participate in the discussions and express their opinions from objective points of views. This participatory approach contained in the Checklist so devised and given below was well accepted by all the participants:

Consultants Checklist:

- Location of consultation
- Name and occupation of the participants
- Awareness of the participants about the Project
- Description of the Project
- Benefits of the Project
- Impacts of the Project on social and environmental components
- Concerns about the Project
- Expectations from the Project
- Suggestions about the Project

During the public consultations, social, environmental as well as cross-cutting issues were discussed in detail. In addition, such discussions also included the potential impacts of the project activities on environmental and social parameters, identification of sensitive issues, risks, potential threats, public concerns and expectations from the project.

4.3 Findings from Focus Group Discussion

The salient features of the opinions expressed by the participants of different profession have divulged in general that they are concerned with due compensation and rehabilitation wherever any damage is done and with request for providing safe water in their localities on priority basis.

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Though they have, in general, appreciated the project as a development work of the country and in their opinion, it will help setting up economic development, generate employment but note of caution was there from them that the work should be done carefully to avoid any accident in future and reinstatement along the project site has to be done properly and promptly after completing the all project works.

Participants in these consultation meetings were the land owners and available the local people along the intake and impounding reservoir site. **Table-4.2** through **4.4** reveals the number and composition of the participants in these meetings.

The participants in general welcomed for some extent and at some instant their approach is very much negative for this project site especially at the impounding reservoir and surface water treatment plant site. As reported, the following major issues among others were raised in the public consultation meetings for three sites.

(1) Impounding Reservoir Site

- Shrimp cultivation is the main business of this locality. This will affected a lot due to this project. So proper reimbursement like fish development cost to land compensation cost like double or triple or sometimes five times payment to the affected people.
- Agricultural products including vegetation were affected. Due compensation of which should be paid on the spot to the affected people before the construction starts. Trees and vegetation compensation should be included for the affected people.
- Assembly of worker (labour) during project activities may damage crops and other trees.
- Noise pollution from vehicles and equipment at the project sites may cause disturbance to human being and wild life.
- Air pollution due to dust and gaseous emission should be controlled.
- Compensation for land as per government rate would not be a fair compensation to the affected person as it is far below prevailing market rate and should be minimized this issue as per market prices.
- There will be enhanced soil quality degradation particularly for the after project construction activities, which should be addressed properly.
- Water pollution of the natural water bodies may be aggravated and should be taken care of as this water is used for agriculture and domestic purposes.
- Movement of vehicles may affect movement of people, especially women, children and disabled persons from one place to another due to the project activities.
- Environmental pollution through sanitation and waste materials as well as other social nuisance should be controlled.
- They also raise issues that what will be benefit of the land owners for this project implementation.
- Moreover this land is their life and without these pieces of land they will lose everything, so if possible or not do not take this land instead of this land use government (khas) land.

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- The tenant also wants the proper compensation that they are working and taking other land owners land for their living.
- The workers who are working at the land owners land as a labour, they will be jobless, so they also want proper compensation.
- The compensation they want on the spot.
- The proper compensation is required for the standing crops of the land.

(2) Water Intake Site

- Agricultural products like rice, jute and including vegetation were affected. Due compensation of which should be paid on the spot to the affected people before the construction starts. Trees and vegetation compensation should be included for the affected people.
- There will be enhanced soil erosion particularly on the river banks, which should be addressed properly.
- Traffic management should be controlled at day time may affect movement of people, especially women, children and disabled persons from one place to another.
- Environmental pollution like air pollution (due to dust and gaseous emission), water pollution (Madhumoti river) as natural water bodies may be aggravated and should be taken care of as this water is used for agriculture and domestic purposes and through sanitation and waste materials as well as other social nuisance should be controlled.

(3) Distribution Reservoir and Overhead Tank Site

- Most of the land inside the city is valuable and costly, so if possible then take government land.
- Proper compensation should be paid for the land inside the city sites.
- The shop owner at Andir pukur also wants some compensation as he is doing business there around several years.
- The leaseholder at Chorerhat, Khalispur doing business there as a lease from the government over couple of years and under that places there are around 25-30 labour are working. So they will be jobless if the business stop. They want proper compensation.

Summary of three sides opinion are presented in the **Table-4.6**.

Table-4.6: Summary of Opinion

| Sl. No. | Opinion |
|---------|---|
| 1 | Compensations of Shrimp Gher |
| 2 | Compensations of lands and trees |
| 3 | Noise and air pollution |
| 4 | Soil quality degradation |
| 5 | River and natural water pollution |
| 6 | Movement of vehicles and Traffic Management |
| 7 | Government (khass) land |
| 8 | Compensation for the tenant, worker, leaseholders |

Source: Field Survey

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This opinion is basically the general opinion that is found the similar situation in any development project work in any parts of the country of Bangladesh. Actually no resettlement work will be of this project except the land acquisition.

4.4 Expectations of the People

The following expectations of the local people were evidenced during the consultations:

- Local personnel should be employed in different activities of the project on a priority basis.
- Preference should be given to engage local businessmen/ contractors in different phases of the project for construction and development depending in their suitability for such engagements.
- Compensation payment, it should be in the rate of market prices and also with the negotiation of the affected people, should be properly and promptly distributed so that the actual affected person gets his full share and in right time.
- Supply of produced water would help improving their social life as drinking safe water conditions and therefore water should be made available in the areas through which water line would be passing through.

4.5 Public Consultation Results

The findings as recorded from public consultations have been presented in the **Table-4.7** indicating the critical issues. The names of some of the participants present in the meetings are listed at the **Table-4.2** through **4.4** on FGD records.

Table-4.7: Public Consultations

| Project Name | Issues Discussed | Issue Raised | Suggestions |
|---|--|--------------------------------------|---|
| Khulna Water Supply Improvement Project | Impact of construction of Water Intake, Impounding Reservoir and Surface water Treatment Plant | - Development | - Area will be developed by new access road, landscaping. |
| | | - Reduce Unemployment | - Labour should be taken from that locality. |
| | | - Social & Economic development | - Living status will be high. |
| | | - Land & property damage | - Due compensation to be paid according to the latest approval price list. |
| | | - Crop damage | - Due compensation to be paid on the spot. |
| | | - Fruit trees damage | - Due compensation to be paid on the spot. |
| | | - Saline free water | - Discuss with superior person of the locality for providing water. |
| | | - Compensation assessment | - Compensation assessment by DC and local leader. |
| | | - Shrimp Cultivation | - Proper compensation will be paid as land development to shrimp Cultivation. |
| | | - Fish breeding | - Must avoid breeding time |
| | | - Pollution of air and surface water | - Due Compensation to be given, Monitoring shall be adopted. |
| | | - Sanitary problem | - Sanitary system should be developed during construction. |

Source: Field Survey

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4.5.1 Consultation with Project Affected Person

This time a structured questionnaire was devised to collect all relevant socio-economic condition of the PAP along the dag number of the project activities area.

The suggestions on the losses, mitigation options and implementation strategies were taken from the people and the information and comments provided by each individual owner or his relative present in the Households was duly recorded in the questionnaire well structured to cover all relevant points respective to his socio-economic condition, attitude towards implementation and his claim / expectation of compensation for the losses he is going to incur for the project.

This time, members of the local government, local elites and people of different profession, representatives of JICA Study Team, KNASA, data collector were present to understand the views and suggestions of the PAP and the local people when the background, nature and components of project, summary findings of the EIA and LAP/RAP studies in respect of its positive and negative impacts etc including market value of their assets being affected, payment of compensation and grievance redress mechanism were discussed in details.

A summary of such meetings has been placed where in a total of 21 persons present were including local people, chairman, member, teachers, business man, services and etc. covering the plots as much as possible during the field survey and public consultation. The response of each and every PAP to the questionnaire has been duly recorded and then compiled in the master database prepared for the study.

4.5.2 Discussion Relating to Public Property

According to the present projects site, 84 nos. public lands and highway, LGED and city corporation roads are to be affected by the project. This affected land, infrastructures and facilities will create problems in turn for the local community to live smooth life. For example, at the construction stage, access road being used during water pipeline crossings, movement of human and transports, alternative access roads will have to be arranged for mitigating the inconvenience.

Thread bear discussion was held with KNASA on this issue and it has been revealed that due permission will be sought from respective authorities following finalization of design of the water pipeline sections with exact location of the crossing points, dimensions of crossings and tentative schedules etc and such permissions will be obtained on due payment of fees and other charges as asked for by these authorities are summarized in the following **Table-4.8**.

Table-4.8: List of Authorities

| Sl. No. | Name of the Authorities |
|---------|---|
| 1 | Bangladesh Inland Transport Authorities (BIWTA) |
| 2 | Bangladesh Water Development Board (BWDB) |
| 3 | Roads and Highway Department (R&H) |
| 4 | Local Government Engineering Department (LGED) |
| 5 | Khulna City Corporation (KCC) |
| 6 | Khulna Development Authority (KDA) |
| 7 | District Commissioner (Khulna and Bagerhat) |
| 8 | Department Public Health Engineering (DPHE) |
| 9 | Bangladesh Railway |
| 10 | Bangladesh Telecommunication Company Limited |

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Further, it has been disclosed that all works related to reinstatement, erosion protection, alternate thoroughfare provision etc. required thereof to mitigate the public inconveniences and restoration of damages will be included in the tender doc of the EPC contractors.

4.6 Response to Project

Summary of PAP response to this project is placed in Table-4.9 to Table-4.11.

Table-4.9: Summary of PAP Response to the Project (Mollarhat)

| Comments | H/H No. | % |
|--|----------|------------|
| Positive without any condition | - | - |
| Positive on conditions of proper compensation, providing job etc | 7 | 100 |
| Alternate suggestion | - | - |
| Negative | - | - |
| Total | 7 | 100 |

Source: Field Survey

Table-4.10: Summary of PAP Response to the Project (Samonto Sena)

| Comments | H/H No. | % |
|--|-----------|---------------|
| Positive without any condition | 6 | 19.35 |
| Positive on conditions of proper compensation, providing job etc | 6 | 19.35 |
| Alternate suggestion | 9 | 90.00 |
| Negative | 10 | 32.26 |
| Total | 31 | 100.00 |

Source: Field Survey

Table-4.11: Summary of PAP Response to the Project (Khulna City Corporation area)

| Comments | H/H No. | % |
|--|----------|------------|
| Positive without any condition | - | - |
| Positive on conditions of proper compensation, providing job etc | 2 | 66.67 |
| Alternate suggestion | 1 | 33.33 |
| Negative | - | - |
| Total | 3 | 100 |

Source: Field Survey

4.7 Feedback and Conclusions

4.7.1 Conclusion

The Khulna Water Supply Improvement Project of KWASA is considered to be a feasible project examined from both social and environmental points of view. Acquisition of land being on both intake and impounding reservoir and surface water treatment plant site, and the distribution reservoir and overhead tank, the general conclusion of the study and preparing of land Acquisition Plan and Resettlement Action Plan Report is that no significant negative environmental and social impact will be produced by the project interventions so long as due mitigation measures and land acquisition or social impact actions are taken as per Environmental Management Plan (EMP) and the Land Acquisition Plan (LAP)/Resettlement Action Plan (RAP) report respectively. The study has also revealed the important areas, which need special emphasis during design and implementation phase. The following are the important considerations:

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- a) Ensure institutional capacity of KWASA for implementing and monitoring EMP and LAP/RAP including formation of Grievance Redress Committee (GRC) with due representation from PAP and the authority and ensure budget provision in KWASA for implementing the LAP/RAP with due importance to social management plan as placed and the recommendations made at the LAP/RAP report. Provide them with due adequate manpower, logistic supports and the fund as required.
- b) Arrange all preparatory works so that compensations are paid to all of the eligible PAP well before carrying out of any works at site with interventions in their properties and ensure adequacy of the grievance redress mechanism during post project evaluation and take care of the residual impact, if any, under the GOB regulations & the JICA and ADB policy frame work. But as per GOB regulation KWASA cannot pay any excess money to the PAP for land acquisition. KWASA is under considering the point that the PAP raise during the stakeholders meeting and FGD period and KWASA will discuss this issue with the LGD to mitigate.
- c) Ensure incorporation of the provision of all mitigation measures including but not limited for due reinstatement of all public roads and protection of river banks etc from erosion. Ensure identification and inclusion of all items relating to EMP to be carried out by the EPC contractor in their scope of work.
- d) Monitor progress of implementation of both EMP and LAP/RAP through Owner's Engineer including deployment of Environmental Specialist/Social Specialist of the independent Consulting Group with their placement in the organization chart recommended at of this report and ensure progress reporting to the management of KWASA and other concerned authorities e.g. DOE, JICA and ADB etc as applicable.

Acquisition under this project is a bulk nature. However, if any found during execution of works he/ they will have to be duly compensated. All these issues will be taken special care of by the GRC about their due compensation and grant as applicable.

In fine, feedbacks from the consultation process played an important role in understanding the apprehensions and expectations of the members of the public in general and stakeholders in particular. Such inputs from them helped development of a clear picture of the socio-economic and environmental base line of the project area too. This because, the public roads, streams/ canals and banks of the rivers as affected by the project have been well identified and due mitigation measures have also been proposed for the same for example, loss of access to common property resources like roads, irrigation canals as identified have to be provided with alternative arrangements by the contractor during the project implementation stage. It may be mentioned that the opinion expressed by them may also be considered indicative during preparation of LAP/RAP. Such steps of information dissemination and consultation shall have to continue throughout the implementation period in the interest of smooth execution of the project.

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Chapter-5 Land Acquisition Plan/Resettlement Action Plan

5.1 Justification of Land Acquisition Plan

Water Supply projects, in general, have not so much potentials for adverse environmental impacts during both the construction and operational phases. Rather, these projects have substantial positive impacts particularly, in terms of socio-economic benefits. However, in the EIA report, findings is that in this pre-construction, construction and post construction stage, initial assessment of possible impacts caused by the projects has been identified. Only main impact shall the land acquisition impact. And also from the social survey and field investigation of all the three projects facilities area it is observed that there is no permanent structure that is going to demolish during the construction stage. In the mean time Department of Environment (DOE) issued the Site clearance Certificate (SCC) for the three sites at 18th October, 2010. It means that the KWASA can start the land reclamation and infrastructure development at the proposed three sites. After that if any one tries to build any structures inside the project area, the KWASA destroy that structure without giving any compensation.

For this instant, Land Acquisition is the most important part of this project. So in this chapter Land Acquisition Plan will be reviewed. If any circumstance if KWASA has to pay any compensation for the structures to any land owners the Resettlement procedure are provided in the **Annex-5**.

5.2 Objectives of the LAP

Objectives of the Land Acquisition Plan are as follows:

- Is to identify the land owners who's land will be acquisition
- Find the Land compensation and social information

5.3 Review of the Laws and Guidelines for Land Acquisition

In preparation of LAP the consultants has thoroughly gone through the existing laws of the land in connection with land acquisition (see **Chapter-2**).

5.4 Land Acquisition and Compensation System

Land Acquisition and its compensation systems in Bangladesh can be summarized as follows:

- Special attention has to be made for vulnerable, indigenous people and female headed households, as applicable, from resettlement point of view in case of donor supported projects. Though not legally obligated, the government takes care about providing these facilities through administrative instance.
- As mentioned above, Acquisition and Requisition are held under the Acquisition and Requisition Immoveable Property Ordinance (ARIPO) of 1982 and its subsequent amendments in 1993 and 1994. It covers all cases of acquisition and requisition by the government for public purpose and interest.

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- The legal process is initiated by the deputy commissioner (DC) of the concerned district with a detailed map of the area and a land acquisition plan. The DC is empowered to exercise permanent acquisition or temporarily requisition of property and pay compensation to legal owners.
- The DC assesses the level of compensation, taking into consideration of the factors such as, land transaction in the locality over the past twelve months by averaging recorded land price categorically in the land registry office. Consideration for extra payment is based on land market survey. The value ascertained thereof is treated as present market value of the acquired land.
- The amendments, which has been made to the ARIPO in 1993 has increased the amount of the premium (to reflect market or replacement values) for compulsory acquisition from 25% to 50% on the assessed value of the property. The 1994 amendment provides provision for payment of crop compensation to tenants. ARIPO does not cover compensation for loss of wage income; it also doesn't cover losses of non-titled persons (squatters, encroachers, etc) aside from crop losses to tenants.
- The policy framework and entitlements for the Projects are all based on this national law called Acquisition and Requisition of Immovable Property Ordinance of 1982.
- For the purpose of acquisition and requisition of immovable properties in Bangladesh, the government, taking into consideration all previous Acts, Rules, Ordinances etc., have prepared 'Acquisition of Immovable Properties Manual-1997'. This manual guides all acquisition and requisition of immovable properties, for all related purposes whatsoever as well as payment of compensation for all sorts of losses.

5.5 Administrative procedure for implementation of land acquisition plan

1) Step-wise Land Acquisition Process

The Acquisition of Immovable Property Rules of 1982 (No. S.R.O. 172-U82) are made for the exercise of the powers conferred upon by Section 46 of ARIPO. The rules spell out the procedural details required for the acquisition of immovable properties as follows:

- i. Proceedings for acquisition
- ii. Issuing Notices under sections 3, 6, and 7
- iii. Declaration of acquisition and possession
- iv. Declaration of abatement and revocation of proceedings
- v. Transfer of acquired land
- vi. Assessment of compensation, and
- vii. Unutilized acquired property

In other words, when the pre-requisites are fulfilled, the step-wise activity of land acquisition process that has to be followed is given below:

- a. Submission of land acquisition proposal by the requiring body to the Deputy Commissioner (DC)
- b. Holding District Land Acquisition meeting and providing land allocation
- c. Serving Notice under Section 3 to the affected persons
- d. Joint verification of the acquire property
- e. Final approval of land to be acquired by the Divisional Commissioner (for area of land 50 Bighas (Approximately 6.7 ha) or less) or the Land Ministry (for area of

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- land over 50 Bighas) on the basis of land area requirement.
- f. Serving notice under Section 6 to settle any dispute
 - g. Estimation of jointly verified property for cost compensation and informing requiring body.
 - h. Acceptance of estimate of cost compensation and placement of fund to the Deputy Commissioner by the requiring body
 - i. Serving Notice under Section 7 by the Deputy Commissioner to the affected land owners for disbursement of compensation
 - j. Disbursement of compensation as per estimate to the affected persons
 - k. Giving possession of land to the requiring body
 - l. Cash Compensation under the Law (CCL) payment by the DC.

2) Time frame of Final Decision of Land Acquisition

As mentioned above, depending on total property areas to be acquired the following will be preceded for the final decision of Land Acquisition according principally to ARIPO.

- Property exceeds fifty (50) Bighas (Approximately 6.7 ha): the DC submits the record of the proceedings including a report prepared by the DC for the decision of the Bangladesh Government.
- Property does not exceed fifty (50) Bighas (Approximately 6.7 ha): the DC submits the record of the proceedings including a report prepared by the DC for the decision of the Divisional Commissioner.

After considering the report submitted by the DC, the Government (in case of exceeds fifty Bighas) or the Divisional Commissioner (in case of not exceed fifty Bighas) makes a final decision about acquisition of the property within the time limitation as summarized in the **Table-5.1**.

Table-5.1- Time Frame of Final Decision of Land Acquisition

| Property | Submissions by DC | Final Decision | Days from the submissions' date |
|-------------|--|---|---|
| > 50 Bighas | Record of the proceedings including a report by DC | By the Bangladesh Government (Local Land Authority) | Within 15 days, or within such further time but not exceeding one (1) month |
| ≤ 50 Bighas | Record of the proceedings including a report by DC | By the Divisional Commissioner. | Within 90 days |

Note: DC; District Deputy Commissioner, Bighas; Approximately 6.7 ha
Source: Acquisition and Requisition of Immovable Property Ordinance 1982

5.6 Land Acquisition Matrix:

In the following **Table-5.2** process of land acquisition has been presented for easy understanding land acquisition process.

Table-5.2: Process of Land Acquisition

| Serial | Activity | Days Required |
|--------|--|---------------|
| 1 | Submission of land acquisition proposal by the RB | 00 |
| 2 | Physical enquiry on proposed land and sending a feasibility report to DLAC or CLAC by the DC | **21 |
| 3 | Land allocation for acquisition by the committee | |
| 4. | Execution of deed agreement u/s 15(1), rule 7(1) by the RB | *15 |
| 5.a | Publication of preliminary notice u/s 3, rule 4(2), | |
| B | Waiting for filing objection(s), if any person interested may object to the acquisition of the property. | |
| N.B | No property used by the public for the purpose of religious worship, graveyard and cremation | |

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| | | |
|--------|--|---|
| | ground shall be acquired. | |
| 6. | The DC and RB will conduct a field verification on proposed land jointly to classify the status of land and to enumerate the different type of losses u/s 8(1) | |
| N.B | The above list of losses u/s 8(1) b, c, d, e need to be verified further (see para 8b & 12c). | |
| 7 | Making final decision u/s 4(3)b by the DC for Land acquisition up to fifty standard bighas project without objection Or Hearing (if any objection(s) filed the objection(s) and preparation of report u/s 4(3); sending the case record and report with a opinion for final decision to, - the Divisional Commissioner up to fifty standard bighas project u/s 5(1)a or, - the government above fifty standard bighas project u/s 5(1)b irrespective of objection raised or not). | *10+30=40 *30+ *15+30=45 *90 |
| 8 a | Service of public notice u/s 6 rule 49) to the person(s) interested. The DC may also require any such person to make or deliver a statement to him earlier than 15 days u/s 6(4) | |
| N.B | The provisions of act XIV of 1995 and rules should be considered carefully to determine the losses (see para 6&12b) | |
| 8.b. | Collection of sales figure of land and other information from different departments. Preparation of estimate of compensation according to the provision of sections 8&9, rule 8read with the section + section 5, rule 3&4 and executive instructions | **30 |
| 9 | Sending the estimate of compensation u/s 7(3)b to the RB | *07 |
| 10 | The RB shall deposit the estimated amount of compensation with the DC u/s 7(4) from the date of receipt of estimate. Or If failed to deposit, all proceedings shall stand abated u/s 12(1). | *60 |
| 11 | Making award of compensation and publication notice of award of compensation u/s 7(3)a. | *07 |
| 12.a | Take over the possession of land u/s 11(1) by the DC and hand over the possession of land to the RB | **15 |
| 12.b. | If the DC is opposed or impended in taking possession, he shall enforce the surrender of the property to himself u/s 41. | |
| 12.c | The DC and RB jointly will conduct a field verification on acquired land to -finalize the provisional list of losses u/s 8(1) b, c, d, e (see para 6 and 8b) -prepare the inventory of standing crops u/s 8(1)b. -check(see para 6&8) and prepare a list of severing any property from other property u/s 8(1)c injuriously affecting other properties and earnings u/s 8(1)e and any diminution of profits of the property u/s 8(1)f. | |
| N.B | Preparation of estimate of estimate for standing crops and other losses compensation u/s 8 (1) b, c, d, e, f (if not estimated earlier) and sending the same to the RB. | |
| 13.a | Making payment of compensation u/s 10 to the person(s) interested | *60 |
| 13.b | Any person received payment under protest u/s 10(2) as to the sufficiency of the amount and who has not accepted any award, shall be entitled to make an application u/s 28 to the arbitrator for revision of award from the service of notice of the award u/s 7(3)a | *45 |
| N.B | The compensation of crops and other losses(see para 12c) will be paid after receiving the estimated amount from RB | |
| 14.a | Publication of a declaration in official Gazette u/s 11(2), rule 5. | **90 |
| 14.b | Sending a rent abatement statement to the revenue department | |
| 14.c | Making arrangement of mutation after publication of declaration | **90 |
| 15.a | Issuing the notice to deposit the additional amount of compensation by the DC to the RB u/s 34.a as per arbitrator's or arbitration appellate tribunal's decision | *30 |
| 15.b | The RB shall deposit its additional amount of compensation with the DC u/s 34a by the RB | *30 |
| Serial | Activity | |
| 16.a | Execution of deed of transfer u/s 15(2), rule 7(2) | |
| 16.b | Adjustment of estimated amount of compensation received by the DC | |
| 16.c | Confirmation of land acquisition proceedings by the commissioner or government | |
| 16.d | Consignment of case record to the record room | |
| | Abbreviations and Symbols DC=Deputy Commissioner RB=Requiring body DLAC= District Land Allocation Committee CLAC=Central Land Allocation Committee u/s= under Section + =Act XIV of 1995 30 = one month *=Provision of Law ** =Executive instruction 01 =24 hours | |

Source: Synopsis of the Immovable Property Acquisition Procedure under Ordinance.-II of 1982 (As Modified Up to December, 1994). Read with the Provisions of Act XIV of 1995.

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Based on the above reviews on land acquisition and compensation system, the process can be summarized as shown in Figure-3.

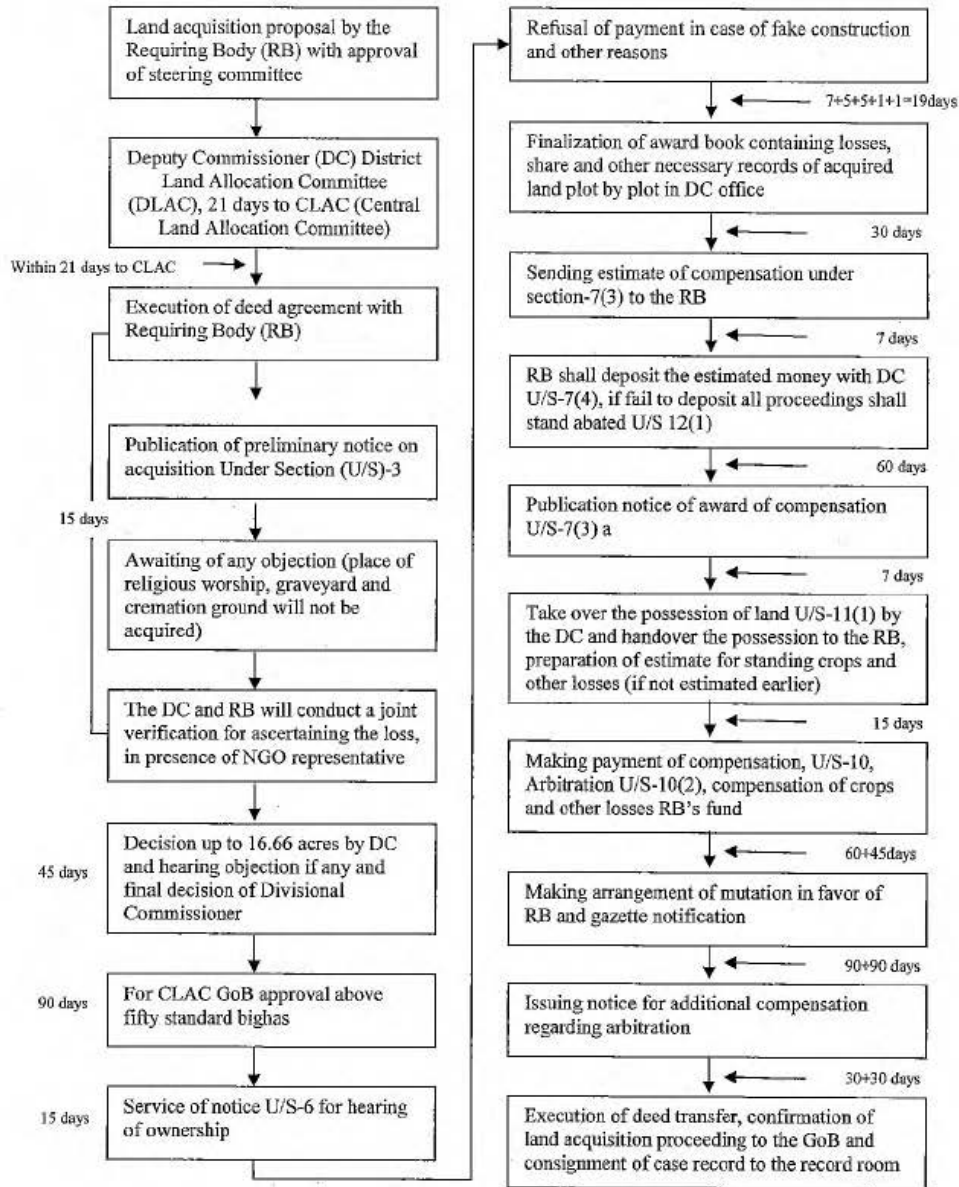


Figure-5.1: LAND ACQUISITION FLOW CHART

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5.7 Custom and Practice in Land Acquisition

Customs and traditions of any society are very important in implementing any large project. Here land acquisition mainly dealt with the district administration as per the laws of the country. This is a continuing practice from previous governments. The district administration acts on behalf of requiring body. There is no other social norm regarding land acquisition. But in local government department there is a social norm of giving gift or donation of required rural land in the construction of rural road by the local people. However, another system is to purchase small land in case of public interest, but it needs more money and should be furnished amicably. In case of large acquisition the system will not be function able.

5.8 Problem Encounters in Acquisition law and practice

It is found that in the project areas legal payments in most cases don't conform to the actual land and other asset price for various reasons. So, affected people suffer a lot.

5.9 Eligibility Criteria

All eligibility will be determined by the prevailing laws of the country in acquisition. There will be a cutoff date for all entitlement except any unforeseeable loss due to the project. The cutoff date will be counted from serving section-3 notice from DC office and all entitlement will be from that date in acquisition or requisition land. Primary entitlement will be identified by the concerned DC and payment will be ensured by the concerned Land Acquisition officer. But most payment will be ensured before construction work.

5.9.1 Identification of Entitlement by Joint Verification Team

Before the present entitlement policy can be applied, in acquisition, it is necessary to determine who the entitled person is and what his/her entitlement is. The entitlements against different types of losses have been defined according to categories. A final verification will, be made during joint investigation by the DC and the KWASA staff to ascertain the accurate amount of land under acquisition/requisition as well as other assets lost to the project. The fact is that more than one person in a household will be eligible for one or more entitlement for titled land and structure.

Joint Information Verification Team (JIVT) will be responsible for making inventory of land and crop losses after serving section-3 notice. JIVT will be formed by the representative of DC office (Canongo/Surveyor), and representative of requiring body (equivalent to Executive Engineer) for preparation of carrying out 'joint inventory'. In addition to that video filming also will be done simultaneously.

5.9.2 Process of Identification Entitlement Other than DC office:

The preliminary list of PAPs and their entitlement will be prepared on the basis of land acquisition records. PAPs will be asked to bring any discrepancies to the notice of DC office through field workers. Persons who feel that they have been excluded from the list of PAPs and hence not received any file would also be asked to show the necessary documents during the information campaign to bring their complaints to JIVT. They would also be asked to submit relevant records as proof of their claims. The proofs would include:

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- i) Copies of title deeds (Khatian), compensation awards or mortgage deeds in the case of disputes related to legally owned land;
- ii) In case of share cropped or rented/lease land, documentary evidence of the understanding between land owner and the tenant if there are any or an affidavit signed by the land owner and the tenant or with any government agencies; this will be decided by PVAT/JIVT as the project needs to implement amicably between requiring body and affected people.

The JIVT will review and verify the claims/complaints on the basis of existing records such as land acquisition records and the proofs submitted in support of the claim.

5.10 Social Impacts and Mitigation arrangements

Table-5.3 Impact and Mitigation Measures

| Type of impacts | Impacts | Mitigation Measures |
|--|---|---|
| 1. Acquisition of different types of land due to implementation of the project | May cause disruptions in existing land holdings and resource use Loss of income from the acquired land May cause negative impact due to income loss | Payment of compensation at the replacement/market value on DC's payment including Stamp duty will be refunded covering replacement cost of acquired land. This will be decided by PVAT (Property Valuation Advisory Team). Income restoration assistance where applicable and no of months and daily amount will be decided by PVAT. |
| 2. Tree Loss | Loss of income from fruits and fuel wood | Income Restoration Grant, Market value paid for the acquired trees, but on the other hand tree will be taken by the affected person. |
| 3. Crop Loss | Loss of income from crop | Price of existing crop will be refunded. Three months income restoration grant for farmer and sharecropper. |
| 4. Water body loss | Disruption of income | Payment of compensation at the replacement/market value on DC's payment. This will be decided by PVAT regarding replacement cost including Stamp duty. |
| 5. Temporary Requisition land | Income Loss | Rental Value is to be paid to the affected person and decided by DC |

5.11 Entitlement Policy

In the starting of this chapter, it is cleared that the project facilities did not touch any structures that's why his chapter comprise with only the Land acquisition issues. As entitlement policy consists both the land acquisition and resettlement, so in this section both discussion are there (if necessary KWASA, ADB will decide the resettlement issues.)

The project-affected households depend on a variety of sources such as farmland, tenant farming, wage labor, trading etc. for their livelihood. One household may rely on more than one means of livelihood. Number of households may suffer different kinds of losses. The entitlement policy takes this into consideration by linking the entitlement to the types of losses rather than to the category of project-affected person. In the end, however, individuals and households do get entitlement proportionate to their losses.

The policy matrix makes entitlement more precise and includes operational aspects such as implementation issues and actors. Basic concepts and principles of the entitlement policy are described in the following paragraphs:

5.12 Entitlement Policy Matrix

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Land Acquisition and Compensation Policy Matrix

The Matrix presented earlier outlined various losses, methods of identification of entitled persons (EPs), compensation benefits etc. in terms of restoration of income and livelihood of the affected people in the Project where applicable. Though in this project there is no such structures that will be resettled, the Land acquisition and also Resettlement Matrix presented below identified income or livelihood loss and the compensation payment mechanism (if necessary). In future, if needed concern Grievance Redress Committee (GRC) and Property Valuation Advisory Team (PVAT) will solve the problems. However, all payment will be paid within the one year of project start PVAT justify this and budget is available.

Table-5.4 Entitlement Policy Matrix

| Type of Losses | Definition of APs | Entitlement | Implementation Issue | Agency Responsible |
|--|---|--|---|--|
| 1. Loss of agricultural land | Owner(s) of a plot as recorded in title deeds | a. CCL including 50% premium b. Cash grant to cover the difference between CCL including 50% premium and cost of equivalent replacement land c. Cash compensation for losses of profits and income due to the loss of property or access | a. Replacement value will be determined and decided by Property Valuation and Advisory Team (PVAT). The maximum amount of cash grant Will be the difference between the total CCL including 50% premium and the replacement value determined. | a. DC b. Cash grants-Project c. Refund-Project |
| 2. Loss of commercial land (rural and urban) | Owner(s) of plot as recorded in title deeds | a. CCL including 50% premium b. Cash grant to cover the difference between the CCL including 50% premium and the cost of equivalent replacement land c. Cash compensation for losses of profits and income due to the loss of property or access | a. Replacement value will be determined and justified by the PVAT. The maximum amount of cash grant will be the difference between the total CCL including 50% premium and the replacement value determined. | a. DC b. Cash grants-Project c. Refund-Project |
| 3. Loss of homestead land (rural and urban) | Owner(s) of homestead plot as recorded in title deeds | a. CCL including 50% premium b. Cash grant to cover the difference between the CCL including 50% premium and the cost of equivalent replacement land | a. APs opting for purchase should identify the homestead land. b. Project will explore the possibility of staggering the evacuation of APs to ease the resettlement process. c. PVAT will decide any replacement cost will be needed or not | a. DC b. Cash grants -Project c. Refund-Project. |
| 4. Loss of homestead (rural and urban) | Households living as squatters on public/private land | a. Cash grant equivalent to the market price and replacement land | a. List of eligible persons will be finalized by JIVT. b. APs opting for purchase should identify the homestead land. c. Project Management Will explore the possibility of the | a. DC b. Cash grants-Project c. Refund Project |

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| Type of Losses | Definition of APs | Entitlement | Implementation Issue | Agency Responsible |
|--|--|---|--|--|
| | | | evacuation of APs to ease the resettlement process. d. PVAT will take decision how will they be rehabilitated for disturbing the vulnerable poor for project and for the greater interest of society. | |
| 5. Temporary loss of land regardless of use | Titled and untitled APs | a. CCL including 50% premium for titled owner b. Cash grant to cover the difference between the CCL and the PVAT assessed rental value or income/profit lost c. Cash grant to reflect expenses of vacating land, reoccupying land and damages, in accordance with ARIPO d. For untitled replacement cost due to unavoidable situation for vulnerability and legal complexity PVAT will take decision | a. The maximum amount of cash grant will be the difference between the total CCL including 50% premium and the rent of land or income & profit lost determined by PVAT. b. Requiring body (KWASA) will ensure contractors reinstate land and affected common resources to pre-project levels upon project completion. Contractors will also maintain common infrastructure during construction including irrigation and drainage. c. About rehabilitation of untitled PVAT will be responsible | a. DC b. Cash grants-Project c. DC d. Contractors |
| 6. Loss of Ponds, Shrimp Cultivation (Shrimp Gher), Gher of White Fishes and fish stock | Legal owner of pond, gher to get compensation for land while usufruct right holder, legal or socially recognized, APs to get compensation for fish stock | a. CCL including 50% premium b. Cash grant to cover the difference between CCL including 50% premium and the replacement cost of pond/gher, c. Cash compensation for losses of profits and Income due to the loss of property | a. Replacement value will be determined and decided by PVAT b. If pond is on public land and not under lease from Government, AP is entitled to compensation for of the existing fish stock. | a. DC b. Cash grant-Project |
| 7. Loss of houses structures used for living and commercial activities (rural and urban areas) | Legal owner of structure | a. CCL including 50% premium b. Transfer grant(TG) c. House construction grant(CG) CCL including 50% premium d. AP permitted to retain salvageable building materials e. Cash compensation for losses of profits and income due to the loss of property | a. PVAT to find out realistic construction costs of the most common types of houses/structures. The costs determined will be used in cases of disputes/grievances regarding compensation rates for structures. b. PVAT will take decision about TG and CG and replacement cost | a. DC b. Cash grants-Project c. Refund-Project |
| 8. Loss of house structures used for living and commercial activities (rural and urban) | Untitled APs (squatters on public/private lands) | a. CCL including 50% premium for structure b. Transfer grant c. House construction grant d. AP permitted to retain salvageable building materials e. Cash compensation for losses of Income due to loss | a. PVAT to find out realistic construction costs of the most common types of houses/structures. The costs determined will be used in cases of disputes/grievances regarding compensation rates for structures. | a. DC b. Cash grants-Project c. Refund-Project |

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| Type of Losses | Definition of APs | Entitlement | Implementation Issue | Agency Responsible |
|---|---|---|--|--|
| areas) 9. Loss of timber and fruit trees, bamboo and banana groves | Legal owners determined by DC and untitled users of land | of property a. CCL including 50% premium b. Cash grant to cover the difference between the CCL including 50% premium and current market value c. AP to be permitted to cut and take away the trees and fruits d. In case of fruit trees e. Replacement cost of perennial fruit and other trees will be decided by PVAT as grants | a. Government will issue executive orders allowing the APs to cut and take away the tree and fruits and PVAT will take decision. | a. DC b. Cash grant-project |
| 10. Loss of standing crops | Cultivator (see definition) | a. CCL+50% premium b. Cash grant to cover the difference between CCL+50% premium and the market value | a. Market value at harvest determined by JVT and PVAT will replacement cost any b. Verify whether or not crops are in existence at the time of handover | a. DC b. Cash grant-Project |
| 11. Loss of wage income | Affected wage laborer in agriculture or non-agriculture sectors, | a. One time cash grant b. Livelihood and skills training c. Replacement cost | A, PVAT will take decision about APs to be trained in productive activity, trade or skill and loan facilities. | a. Cash grant-Project. b. Training-Project c. Loan-Financial Institutions. |
| 13. loss of business Income from displaced commercial premises (rural and urban) | 1. Any business person operating on the premises as tenant at the time of notification 2. Owner of the rented out premises | a. CCL including 50% premium b. One time moving assistance c. rent to owner of the premise on private land d. Cash grant replacement cost e. Training | 1. Compensation for loss of business income determined by PVAT. 2. Rent of premises determined by PVAT through verification. 3. PVAT/JVT will take decision. | a. DC b. Cash grant-Project c. Moving assistance-Project d. Training Project. |
| 14. Loss of usufruct right on mortgaged. Leased, and Khai-Khalasi land(yearly subtracted from principle money). | 1. Persons with legal agreement 2. Persons with verbal agreement | a. CCL including 50% premium b. Cash grant to cover difference between CCL including 50% premium and replacement value | 1. Legal agreement Legal owner and mortgage/leaseholder will be paid CCL including 50% premium by DC. 2. Verbal agreement Legal owner will pay the outstanding liabilities upon receipt of CCL. 4. In case of any dispute, J1VT/PVAT/GRC will verify and decide. | DC |
| 15. Disruption of private or common property | Titled owner, tenant, untitled user, community | Restoration to original status | 1. Prior to disruption verify existing crops or structures to be restored after project completion | Contractor |
| 16. Vulnerable | Female headed, (AP. | Assistance to mitigate negative Impacts on | 1. Livelihood and skills training 2. Preference for project related | 1. Project |

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| Type of Losses | Definition of APs | Entitlement | Implementation Issue | Agency Responsible |
|---------------------|---|--------------------------------|--|-------------------------------|
| APs | and households with less than Tk 3,000 monthly Income | vulnerable groups | employment. 3.PVAT will take decision about skills training and its justification | |
| 17. Unforeseen loss | Person affected adversely by Project other than the above categories. | Assistance to mitigate impacts | Mitigation measures to be proposed by RU. Project will closely coordinate activities, monitor, and mitigate adverse Impacts. | Mitigation Assistance-Project |

5.13 Timetable and Budget

5.13.1 Activity Schedule for LAP Implementation

The activity schedule of the Land Acquisition Plan is placed in the **Annex-5**.

*Land Acquisition Plan and
Resettlement Action Plan (Chapter-5)*

5.13.2 Estimated Budget

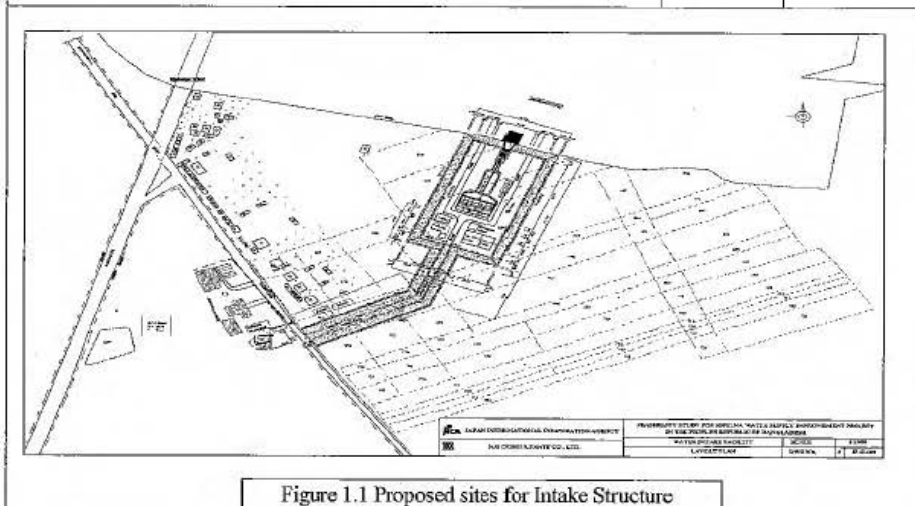
Table- 5.5 Estimated Budget

| Cost Item | Amount (Tk.) | Payment | |
|---|--------------------------|---------------------------|----------------------------------|
| | | DC | Project |
| 1. Replacement value of land Water Intake point-2.521 acreX2,00,000=Tk.50,40,000(@20lakh per acre) Impounding Reservoir and Water treatment Plant-67.73 acreX20,00,000(@20lakh per acre)=Tk.1,38,46,000 Overhead tank-11.78 acreX1,00,00,000=Tk11,78,00,000(@1 crore per acre) | Tk.13,54,60,000 | CCL including 50% Premium | Rest as grant if Decided by PVAT |
| 3. Compensation for trees CCL including 50% premium i) 8892 treesX2000=1,77,84,000(on average Tk.2,000each): | Tk.1,77,84,000 | CCL including 50% Premium | Rest as grant |
| 4. Shrimp Gher 50% SWTP and Impounding Reservoir(average net return Tk.3,00,000 per acre(Tk.3,00,000X35 acre=Tk1,05,000) | Tk.1,05,00,000 | CCL+50% Premium | Rest as grant |
| 5. Standing crop (35 acreX40,000=Tk.14,00,000(per acre production 1.6 ton(40 maund approximately, local measurement) | Tk.14,00,000 | | |
| Total Cost: | Tk.14,73,77,784 | | |
| 11. Administrative Cost 10% of Total cost | Tk. 1,47,37,778.4 | | |
| Total Cost+10%: | Tk.16, 21,15,562 | | |
| Contingency 30% of Estimated Cost: | Tk.4,86,34,668.7 | | |
| Grand Total: | Tk.21,07,50,231 | | |

Annex-1

A. Land details for proposed Water Intake Point

| Sl. No. | District | Thana | Mouza | JL # | Sheet # | SA | Area (acre) | Proposed land Area (acre) |
|--|----------|----------|-------|------|---------|-----|-------------|---------------------------|
| 1 | Bagerhat | Mollahat | Garfa | 53 | 1 | 665 | 0.81 | 0.436 |
| 2 | | | | | | 668 | 2.72 | 0.872 |
| 3 | | | | | | 664 | 0.81 | 0.552 |
| 4 | | | | | | 663 | 1.28 | 0.123 |
| 5 | | | | | | 658 | 0.29 | 0.001 |
| 6 | | | | | | 669 | 0.69 | 0.025 |
| 7 | | | | | | 680 | 0.14 | 0.051 |
| 8 | | | | | | 678 | 0.36 | 0.15 |
| 9 | | | | | | 673 | 0.3 | 0.132 |
| 10 | | | | | | 689 | 0.88 | 0.038 |
| 11 | | | | | | 681 | 1.86 | 0.1 |
| 12 | | | | | | 672 | - | 0.008 |
| 13 | | | | | | 679 | - | 0.033 |
| For Water Intake Point Total required land Area | | | | | | | | 2.521 |



Annex-1

B. Land details proposed for Surface Water Treatment Plant and Impounding Reservoir

| Sl. No. | District | Thana | Mouza | JL.# | Sheet # | SA | Area (acre) | Proposed land Area (Acre) |
|---------|----------|--------|---------------------|---------|----------|------|-------------|---------------------------|
| 1 | Khulna | Rupsha | Patharghata & Tilak | 36 & 35 | 1, 2 & 4 | 219 | 0.59 | |
| 2 | | | | | | 170 | 0.41 | |
| 3 | | | | | | 1818 | 0.26 | |
| 4 | | | | | | 3774 | 0.13 | |
| 5 | | | | | | 3775 | 0.26 | |
| 6 | | | | | | 3776 | 0.23 | |
| 7 | | | | | | 3777 | 0.23 | |
| 8 | | | | | | 3778 | 0.93 | |
| 9 | | | | | | 3783 | 0.23 | |
| 10 | | | | | | 3784 | 0.2 | |
| 11 | | | | | | 158 | 0.36 | |
| 12 | | | | | | 162 | 0.94 | |
| 13 | | | | | | 163 | 1.44 | |
| 14 | | | | | | 164 | 0.56 | |
| 15 | | | | | | 165 | 1.03 | |
| 16 | | | | | | 166 | 0.91 | |
| 17 | | | | | | 168 | 2.92 | |
| 18 | | | | | | 169 | 0.5 | |
| 19 | | | | | | 174 | 0.43 | |
| 20 | | | | | | 217 | 0.9 | |
| 21 | | | | | | 218 | 1.1 | |
| 22 | | | | | | 220 | 0.73 | |
| 23 | | | | | | 221 | 0.29 | |
| 24 | | | | | | 222 | 0.33 | |
| 25 | | | | | | 223 | 0.22 | |
| 26 | | | | | | 224 | 1.66 | |
| 27 | | | | | | 225 | 0.96 | |
| 28 | | | | | | 226 | 1.02 | |
| 29 | | | | | | 227 | 0.65 | |
| 30 | | | | | | 228 | 0.56 | |
| 31 | | | | | | 230 | 0.16 | |
| 32 | | | | | | 231 | 0.65 | |
| 33 | | | | | | 234 | 1.06 | |
| 34 | | | | | | 1502 | 1.01 | |
| 35 | | | | | | 1503 | 3.85 | |
| 36 | | | | | | 1504 | 1.69 | |
| 37 | | | | | | 1505 | 1.69 | |
| 38 | | | | | | 1506 | 0.52 | |
| 39 | | | | | | 1509 | 1.11 | |
| 40 | | | | | | 1510 | 0.78 | |

Annex-1

| Sl. No. | District | Thana | Mouza | Jl. # | Sheet # | SA | Area (acre) | Proposed land Area (Acre) |
|---------|----------|-------|-------|-------|---------|------|-------------|---------------------------|
| 41 | | | | | | 1516 | 0.45 | |
| 42 | | | | | | 1517 | 3.51 | |
| 43 | | | | | | 1518 | 0.44 | |
| 44 | | | | | | 1519 | 0.7 | |
| 45 | | | | | | 1520 | 0.65 | |
| 46 | | | | | | 1521 | 0.48 | |
| 47 | | | | | | 1522 | 0.69 | |
| 48 | | | | | | 1523 | 0.55 | |
| 49 | | | | | | 1524 | 0.6 | |
| 50 | | | | | | 1525 | 0.26 | |
| 51 | | | | | | 1526 | 0.71 | |
| 52 | | | | | | 1527 | 0.48 | |
| 53 | | | | | | 1528 | 0.38 | |
| 54 | | | | | | 1539 | 0 | |
| 55 | | | | | | 1788 | 0 | |
| 56 | | | | | | 1789 | 0.26 | |
| 57 | | | | | | 1802 | 0.07 | |
| 58 | | | | | | 161 | 0.19 | |
| 59 | | | | | | 171 | 0.89 | |
| 60 | | | | | | 214 | 1.1 | |
| 61 | | | | | | 159 | 0.37 | |
| 62 | | | | | | 1531 | 1.26 | |
| 63 | | | | | | 1507 | 0.18 | |
| 64 | | | | | | 155 | 0.17 | |
| 65 | | | | | | 216 | 1.06 | |
| 66 | | | | | | 233 | 1.19 | |
| 67 | | | | | | 179 | 0.15 | |
| 68 | | | | | | 199 | 1.33 | |
| 69 | | | | | | 197 | 0.15 | |
| 70 | | | | | | 233 | 0.3 | |
| 71 | | | | | | 1529 | 1.92 | |
| 72 | | | | | | 1530 | 0.23 | |
| 73 | | | | | | 1532 | 0.53 | |
| 74 | | | | | | 1533 | 0 | |
| 75 | | | | | | 1554 | 3.18 | |
| 76 | | | | | | 1555 | 0.96 | |
| 77 | | | | | | 160 | 0.76 | |
| 78 | | | | | | 231 | 0.65 | |
| 79 | | | | | | 1511 | 1.9 | |
| 80 | | | | | | 1816 | 0.46 | |
| 81 | | | | | | 172 | 0.23 | |

Annex-I

| Sl. No. | District | Thana | Mouza | JL.# | Sheet # | SA | Area (acre) | Proposed land Area (Acre) |
|--|----------|-------|-------|------|---------|------|-------------|---------------------------|
| 82 | | | | | | 173 | 0.06 | |
| 83 | | | | | | 217 | 0.9 | |
| 84 | | | | | | 232 | 0.7 | |
| 85 | | | | | | 1535 | 0.63 | |
| 86 | | | | | | 215 | 0.72 | |
| 87 | | | | | | 167 | 0.29 | |
| 88 | | | | | | 177 | 1.31 | |
| 89 | | | | | | 178 | 0.34 | |
| 90 | | | | | | 200 | 0.69 | |
| 91 | | | | | | 156 | 0.44 | |
| 92 | | | | | | 158 | 0.43 | |
| 93 | | | | | | 202 | 0.15 | |
| 94 | | | | | | 152 | 0.81 | |
| 95 | | | | | | 175 | 0.71 | |
| 96 | | | | | | 203 | 0.22 | |
| 97 | | | | | | 204 | 0.61 | |
| 98 | | | | | | 207 | 0.87 | |
| 99 | | | | | | 155 | 0.49 | |
| 100 | | | | | | 208 | 0.41 | |
| 101 | | | | | | 213 | 0.56 | |
| 102 | | | | | | 1501 | 0.2 | |
| 103 | | | | | | 1515 | 0.56 | |
| 104 | | | | | | 209 | 0.21 | |
| 105 | | | | | | 180 | 0.55 | |
| 106 | | | | | | 198 | 0.56 | |
| 107 | | | | | | 210 | 0.93 | |
| 108 | | | | | | 211 | 1 | |
| 109 | | | | | | 212 | 0.2 | |
| 110 | | | | | | 3492 | 0.58 | |
| 111 | | | | | | 3493 | 0.35 | |
| Land available in the listed SA | | | | | | | 79.37 | |
| Total Proposed land for surface water treatment plant and Impounding reservoir | | | | | | | | 67.73 |

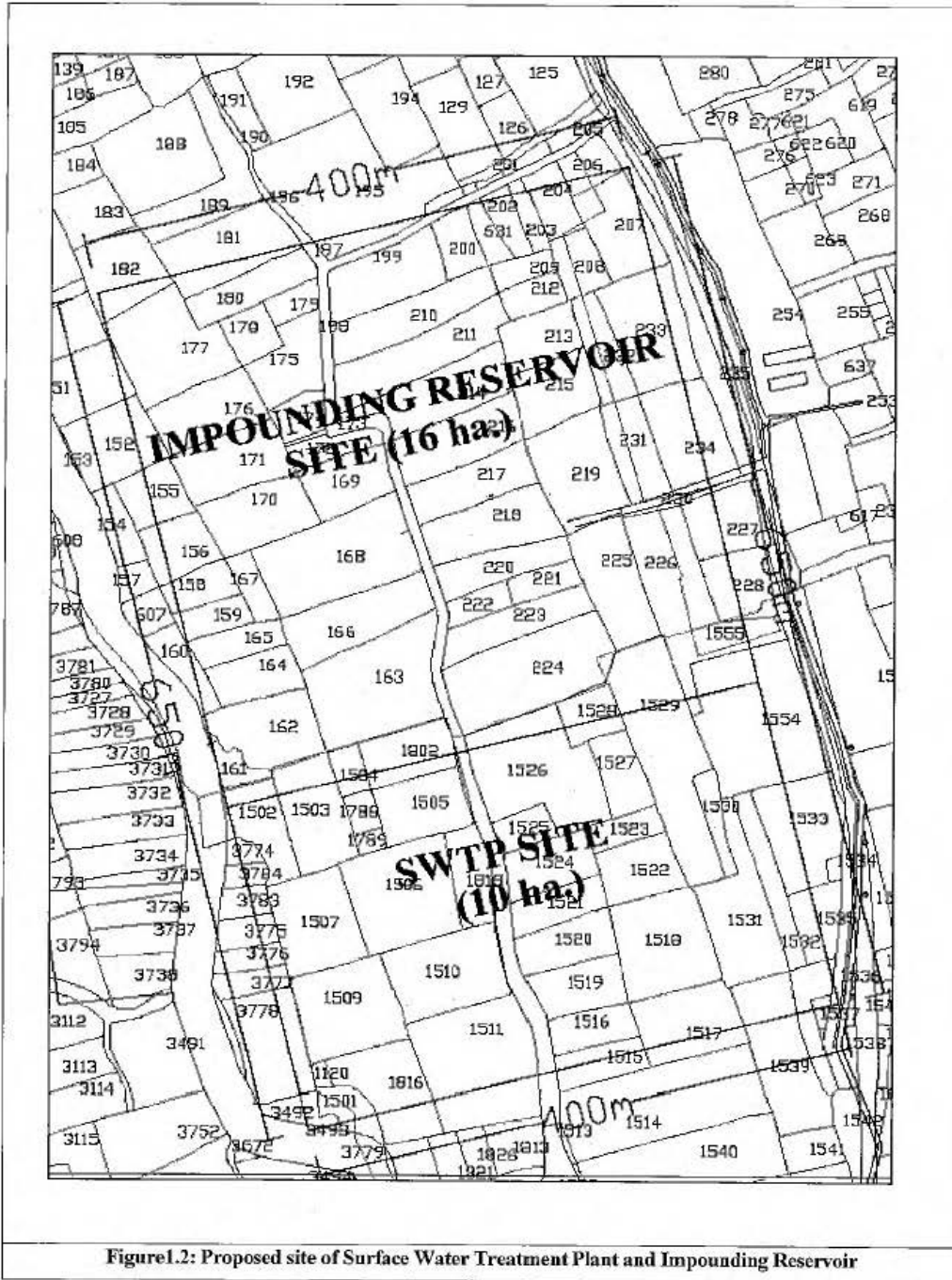


Figure 1.2: Proposed site of Surface Water Treatment Plant and Impounding Reservoir

Annex-1

C. Land details of proposed Over Head Tank (OHT) and Underground Reservoir

| Sl. No. | Name | District | Thana | Mouza | JL# | Sheet# | SA# | Area (Acre) | Proposed Area (Acre) | |
|--------------|--|----------|----------------|--------------|-----|--------|--------------|--------------|----------------------|------|
| 1 | Deana West Para Reservoir and Over Head Tank | Khulna | Doulatpur | Deyana | 8 | 2 | 1386 | 0.3 | 1.7 | |
| | | | | | | | 1387 | 0.3 | | |
| | | | | | | | 1254 | 0.23 | | |
| | | | | | | | 1255 | 0.12 | | |
| | | | | | | | 1256 | 0.14 | | |
| Total | 1.09 | | | | | | | | | |
| 2 | Ward # 16 Councilor office Reservoir and Over Head Tank | Khulna | Sonadanga | Choto Boira | 1 | 4 | 1711 | 1.02 | 1.7 | |
| | | | | | | | 1712 | 0.67 | | |
| | | | | | | | Total | 1.69 | | |
| 3 | Sonadanga Mola Sarak Reservoir and Over Head Tank (Women Stadium) | Khulna | Sonadanga | Choto Boira | | | 2157 | 0.98 | 2.2 | |
| | | | | | | | 2155 | 0.79 | | |
| | | | | | | | Total | 1.78 | | |
| 4 | Beside of 7 No. Ward Councilor Office Reservoir and Over Head Tank | Khulna | Khalishpur | Goalpara | 1 | 4 | 1 | 261 | 0.17 | 1.7 |
| | | | | | | | | 262 | 0.33 | |
| | | | | | | | | 263 | 0.59 | |
| | | | | | | | | Total | 1.09 | |
| 5 | Khalishpur Chorerhat River Ghat Reservoir and Over Head Tank | Khulna | Khalishpur | Goalpara | 1 | 4 | 2 | 3284 | 0.1 | 2.2 |
| | | | | | | | | 3286 | 0.27 | |
| | | | | | | | | 3287 | 0.17 | |
| | | | | | | | | 3283 | 0.31 | |
| | | | | | | | | 3285 | 0.19 | |
| | | | | | | | | 3288 | 0.1 | |
| | | | | | | | | 3227 | 0.77 | |
| | | | | | | | | 3355 | 0.22 | |
| Total | 2.13 | | | | | | | | | |
| 6 | Rab Sarani Over Head Tank (Word # 2) | Khulna | Khan Jahan Ali | MircerDanga | | | 3 | 140 | 0.4 | 0.33 |
| | | | | | | | | 141 | | |
| | | | | | | | | Total | 0.4 | |
| 7 | Mujgunni Over Head Tank (Word # 9) | Khulna | Khalishpur | Boira | 1 | 2 | 1 | 1051 | 0.63 | 0.33 |
| | | | | | | | | Total | 0.63 | |
| 8 | Ferry Ghat Power House More (KCC Garage) Over Head Tank | Khulna | Khulna Sadar | Baniakhannar | 4 | | 3 | 2405 | 0.83 | 0.33 |
| | | | | | | | | Total | 0.83 | |
| 9 | Andir Pukur Over Head Tank | Khulna | Khulna Sadar | Baniakhannar | 3 | | 9 | 5659 | 0.24 | 0.43 |
| | | | | | | | | 5658 | 0.14 | |
| | | | | | | | | 5657 | 0.1 | |
| | | | | | | | | Total | 0.48 | |

Annex-1

| Sl. No. | Name | District | Thana | Mouza | JL# | Sheet # | SA# | Area (Acre) | Proposed Area (Acre) |
|--|--|----------|--------------|------------|-----|---------|-------|-------------|----------------------|
| 10 | South side of Word # 31 office Labanchura Over Head Tank | Khulna | Khulna Sadar | Labanchora | | 1 | 139 | 7.92 | 0.43 |
| | | | | | | | Total | 7.92 | |
| 11 | DPHE Rupsha Over Head Tank | Khulna | Khulna Sadar | Tutpara | 5 | 5 | 1160 | 1.49 | 0.43 |
| | | | | | | | Total | 1.49 | |
| Total Proposed land for Over Head Tank (OHT) and Underground Reservoir | | | | | | | | | 11.78 |

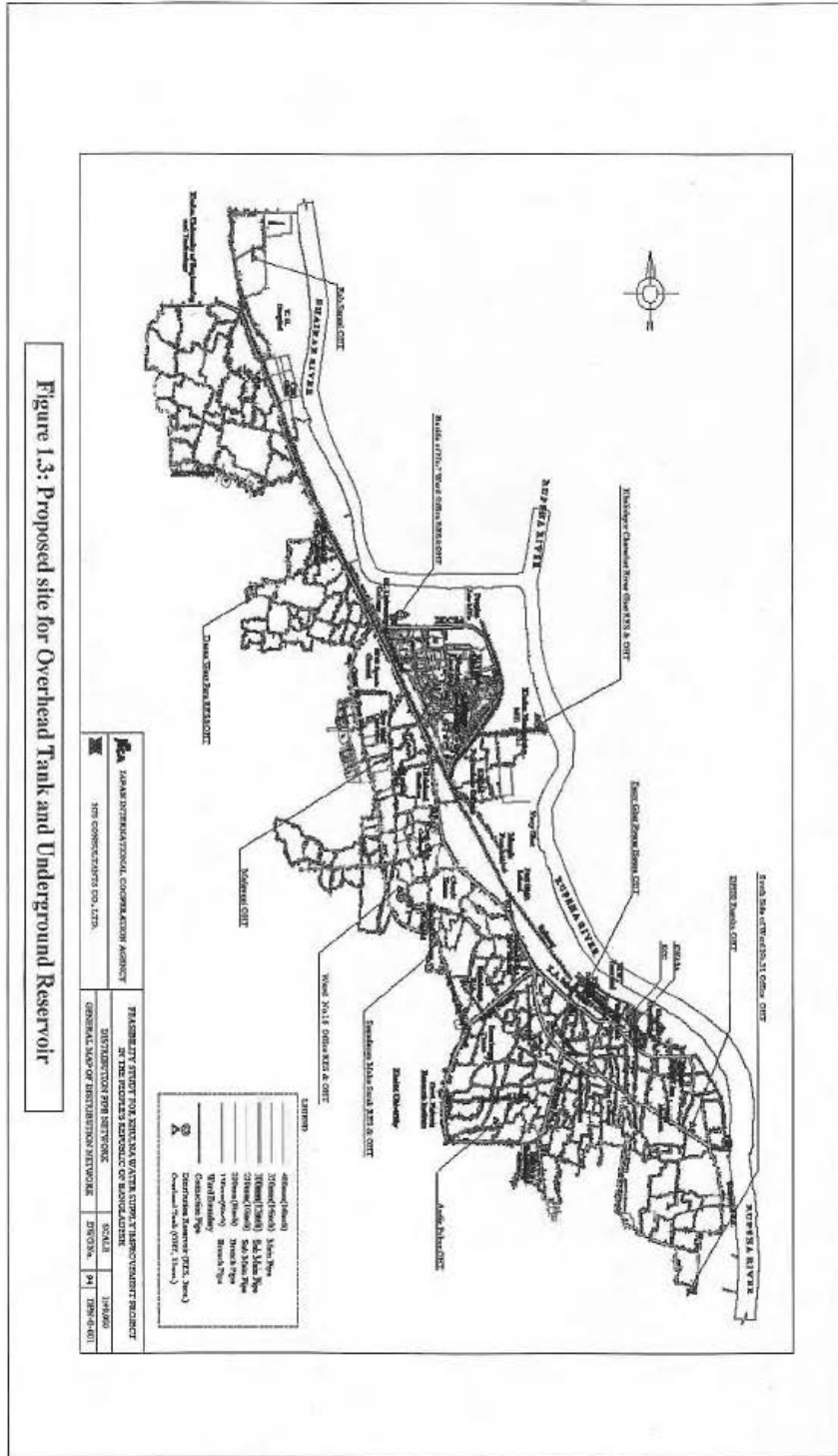


Figure 1.3: Proposed site for Overhead Tank and Underground Reservoir



Pictures 2: Stake Holders meeting at Mollahat UNO office (05.09.10)



Pictures 3: Public Consultation at Samonto Sena (7.10.10)



Pictures 4: Public Consultation at Mollahat (9.10.10)



Pictures 5: Public Consultation at Mollahat (9.10.10)

MINUTES OF MEETING AT SAMANTO SENA

Saturday, 21st August, 2010.

The Honorable City Mayor Talukder Abdul Khalek went to the Samanta Sena area with Managing Director of KWASA, Deputy Managing Director of KWASA, Executive Engineer of KWASA, Upazila Chairman of Rupasha, Additional District Commissioner (Land Acquisition Division), Project Coordinator of JICA Study Team, Planning & Development Officer of JICA Study Team & Surveyor of JICA Study Team.

After arriving of City Mayor, local people arranged a meeting in the nearest school with the help of local Chairman Paris. In this meeting the land owners of Samanta Sena, local people, Chairman & other members of Land Owners Association were present.

At the starting of meeting, local Chairman Paris announced the name of land owners of the selected land for KWASA's project. After that City Mayor gave a short speech. He said, 'in the last meeting at KWASA, there was a proposal of alternative land for the KWASA project. We are here to discuss with you to solve the problem/complexity about land acquisition. There is some confusion the project activities. We will acquire only 64 acre land. Maximum portion of the land is owned by Md. Abul Hossain Shaikh. We sorted out that only 28 owners from the record book will lose their land. So, don't think that large amount people will affected by the land acquisition procedure. Even we will consider the cost for trees & others also. You will get 1.5 time better price than market price for your land. So, please tell us about your problems. It is better only listed owners will speak to us. Otherwise it make crowd.'

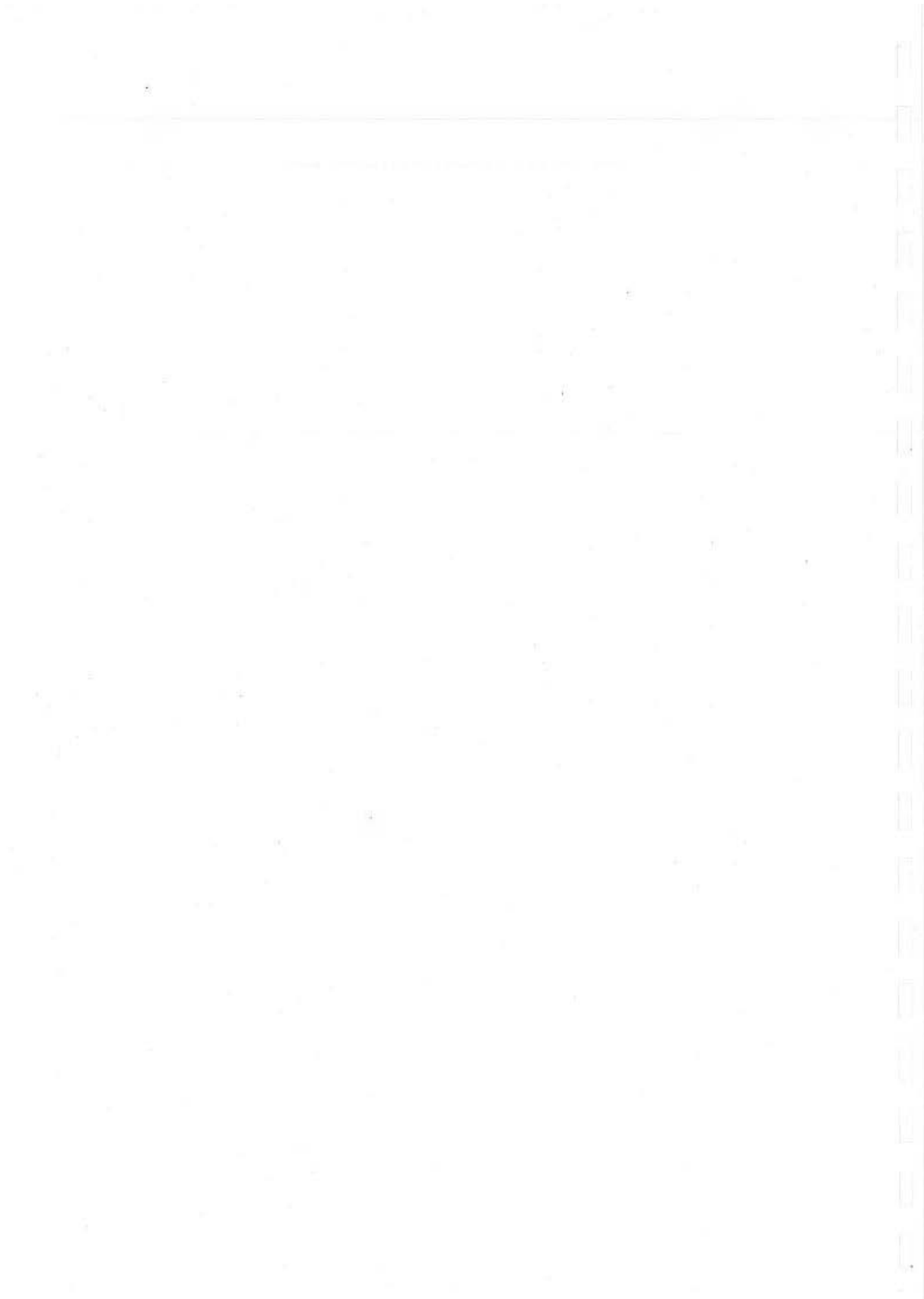
Land owners were start to saying about their problems. They mainly mention their problem as-

- These lands are their main income source;
- There are many complexities about owners' information. As a result, the original land owner may not get the compensation;
- They don't know that which lands will acquire or not. So, everyone is worried;
- There are many rumors about land acquisition which are making them confused. Such as-If small portion of a land will lies on the project area, then will they get compensation for whole land or for that small portion.

During the discussion, a little bit bargains had occurred among the land owners & City Mayor. Local People proposed to mark the selected lands by red flag or red ribbon. It will help to remove all confusions about the process.

Additional District Commissioner (Land Acquisition) of Khulna gave assurance the land owners that they will get the proper compensation & minimum lose of wealth will consider for this project.

At the ending session, the City Mayor said, 'some lands must be needed for each development project. In some other project a lots of land have to acquire by government in Bangladesh. But in this project the required land amount is not too much. Another thing, 6 more alternative options were selected by the JICA Study Team. This area is the most suitable option for this project. So, we have no option for alternate. Otherwise project will not sustainable.' He requested the people to help the government by their contribution.



MINUTES OF STAKEHOLDERS'S MEETING

DATE: 12.08.2010

A Stakeholders meeting with land owners, different stakeholders were organized by KWASA was held in 12th August, 2010. First, all of the participants introduce each other. The inaugural session was started by the meeting's chairperson Honorable City Mayor Talukder Abdul Khalek. He spoke about the project of Khulna Water Supply Improvement. He said, 'since from many years ago we were trying to establish KWASA for proper water supply distribution in this region. Because the people are suffering by different diseases and health hazards due to lack of pure drinking water supply. Generally, most of the citizens are collecting drinking water by deep tube well. As a result the underground water level has been decreasing day by day. The existing water supply system is not sufficient to support the total need and future demand. In this circumstance, GOB & KWASA initiate for Khulna Water Supply Improvement Project with the funding of JICA & ADB. By this project a long term development plan will established which can meet the future demand.'

After Mayor's speech, Honorable Managing Director of KWASA Md. Abdullah started to explain about the project information to the stakeholders. He said, 'we are going to start a new project named as-Khulna Water Supply Improvement Project for proper water supply distribution in the Khulna city. For this purpose, JICA study team has been conducting a feasibility study from the October, 2009. The experts and consultants are examined the total water supply process and they are developing a plan for new project. They already chose the suitable places for project area. We will collect the surface water from the Madhumati River at Mollarhat area. There will be a surface water treatment plant and an impounding reservoir at Samanta Sena to purify the raw water which will transmit from the intake point Mollarhat. This clear water will distribute in the city through clear water transmission pipe to five distribution reservoirs and eleven over head tanks. From the over head tanks, water will distribute to the houses by service and distribution pipe. It is very large project as it cannot be implement by the funding of GOB alone. It is very good news for us that JICA & ADB has been agreed to provide 150,000 million Taka as loan.'

Ali Akbar Shaikh, Chaiman of Rupsha Upazila, had introduced the chairman of Padma beel Water Rights Protection Association, Khan Bozlur Rahman. Khan Bozlur Rahman told about some problems of land acquisition in Samanta Sena Area. He explained, 'we are very happy to know about the new project of KWASA cause, we also want the pure/clean drinking water supply in this region. The Padmabeel (Samanta Sena) area's soil is very fertile for cultivation. In the whole year different kinds of crops are cultivating in the whole area. The people of that area are mainly depending on the crop cultivation of the land. We heard that there will be two projects in that area, i.e. 1. KWASA's Project & 2. Women Cadet College (which is initiated by City Mayor). So, if these two projects will implement in that area, we will lose a lots of cultivable land by the land acquisition procedure. For this reason, we are proposing another land for KWASA's project. There is a huge land in Atharo Baki area of Alaipur Mouza.

These lands were created through the river erosion process of Madhumati River. These lands are known as *Char* Land (Govt. Land). If these land can be use of KWASA's project then government will not to pay any compensation for land and we will not lose any cultivable lands of Samanta Sena area. So, please consider our condition.'

Additional District Commissioner (Revenue) of Bagerhat had tried to convince the land owners. He explained them, 'JICA study team selects the lands by the different criteria of suitability. The selected lands are not using for crop cultivation mainly. These lands are using mainly for shrimp cultivation. Maximum portion of required 26 hector land is owned by Abul Hossain. So, many of land owners will not victim.'

Additional District Commissioner (Land Acquisition) of Khulna said, 'this project is of 150,000 million Taka budget. There are no obstacles to acquisition of land for government. So we have to take decision earlier without any kind of delay. This project will bring new job and opportunity for the development of the Samonto Sena area. We will consider honestly maximum compensation to the victims.'

City Mayor was said them, 'we have to think about our nation & nation's development. Sometimes small things have to sacrifice for development. The selected places are the most suitable places for this project. We are giving you the word that you will get proper compensation not only the land owners, also the employees of the lands. I will visit your proposed area in 21st August, 2010. If this place will suitable then we change the selection otherwise not. So right now KWASA consultant have some task at the Samonto Sena area, I think the people of that area will coordinate with them'

Managing Director Md. Abdullah also agreed with the Mayor's commitment. In this meeting, Chairman, UNO & Vice-chairman of Rupsha Upazila, Bio-chemist of DOE, Additional District Commissioner (Revenue) of Bagerhat & Additional District Commissioner (Land Acquisition) Khulna, Engineer of KDA, Chairman of Noihati Union Parishad, Deputy Managing Directors, Engineer of KWASA, Team Leader Tadao Funamoto, Project Co-ordination Asif Masud & Planning & Development Officer Mitun Talapatra of JICA Study Team, land owners etc. were present.

Kwasa
JICA Study Team

Meeting with Stakeholders

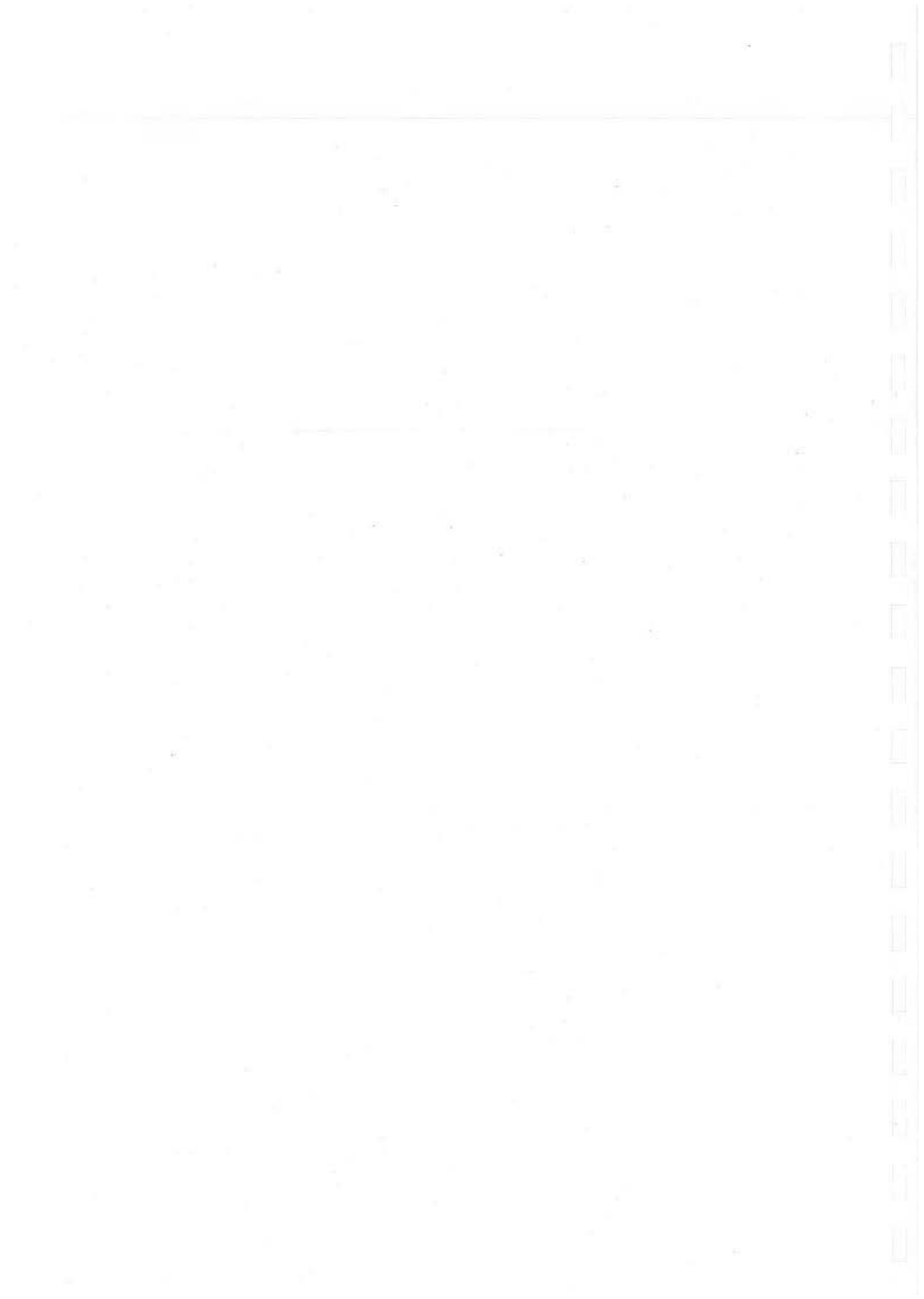
Venue: Conference Room, Kwasa, Khulna

Time of meeting: 12:00pm

Date of Meeting: August 12, 2010.

Participants List

| Sl. # | Name | Designation | Organization | Communication | Signature | Remarks |
|------------------------------|-----------------------------|---|---|---------------|-----------|---------|
| 1. | Mr. Talukder Abdul Khaleq | Honorable Mayor | KCC | | | |
| Administration | | | | | | |
| 2. | Md. Zahidul Ismail | Additional District Commissioner (Land Acquisition) | Khulna DC Office | 01716-886-471 | | |
| 3. | Md. Delwar Haider | Additional District Commissioner (Revenue) | Bagerhat DC Office | 01971-067-788 | | |
| 4. | Mr. Ali Akbar Shaikh | Chairman | Rupsha Upazila | 01711-332-556 | | |
| 5. | Md. Monirul Islam | UNO | Rupsha Upazila | 01747-606-060 | | |
| 6. | Md. Ayube Mollik (Babu) | Vice-Chairman | Rupsha Upazila | 01913-460-055 | | |
| 7. | Ms. Parul Begun | Vice-Chairman | Rupsha Upazila | 01714-832-554 | | |
| 8. | Khan Shajahan Kabir Paris | Chairman | TS Bahirdia Union | | | |
| 9. | Saifur Rahman Molla | Chairman | Noihati Union | 01911-468-342 | | |
| 10. | Azizur Rahman | Member | Rupsha Union Paris | | | |
| 11. | Shaikh Firoz Mahmud | Member | Rupsha Union Paris | | | |
| 12. | Md. Zakir Hossain | Member | Rupsha Union Paris | | | |
| 13. | Shyamsundar Baishnob | Land Owner | Kazdia, Rupsha | 01553-453-735 | | |
| 14. | Khan Bazlur Rahman | President | Padma beel Water Protection Association | 01712-544-788 | | |
| JICA Study Team Participants | | | | | | |
| 15. | Tadao Funamoto | Team Leader | | | | |
| 16. | Emon Khan | Project Coordinator | | | | |
| 17. | Md. Asif Masud | Project Coordinator | | | | |
| 18. | Mitun | Planning & Development Officer | | | | |
| KDA Participants | | | | | | |
| 19. | Engr. Kazi Md. Sabirul Alam | Superintending Engineer | KDA Khulna | 01711-825-305 | | |
| DOE Participants | | | | | | |
| 20. | Sayed Ahmed Kabir | Bio-Chemist | DOE Khulna | 01712-932-380 | | |
| Kwasa Participants | | | | | | |
| 21. | Md. Abdullah | MD | | | | |
| 22. | S.M. Jaglul Haider | DMD (Engr.) | | | | |
| 23. | Md. Alim Uddin | DMD (Admin.) | | | | |
| 24. | Mafiz Uddin Ahamed | Executive Enngineer | | | | |



Questionnaire Relating to Environmental, Socio-Economic,
Land Acquisition and Resettlement Survey
(Additional Data Collection with Respect to
Optionwise Impacts/Losses)

Part-I: Socio-Economic Condition Related Questionnaires

Survey Questionnaires on “Environmental Socio-Economic Condition
for Rehabilitation of Khulna Water Supply Improvement project

Questionnaire No-----

Socio-Economic Related Questionnaires

A. Optionwise location (Please give tick)

- (a) Option-1, (b) Option-2, (c) Option-3, (d) Option-5, (e) Option-6, (f) Option-6
(g) Option-7, (h) Option-8

Name of Affected Mouza
and Plot No.:

B. Type of the components (Please give tick)

- (a) Water Intake Point (b) Water transmission line (c) Impounding reservoir (d) Water treatment plant (e) Water
Distribution Reservoir (f) overhead Water Tank

**C. Type of Respondents (Please give tick) (a) Living in the acquired land (b) Absentee Land owner/Living outside
the acquired land**

- D. Type of affected (please give tick) (a) Only homestead loser (b) Agriculture land loser (c) Commercial land loser (d)
only tree loser (e) only structure loser (f) Loss of waterbody other than shrimp gher (g) Land, tree and structure
loser (h) Loss of shrimp gher (i) squatter**

**E. Type of respondents regarding vulnerability (Please mark tick) (a) Women headed households (b) Ethnic
minority (c) Indigenous people (d) Physically handicapped (e) others**

1.0 Identity of the Household:

1.1 Name of the Affected Person : _____

1.2 Father's Name of the Affected Person : _____

1.3 Name of the Respondent : _____

1.4 Relation of the respondent with the Affected Person: _____

1.5 Village : _____

1.6 Mouza : _____

1.7 Union : _____

1.8 Upazila : _____

1.9. District : _____

1.10. Religion (please give tick): Muslim 1 Hindu 2 Christian 3 Buddhists 4 Others 5

SOCIO ECONOMIC ISSUES:

2.0. Household Demographic Information

2.1. Total Family Members: Male: _____ Female: _____ Total: _____

2.2 Family Information (Starting from Family Head), please use code

| Sl. No. | Relation with Household Head | Marital Status | Age | Sex | Education | Main Occupation | Secondary Occupation | Work Place |
|---------|------------------------------|----------------|-----|-----|-----------|-----------------|----------------------|------------|
| 1. | | | | | | | | |
| 2. | | | | | | | | |
| 3. | | | | | | | | |
| 4. | | | | | | | | |
| 5. | | | | | | | | |
| 6. | | | | | | | | |
| 7. | | | | | | | | |
| 8. | | | | | | | | |
| 9. | | | | | | | | |
| 10. | | | | | | | | |

Code

| | | |
|--|---|--|
| <p>Relation: Household Head = 1 Husband/Wife = 2 Father/Mother = 3 Brother/Sister = 5 Daughter in Law/Son in Law = 6 Father in Law/ Mother in Law = 7 Maid servant = 8 Grand son/Grand daughter = 8 Other = 10</p> | <p>Occupation: Farmer = 1 Fisherman = 2 Agriculture Labor = 3 Non Agriculture Labor = 4 Service = 5 Small Business = 7 Household Work = 8 Student = 9 Child = 9 Retired/Handicapped = 11 Unemployed = 12 Service in Abroad = 13 Others = 14</p> | <p>Education: Illiterate = 99 Only Read = 91 Read and write = 92 Child (below four yrs) = 1 Primary=(class-1 to class 5) = 2 Secondary (class-6 to class 10) = 3 SSC/ Equivalent = 4 HSC/Equivalent = 6 Degree = 7 Masters, Honours = 8 Others = 9</p> |
|--|---|--|

| |
|--|
| <p>Main Place of Work: Village = 1 Union = 2 Upazila = 3 District = 4 Other district = 5 Abroad = 6</p> |
|--|

| |
|--|
| <p>Sex: Male = 1 Female = 2</p> |
|--|

| |
|--|
| <p>Marital Status: Married = 1 Unmarried = 2 Widow = 3 Widower = 4 Divorced = 5 Separated = 6 Others = 7</p> |
|--|

3.0 Asset of the households and physical facilities (please tick, where necessary)

3.1 Type of residents: 1 Own 2 Rented 3 Others

3.2 Types of Housing Structure: 1 Kutchha 2 Semi Pucca 3 Pucca 4 Others

3.3 Types of roof: 1 Straw/Chan/Golpata 2 Tiles 3 Tin 3 Pucca 4 Others

3.4 Total land of households (in decimals): Homestead: _____ Agriculture: _____
Water body: _____ Total: _____; Share in _____ Share Out _____ Mortgage in _____
Mortgage Out _____

3.5 Electricity: 1 Yes 2 No

3.6 Cooking Fuel: 1 Natural Pipe Gas 2 Cylinder Gas 3 Kerosene Stove

4 Electricity 5 Wood/Leaf/ Agriculture Waste 6 Cow dung

7 Others

3.7 Do you have Ownership of Poultry birds: hen-----swan-----pigeon-----?

3.8 How many livestock do you own: Cow-----, buffalo-----goat-----?

4.0 Water Supply and Sanitation (please Tick):

4.1 Water Source

| Type of use | Shallow Tube Well (STW) | Deep Tube Well (DTW) | Water Supply | Well | Pond | Canal/River Mention Name |
|---------------------|-------------------------|----------------------|--------------|------|------|--------------------------|
| Drinking | | | | | | |
| Cooking/Washing | | | | | | |
| Bathing | | | | | | |
| Cattle/Goat Washing | | | | | | |

4.2 Do you have own TW? Yes, working: _____ Out of order: _____ No TW: _____

4.3 How far is the nearest TW from your house if you have no TW? _____ ft.

4.4 Do your TW free of Arsenic? Yes 1 No 2 Not Examine 3

4.5 Type of latrine?

1 Sanitary 2 Pit 3 Hanging 4 Open Place 5 Others

4.6 Hand washing after toilet use?

1 Only water 2 Soap 3 Ash 4 Soil 5 Others

5.0 Health Information:

5.1 Main Disease suffered you and your Family in Last 2 Years

| Disease Code | Treatment |
|--------------|-----------|
| | |
| | |
| | |

Disease code: Diarrhoea-1, Typhoid-2, Dysentery/gastroentric disease-3, Jaundice-4, Skin disease-5, Titanus-6, TB-7, Pneumonia-8, Asthma-9, others-10

Treatment Code: 1. Herbal, 2.Homoeopathy, 3.village doctor/Pharmacy, 4. MBBS+, 5. No treatment, 6. No ability, 7. Unknown, 8. others

5.2 Health Facilities in the area (Use Tick mark):

- 1 Government Hospital
 3 Union Health complex
 5 Private doctor
 2 Private clinic
 4 NGO clinic
 6 Good Pharmacy
 7 Village doctor
 8 Others

6.0 Agriculture Related Information

6.1 Last year Cultivated

| Sl. No. | Name of Crop | Area of Land (Decimals) | Production (kg) | Price/ Kg | Sl. No. | Name of Crop | Area of Land (Decimals) | Production (kg) | Price/ Kg |
|---------|--------------|-------------------------|-----------------|-----------|---------|-------------------------|-------------------------|-----------------|-----------|
| 1 | R. Aman | | | | 11 | Chilli | | | |
| 2 | B. Aman | | | | 12 | Coriander Seed (Dhania) | | | |
| 3 | Aus | | | | 13 | Turmeric | | | |
| 4 | Upshi Boro | | | | 14 | Zinger | | | |
| 5 | Jute | | | | 15 | Sugarcane | | | |
| 6 | Potato | | | | 16 | Mustard | | | |
| 7 | Sweet Potato | | | | 17 | Nut | | | |
| 8 | Pulse | | | | 18 | Betal Nut | | | |
| 9 | Onion | | | | 19 | Others | | | |
| 10 | Garlic | | | | | | | | |

6.2 Type of Farmer (Use tick mark): 1 Cultivation own land 2 Own and other's land

3 Only owner of land 4 Share Cropper

6.3 If the land is not cultivated by the owner, please mention name of the sharecropper and his address

6.4 Mention land use practice and conditions in your area e.g rent, mortgage and share cropping-----

6.5 Cropping pattern in the area: Single crop _____ %Double Crop _____ %Tripple Crop _____ %

6.6 (i) Irrigated Land in your area _____ %, (ii) fallow land _____ %

6.7 Land under Shrimp/fish Culture _____ % (only Shrimp/Paddy, Please Tick)

7.0 Trees/Vegetables

7.1 Trees will be affected

| Sl. No. | Name of the Trees | Qty | Sl. No. | Name of the Trees | Qty | Sl. No. | Name of the Trees | Qty | Sl. No. | Name of the Trees | Qty |
|---------|-------------------|-----|---------|---------------------|-----|---------|--------------------------|-----|---------|-------------------|-----|
| 1. | Banana | | 7. | Guava (Pears) | | 13. | Col | | 19. | Lemon | |
| 2. | Jackfruit | | 8. | Black Bery (jum) | | 14. | Sofda | | 20. | Orange | |
| 3. | Mango | | 9. | Jambora | | 15. | Emblie myrbalan (Am oky) | | 21. | Pineapple | |
| 4. | Lichi | | 10. | Wood Apple (Bd) | | 16. | Pomgranate (Dalim) | | 22. | Others Wood | |
| 5. | Papaya/Paw | | 11. | Kabel | | 17. | Acid Fruit(Chalta) | | 24. | | |
| 6. | Coconut | | 12. | Custard Apple (Ata) | | 18. | Kamranga | | 25. | | |

7.2. Vegetables will be affected (Use tick mark)

| | | | | | | | |
|----|-----------------------|-----|------------------------|-----|-----------------------|-----|------------------|
| 1. | Gourd(Lau) | 9. | Snake Gourd (Chicirga) | 17. | Koikambar | 25. | Turnip (Shalgam) |
| 2. | Pumpkin (Komra) | 10. | Luffa Gourd (Dondil) | 18. | Bean(Shim) | 26. | Arum (Kachu) |
| 3. | Sweet Pumpkin (Komra) | 11. | Basil (Puishak) | 19. | French(Barbati) | 27. | Karella (Ostra) |
| 4. | Deta | 12. | Calery (Lalshak) | 20. | Kakrul | 28. | Others ----- |
| 5. | Radish | 13. | Sagina | 21. | Tomato | | |
| 6. | Brinjal | 14. | Arhar | 22. | Cauliflower (Fulcapi) | | |
| 7. | Purbal(Patal) | 15. | Lady's Finger (Darash) | 23. | Cabbage (Badacapi) | | |
| 8. | Luffa(Jingga) | 16. | Kholrabi (Olcapi) | 24. | Karat | | |

8.0 Economic Information

8.1 No of Income earning member in the family: Male: _____ Female: _____ Total: _____

8.2 Monthly Average Income of the Family: Tk _____

8.3 Monthly Expenditure of the Family: Tk _____

8.4 Last year loan +Interest (principle+interest)? 1 Yes 2 No

8.5 Last year loan received if any: _____ Tk. Source: (1) Bank (2) NGO (3) Others

(Bank/NGO Name?) _____

8.6 Total cumulative Family Loan Tk: _____

9.0 Fish Culture in the Affected Pond? _____

9.1 When you have started fish culture? _____

9.2 Probable time for harvesting fish: _____

9.3 Amount of loss of fish culture?

| Name of the Fish | Qty | Rate |
|------------------|-----|------|
| 1. | | |
| 2. | | |
| 3. | | |
| 4. | | |
| 5. | | |

9.4 Type of Water body (dec.): Paddy Field (dec.) _____ Pond (dec.): _____

Fish in Paddy Field (dec.): _____

9.5 Name of of co- owners/ co- sharer of Fish Culture land:

9.6 How many people work under your fish project:

9.7 Type of Fishes in your area: -----

10.0 Historical sites/ Monuments /Culture in and around the project site: Use separate FORM: Plot Number for affected area _____

10.1 Have any aborigines in your area? Yes 1 No 2

10.2 If yes of 10.1

Name & number Aborigines (specify):- _____

10.3 Have any historical sites/monuments in your area? Yes 1 No 2

10.4 If yes

Name and location _____

10.5 Have any old Mosque, Temple, Pagoda, Church, and Graveyard in your area?

Plot Number for affected area _____ Yes 1 No 2

10.6 If any

Name and location _____

10.7 Do have any community place or right of common in the affected land e.g Park, playground, pasture land, dighi, pond or fishing area, road etc? Please mention, ownership, -impacts-----

11.0 About Project

11.1 Do you know project will likely affect your land?

Yes 1 No 2

11.2 What are your Comments (please tick):

Yes 1 No 2 Cause.....

11.3 Do you like to co-operate the construction? Yes 1 No 2

11.4 Do you have any suggestions or conditions for co-operating the project?

Yes 1 No 2 Condition 3

Specify _____

11.4.1 Types of conditions (If condition apply)

(a) If appropriate compensation provided 1
(b) If it is short time based 2
(c) If houses are not affected 3

11.5 Any comments on compensation

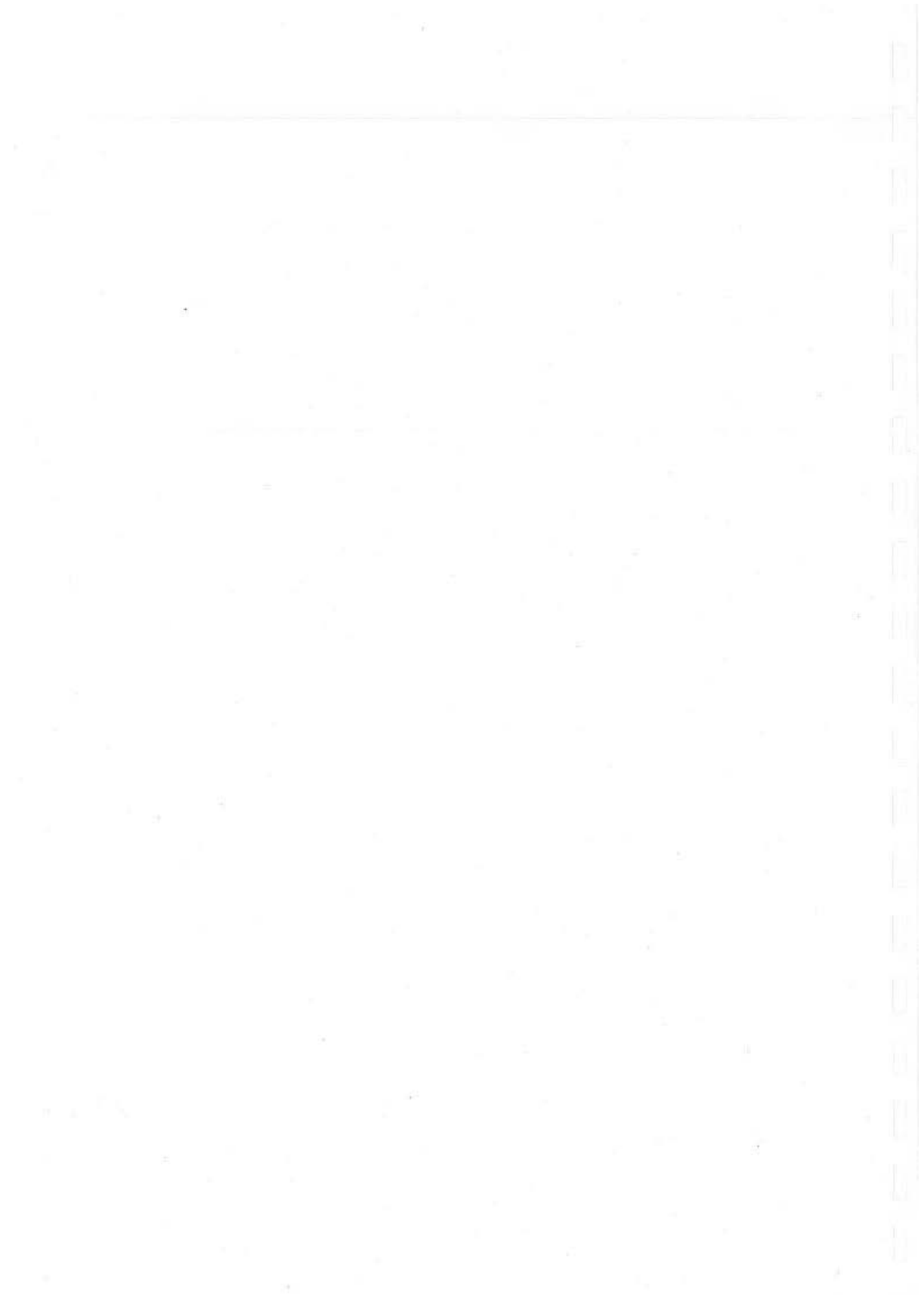
Yes 1 No 2

11.5.1 If yes

What is it? -----

12.6 Any suggestion for reducing the cost of project?

12.6.1 If any Suggestion that is _____



Questionnaire No-----

Part-II: Economic, Land Acquisition & Resettlement Related Questionnaires

1.0 Do you have any experience of Land Acquisition? Please explain

1.1 Do you have any suggestion regarding land acquisition related practice in the DC office or law?

1.2 If problem, what are the mitigation measures? -----

2.0 Type of affected land under your possession: (Put ✓ Mark)

2.1 (1) Cultivated land (2) Uncultivated land (3) Water body (Under fish Culture) (4) Fallow land (5) Abandoned

Plot/Dag no..... Mouza:

2.1 Option (Put ✓ Mark) 1 2 3 4 5 6 7 8 9

2.2. Type of affected Land

| Type of Loss | Area of Land Owned (decimals) | Affected Land Decimals | Price/acre (Tk) | Permanent Loss in decimals | Temporary Loss amount in decimals | Plot No of acquired Land |
|------------------|-------------------------------|------------------------|-----------------|----------------------------|-----------------------------------|--------------------------|
| Homestead land | | | | | | |
| Agriculture Land | | | | | | |
| Commercial land | | | | | | |
| Water body | | | | | | |
| Total Land (dec) | | | | | | |

2.3 Is there any co- sharer of the above land, please mention

| Serial | Name, Father's Name and Address | Amount of Sharecropping land | Mouza and plot no(if available) | Present land use | Condition |
|--------|---------------------------------|------------------------------|---------------------------------|------------------|-----------|
| | | | | | |
| | | | | | |
| | | | | | |

2.4 Is the above land is under mortgage or rent system? Please mention following items

| Serial | Name, Father's Name and Address | Amount of mortgage/rent land | Mouza and plot no(if available) | Present land use | Conditions |
|--------|---------------------------------|------------------------------|---------------------------------|------------------|------------|
| | | | | | |
| | | | | | |
| | | | | | |

2.5 Is there any squatter/floating people on your land, please mention details

| Serial | Name/ Father's Name/Address | How long staying in this location | Plot No |
|--------|-----------------------------|-----------------------------------|---------|
| | | | |
| | | | |
| | | | |

2.6 Type structure on the acquired land (housing and other structure)

| Serial | Type Structure | Size (sq.meter) Length x Width | Year of Construction | Floor (code) | Wall (code) | Roof (code) | Approximate Value |
|--------|------------------------------------|-----------------------------------|----------------------|--------------|-------------|-------------|-------------------|
| 1. | Housing structure(1) | | | | | | |
| 2 | Housing structure(2) | | | | | | |
| 3 | Commercial structure | | | | | | |
| 4 | Other structure(TW), boundary wall | | | | | | |
| | Total | | | | | | |

Code: 1.Thached 2.Tin 3.Kutchha 4.Pucca

3.0 Loss of trees (Put ✓ Mark) Permanent Temporary

| Name of Tree | Big size | Tentative price (Tk) | Middle size | Tentative price (Tk) | Small size | Tentative price (Tk) | Total trees(no) |
|--------------|----------|----------------------|-------------|----------------------|------------|----------------------|-----------------|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| Total: | | | | | | | |

4.0 Business Loss (please tick): Permanent Temporary

- 4.1 Type of Business and capital? _____
- 4.2 Daily income Loss from the affected business (Taka)
- 4.3 Total income loss from business amount in Taka
- 5.0 Type of crops if damaged: permanent/temporary (Put tick)
- 5.1 (1) Paddy (2) Wheat (3) Pluse (4) Vegetables (5) Betel Leaf (Pan) (6) Maize (7) Others
 a) Damaged crops.....Production per decimal (kg)..... Price per kg.....
 b) Damaged crops.....Production per decimal (kg)..... Price per kg.....
 c) Damaged crops.....Production per decimal (kg)..... Price per kg.....
 d) Damaged crops.....Production per decimal (kg)..... Price per kg.....
- 5.2 Amonut of crop loss: _____ Tk. (permanent).....
- 5.3 Type of damaged paddy:
- 5.4 Type of affected land: Single crop/Double crop/ Triple crop (put tick)
- 5.5 Type of crop circulation:
- 5.6 What percent of productive land is being lost due to the project?
- 5.7 If other income generating assets are being lost due to the project, please specify these.
- 6.0 Affected pond (if any): _____ total loss.....%
- 6.1 Length..... (Feet) Width..... (Feet)
- 6.2 Description of the pond (if aquaculture)

- 6.3 In case of Shrimp gher please mention varieties, area, production and approximate loss-----

- 6.4 Amount of loss (Taka) _____
- 7.0 What percent of total productive assets are being lost due to project?
- 7.1 Amount of total loss Taka. _____
- 8.0 Type of training and assistance for income rehabilitation.
 Name of training: _____ Assistance: (put tick✓)
 (1) Micro credit (2) Assistance for reselling/small business (3) Poultry/livestock rearing (4)Fish culture
 (5) hatchery management (6)Fish Processing (7) Driving(8) Electrical (9) solar maintenance(10)
 Agriculture(11)Automobile(12) Radio/TV maintenance(13)others
- 9.0 Comments about the project: _____

- 10.0 Do you think the project will create some Socio-economic opportunity in the area?
 Yes No
 If yes give description: _____

- 11.0 Is there any negative impact on economic activities? Yes No
Description: _____
- 12.0 Type of social wealth/community or rights of common (if damaged)?
(1) Forest (2) Park (3) Others (playground, water, fishing etc)
(2) Area (sq. m)
(3) Amount of loss (Taka) _____
- 13.0 Others damaged/affected property: (Numbers)
(1) Well: _____ (2) Tubewell: _____ (3) Govt. Land: _____ (decimal)
(4) Percentage to total Govt. land? _____ (5) Amount of loss (taka): _____
- 14.0 Is there any law complexity in acquired land?
(1) Yes (2) NO
What type (if)? _____
- 15.0 No of floating people living in the land to be acquired (if any) in your land or adjacent areas of your land?
- 15.1 Description: _____ Plot No: _____
- 15.2 is there any social problem arises if land acquired in the middle of beel by disrupting communications, access and social linkage? Mention mitigation measures any _____
- 16.0 Describe if mosque, cultural place on land to be acquired.

Plot no. _____
- 17.0 Have any aborigine's area affected in this Mouza? Yes No
Number: _____ Amount of land: _____ Plot No. _____
Percentage to total land: _____ Amount of loss (Tk.) _____
- 18.0 Comments on the effect of the project for aborigines: _____
- 19.0 Daily labour Charge TK _____
- 20.0 Comments of information collector/Field Investigator (write comments on income and expenditure and rehabilitation if the damaged family is woman headed/Children/Vulnerable/handicapped/ethnic minority family): _____
- 21.0 Name and address of local elite introduced during the time of taking interview
Name:.....
Address:.....
Telephone:.....
Designation:.....
Occupation:.....
General comments:.....

22.0 Overall Comments of the Field Investigator relating land acquisition, resettlement and other issues:

.....

.....

.....

.....

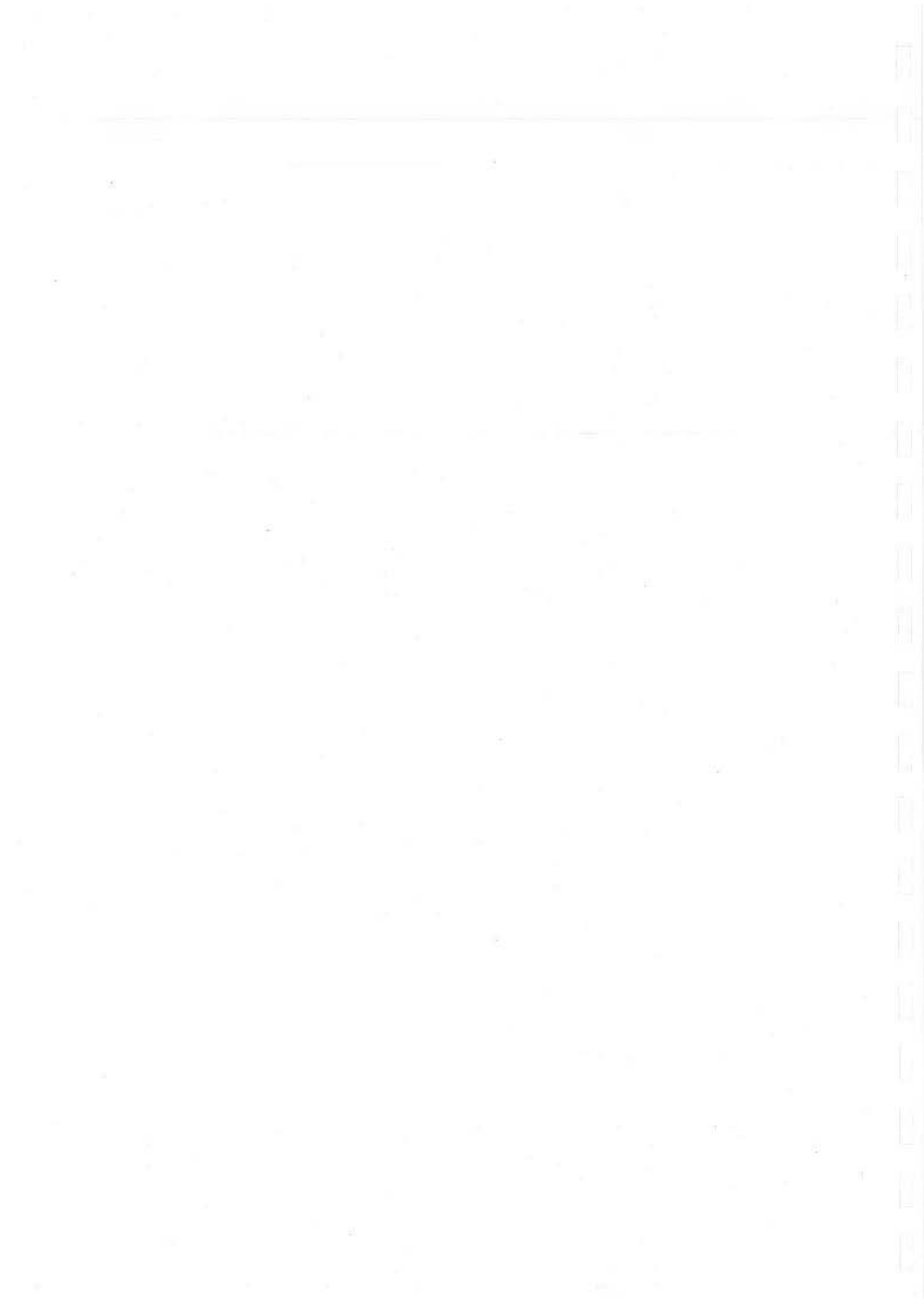
.....

Name of information collector/Field Investigator: _____

Date of information taken: _____

Signature: _____ Date: _____

Thanks



Resettlement Action Plan

1. Why Resettlement?

Resettlement is for rehabilitation of project affected person to pre project condition both socially and economically. But still it is not reached to the accepted level. It is found that in the project areas legal payments in most cases don't conform to the actual land and other asset price for various reasons. So, affected people suffer a lot. From that view point, government agrees in resettlement issues by contemporary administrative tradition and present practices are in large projects with donors support.

2. JICA Policy on Involuntary Resettlement:

According to the JICA (former JBIC) policy, Environmental and social consideration (2002) refer not only to the natural environment, but also to social issues such as involuntary resettlement and respect for the human rights of indigenous peoples (hereinafter collectively referred to as environment. This guideline is safeguards requirements with all projects with involuntary resettlement for preparation of resettlement plans. As per JBIC environmental and social considerations following issues are to be considered in preparation of RAP,

- (i) Involuntary resettlement and loss of means of livelihood are to be avoided where feasible, exploring all viable alternatives. When after such examination, it is proved unfeasible, effective measures to minimize impact and to compensate for losses must be agreed upon with the people who will be affected;
- (ii) People to be settled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported by the project proponents, etc, in timely manner. The projects proponents, etc must make efforts to enable the people affected by the project, to improve their standard of living, income opportunities and production levels, or at least to restore them to pre project levels. Measures to achieve this may include ; providing land and monetary compensation for losses(to cover land and property losses), supporting the means for an alternative sustainable livelihood, and providing the expenses necessary for relocation and the reestablishment of community at relocation sites; and
- (iii) Appropriate participation by the people affected and their communities must be promoted in planning, implementation and monitoring of involuntary resettlement plans and measures against the loss of their means of livelihood.
- (iv) In case of indigenous people, when a project may have adverse impacts on indigenous peoples, all of their rights in relation to land and resources must be respected in accordance with the spirit of the relevant international declarations. Efforts must be made to obtain the consent of indigenous peoples after they have been fully informed.
- (v) Regarding monitoring, it is desirable that, after a project begins, the project proponents monitor; whether any situations that unforeseeable before the project began have arisen, the implementation situation and the mitigation measures prepared in advance, and that they then take appropriate measures based on the results of such monitoring.

- (vi) Sufficient information disclosure and include the participation of stakeholders, countermeasures and discussion forum, in case of objection not compliance of environmental and social considerations.

3. Objectives of the RAP

Objectives of the Land Acquisition Plan and Resettlement Plan are as follows:

- 1) Involuntary resettlement should be avoided where feasible. If population displacement is unavoidable it should be minimum
- 2) Since some displacement is unavoidable, resettlement plans should be developed as a planned change. Any involuntary resettlement should, as far as possible, be conceived and executed as development programs with appropriate time bound actions and budgets. Resettled persons should be provided with sufficient resources and opportunities to reestablish their homes and livelihoods as soon as possible, and to share in project benefits.
- 3) The adversely affected persons should be (i) compensated for their losses at full replacement cost.(ii) assisted with the move and supported during the transition period of relocation;(iii) assisted in their efforts to improve their former living standards, income earning capacity, and production level, or at least to restore them. The adversely affected population should also include indigenous group, ethnic minorities who may have usufruct or customary rights to the land or other resources taken from the project. Particular attention should be given to the needs of the poorest affected person, female-headed households and other vulnerable groups to be resettled.
- 4) Community participation in planning and implementing resettlement program should be encouraged. The affected people should be fully informed and closely consulted on resettlement and compensation options.
- 5) Land, alternative source of income, skill training, housing, infrastructure and other compensation should be provided to the adversely affected populations who have usufruct or customary rights to the land or other resources taken for the project. Absence of legal title to land should not be a bar to compensate those depriving an income from the land or living on the land.

Involuntary displaces should not be worse off in terms of their socio economic condition. Attempts will be made to make the affected land owners better off after relocation through both direct compensation and remedial measures.

To achieve the above the RAP has the following specific objectives to

- i) Develop a compensation and resettlement policy by clearly defining various types of losses or impacts, entitled persons and entitlement to compensation and resettlement, and specifying the implementation issues and actors;
- ii) Asses the socio economic status of the land owners prior to land acquisition and resettlement cost of land and other assets, which should be serve as benchmark for implementation of RAP, and consult the affected people and host community on various resettlement issues at the inception stage;

- iii) Determine the losses and entitlement of each EP (entitlement Person) under the adopted policy framework and an identity (ID) card of each Entitled Person(EP);
- iv) Develop an appropriate implementation strategy and sound organization structure to carry out the resettlement program;
- v) Prepare a development oriented resettlement budget; and
- vi) Develop implementation schedule, monitoring and evaluation and management information system for implementation of RAP.

4. Eligibility Criteria

All eligibility will be determined by the prevailing laws of the country and JICA policy of environmental and social considerations of involuntary resettlement and ADB Safe Guard policy. In addition to that administrative practice, social norms, custom based on equity and humanitarian ground. However, the process will ensure public participation and common interest. There will be a cutoff date for all entitlement except any unforeseeable loss due to the project. The cutoff date will be counted from serving section -3 notice from DC office and all entitlement will be from that date in acquisition or requisition land. Primarily entitlement will be identified by the concerned DC and payment will be ensured by the concerned Land Acquisition officer. But most payment will be ensured before construction work. Remaining payment will be confirmed within one year. Extra payment will be paid on the DC's payment and identification of EPs in case of legal owner but decided by the PVAT committee.

4.1 Process of Identification of Entitlement Other than DC office:

The preliminary list of the affected land owners and their entitlement will be prepared on the basis of land acquisition records. Land owners will be asked to bring any discrepancies to the notice of RU through field workers. Land owners who feel that they have been excluded from the list of land owners and hence not received Household File would also be asked to show the necessary documents during the information campaign to bring their complaints to RU. They would also be asked to submit relevant records as proof of their claims. The proofs would include:

- i) Copies of title deeds (Khatian), compensation awards or mortgage deeds in the case of disputes related to legally owned land;
- ii) In case of share cropped or rented land, documentary evidence of the understanding between land owner and the tenant if there are any or an affidavit signed by the land owner and the tenant; this will be decided by PVAT as the project needs to implement amicably between requiring body and affected people.
- iii) Rent receipts in case of rented commercial premises;
- iv) In the case of squatters, voter list, community witness or any other membership records with cooperatives or Grameen Bank etc if it decided to pay as official vulnerable group by PVAT.
- v) In the case of wage employment, wage records if there are any; or an affidavit signed by the employee and the employer. The same will be applicable for wage employment.

The Resettlement Unit will review and verify the claims/complaints on the basis of existing records such as land acquisition records and the proofs submitted in support of the claim.

4.2 Identification of Entitlement by Joint Verification Team:

A final verification will, be made during joint investigation by the DC and the KWASA staff to ascertain the accurate amount of land under acquisition and requisition as well as other assets lost to the project. So, for efficient management of information related to entitlement and its implementation a fully computerized data management system will be developed. This will have the following two basic components:

Joint Information Verification Team (JIVT) will be responsible for making inventory of structure and crop losses after serving section -3 notice

All relevant information on each individual household that is required for implementation of the RAP and its monitoring and subsequent evaluation will be maintained at Resettlement Unit (RU). It would also be used to produce individual "Household file" and periodic monitoring reports. The computer facility and the programs will be designed and managed by the project management.

Household profiles would be prepared for each household recording detail of loss and entitlement, and other basic information regarding the families' resettlement as well. If a person loses lands or other assets in more than one Mauza (land administration unit), the person will be counted once, and his/her entitlements will be paid together. The information will be periodically updated to reflect the progress and the updated information will be passed on to the KWASA central computer facilities. Field workers will be trained to prepare and maintain the household files. Copies of these files will be maintained at the field RU.

The above system will be integrated with the overall management information system for resettlement.

4.3 Entitlement Policy

The project-affected households depend on a variety of sources such as farmland, tenant farming, wage labor, trading etc. for their livelihood. One household may rely on more than one means of livelihood. Number of households may suffer different kinds of losses. The entitlement policy takes this into consideration by linking the entitlement to the types of losses rather than to the category of project-affected person. In the end, however, individuals and households do get entitlement proportionate to their losses.

The policy matrix makes entitlement more precise and includes operational aspects such as implementation issues and actors. Basic concepts and principles of the entitlement policy are described in the following paragraphs:

4.4 Concepts and policy

Compensation at Replacement Cost: This is a very meaningful terminology. This means affected land owners or other affected are to be compensated in such a way that at least to restore them pre-project position regarding livelihood, land or other loss including social consideration. So, compensation will be sufficient in regaining at least pre-project socio-economic condition. Legal compensation in most cases is unable to compensate at the rate of

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replacement cost. For this reason RAP is necessary for additional payment other than legal payment.

A **Project Affected** land owner is defined as a person who lives and/or earns a living in the project affected area at the time of section 3 notification under the land acquisition law or at the time of socio economic survey (whichever is later) and whose property, place of residence or means of livelihood is affected by the project.

A **Household** is defined as all persons living and eating together (sharing the same kitchen and cooking food together as a single-family unit). There may be one or more person in a household who are entitled to a resettlement benefit.

Entitlement to Replacement Land or cash grants & credits in lieu of replacement land is based on the legal ownership, which is ascertained according to the title deed of land (recipient of compensation under the law). In the case of joint title deed, the replacement land or cash grants & credits in lieu of replacement land will be given to the joint holders (i.e. joint holders will be treated as one unit). Regarding replacement additional PVAT will consider is DC's compensation will cover actual market price.

In the case of house/building construction grants, the entitled person is the legal owner of the structure (one who receives the compensation under the law). About Transfer and construction will do according to the field situation and government approval and availability budget .

Maintenance Grant and Vocational Training is provided to persons affected by loss of wage earning opportunities or rented in/share cropped land. This entitlement is eligible to the individual so, affected and the criteria of entitlement are loss of primary occupation/primary source of income. But this will be decided by PVAT.

If more than one adult in a household is affected by loss of their primary source of income, each such person is entitled to maintenance grant and vocational training. Domestic help, casual employees and person not usually residing with or dependent upon the land owner household, however, are not eligible for resettlement benefits. About maintenance and vocational training PVAT will analyze exact situation.

The **indirectly affected** persons are those, whose primary source of income was dependent on areas acquired for the project, but do not own any property in those areas and are not normally residing in those areas. Their eligibility status will be determined through (i) joint verification by JIVT and /or (ii) an affidavit confirming their status jointly signed by the affected land owner, his/her employer and the Union Parishad Member. Compensation regarding indirect affected will be decided by PVAT.

Disputes and grievances arising out of the definition of household or entitled person will be resolved through a mechanism of formal verification and or through JIVT. At the implementation period any dispute or grievances will be solved by RU, KWASA. A GRC committee will be developed with RU, requiring body other than legal issues and will be formed by Representative of requiring body (KWASA), and local government representative and a land owner's representative.

4.5 Entitlement Package

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Loss of Farmland: All land owners affected by loss of farmland are entitled for a compensation package adequate to buy an equal area of replacement land. This package includes, in addition to the compensation under the land acquisition Act, a cash grant to meet the difference between the compensation and the replacement value of an equivalent area of land.¹ About additional grant the PVAT committee will take decision.

Affected Land owners are also eligible for credit up to 50 percent of the total compensation for purchase of land. This facility is provided for safeguarding those land owners who are, for any genuine reasons, unable to bear their share of money (compensation money received earlier). This provision will not be applicable to those land owners whose per capita residual holding is more than 33 decimals (1 decimal is equal to 40 square meters). Regarding this RU and PVAT will take decision later.

For temporary loss of land, as in case of requisition, the entitlement for compensation is for rental charges and compensation for crop loss as determined by the JIVT, and cash grants for income restoration, in accordance with ARIPO provisions. In addition, contractors will be bound to restore land to its original state, including restoration of common property resources affected.

Loss of Homestead: All land owners who have lost their place of residence (land and structures owned or otherwise occupied) to the project are entitled to an equivalent replacement homestead land. Such land owners will not be evicted from their place of residence until they arrange their replacement homesteads. Entitlement about additional grant RU and PVAT decide whether CCL is sufficient or not.

The scale of homestead plots to be provided for different categories of homestead losers are:

Households who lose 100 sq. meters (2.5 dec) or more homestead land are eligible for a cash grant adequate to make up the difference between the compensation and the replacement cost of an equal area of homestead and decided by RU and PVAT.

Households, who own less than 100 sq. meters of homestead and lose all or most of the homestead area will be provided with a minimum size homestead of 100 sq. meters through private land purchase. The difference between the total compensation money received for homestead and the cost of replacement homestead plot of 100 sq. meters will be considered as a grant and will confirmed by PVAT.

Loss of Residential and Commercial Structures: land affected by loss of residential structures may entitle to a transfer grant (TG) and the construction grant after the land owner has identified a homestead land. PVAT may decide considering practical situation In addition, they are allowed to take away all salvageable materials from their old structure(s) as it is practiced in different projects and auction value is not so much and this will be support for

¹ The replacement value will be determined by the PVAT. The cash grant will be provided by the RU to land owners at the same time as the compensation for land is provided and prior to displacement. Property Valuation Advisory Team (PVAT) will be formed by the representative of requiring body (preferably deputy director, KWASA), Local Government representative (Chairman/Mayor/Councilor of Pourashava, Union parishad, city corporation) and two members of affected person. PVAT will carry out a land market survey including other asset loss for determining replacement cost and will decide all sorts additional payment covering titled and untitled affected, special attention will all sorts vulnerable both humanitarian and resettlement practice in the country. RU will hire a Resettlement Specialist in this connection.

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the land owners who are displaced from a rented/occupied commercial premise may be entitled for a moving transfer grant of decided by PVAT. Household who owns less than 100 sq. meters of homestead and loses all or most of the homestead area will be provided with a minimum size homestead of 100 sq. meters through private land purchase. The difference between the total compensation money received for homestead and the cost of replacement homestead plot of 100 sq. meters will be considered as a grant and decided by PVAT.

Loss of Wage Labor/Employment: Persons affected by such losses are entitled to one time maintenance grant of and eligible for vocational training at project cost and decided by PVAT. Preference should also be given to the ability of land owners in engaging laborers/ workers for the project activities. Share croppers may include in this group.

Vulnerable Project Affected: Income restoration of the vulnerable groups is an important objective of the resettlement work. Vulnerable Affected means, squatter, poor, elderly, minorities, female-headed households and indigenous people. No indigenous people has so far identified in the project. Here wage loser is a poor group. There is an income restoration grant for wage losers, tenants, elderly and female-headed households and people affected of marginal income group. About their support viz. training for skill development as per market demand may consider PVAT. In addition, all vulnerable people can get employment and can sale wages for construction work on priority basis. Project authority will do all necessary support for them. In case of elderly and female headed, the APs can nominate their awards for training and other facilities.

Compensation Procedure and Resettlement of illegal Roadside Squatter: Roadside squatters and illegal affected have no compensation under the law. In resettling these vulnerable RAP has provision and these will be decided by PVAT after necessary investigation as per the resettlement practice in Bangladesh.

4.6 Entitlement Policy Matrix

The policy matrix is describes in Chapter-5.

4.7 Organizational Arrangements

The organizational framework will be decided by KWASA, ADB and JICA and other officials entity (KCC, DC and etc).

4.8 Grievance Redress Mechanism

Grievance Redress Committee (GRC) will be formed for solving all sorts of grievances as per RAP based of law, equity and justice. GRC will be formed one from local government body e.g. Chairman/Member/Councilor of the Local Government (Union parishad/pourashava/City corporation) and a representative of the affected households, headed by Project manager of KWASA and GRC member with RU. GRC member will be full time employee and act as member secretary of the committee. Project manager will be the Chairman of the committee. The aggrieved person will apply to the chairman of the committee with necessary documents. And the grievances will be recorded chronologically in a register and the committee will issue a receiving documents. The committee will sit in a month and the case will be solved

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**Khulna Water Supply Improvement Project
Timeline for Land Acquisition Plan**

| Serial | Name of the Activities | M-1 | M-2 | M-3 | M-4 | M-5 | M-6 | M-7 | M-8 | M-9 | M-10 | M-11 | M-12 | M-13 | M-14 | M-15 |
|--------|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| 1 | Tender Design and Construction Contract | | | | | | | | | | | | | | | |
| 2 | Land Acquisition | | | | | | | | | | | | | | | |
| 3 | Strengthening Land Acquisition Unit | | | | | | | | | | | | | | | |
| 4 | Information Campaign | | | | | | | | | | | | | | | |
| 5 | Stakeholders meeting in accordance with Public Consultation | | | | | | | | | | | | | | | |
| 6 | Relocation | | | | | | | | | | | | | | | |
| 7 | Collection of Documents from DC Office | | | | | | | | | | | | | | | |
| 8 | Preparation of ID Cards | | | | | | | | | | | | | | | |
| 9 | GRC Activities | | | | | | | | | | | | | | | |
| 10 | Payments of grants | | | | | | | | | | | | | | | |
| 11 | Monitoring | | | | | | | | | | | | | | | |
| 12 | Remedial Action | | | | | | | | | | | | | | | |
| 13 | Final Monitoring & Evaluation | | | | | | | | | | | | | | | |

Supporting Report 10.4 Environmental Protection Measures to be Incorporated

1) Environmental Protection Measures during Construction Stage

Air Quality

In view of the common kinds of construction works, the effect of dust generation from the construction works is expected to be insignificant with the implementation of mitigation measures. The impact will be minimized by the adoption of proper working method, e.g. regular sweeping and water spraying in dry season.

Water Quality

To minimize site runoff and potential water pollution is recommended, e.g. silt removal facility at nearby stormwater drains on-site before commencement of the excavation.

Implementation of good site arrangement and management practice is required. In view of the common kinds of construction works, adverse water quality impact during construction stage will not be anticipated.

Noise

The construction activities of the Project will include excavation, building construction and general M&E installation works. Only minor noise impact will be anticipated.

Implementation of good site practice e.g. regular maintenance of powered mechanical equipment and use of silent equipment as the proper noise control measures during the construction stage are recommended to minimize the potential noise impacts.

2) Environmental Protection Measures during Operation Stage

Air Quality

The standby generators at the water intake site and the SWTP site will be enclosed to contain the air pollution emission. It is difficult to assume the operation time of such emergency equipment and even if there is something, it is understandable that the emission is expected to be insignificant.

Water Quality

The water supplied to the people in Khulna will be discharged into the public water bodies and consequently to the Rupsha River. Some discharged water will be treated by small scale facilities such as septic tanks and natural purification. To date there are any centralized wastewater treatment system in Khulna. Compare to the increase of supplied water is expected to be insignificant compare to the flow of Rupsha River.

Noise

The standby generators will be enclosed to contain the noise emission. Silencers at the air intakes and discharge opening of the generators will also be employed to further reduce the noise impact.

With these mitigation measures in place, adverse noise impact is not anticipated during the operation stage of the Project.

3) Monitoring of Environmental Effect

DOE Khulna is continuously, once a month, monitor air quality and water quality in Khulna Division.

There is an air quality monitoring point at Boyra in Khulna city.

And as to the water quality there are 4 monitoring points in the Project Site.

- Madhumati River at Mollarhat Bridge
- Bhairab River at Carehat River Ghat
- Rupsha River at Rupsha Ferry Ghat
- Rupsha River at Rupsha Bridge

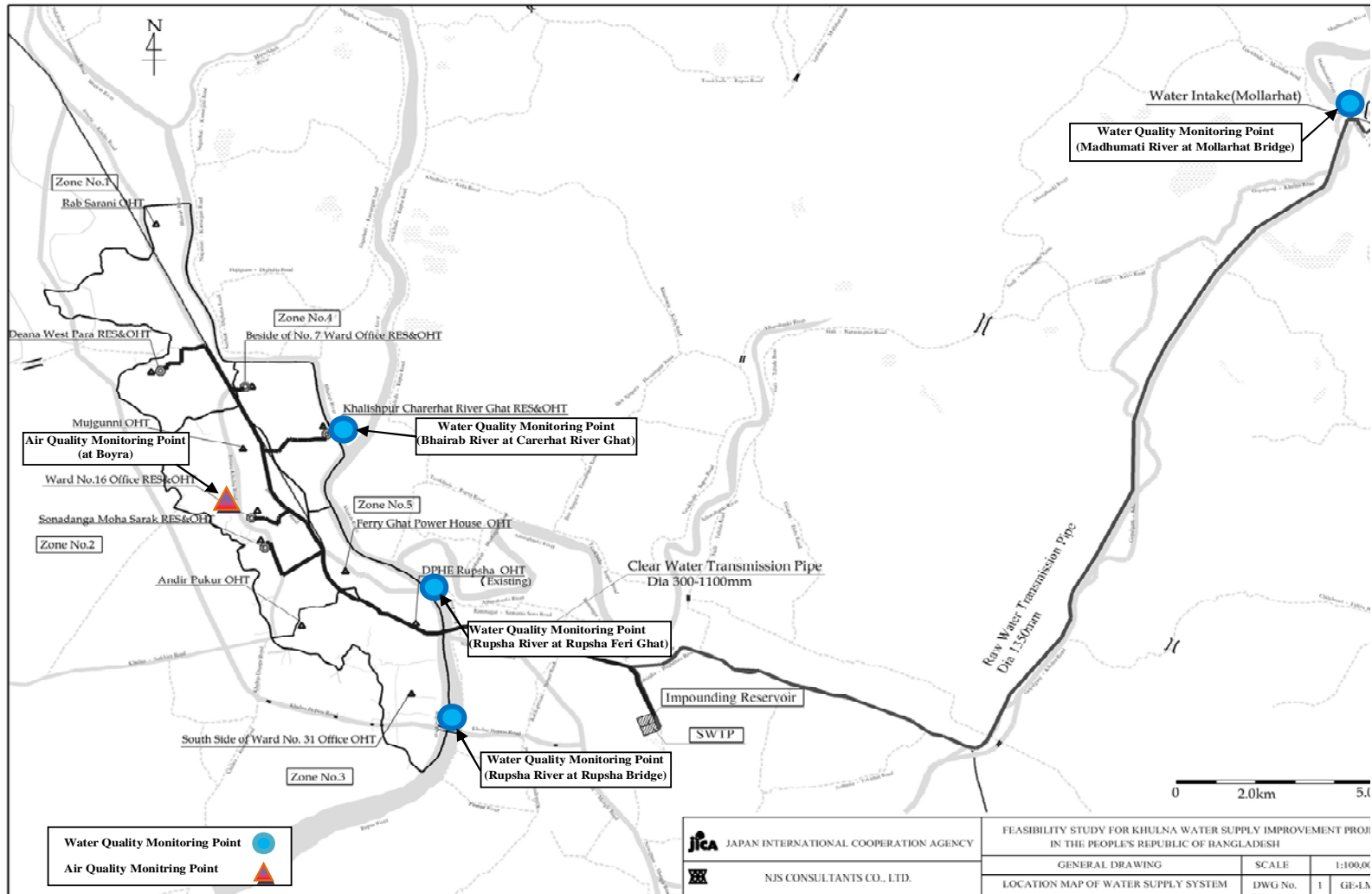
The locations of the above monitoring points are as shown in the **Figure 1**.

Construction Stage

In the construction stage of the Project KWASA's PMU and the Consultant will collect the DOE's monitoring result and check the air quality and the water quality within and surrounding the Project site continuously (once a month) and take necessary action with the Contactor if there are any irregularities are found.

Operation Stage

In the operation stage KWASA will collect the DOE's monitoring result and check air quality and the water quality within and surrounding the Project site continuously (once a month) and take necessary action if there are any irregularities are found.



The latest one year DOE's monitoring results are as follows;

Air Quality (at Boyra) (From July 2009 to June 2010)

| Item | Unit | Measured Value (Mean) | Measured Value (Max.) | Country's Standards | Standards for Contract | Referred International Standards | Remarks (Monitoring Point) |
|-----------------|-------------------|-----------------------|-----------------------|---------------------|------------------------|----------------------------------|----------------------------|
| SO ₂ | µg/m ³ | 6 | 2 | 80 | - | - | - |
| NO ₂ | µg/m ³ | 29 | 21 | 80 | - | - | - |
| CO | µg/m ³ | - | - | 2000 | - | - | - |
| O ₂ | - | - | - | - | - | - | - |
| Soot & dust | - | - | - | - | - | - | - |
| SPM | µg/m ³ | 203 | 137 | 200 | - | - | - |
| Dust | - | - | - | - | - | - | - |

Water Quality (Madhumati River at Mollarhat Bridge) (Nov-Dec, 09, Feb-Mar, 10)

| Item | Unit | Measured Value (Mean) | Measured Value (Max.) | Country's Standards | Standards for Contract | Referred International Standards | Remarks (Monitoring Point) |
|-----------------------------|------|-----------------------|-----------------------|---------------------|------------------------|----------------------------------|----------------------------|
| pH | - | 7.74 | 7.74 | 6.5 – 8.5 | - | - | |
| SS (Suspended Solid) | mg/l | 23.25 | 23.67 | 10 | - | - | |
| BOD/COD | mg/l | 0.65/20 | 0.8/20 | 0.2/4 | - | - | |
| DO | mg/l | 5.5 | 5.6 | 6 | - | - | |
| Total Nitrogen | mg/l | - | - | 1 | - | - | |
| Total Phosphorus | mg/l | - | - | 0 | - | - | |
| Heavy Metals | - | - | - | - | - | - | |
| Hydrocarbons / Mineral Oils | - | - | - | - | - | - | |
| Phenols | mg/l | - | - | 0.002 | - | - | |
| Cyanide | mg/l | - | - | 0.1 | - | - | |
| Temperature | °C | 29.4 | 32.4 | 20-30 | - | - | |

Water Quality (Bhairab River at Average data) (From July 2009 to June 2010)

| Item | Unit | Measured Value (Mean) | Measured Value (Max.) | Country's Standards | Standards for Contract | Referred International Standards | Remarks (Monitoring Point) |
|-----------------------------|------|-----------------------|-----------------------|---------------------|------------------------|----------------------------------|----------------------------|
| pH | - | 7.61 | 7.72 | 6.5 – 8.5 | - | - | |
| SS (Suspended Solid) | mg/l | - | - | 10 | - | - | |
| BOD/COD | mg/l | 0.75/66 | 1.10/188 | 0.2/4 | - | - | |
| DO | mg/l | 5.15 | 5.80 | 6 | - | - | |
| Total Nitrogen | mg/l | - | - | 1 | - | - | |
| Total Phosphorus | mg/l | - | - | 0 | - | - | |
| Heavy Metals | - | - | - | - | - | - | |
| Hydrocarbons / Mineral Oils | - | - | - | - | - | - | |
| Phenols | mg/l | - | - | 0.002 | - | - | |
| Cyanide | mg/l | - | - | 0.1 | - | - | |
| Temperature | °C | - | - | 20-30 | - | - | |

Water Quality (Rupsha River at Average data) (From July 2009 to June 2010)

| Item | Unit | Measured Value (Mean) | Measured Value (Max.) | Country's Standards | Standards for Contract | Referred International Standards | Remarks (Monitoring Point) |
|-----------------------------|----------------|-----------------------|-----------------------|---------------------|------------------------|----------------------------------|----------------------------|
| pH | - | 7.60 | 7.71 | 6.5 – 8.5 | - | - | |
| SS (Suspended Solid) | mg/l | - | - | 10 | - | - | |
| BOD/COD | mg/l | 0.90/86 | 1.30/198 | 0.2/4 | - | - | |
| DO | mg/l | 4.92 | 5.30 | 6 | - | - | |
| Total Nitrogen | mg/l | - | - | 1 | - | - | |
| Total Phosphorus | mg/l | - | - | 0 | - | - | |
| Heavy Metals | - | - | - | | - | - | |
| Hydrocarbons / Mineral Oils | - | - | - | | - | - | |
| Phenols | mg/l | - | - | 0.002 | - | - | |
| Cyanide | mg/l | - | - | 0.1 | - | - | |
| Temperature | ^o C | - | - | 20-30 | - | - | |

SUPPORTING REPORT 11.4 Terms of Reference

1.1 Consulting Services

1.1.1 Terms of Reference

Draft Terms of Reference of Design and Construction Supervision Consultant

This project is an introduction of surface water supply system to Khulna city and aims for safety and sustainable water which will dedicate to improve life condition of people in Khulna.

Objective

The project objective is to improve access to drinking water of the population of the Khulna city.

The project will involve the construction, from a water intake on Madhumati River at Mollarhat in Bagherhat, a long distance raw water transmission pipe of 33km, an impounding reservoir and a surface water treatment plant of 110,000 m³/day.

Scope of Works

The Consultants will undertake detailed design and supervise construction of the Khulna Water Supply System components comprising expertise in water supply system design and engineering, preparing contracts, procurement of construction works and goods, construction supervision.

The Consultants have a specific responsibility to ensure that the works are designed in accordance with international engineering standards, and are constructed to the prescribed quality in accordance with the specifications, bidding documents, and quality assurance systems. The consultants will work in close coordination with Project Director PMU and will also be responsible for preparation of Program Completion Reports.

The scope of work for design and construction supervision of JICA component is summarized as follows:

- Design and construction of a water intake at Mollarhat along Madhumati River in Bagherhat
- Design and construction of a raw water transmission pipe of 33 km long
- Design and construction of an impounding reservoir of 340 m long, 190 m wide and 12 m depth, which will be located at Samanto Sena.
- Design and construction of a surface water treatment plant of 110,000 m³/day production capacity, which will be located at Samanto Sena.

The major tasks of the consultants during the design and construction phases of the Project are generally as follows:

Survey, Investigations and Tests: Review available secondary data and reports and identify requirements

of field surveys and other investigations. Based on the assessment, consultants with the agreement of the Project Director of PMU will carry out all the required engineering surveys and investigations such as total station surveys, geo-technical investigations, soil surveys, leak detection survey, construction material survey, ground water investigation i.e. hydro-geological investigations, rainfall data collection, traffic survey, identification of underground utilities and its mapping, etc. The survey will incorporate all the necessary features for design of all allied infrastructure.

Preliminary Design: The preliminary designs will provide technical rationale of the proposed design option, describe design criteria & parameters, design horizon, tentative cost estimates, additional survey and investigation requirements for detailed design, identify statutory requirements and proposed implementation procedures.

Detailed Engineering Designs: Once the preliminary designs are agreed, the consultants will prepare the detailed engineering. Designs will be sufficiently detailed to ensure clarity and understanding. All the design should be in conformity with the international/Indian engineering standards. All necessary calculations will be prepared to determine and justify the engineering solution proposed for each subproject/component, and will be incorporated into the design reports. Based on the detailed engineering design, the consultants will prepare all necessary tender drawings, specification, bill of quantities, detailed cost estimates, implementation schedule, and quality control programs; prepare bid documents considering JICA's requirements and ease of implementation. The specifications will be detailed and use international standards as well as meet JICA's requirements. They will also prepare construction drawings with sufficient details to permit contractors to construct the work.

Bidding Documents: Prepare the necessary documentation required for international competitive biddings, shoppings, etc. for all the procurement packages. The bidding documents will include instruction to bidders, general and special conditions of contract, technical specifications, bill of quantities, tender drawings, and forms of contract etc. The Consultant will assist PMU in bid evaluation, award of contract and contract signing etc.

Construction Supervision and Contract Monitoring: The Consultant, as the Engineer/Engineer's Representative under the contract, will supervise construction of all the project components; monitor construction methods and quality control; certify that the quality of works conforms to the specifications and drawings; assess the adequacy of the contractor's input materials, labour, equipment, and construction methods; resolution of contractual issues, furnish all revisions and detailed drawings as necessary during the continuance of the contract; examine the contractor's claims for variations/extension, etc., and assist in preparing planned maintenance procedures; assist; and check installation and commissioning.

When preparing or reviewing bidding documents for procurement of works and those for procurement of supply and installation of plant, the Consultants shall make sure to meet followings:

- a) The Consultants shall review the safety plans submitted by the bidders from the point of view of securing the safety during the construction..

- b) The Consultants shall review the Programme submitted by the contractors from the point of view of securing the safety during the construction and require them to submit further details, if necessary.
- c) During the supervision of the construction work, the Consultants shall confirm that an accident prevention officer proposed by the contractor is duly assigned at the project site and that the construction work is carried out according to the safety plan as well as the safety measures prescribed in the Programme. If Consultants recognize any questions regarding the safety measures in general including the ones mentioned above, the consultants shall require the contractors to make appropriate improvements.

The supervision services broadly include supervision and management of construction works. Following are the broad works to be taken up:

- a) Contract administration and management of the project
- b) Interpretation of the technical specifications
- c) Scrutinize the contractor's detailed work program
- d) Scrutinize construction methods proposed by contractor including environmental, safety, personnel and public issues
- e) Quality assurance system including verification and source of material and certification
- f) Monitor mobilization and progress of work
- g) Measurement of quantities and certification
- h) Prepare and certify at the end, as-built drawings
- i) Carryout supervision of all the works including periodical inspection of contractor's machinery and equipments
- j) Inspect the works at appropriate intervals during defect liability period and certification issue
- k) Prepare construction supervision manual
- l) Prepare maintenance manual
- m) Assist employer in computer aided monitoring of progress / implementation, project management

Reporting:

The Consultants will produce and submit to the PMU the following reports:

- a) Inception report one month after mobilization;
- b) Brief monthly progress reports describing works and services performed and issues encountered during the reporting month and scheduled activities in the following month, quarterly progress reports and annual reports, describing in detail the implementation progress of all project components with issues highlighted.
- c) Interim report at the end of the second year to provide a broad view of the physical and institutional progress achieved, and makes recommendations to the Government and JICA on suitable modifications to successful implementation of the Project.

- d) Detailed design drawings, cost estimates and bidding documents in the numbers specified for all contract packages. In addition, survey plans, topographic maps, base maps and final as-built drawings will be submitted as necessary.
- e) Draft project completion report one month before the completion of the services and final Project completion report within one month of the completion of the services.
- f) Various reports related to design and implementation.

The consultant will be engaged for a period (2012- 2016). The estimated input of the consultant is 174 man month international professionals and 399 man month national and support staff as required. List of tentative professional expertise required for design and construction phases are mentioned below:

Tentative Man Months for Consultant Services

| | Position of Specialists | Design Phase (MM) | Construction Phase (MM) | Total (MM) |
|------|---|--------------------------|--------------------------------|-------------------|
| | International Specialist | | | |
| A-1 | Team Leader | 14 | 34 | 48 |
| A-2 | Sub-Team Leader/ SWTP & IPR Engineer | 11 | 26 | 37 |
| A-3 | Water Intake Engineer | 7 | | 7 |
| A-4 | Raw Water/ Clear Water Transmission Pipeline Engineer | 8 | 10 | 18 |
| A-5 | Structure Engineer | 3 | | 3 |
| A-6 | Mechanical Equipment Engineer | 8 | 10 | 18 |
| A-7 | Electrical Equipment Engineer | 8 | 10 | 18 |
| A-8 | Architect | 5 | | 5 |
| A-9 | Topographic Survey Specialist | 4 | | 4 |
| A-10 | Geotechnical Specialist | 4 | | 4 |
| A-11 | Specification Specialist | 2 | | 2 |
| A-12 | Quantity Surveyor | 5 | | 5 |
| A-13 | Contract Specialist | 5 | | 5 |
| | Total MM of International Specialists | 84 | 90 | 174 |
| | National Specialist | | | |
| B-1 | Team Leader (for Local Engineer) | 9 | | 9 |
| B-2 | Senior Engineer (SWTP) | 9 | 36 | 45 |
| B-3 | Senior Engineer (IPR) | 8 | 31 | 39 |
| B-4 | Senior Engineer (Intake) | 9 | | 9 |
| B-5 | Engineer (SWTP) | 9 | 36 | 45 |
| B-6 | Engineer (IPR) | 9 | 33 | 42 |
| B-7 | Engineer (Intake) | 9 | | 9 |
| B-8 | Senior Engineer (Structure) | 5 | | 5 |
| B-9 | Senior Engineer (Mechanical) | 7 | 30 | 37 |
| B-10 | Senior Engineer (Electrical) | 7 | 30 | 37 |
| B-11 | Senior Engineer (Architect) | 5 | | 5 |
| B-12 | Senior Engineer (Architectural M & E) | 5 | | 5 |
| B-13 | Senior Engineer (Raw Water Transmission Pipeline) | 9 | 36 | 45 |
| B-14 | Engineer (Raw Water Transmission Pipeline) | 9 | 33 | 42 |
| B-15 | Engineer (Topographic Survey Specialist) | 6 | | 6 |
| B-16 | Engineer (Geotechnical Specialist) | 6 | | 6 |
| B-17 | Engineer (Specification Specialist) | 4 | | 4 |
| B-18 | Senior Engineer (Quantity Surveyor) | 5 | | 5 |

| | | | | |
|------|---|------------|------------|------------|
| B-19 | Engineer (Quantity Surveyor) | 4 | | 4 |
| | Total MM of National Specialists | 134 | 265 | 399 |

Qualification, Experience and TOR for Consultant’s Personnel

DESIGN PHASE

1. Team Leader (International)

The Team Leader will need to be a professional qualified at least graduate master degree in civil engineering or other relevant field of engineering with not less than twenty (20) years experience in (i) designing (ii) project management and (iii) contract management in major project in the field of water supply.

Terms of Reference

- a) Define TORs for surveys and investigation
- b) Update feasibility plan and activity scheduling
- c) Design of water supply system geometrics, including preparation of working drawings
- d) Carry out Preliminary and conceptual design, options study, comparison and recommendation of preferred design options of water intake, raw water transmission, SWTP and impounding reservoir.
- e) Coordinate with all experts during and supervision of all the design works including implementation
- f) Prepare designs for all elements (including working drawings)
- g) Prepare estimates in consultation with the Structural engineer, the airport architect and associated bidding documents
- h) Assist PMU in bidding procedures including invitation of bids, bid evaluation, and awards of contract

2. Sub-Team Leader /SWTP & IPR Engineer (International)

The Sub-Team Leader/ SWTP & IPR Engineer will need to be a professional qualified at least university graduate degree in civil engineering or other relevant field of engineering with not less than fifteen (15) years experience in (i) designing and (ii) project management in major project in the field of water supply.

Terms of Reference

- a) Carry out Preliminary and conceptual design, options study, comparison and recommendation of preferred design options of SWTP
- b) Carry out detail design of SWTP
- c) Prepare design drawings
- d) Prepare cost estimates and BOQ of SWTP works

- e) Prepare Technical specifications
- f) Contribute to preparation of design report
- g) In consultation with the Specification specialist prepare the bid documents
- h) In consultation with the Contract specialist proceed bid process including invitation, evaluation and award
- i) Assist the Team Leader to Prepare of estimates and in consultation with the contract specialist, bid documents of all civil and, infrastructural facilities as part of the project

3. Water Intake Engineer (International)

The Water Intake Engineer will need to be a professional qualified at least university graduate degree in civil engineering or other relevant field of engineering with not less than fifteen (15) years experience in designing and in major project in the field of water supply including water intake system.

Terms of Reference

- a) Carry out Preliminary and conceptual design, options study, comparison and recommendation of preferred design options of Water Intake
- b) Carry out detail design of Water Intake
- c) Prepare design drawings
- d) Prepare cost estimates and BOQ of Water Intake works
- e) Prepare Technical specifications
- f) Contribute to preparation of design report

4. Raw Water Transmission Pipeline Engineer (International)

The Raw Water Transmission Pipeline Engineer will need to be a professional qualified at least university graduate degree in civil engineering or other relevant field of engineering with not less than fifteen (15) years experience in designing and in major project in the field of water supply including pipeline system.

Terms of Reference

- a) Carry out Preliminary and conceptual design, options study, comparison and recommendation of preferred design options of Raw Water Transmission Pipeline
- b) Carry out detail design of Raw Water Transmission Pipeline
- c) Prepare design drawings
- d) Prepare cost estimates and BOQ of Raw Water Transmission Pipeline works
- e) Prepare Technical specifications
- f) Contribute to preparation of design report

5. Structure Engineer (International)

The Structure Engineer will need to be a professional qualified at least university graduate degree in civil engineering or other relevant field of engineering with not less than fifteen (15) years experience in structural designing and in major project in the field of water supply system.

Terms of Reference

- a) Review of geo-technical survey report
- b) Review the architectural floor plans of water intake building and SWTP buildings
- c) Carry out structural design of all the above mentioned buildings
- d) Carry out structural design of structures for water intake and SWTP facilities
- e) Prepare design drawings
- f) Review and elaborate technical specifications
- g) Contribute to preparation of report

6. Mechanical Engineer (International)

The Mechanical Engineer will need to be a professional qualified at least university graduate degree in mechanical engineering or other relevant field of engineering with not less than fifteen (15) years experience in mechanical designing and in major project in the field of water supply system.

Terms of Reference

- a) Prepare the list of equipment required in compliance with the requirements for the local conditions and compare with what is at present available
- b) Prepare specifications for equipment and spare parts
- c) In consultation with the Specification specialist, prepare the bidding documents for procurement of equipment and spare parts
- d) In consultation with the Specification specialist prepare the bid documents
- e) In consultation with the Contract specialist proceed bid process including invitation, evaluation and award
- f) Assist Team Leader in bid preparation and evaluation

7. Electrical Engineer (International)

The Electrical Engineer will need to be a professional qualified at least university graduate degree in electrical engineering or other relevant field of engineering with not less than fifteen (15) years experience in electrical designing and in major project in the field of water supply system.

Terms of Reference

- a) Lead the design of electrical systems for the proposed facilities inclusive supervisory control and data acquisition (SCADA) systems.
- b) Design the technical and functional specifications for the proposed system

- c) In consultation with the Specification Specialist prepare the bid documents
- d) In consultation with the Specification specialist prepare the bid documents
- e) In consultation with the Contract specialist proceed bid process including invitation, evaluation and award
- f) Assist Team Leader in bid preparation and evaluation

8. Architect (International)

The Architect will need to be a professional qualified at least university graduate degree in architect or other relevant field of engineering with not less than fifteen (15) years experience in architect designing and in major project in the field of water supply system.

Terms of Reference

- a) Lead the design of layout of water intake facility and SWTP
- b) Design all above facilities and optimize facility space and landscape
- c) In consultation with the civil and electrical engineers, complete the estimates for the activities proposed
- d) In consultation with the Specification specialist prepare the bid documents
- e) In consultation with the Contract specialist proceed bid process including invitation, evaluation and award

9. Topographic Survey Specialist (International)

The Topographic Survey Specialist will need to be a professional qualified at least registered and/or licensed in surveying with not less than ten (10) years experience in surveying for designing including water supply system.

Terms of Reference

- a) Prepare TORs and coordinate required surveys and investigations
- b) Prepare topographic survey drawings
- c) Ensure consistency of results and to avoid any inconveniences that affect design of water supply facilities

10. Geotechnical Specialist (International)

The Geotechnical Specialist will need to be a professional qualified at least university graduate degree in geology or other relevant field with not less than ten (10) years experience in geotechnical surveying and analysis for designing including water supply system.

Terms of Reference

- a) Prepare TORs and coordinate required surveys and investigations

- b) Prepare geotechnical survey report
- c) Ensure consistency of results and to avoid any inconveniences that affect design of water supply facilities

11. Specification Specialist (International)

The Specification Specialist will need to be a professional qualified at least university graduate degree with not less than five (5) years experience in similar position on preparation of tender documents for international competitive bidding projects.

Terms of Reference

- a) Prepare technical specifications and evaluation criteria
- b) Prepare compliance document for the contract
- c) Prepare contract specifications for all project components

12. Quantity Surveyor (International)

The Quantity Surveyor will need to be a professional qualified at least university graduate degree with not less than five (5) years experience in similar position on quantity justification for the preparation of tender documents for international competitive bidding projects.

Terms of Reference

- a) Review design drawings and specifications
- b) Prepare BOQ for all project components
- c) Prepare rate analysis and rates for all BOQ items and const estimates of project components

13. Contract Specialist (International)

The Contract Specialist will need to be a professional qualified at least university graduate degree with not less than five (5) years experience in similar position on preparation of contract documents for international competitive bidding projects.

Terms of Reference

- a) Assist Team Leader in bid preparation and evaluation
- b) Assist KWASA in contract administration and management of the project and implementation works contracts with the Team Leader
- c) Review and ensure conformity of contractor's safety measures

B-1. Position: Team Leader (National)

The National Team Leader will need to be at least university graduate degree of civil engineering or other relevant field of engineering with not less than twenty (20) years experience in (i) designing (ii)

project management and (iii) contract management in major project in the field of water supply.

Terms of Reference

- a) Manage all coordination between the KAWASA staffs / PMU staffs and the design team in general
- b) Arrange and supervise work of national engineers and specialists
- c) Make certificate of performed works and keep records of report documentation.
- d) The Chief Engineer (CE) is responsible for construction supervision
- e) Arrange meetings between the KAWASA staffs / PMU staffs and the design team and keep record of the meetings

B-2. Senior Engineer-1 (SWTP) (National)

The Senior Engineer-1 (SWTP) will need to be a professional qualified at least university graduate degree in civil engineering or other relevant field of engineering with not less than twelve (12) years experience in designing and in major project in the field of water supply.

Terms of Reference

With the overall guidance of the SWTP & IPR Engineer (International), design service arrangements regarding water treatment facilities.

- a) Review the topographical survey drawings
- b) Prepare TORs and coordinate required surveys and investigation
- c) Prepare the detailed design, specifications, drawings and estimates
- d) Contribute to preparation of report
- e) In consultation with the Specification specialist prepare the bid documents

B-3. Senior Engineer-2 (IPR) (National)

The Senior Engineer-2 (IPR) will need to be a professional qualified at least university graduate degree in civil engineering or other relevant field of engineering with not less than ten (10) years experience in designing and in major project in the field of water supply.

Terms of Reference

With the overall guidance of the SWTP & IPR Engineer (International), design service arrangements regarding water treatment facilities.

- a) Review the topographical survey drawings
- b) Prepare the detailed design, specifications, drawings and estimates
- c) Contribute to preparation of report

- d) In consultation with the Specification specialist prepare the bid documents

B-4. Senior Engineer-3 (Water Intake) (National)

The Senior Engineer (Water Intake) will need to be a professional qualified at least university graduate degree in civil engineering or other relevant field of engineering with not less than ten (10) years experience in designing and in major project in the field of water supply including water intake system.

Terms of Reference

With the overall guidance of the Water Intake Engineer (International), design service arrangements regarding water intake facilities.

- a) Review the topographical survey drawings
- b) Prepare TORs and coordinate required surveys and investigation
- c) Prepare the detailed design, specifications, drawings and estimates
- d) Contribute to preparation of report

B-5. Engineer-1 (SWTP) (National)

The Engineer-1 (SWTP) will need to be a professional qualified at least university graduate degree in civil engineering or other relevant field of engineering with not less than eight (8) years experience in designing and in major project in the field of water supply.

Terms of Reference

With the overall guidance of the SWTP & IPR Engineer (International) and Senior Engineer-1(SWTP) (National), technical assistance services regarding water treatment facilities design.

- a) Support the preparation of design drawings
- b) Support the preparation for BOQ of the SWTP facilities implementation works
- c) Support the preparation of report

B-6. Engineer-2 (IPR) (National)

The Engineer-2 (IPR) will need to be a professional qualified at least university graduate degree in civil engineering or other relevant field of engineering with not less than eight (8) years experience in designing and in major project in the field of water supply.

Terms of Reference

With the overall guidance of the SWTP & IPR Engineer (International) and Senior Engineer -2 (IPR) (National), technical assistance services regarding water treatment facilities design.

- a) Support the preparation of design drawings

- b) Support the preparation of report

B-7. Engineer -3 (Water Intake) (National)

The Engineer -3 (Water Intake) will need to be a professional qualified at least university graduate degree in civil engineering or other relevant field of engineering with not less than eight (8) years experience in designing and in major project in the field of water supply including water intake system.

Terms of Reference

With the overall guidance of the Water Intake Engineer (International) and Senior Engineer -3 (Water Intake) (National), technical assistance services regarding water treatment facilities design.

- a) Support the preparation of design drawings
- b) Support the preparation for BOQ of the Water Intake facilities implementation works
- c) Support the preparation of report

B-8. Senior Engineer (Structural) (National)

The Senior Engineer (Structural) will need to be a professional qualified at least university graduate degree in civil engineering or other relevant field of engineering with not less than ten (10) years experience in structural designing and in major project in the field of water supply system.

Terms of Reference

With the overall guidance of the Structure Engineer (International), design service arrangements regarding structural design of water supply facilities.

- a) Review of geo-technical survey report
- b) Review the architectural floor plans of water intake building and SWTP buildings
- c) Carry out structural design of all the above mentioned buildings
- d) Carry out structural design of structures for water intake and SWTP facilities
- e) Prepare design drawings
- f) Review and elaborate technical specifications
- g) Contribute to preparation of report

B-9. Senior Engineer (Mechanical) (National)

The Mechanical Engineer will need to be a professional qualified at least university graduate degree in mechanical engineering or other relevant field of engineering with not less than ten (10) years experience in mechanical designing and in major project in the field of water supply system.

Terms of Reference

With the overall guidance of the Mechanical Engineer (International), design service arrangements

regarding mechanical equipment design of water supply system.

- a) Prepare the list of equipment required in compliance with the requirements for the local conditions and compare with what is at present available
- b) Prepare specifications for equipment and spare parts
- c) In consultation with the Specification specialist, prepare the bidding documents for procurement of equipment and spare parts

B-10. Senior Engineer (Electrical) (National)

The Senior Engineer (Electrical) will need to be a professional qualified at least university graduate degree in electrical engineering or other relevant field of engineering with not less than ten (10) years experience in electrical designing and in major project in the field of water supply system.

Terms of Reference

With the overall guidance of the Electrical Engineer (International), design service arrangements regarding electrical equipment design of water supply system inclusive SCADA systems

- a) Lead the design of electrical systems for the proposed facilities.
- b) Design the technical and functional specifications for the proposed system
- c) In consultation with the Specification Specialist prepare the bid documents

B-11. Senior Engineer (Architect) (National)

The Senior Engineer (Architect) will need to be a professional qualified at least university graduate degree in architect or other relevant field of engineering with not less than ten (10) years experience in architect designing and in major project in the field of water supply system.

Terms of Reference

With the overall guidance of the Architect (International), design service arrangements regarding architectural design of water supply system.

- a) Design the water intake facility and SWTP, control room, power supply facilities, water supply facilities and other facilities

B-12. Senior Engineer (Architectural Mechanical & Electrical) (National)

The Senior Engineer (Architectural Mechanical & Electrical) will need to be a professional qualified at least university graduate degree in architect or other relevant field of engineering with not less than ten (10) years experience in architectural mechanical and electrical equipment designing and in major project in the field of water supply system.

Terms of Reference

With the overall guidance of the Electrical Engineer (International), design service arrangements

regarding architectural mechanical and electrical equipment design of water supply system.

- a) Design the water intake facility and SWTP, control room, power supply facilities, water supply facilities and other facilities
- b) Design the ventilation facilities in water supply system buildings with electricity supply system
- c) Design the computer interface network

B-13. Senior Engineer (Raw Water Transmission Pipeline) (National)

The Senior Engineer (Raw Water Transmission Pipeline) will need to be a professional qualified at least university graduate degree in civil engineering or other relevant field of engineering with not less than ten (10) years experience in designing and in major project in the field of water supply including pipeline system.

Terms of Reference

With the overall guidance of the Raw Water Transmission Pipeline Engineer (International), design service arrangements regarding the raw water transmission pipeline and the clear water transmission pipeline.

- a) Carry out Preliminary and conceptual design, options study, comparison and recommendation of preferred design options of Raw Water Transmission Pipeline
- b) Carry out detail design of Raw Water Transmission Pipeline
- c) Prepare design drawings
- d) Prepare cost estimates and BOQ of Water Intake works
- e) Prepare Technical specifications
- f) Contribute to preparation of design report

B-14. Engineer (Raw Water Transmission Pipeline) (National)

The Engineer (Raw Water Transmission Pipeline) will need to be a professional qualified at least university graduate degree in civil engineering or other relevant field of engineering with not less than eight (8) years experience in designing and in major project in the field of water supply including pipeline system.

Terms of Reference

With the overall guidance of the Raw Water Transmission Pipeline Engineer (International) and Senior Engineer (Raw Water Transmission Pipeline) (National), technical assistance services regarding water treatment facilities design.

- a) Support the preparation of design drawings
- b) Support the preparation for BOQ of the Raw Water Transmission Pipeline and the Clear Water Transmission Pipeline implementation works
- c) Support the preparation of report

B-15. Engineer (Topographic Survey Specialist) (National)

The Engineer (Topographic Survey Specialist) will need to be a professional qualified at least registered and/or licensed in surveying with not less than eight (8) years experience in surveying for designing including water supply system.

Terms of Reference

With the overall guidance of the Topographic Survey Specialist (International), topographic survey arrangements regarding topographic survey for water supply system design.

- a) Prepare TORs and coordinate required surveys and investigations
- b) Prepare topographic survey drawings
- c) Ensure consistency of results and to avoid any inconveniences that affect design of water supply facilities

B-16. Engineer (Geotechnical Specialist) (National)

The Engineer (Geotechnical Specialist) will need to be a professional qualified at least university graduate degree in geology or other relevant field with not less than eight (8) years experience in geotechnical surveying and analysis for designing including water supply system.

Terms of Reference

With the overall guidance of the Geotechnical Specialist (International), geotechnical survey service arrangements regarding topographic survey for water supply system design.

- a) Prepare TORs and coordinate required surveys and investigations
- b) Prepare geotechnical survey report
- c) Ensure consistency of results and to avoid any inconveniences that affect design of water supply facilities

B-17. Engineer (Specification Specialist) (National)

The Engineer (Specification Specialist) will need to be a professional qualified at least university graduate degree with not less than five (5) years experience in similar position on preparation of tender documents for projects.

Terms of Reference

With the overall guidance of the Specification Specialist (International), specification compiling regarding water supply system construction works.

- a) Prepare technical specifications and evaluation criteria
- b) Prepare compliance document for the contract
- c) Prepare contract specifications for all project components

B-18. Senior Engineer (Quantity Surveyor) (National)

The Senior Engineer (Quantity Surveyor) will need to be a professional qualified at least university graduate degree with not less than ten (10) years experience in similar position on quantity justification for the preparation of tender documents for international competitive bidding projects.

Terms of Reference

With the overall guidance of the Quantity Surveyor (International), BOQ compiling regarding water supply system construction works.

- a) Review design drawings and specifications
- b) Prepare BOQ for all project components
- c) Prepare rate analysis and rates for all BOQ items and const estimates of project components

B-19. Engineer (Quantity Surveyor) (National)

The Engineer (Quantity Surveyor) will need to be a professional qualified at least university graduate degree with not less than eight (8) years experience in similar position on quantity justification for the preparation of tender documents for international competitive bidding projects.

Terms of Reference

With the overall guidance of the Quantity Surveyor (International) and the Senior Engineer (Quantity Surveyor) (National), BOQ compiling regarding water supply system construction works.

- a) Review design drawings and specifications
- b) Prepare BOQ for all project components
- c) Prepare rate analysis and rates for all BOQ items and const estimates of project components

CONSTRUCTION PHASE

A-1. Team Leader (International)

Terms of Reference

- a) Construction supervision of all facilities including ,procurement of goods, installation of equipment, testing and commissioning Review design drawings and specifications
- b) Quality control of all procurements
- c) Supervise other engineers and other staffs
- d) Check and certify contractor's payment certificates
- e) Check periodically quantities in BOQ and actual works performed
- f) Prepare various reports

A-2. Sub-Team Leader /SWTP & IPR Engineer (International)

Terms of Reference

- a) Carry out quality control/assurance as per standard procedures to meet the best international standard/practice, Review materials used for specific elements including sourcing
- b) Testing materials to assess their tolerant as per standards tests applicable
- c) Supervising quality control throughout the construction and production process
- d) Monitoring plant conditions and material reactions during use
- e) Carry out quality assurance as per standard procedures
- f) To supervise the construction work to ensure in conformity with design especially for the construction works of the water intake
- g) To issue alternative designs in case of changes demanded by circumstances especially for the construction works of the water intake
- h) Review materials used for specific elements including sourcing for the construction works of the water intake
- i) Testing materials to assess their tolerant as per standards tests applicable especially for the construction works of the water intake
- j) Supervising quality control throughout the construction and production process especially for the construction works of the water intake
- k) Helping to ensure that products comply with national and international legal and quality standards especially for the construction works of the water intake
- l) Assess the cost implications of materials used and alternatives, in terms of both time and money especially for the construction works of the water intake
- m) Carry out quality assurance as per standard procedures especially for the construction works of the water intake

A-4. Raw Water Transmission Pipeline Engineer (International)

Terms of Reference

- a) To supervise the construction work to ensure in conformity with design
- b) To issue alternative designs in case of changes demanded by circumstances
- c) Review materials used for specific elements including sourcing
- d) Testing materials to assess their tolerant as per standards tests applicable
- e) Supervising quality control throughout the construction and production process
- f) Helping to ensure that products comply with national and international legal and quality standards
- g) Assess the cost implications of materials used and alternatives, in terms of both time and money
- h) Carry out quality assurance as per standard procedures

A-6. Mechanical Equipment Engineer (International)

Terms of Reference

- a) Compare the tendered specification
- b) Check the tendered specification with the type of spare parts
- c) Certify for payment of the equipment and spare parts
- d) Supervise installation of mechanical works
- e) Coordinate with the Contractor to train KWASA personnel in operation and maintenance of all mechanical installation

A-7. Electrical Equipment Engineer (International)

Terms of Reference

- a) Compare the tendered specification
- b) Check the tendered specification with the type of spare parts
- c) Certify for payment of the equipment and spare parts
- d) Supervise installation of electrical works inclusive SCADA systems
- e) Coordinate with the Contractor to train KWASA personnel in operation and maintenance of all electrical installation

B-2. Senior Engineer (SWTP) (National)

Terms of Reference

With the overall guidance of the SWTP & IPR Engineer (International), supervising the works for water supply facility especially for the SWTP.

- a) To supervise the construction work to ensure in conformity with design
- b) To issue alternative designs in case of changes demanded by circumstances
- c) Review materials used for specific elements including sourcing
- d) Testing materials to assess their tolerant as per standards tests applicable
- e) Helping to ensure that products comply with national and international legal and quality standards
- f) Carry out quality assurance as per standard procedures

B-3. Senior Engineer (IPR) (National)

Terms of Reference

With the overall guidance of the SWTP & IPR Engineer (International), supervising the works for water supply facility especially for the water intake and the IPR.

- a) To supervise the construction work to ensure in conformity with design
- b) To issue alternative designs in case of changes demanded by circumstances
- c) Review materials used for specific elements including sourcing

- d) Testing materials to assess their tolerant as per standards tests applicable
- e) Helping to ensure that products comply with national and international legal and quality standards
- f) Carry out quality assurance as per standard procedures

B-5. Engineer (SWTP) (National)

Terms of Reference

With the overall guidance of the SWTP & IPR Engineer (International) and the Senior Engineer (SWTP) (National), supervising the works for water supply facility especially for the SWTP.

- a) Supervising quality control throughout the construction and production process
- b) Monitoring plant conditions and material reactions during use
- c) Carry out quality assurance as per standard procedures

B-6. Engineer (IPR) (National)

Terms of Reference

With the overall guidance of the SWTP & IPR Engineer (International) and the Senior Engineer (IPR) (National), supervising the works for water supply facility especially for the water intake and the IPR.

- a) Supervising quality control throughout the construction and production process
- b) Monitoring plant conditions and material reactions during use
- c) Carry out quality assurance as per standard procedures

B-9. Senior Engineer (Mechanical) (National)

Terms of Reference

With the overall guidance of the Mechanical Equipment Engineer (International), supervising the mechanical works for all water supply facilities.

- a) Compare the tendered specification
- b) Check the tendered specification with the type of spare parts
- c) Certify for payment of the equipment and spare parts
- d) Supervise installation of mechanical works
- e) Coordinate with the Contractor to train KWASA personnel in operation and maintenance of all mechanical installation

B-10. Senior Engineer (Electrical) (National)

Terms of Reference

With the overall guidance of the Electrical Equipment Engineer (International), supervising the

electrical works for all water supply facilities inclusive SCADA systems.

- d) Compare the tendered specification
- e) Check the tendered specification with the type of spare parts
- f) Certify for payment of the equipment and spare parts
- g) Supervise installation of electrical works
- h) Coordinate with the Contractor to train KWASA personnel in operation and maintenance of all electrical installation

B-13. Senior Engineer (Raw Water Transmission Pipeline) (National)

Terms of Reference

With the overall guidance of the Raw Water Pipeline Engineer (International), supervising the works for raw water transmission pipeline.

- a) Compare the tendered specification
- b) Check the tendered specification with the pipeline materials
- c) Certify for payment of the pipeline materials
- d) To supervise the construction work to ensure in conformity with design
- e) To issue alternative designs in case of changes demanded by circumstances
- f) Review materials used for specific elements including sourcing

B-14. Engineer (Raw Water Transmission Pipeline) (National)

Terms of Reference

With the overall guidance of the Raw Water Pipeline Engineer (International) and the Senior Engineer (Raw Water Transmission Pipeline) (National), supervising the works for clear water transmission pipeline.

- a) To supervise the construction work to ensure in conformity with design
- b) Testing materials to assess their tolerant as per standards tests applicable
- c) Supervising quality control throughout the construction and production process

SUPPORTING REPORT 11.5 Breakdown of Construction Cost Estimation

A. Package 1: Intake & Raw Water Transmission Pipe

Package-1 Water Intake & Raw Water Transmission Pipe

For Q=118,000 m³/d

| Items | Specification | Unit | Qty | FC Portion (Yen) | | LC Portion (Yen) | | Reference |
|-----------------------------|-------------------------------|------|-----|------------------|---------------|------------------|----------------------|-----------|
| | | | | Unit Price | Amount | Unit Price | Amount | |
| Water Intake Facility | Q = 118,000 m ³ /d | Ls | 1 | | 401,000,000 | | 162,400,000 | |
| Raw Water Transmission Pipe | D1350, L=33km | Ls | 1 | | 5,124,000,000 | | 1,281,000,000 | |
| Total Cost | | | | | 5,525,000,000 | | 1,443,400,000 | |
| Total Cost (FC+LC) | | | | | | | 6,968,400,000 | |

Construction Cost of Water Intake (Total)

For Q=118,000 m³/d

| Items | Specification | Unit | Qty | FC Portion (Yen) | | LC Portion (Yen) | | Reference |
|-----------------------------|-------------------------------|------|-----|------------------|-------------|------------------|--------------------|-----------|
| | | | | Unit Price | Amount | Unit Price | Amount | |
| Civil & Architechtual Works | Q = 118,000 m ³ /d | Ls | 1 | | 69,773,685 | | 141,817,540 | |
| Mechanical Works | | Ls | 1 | | 172,350,000 | | 7,912,500 | |
| Electrical Works | | Ls | 1 | | 158,912,500 | | 12,712,500 | |
| Total Cost | | | | | 401,036,185 | | 162,442,540 | |
| Total Cost (FC+LC) | | | | | | | 563,478,725 | |

Construction Cost of Water Intake Civil Works

For Q=118,000 m³/d

| Items | Specification | Unit | Qty | FC Portion (Yen) | | LC Portion (Yen) | | Reference |
|------------------------------------|--|----------------|--------|------------------|------------|------------------|--------------------|--|
| | | | | Unit Price | Amount | Unit Price | Amount | |
| Sheet Pile Driving Work | Type III, L = 3m | m | 75 | 300 | 22,500 | 1,700 | 127,500 | |
| Sheet Pile | Type III, L = 3m, Rems | t | 4.5 | 98,010 | 441,045 | 10,000 | 45,000 | |
| Temporary Sheet Pile Driving Work | | m | 9,580 | 300 | 2,874,000 | 1,300 | 12,454,000 | |
| Temporary Sheet Pile Removing Work | | m | 9,580 | 150 | 1,437,000 | 800 | 7,664,000 | |
| Sheet Pile Lease | | t | 575.0 | 19,800 | 11,385,000 | 10,000 | 5,750,000 | |
| Supporting Works for Formwork | | m ³ | 3,923 | 225 | 882,675 | 1,000 | 3,923,000 | |
| Excavation | | m ³ | 27,273 | 35 | 954,555 | 190 | 5,181,870 | Karnaphuli BOQ, No-03 Clarifier |
| Backfilling | | m ³ | 20,269 | 24 | 486,456 | 130 | 2,634,970 | Karnaphuli BOQ, No-03 Clarifier |
| Gravel | | m ³ | 177 | 485 | 85,845 | 2,700 | 477,900 | Karnaphuli BOQ, No-04 Filter |
| Sand Foundation | | m ³ | 271 | 95 | 25,745 | 500 | 135,500 | |
| Pile Driving Work | 400x400, L = 3m Including Materials | m | 75 | 2,500 | 187,500 | 60,000 | 4,500,000 | Karnaphuli BOQ, No-03 Clarifier |
| Plain Concrete | | m ³ | 88 | 1,500 | 132,000 | 80,000 | 7,040,000 | Karnaphuli BOQ, No-03 Clarifier |
| Reinforced Concrete | | m ³ | 3,356 | 2,630 | 8,825,754 | 13,000 | 43,625,400 | Karnaphuli BOQ, No-03 Clarifier |
| Rebar Fabrication and Assembly | | t | 336 | 90,300 | 30,304,680 | 20,000 | 6,712,000 | Karnaphuli BOQ, No-03 Clarifier |
| Scaffolding | | m ² | 3,289 | 120 | 394,680 | 600 | 1,973,400 | |
| Gabion | | m | 90 | 300 | 27,000 | 1,500 | 135,000 | |
| Pump Room Works | | m ² | 338 | 9,600 | 3,244,800 | 30,000 | 10,140,000 | Referred from Kamaphuli BOQ, No-14 Guard House |
| Office Building | | m ² | 70 | 12,150 | 850,500 | 40,000 | 2,800,000 | Referred from Kamaphuli BOQ, No-01-5 Office Building |
| Electrical Room & Generator Room | | m ² | 72 | 15,150 | 1,090,800 | 40,000 | 2,880,000 | Referred from Kamaphuli BOQ, No-01-5 Office Building |
| Compact Filter | | m ² | 36 | 15,150 | 545,400 | 40,000 | 1,440,000 | Referred from Kamaphuli BOQ, No-01-5 Office Building |
| Guard House | | m ² | 9 | 13,050 | 117,450 | 30,000 | 270,000 | Referred from Kamaphuli BOQ, No-01-6 Guard House |
| Fence | | m | 521 | 2,700 | 1,406,700 | 8,000 | 4,168,000 | Karnaphuli BOQ, No-17 Site Work |
| Gate | | pcs | 1 | 36,000 | 36,000 | 100,000 | 100,000 | Karnaphuli BOQ, No-17 Site Work |
| Land Improvement | | m ² | 7,200 | 300 | 2,160,000 | 1,200 | 8,640,000 | |
| Paving Works (Access Road) | | m ² | 400 | 439 | 175,600 | 1,500 | 600,000 | Karnaphuli BOQ, No-17 Site Work |
| Embankment (Access Road) | | m ³ | 21,000 | 80 | 1,680,000 | 400 | 8,400,000 | Karnaphuli BOQ, No-01-8 Site Work |
| Total Cost | | | | | 69,773,685 | | 141,817,540 | |
| Total Cost (FC+LC) | | | | | | | 211,591,225 | |

Construction Cost of Water Intake Mechanical Works

For Q=118,000 m³/d

| Items | Specification | Unit | Qty | FC Portion (Yen) | | LC Portion (Yen) | | Reference |
|---|--|------|-----|------------------|-------------|------------------|--------------------|-----------|
| | | | | Unit Price | Amount | Unit Price | Amount | |
| Inlet Stop Log | FRP Log (6 pieces/lot) W-1.2m x H-2.5m | Nr | 2 | 40,000 | 80,000 | 30,000 | 60,000 | |
| Inlet Gate | Manual Sluice Gate W-1.0m x H-2.5m | Nr | 2 | 5,000,000 | 10,000,000 | 200,000 | 400,000 | |
| Inflow screen | Manual Bar Screen W-4.0m x H-10.7m x S.O-10mm | Nr | 2 | 400,000 | 800,000 | 40,000 | 80,000 | |
| Outlet Gate | Manual Sluice Gate W-1.0m x H-1.0m | Nr | 2 | 2,500,000 | 5,000,000 | 200,000 | 400,000 | |
| Isolation Gate | Manual Sluice Gate W-1.0m x H-1.0m | Nr | 1 | 300,000 | 300,000 | 200,000 | 200,000 | |
| Sand Pump | Submersible Sand (Portable type) 0.2m ³ /min x 15m x 5.5kW | Nr | 2 | 700,000 | 1,400,000 | 50,000 | 100,000 | |
| Intake Hoist | Manual Chain Block 2.0t | Nr | 3 | 700,000 | 2,100,000 | 50,000 | 150,000 | |
| Intake Pump | Vertical Double Volute D-400 x 20.5m ³ /min x 38m x 190kW | Nr | 5 | 8,800,000 | 44,000,000 | 500,000 | 2,500,000 | |
| Seal Pump | Tube well 0.1m ³ /min x 40m x 2.2kW | Nr | 5 | 200,000 | 1,000,000 | 20,000 | 100,000 | |
| Drain Pump | Submersible Sump 0.2m ³ /min x 20m x 5.5kW | Nr | 2 | 500,000 | 1,000,000 | 40,000 | 80,000 | |
| Suction Valve | Manual Sluice D-450 | Nr | 5 | 1,000,000 | 5,000,000 | 80,000 | 400,000 | |
| Check Valve | Swing D-450 | Nr | 5 | 1,500,000 | 7,500,000 | 80,000 | 400,000 | |
| Discharge Valve | Manual Butterfly D-450 | Nr | 5 | 1,500,000 | 7,500,000 | 80,000 | 400,000 | |
| Discharge Valve | Motorized Butterfly D-450 x 0.2kw | Nr | 5 | 2,000,000 | 10,000,000 | 80,000 | 400,000 | |
| Flow Control Valve | Manual Butterfly D-1100 | Nr | 1 | 5,000,000 | 5,000,000 | 90,000 | 90,000 | |
| Isolation Valve | Manual Butterfly D-1100 | Nr | 3 | 5,000,000 | 15,000,000 | 50,000 | 150,000 | |
| Overhead Crane | Electrically Crane 3.0t | Nr | 1 | 1,000,000 | 1,000,000 | 50,000 | 50,000 | |
| Elevated Water Tank | PVC Tank 1.0m ³ | Nr | 1 | 700,000 | 700,000 | 50,000 | 50,000 | |
| All Pipework,, steel work, fitting, etc | | Item | 1 | 500,000 | 500,000 | 320,000 | 320,000 | |
| Import Cost | | Item | 1 | 20,000,000 | 20,000,000 | 0 | 0 | |
| sub-total | | | | | 137,880,000 | | 6,330,000 | |
| Miscellaneous | | | | | 34,470,000 | | 1,582,500 | 25% |
| Total Cost | | | | | 172,350,000 | | 7,912,500 | |
| Total Cost (FC+LC) | | | | | | | 180,262,500 | |

Construction Cost of Water Intake Electrical Works

For Q=118,000 m³/d

| Items | Specification | Unit | Qty | FC Portion (Yen) | | LC Portion (Yen) | | Reference |
|-------------------------------------|-------------------------------|------|-----|------------------|-------------|------------------|--------------------|-----------------------|
| | | | | Unit Price | Amount | Unit Price | Amount | |
| MV Incoming Switchgear | 11 k V VCB Incoming Panel | set | 1 | 5,600,000 | 5,600,000 | 400,000 | 400,000 | |
| MV Fedder Switchgear | 11 k V VCB Feeder Panel | set | 1 | 5,300,000 | 5,300,000 | 500,000 | 500,000 | |
| Transformer | 750kVA 3phase Oil Type | set | 2 | 4,000,000 | 8,000,000 | 370,000 | 740,000 | |
| LV Incoming Panel-1/2 | 1200A Busbar MCCB Panel | set | 2 | 4,000,000 | 8,000,000 | 330,000 | 660,000 | MCCB1600A |
| LV Bus-tie Panel | 1600A Busbar MCCB Panel | set | 1 | 2,000,000 | 2,000,000 | 230,000 | 230,000 | MCCB1600A |
| LV Feeder Panel-1 | 1600A Busbar MCCB Panel | set | 1 | 3,000,000 | 3,000,000 | 260,000 | 260,000 | MCCB600A*3 |
| LV Feeder Panel-2 | 1600A Busbar MCCB Panel | set | 1 | 3,000,000 | 3,000,000 | 270,000 | 270,000 | MCCB600A*3 |
| Static Capacitors Panel-1/2 | 7.5kVA+SR0.45kVar | sets | 2 | 2,000,000 | 4,000,000 | 180,000 | 360,000 | |
| Generator System | 1000kVA Package | sets | 1 | 49,450,000 | 49,450,000 | 3,000,000 | 3,000,000 | Inclu. Starting Panel |
| Synchronous Panel | Selfstanding Indoor Use Panel | set | 1 | 3,000,000 | 3,000,000 | 300,000 | 300,000 | |
| Intake Pump Panel | Selfstanding Indoor Starter | sets | 5 | 3,000,000 | 15,000,000 | 80,000 | 400,000 | Reactor Starter + SC |
| Seal Pump Panel | Selfstanding Indoor Starter | set | 1 | 1,500,000 | 1,500,000 | 80,000 | 80,000 | 2.2kW Starter |
| Automatic Inflow Screen Panel | Selfstanding Indoor Starter | set | 1 | 1,000,000 | 1,000,000 | 90,000 | 90,000 | 3.7kW Starter |
| Sand Pump Panel | Selfstanding Indoor Starter | set | 1 | 1,000,000 | 1,000,000 | 100,000 | 100,000 | 5.5kW Starter |
| Drain Pump Panel | Selfstanding Indoor Starter | set | 1 | 1,000,000 | 1,000,000 | 100,000 | 100,000 | 5.5kW Starter |
| Control Relay Panel | Selfstanding Indoor Starter | set | 1 | 5,000,000 | 5,000,000 | 300,000 | 300,000 | |
| Instrumentation Panel | Selfstanding Indoor Starter | set | 1 | 1,000,000 | 1,000,000 | 100,000 | 100,000 | |
| Intake Flow Meter | EMF 1200mm | set | 1 | 6,000,000 | 6,000,000 | 800,000 | 800,000 | |
| Inlet Water Level | Submersible Level Meter | set | 1 | 1,000,000 | 1,000,000 | 80,000 | 80,000 | |
| Pump Pit Water Level-1 | Submersible Level Meter | set | 1 | 1,000,000 | 1,000,000 | 80,000 | 80,000 | |
| Pump Pit Water Level-2 | Differential Pressure Meter | set | 1 | 500,000 | 500,000 | 60,000 | 60,000 | |
| Discharge Valve Opening Indicator | Indicator | sets | 5 | 120,000 | 600,000 | 10,000 | 50,000 | |
| Telemetry Monitoring System | Raidio Telemeter | set | 1 | 1,000,000 | 1,000,000 | 100,000 | 100,000 | (Send and Receive) |
| UPS | 1kVA UPS | set | 1 | 180,000 | 180,000 | 10,000 | 10,000 | |
| Others, Cable, etc. | | LS | 1 | | | | 300,000 | |
| Installation of Electrical Material | | LS | 1 | | | | 800,000 | |
| sub-total | | | | | 127,130,000 | | 10,170,000 | |
| Miscellaneous | | | | | 31,782,500 | | 2,542,500 | 25% |
| Total cost | | | | | 158,912,500 | | 12,712,500 | |
| Total Cost (FC+LC) | | | | | | | 171,625,000 | |

Construction Cost of Raw Water Transmission Pipe

For Q=118,000 m³/d

| Items | Specification | Unit | Qty | FC Portion (Yen) | | LC Portion (Yen) | | Reference |
|--------------------------------|---|------|--------|------------------|---------------|------------------|----------------------|-----------|
| | | | | Unit Price | Amount | Unit Price | Amount | |
| Pipe Installation (Dia 1350mm) | Material+Installation | m | 32,350 | 147,000 | 4,755,450,000 | 27,000 | 873,450,000 | |
| Valve | Material+Installation | pcs | 5 | 6,400,000 | 32,000,000 | 1,600,000 | 8,000,000 | |
| Pipe Bridge | | pcs | 26 | 2,400,000 | 62,400,000 | 6,000,000 | 156,000,000 | |
| Bend Part | | pcs | 150 | 1,600,000 | 240,000,000 | 400,000 | 60,000,000 | |
| Miscellaneous | for unexpected works such as Highway repair, traffic arrangement, compensation for shops & houses along Bahirdia- | Ls | 1 | | 34,150,000 | | 183,500,000 | |
| Total Cost | | | | | 5,124,000,000 | | 1,280,950,000 | |
| Total Cost (FC+LC) | | | | | | | 6,404,950,000 | |

Construction Cost of Pipe Bridge

for 1 Pipe Bridge, L=25m (Average)

Yen

| Work Item | Specification | unit | Unit Price | | Q'ty | Total Cost | | | Reference |
|-------------------|-----------------------|------|------------|---------|------|------------|-----------|---------------|-------------------|
| | | | FC | LC | | FC | LC | Total (FC+LC) | |
| Concrete | | m3 | 2,638 | 14,950 | 75 | 197,850 | 1,121,250 | 1,319,100 | |
| Reinforcement Bar | | t | 90,312 | 22,578 | 7.5 | 677,340 | 169,335 | 846,675 | |
| Steel Pipe | Material+Installation | m | 32,160 | 128,640 | 25 | 804,000 | 3,216,000 | 4,020,000 | |
| Pile | Material+Installation | m | 1,197 | 6,783 | 60 | 71,820 | 406,980 | 478,800 | |
| Air Valve | Material+Installation | pcs | 240,000 | 60,000 | 1 | 240,000 | 60,000 | 300,000 | JP Price×1.2 |
| | | | | | | | | | |
| Other Work | | | | | | 350,202 | 982,713 | 333,229 | 20% of above Work |
| | | | | | | | | | |
| Total | | | | | | 2,341,212 | 5,956,278 | 7,297,804 | |
| | | | | | | | | | |
| Roundup | | | | | | 2,400,000 | 6,000,000 | 8,400,000 | |

B. Package 2: SWTP & Impounding Reservoir

Package-2 SWTP & Impounding Reservoir

For Q=110,000 m³/d

| Items | Specification | Unit | Qty | FC Portion (Yen) | | LC Portion (Yen) | | Reference |
|-------------------------------|---------------|------|-----|------------------|---------------|------------------|----------------------|-----------|
| | | | | Unit Price | Amount | Unit Price | Amount | |
| SWTP | | Ls | 1 | | 2,926,000,000 | | 1,245,600,000 | |
| Impounding Reservoir | | Ls | 1 | | 595,000,000 | | 595,000,000 | |
| Diversion of Irrigation Canal | | Ls | 1 | | 0 | | 92,000,000 | |
| O&M Training | | Ls | 1 | | 50,000,000 | | 0 | |
| | | | | | | | | |
| Total Cost | | | | | 3,571,000,000 | | 1,932,600,000 | |
| Total Cost (FC+LC) | | | | | | | 5,503,600,000 | |

Construction Cost of SWTP (Civil/Architect/Mechanical/Electrical)

| Items | Specification | Unit | Qty | FC Portion (Yen) | | LC Portion (Yen) | | Reference |
|----------------------------------|---------------|------|-----|------------------|---------------|------------------|----------------------|-----------|
| | | | | Unit Price | Amount | Unit Price | Amount | |
| Civil/Architect Works | | | | | | | | |
| Receiving Well | | pc | 1 | | 2,067,674 | | 5,843,726 | |
| Sedimentation Tank | | pc | 1 | | 70,311,476 | | 191,234,524 | |
| Rapid Sand Filter | | pc | 1 | | 63,949,570 | | 189,656,260 | |
| Clear Water Reservoir | | pc | 1 | | 40,389,720 | | 94,939,280 | |
| Sludge Drying Bed | | pc | 1 | | 25,488,940 | | 101,785,400 | |
| Sludge Discharge Tank | | pc | 1 | | 41,199,208 | | 88,280,792 | |
| Inplant Works and Building Works | | pc | 1 | | 114,518,000 | | 378,412,000 | |
| Inplant Pipe | | Ls | 1 | | 229,981,500 | | 51,113,000 | |
| Sub-Total Civil/Architect Works | | | | | 587,906,088 | | 1,101,264,982 | |
| | | | | | | | | |
| Mechanical Works | | Ls | 1 | | 1,744,728,950 | | 46,642,900 | |
| Electrical Works | | Ls | 1 | | 593,362,500 | | 97,700,000 | |
| | | | | | | | | |
| Total Cost | | | | | 2,925,997,538 | | 1,245,607,882 | |
| Total Cost (FC+LC) | | | | | | | 4,171,605,420 | |

Construction Cost of Receiving Well Civil Works

| Items | Specification | Unit | Qty | FC Portion (Yen) | | LC Portion (Yen) | | Reference |
|--------------------------------|---------------------------------------|----------------|-----|------------------|-----------|------------------|------------------|---------------------------------|
| | | | | Unit Price | Amount | Unit Price | Amount | |
| Excavation | | m ³ | 120 | 50 | 6,000 | 150 | 18,000 | Karnaphuli BOQ, No-03 Clarifier |
| Backfilling | | m ³ | 40 | 30 | 1,200 | 120 | 4,800 | Karnaphuli BOQ, No-03 Clarifier |
| Gravel | | m ³ | 17 | 750 | 12,750 | 2,250 | 38,250 | Karnaphuli BOQ, No-04 Filter |
| Surplus Soil Transport | | m ³ | 80 | 0 | 0 | 0 | 0 | |
| Pile Driving Work | 400x400, L=24m Including Materials | m | 624 | 2,156 | 1,345,344 | 4,844 | 3,022,656 | Karnaphuli BOQ, No-03 Clarifier |
| Plain Concrete | | m ³ | 12 | 2,000 | 24,000 | 8,000 | 96,000 | Karnaphuli BOQ, No-03 Clarifier |
| Reinforced Concrete | | m ³ | 121 | 3,000 | 363,000 | 12,000 | 1,452,000 | Karnaphuli BOQ, No-03 Clarifier |
| Supporting Works for Formwork | | m ³ | 22 | 750 | 16,500 | 750 | 16,500 | |
| Rebar Fabrication and Assembly | | t | 12 | 22,000 | 264,000 | 88,000 | 1,056,000 | Karnaphuli BOQ, No-03 Clarifier |
| Scaffolding | | m ² | 218 | 160 | 34,880 | 640 | 139,520 | |
| | | | | | | | | |
| Total Cost | | | | | 2,067,674 | | 5,843,726 | |
| Total Cost (FC+LC) | | | | | | | 7,911,400 | |

Construction Cost of Sedimentation Basin Civil Works

| Items | Specification | Unit | Qty | FC Portion (Yen) | | LC Portion (Yen) | | Reference |
|--------------------------------|---|----------------|--------|------------------|------------|------------------|--------------------|---------------------------------|
| | | | | Unit Price | Amount | Unit Price | Amount | |
| Excavation | | m ³ | 13,700 | 50 | 685,000 | 150 | 2,055,000 | Karnaphuli BOQ, No-03 Clarifier |
| Backfilling | | m ³ | 2,400 | 30 | 72,000 | 120 | 288,000 | Karnaphuli BOQ, No-03 Clarifier |
| Gravel | | m ³ | 850 | 750 | 637,500 | 2,250 | 1,912,500 | Karnaphuli BOQ, No-04 Filter |
| Surplus Soil Transport | | m ³ | 11,300 | 0 | 0 | 0 | 0 | |
| Pile Driving Work | 400×400, L = 24m Including Materials | m | 22,296 | 2,156 | 48,070,176 | 4,844 | 108,001,824 | Karnaphuli BOQ, No-03 Clarifier |
| Plain Concrete | | m ³ | 560 | 2,000 | 1,120,000 | 8,000 | 4,480,000 | Karnaphuli BOQ, No-03 Clarifier |
| Reinforced Concrete | | m ³ | 3,630 | 3,000 | 10,890,000 | 12,000 | 43,560,000 | Karnaphuli BOQ, No-03 Clarifier |
| Rebar Fabrication and Assembly | | t | 291 | 22,000 | 6,402,000 | 88,000 | 25,608,000 | Karnaphuli BOQ, No-03 Clarifier |
| Supporting Works for Formwork | | m ³ | 1,960 | 750 | 1,470,000 | 750 | 1,470,000 | |
| Scaffolding | | m ² | 6,030 | 160 | 964,800 | 640 | 3,859,200 | |
| Total Cost | | | | | 70,311,476 | | 191,234,524 | |
| Total Cost (FC+LC) | | | | | | | 261,546,000 | |

Construction Cost of Rapid Sand Filter Civil Works

| Items | Specification | Unit | Qty | FC Portion (Yen) | | LC Portion (Yen) | | Reference |
|--------------------------------|------------------|----------------|--------|------------------|--------------|------------------|--------------------|---|
| | | | | Unit Price | Amount | Unit Price | Amount | |
| Excavation | | m ³ | 14,000 | 50 | 700,000 | 150 | 2,100,000 | Karnaphuli BOQ, No-03 Clarifier |
| Backfilling | | m ³ | 2,700 | 30 | 81,000 | 120 | 324,000 | Karnaphuli BOQ, No-03 Clarifier |
| Gravel | | m ³ | 430 | 750 | 322,500 | 2,250 | 967,500 | Karnaphuli BOQ, No-04 Filter |
| Surplus Soil Transport | | m ³ | 11,300 | 0 | 0 | 0 | 0 | |
| Pile Driving Work | 400×400, L = 24m | m | 10,970 | 2,156 | 23,651,320 | 4,844 | 53,138,680 | Karnaphuli BOQ, No-03 Clarifier |
| Plain Concrete | | m ³ | 280 | 2,000 | 560,000 | 8,000 | 2,240,000 | Karnaphuli BOQ, No-03 Clarifier |
| Reinforced Concrete | | m ³ | 5,980 | 3,000 | 17,940,000 | 12,000 | 71,760,000 | Karnaphuli BOQ, No-03 Clarifier |
| Supporting Works for Formwork | | m ³ | 7,340 | 750 | 5,505,000 | 750 | 5,505,000 | |
| Rebar Fabrication and Assembly | | t | 478 | 22,000 | 10,516,000 | 88,000 | 42,064,000 | Karnaphuli BOQ, No-03 Clarifier |
| Scaffolding | | m ² | 5,170 | 160 | 827,200 | 640 | 3,308,800 | |
| Filter Sand | | m ³ | 610 | 650 | 396,500 | 3,680 | 2,244,800 | Karnaphuli BOQ, No-04 Filter |
| Filter Gravel | | m ³ | 410 | 485 | 198,850 | 2,748 | 1,126,680 | Karnaphuli BOQ, No-01-2 Filter |
| Filter Operation Gallery | | m ² | 127 | 25,600 | 3,251,200.00 | 38,400 | 4,876,800.00 | Referred from Karnaphuli BOQ, No-01-3 Sub-Station |
| Total Cost | | | | | 63,949,570 | | 189,656,260 | |
| Total Cost (FC+LC) | | | | | | | 253,605,830 | |

Construction Cost of Clear Water Reservoir Civil Works

| Items | Specification | Unit | Qty | FC Portion (Yen) | | LC Portion (Yen) | | Reference |
|--------------------------------|------------------|----------------|--------|------------------|------------|------------------|--------------------|---------------------------------|
| | | | | Unit Price | Amount | Unit Price | Amount | |
| Excavation | | m ³ | 16,100 | 50 | 805,000 | 150 | 2,415,000 | Karnaphuli BOQ, No-03 Clarifier |
| Backfilling | | m ³ | 5,800 | 30 | 174,000 | 120 | 696,000 | Karnaphuli BOQ, No-03 Clarifier |
| Gravel | | m ³ | 230 | 750 | 172,500 | 2,250 | 517,500 | Karnaphuli BOQ, No-04 Filter |
| Surplus Soil Transport | | m ³ | 10,300 | 0 | 0 | 0 | 0 | |
| Pile Driving Work | 400×400, L = 24m | m | 7,320 | 2,156 | 15,781,920 | 4,844 | 35,458,080 | Karnaphuli BOQ, No-03 Clarifier |
| Plain Concrete | | m ³ | 150 | 2,000 | 300,000 | 8,000 | 1,200,000 | Karnaphuli BOQ, No-03 Clarifier |
| Reinforced Concrete | | m ³ | 2,430 | 3,000 | 7,290,000 | 12,000 | 29,160,000 | Karnaphuli BOQ, No-03 Clarifier |
| Supporting Works for Formwork | | m ³ | 8,450 | 750 | 6,337,500 | 750 | 6,337,500 | |
| Rebar Fabrication and Assembly | | t | 194 | 22,000 | 4,268,000 | 88,000 | 17,072,000 | Karnaphuli BOQ, No-03 Clarifier |
| Scaffolding | | m ² | 1,280 | 160 | 204,800 | 640 | 819,200 | |
| Water Proofing (Inside) | | m ² | 3,160 | 1,600 | 5,056,000 | 400 | 1,264,000 | Karnaphuli BOQ, No-03 Clarifier |
| Total Cost | | | | | 40,389,720 | | 94,939,280 | |
| Total Cost (FC+LC) | | | | | | | 135,329,000 | |

Construction Cost of Sludge Drying Bed Civil Works³

| Items | Specification | Unit | Qty | FC Portion (Yen) | | LC Portion (Yen) | | Reference |
|----------------------------------|---------------|----------------|--------|------------------|------------|------------------|-------------|--|
| | | | | Unit Price | Amount | Unit Price | Amount | |
| Excavation | | m ³ | 19,400 | 50 | 970,000 | 150 | 2,910,000 | Karnaphuli BOQ, No-03 Clarifier |
| Backfilling | | m ³ | 2,000 | 30 | 60,000 | 120 | 240,000 | Karnaphuli BOQ, No-03 Clarifier |
| Gravel | | m ³ | 1,760 | 750 | 1,320,000 | 2,250 | 3,960,000 | Karnaphuli BOQ, No-04 Filter |
| Surplus Soil Transport | | m ³ | 3,455 | 0 | 0 | 0 | 0 | |
| Surplus Soil Transport to Intake | | m ³ | 13,945 | 92 | 1,282,940 | 520 | 7,251,400 | Karnaphuli BOQ, Battali Hill Reservoir |
| Plain Concrete | | m ³ | 1,170 | 2,000 | 2,340,000 | 8,000 | 9,360,000 | Karnaphuli BOQ, No-03 Clarifier |
| Reinforced Concrete | | m ³ | 4,100 | 3,000 | 12,300,000 | 12,000 | 49,200,000 | Karnaphuli BOQ, No-03 Clarifier |
| Rebar Fabrication and Assembly | | t | 328 | 22,000 | 7,216,000 | 88,000 | 28,864,000 | Karnaphuli BOQ, No-03 Clarifier |
| | | | | | | | | |
| Total Cost | | | | | 25,488,940 | | 101,785,400 | |
| Total Cost (FC+LC) | | | | | | | 127,274,340 | |

Construction Cost of Sludge Discharge Tank Civil Works

| Items | Specification | Unit | Qty | FC Portion (Yen) | | LC Portion (Yen) | | Reference |
|--------------------------------|-----------------|----------------|--------|------------------|------------|------------------|-------------|---|
| | | | | Unit Price | Amount | Unit Price | Amount | |
| Sheet Pile Driving Work | | m | 5,400 | 400 | 2,160,000 | 1,600 | 8,640,000 | |
| Sheet Pile Removing Work | | m | 5,400 | 200 | 1,080,000 | 800 | 4,320,000 | |
| Sheet Pile Lease | | t | 411 | 19,800 | 8,137,800 | 2,200 | 904,200 | |
| Excavation | | m ³ | 11,300 | 50 | 565,000 | 150 | 1,695,000 | Karnaphuli BOQ, No-03 Clarifier |
| Backfilling | | m ³ | 2,500 | 30 | 75,000 | 120 | 300,000 | Karnaphuli BOQ, No-03 Clarifier |
| Gravel | | m ³ | 130 | 750 | 97,500 | 2,250 | 292,500 | Karnaphuli BOQ, No-04 Filter |
| Surplus Soil Transport | | m ³ | 8,800 | 0 | 0 | 0 | 0 | |
| Pile Driving Work | 400x400, L= 16m | m | 3,168 | 2,156 | 6,830,208 | 4,844 | 15,345,792 | Karnaphuli BOQ, No-03 Clarifier |
| Plain Concrete | | m ³ | 90 | 2,000 | 180,000 | 8,000 | 720,000 | Karnaphuli BOQ, No-03 Clarifier |
| Reinforced Concrete | | m ³ | 2,350 | 3,000 | 7,050,000 | 12,000 | 28,200,000 | Karnaphuli BOQ, No-03 Clarifier |
| Supporting Works for Formwork | | m ³ | 1,070 | 750 | 802,500 | 750 | 802,500 | |
| Rebar Fabrication and Assembly | | t | 235 | 22,000 | 5,170,000 | 88,000 | 20,680,000 | Karnaphuli BOQ, No-03 Clarifier |
| Supporting Beam | | t | 80 | 72,000 | 5,760,000 | 8,000 | 640,000 | |
| Scaffolding | | m ² | 2,010 | 160 | 321,600 | 640 | 1,286,400 | |
| Operation Gallery | | m ² | 116 | 25,600 | 2,969,600 | 38,400 | 4,454,400 | Referred from Karnaphuli BOQ, No-01-3 Sub-Station |
| | | | | | | | | |
| Total Cost | | | | | 41,199,208 | | 88,280,792 | |
| Total Cost (FC+LC) | | | | | | | 129,480,000 | |

Construction Cost of Inplant Work and Building Work

| Items | Specification | Unit | Qty | FC Portion (Yen) | | LC Portion (Yen) | | Reference |
|------------------------------|---------------|----------------|---------|------------------|-------------|------------------|-------------|---|
| | | | | Unit Price | Amount | Unit Price | Amount | |
| Embankment | | m ³ | 300,000 | 100 | 30,000,000 | 400 | 120,000,000 | Karnaphuli BOQ, No-01-8 Site Work |
| Surplus Soil Transport | | m ³ | 100,000 | 0 | 0 | 0 | 0 | |
| Fence | | m | 1,300 | 2,000 | 2,600,000 | 8,000 | 10,400,000 | Karnaphuli BOQ, No-17 Site Work |
| Gate | | Ls | 1 | 48,000 | 48,000 | 192,000 | 192,000 | Karnaphuli BOQ, No-17 Site Work |
| Land Improvement | | m ² | 37,800 | 200 | 7,560,000 | 800 | 30,240,000 | |
| Chemical Building Works | | m ² | 476 | 42,000 | 19,992,000 | 63,000 | 29,988,000 | Referred from Karnaphuli BOQ, No-10 Chemical Building |
| Chlorine Building Works | | m ² | 280 | 42,400 | 11,872,000 | 63,600 | 17,808,000 | Referred from Karnaphuli BOQ, No-11 Chlorine Building |
| Administration Building Work | | m ² | 912 | 34,600 | 31,555,200 | 138,400 | 126,220,800 | Referred from Karnaphuli BOQ, No-12 Administration Building |
| Generator Room Works | | m ² | 312 | 20,200 | 6,302,400 | 80,800 | 25,209,600 | Referred from Karnaphuli BOQ, No-09 Electrical Building |
| Electrical Building Works | | m ² | 182 | 20,200 | 3,676,400 | 80,800 | 14,705,600 | Referred from Karnaphuli BOQ, No-09 Electrical Building |
| Ware House | | m ² | 80 | 11,400 | 912,000 | 45,600 | 3,648,000 | Referred from Karnaphuli BOQ, No-13 Ware House |
| | | | | | | | | |
| Total Cost | | | | | 114,518,000 | | 378,412,000 | |
| Total Cost (FC+LC) | | | | | | | 492,930,000 | |

Construction Cost of Inplant Pipe

| Items | Specification | Unit | Qty | FC Portion (Yen) | | LC Portion (Yen) | | Reference |
|---------------------------|-----------------|------|-----|------------------|-------------|------------------|--------------------|--------------|
| | | | | Unit Price | Amount | Unit Price | Amount | |
| Pipe | Dia. 1350mm DIP | m | 380 | 146,000 | 55,480,000 | 26,000 | 9,880,000 | |
| Bend | Dia. 1350mm DIP | Ls | 1 | - | 16,644,000 | - | 2,964,000 | 30% of above |
| Pipe | Dia. 1200mm DIP | m | 180 | 115,000 | 20,700,000 | 24,000 | 4,320,000 | |
| Bend | Dia. 1200mm DIP | Ls | 1 | - | 6,210,000 | - | 1,296,000 | 30% of above |
| Pipe | Dia. 600mm DIP | m | 190 | 60,500 | 11,495,000 | 15,000 | 2,850,000 | |
| Bend | Dia. 600mm DIP | Ls | 1 | - | 3,448,500 | - | 855,000 | 30% of above |
| Pipe | Dia. 500mm DIP | m | 310 | 50,500 | 15,655,000 | 14,000 | 4,340,000 | |
| Bend | Dia. 500mm DIP | Ls | 1 | - | 4,696,500 | - | 1,302,000 | 30% of above |
| Pipe | Dia. 300mm DIP | m | 250 | 40,500 | 10,125,000 | 12,000 | 3,000,000 | |
| Bend | Dia. 300mm DIP | Ls | 1 | - | 3,037,500 | - | 900,000 | 30% of above |
| Pipe | Dia. 200mm DIP | m | 330 | 35,000 | 11,550,000 | 10,000 | 3,300,000 | |
| Bend | Dia. 200mm DIP | Ls | 1 | - | 3,465,000 | - | 990,000 | 30% of above |
| Pipe | Dia. 100mm DIP | m | 790 | 25,000 | 19,750,000 | 8,000 | 6,320,000 | |
| Bend | Dia. 100mm DIP | Ls | 1 | - | 5,925,000 | - | 1,896,000 | 30% of above |
| Valve | Dia. 1350mm DIP | pc | 3 | 6,400,000 | 19,200,000 | 1,000,000 | 3,000,000 | |
| Valve | Dia. 1200mm DIP | pc | 1 | 5,000,000 | 5,000,000 | 800,000 | 800,000 | |
| Valve | Dia. 600mm DIP | pc | 2 | 2,000,000 | 4,000,000 | 400,000 | 800,000 | |
| Valve | Dia. 500mm DIP | pc | 1 | 1,600,000 | 1,600,000 | 300,000 | 300,000 | |
| Valve | Dia. 300mm DIP | pc | 8 | 1,100,000 | 8,800,000 | 200,000 | 1,600,000 | |
| Valve | Dia. 200mm DIP | pc | 4 | 800,000 | 3,200,000 | 100,000 | 400,000 | |
| | | | | | | | | |
| Total Cost | | | | | 229,981,500 | | 51,113,000 | |
| Total Cost (FC+LC) | | | | | | | 281,094,500 | |

Construction Cost of SWTP Mechanical Works

| Items | Specification | Unit | Qty | FC Portion (Yen) | | LC Portion (Yen) | | Reference |
|--------------------------|---|------|-----|------------------|-------------|------------------|-----------|-----------|
| | | | | Unit Price | Amount | Unit Price | Amount | |
| Inlet Stop Log | Manual Weir | Nr | 2 | 422,740 | 845,480 | 37,000 | 74,000 | |
| Flash Mixer | Turbine Mixer D-1.0m x 8blades x 11kW | Nr | 2 | 5,357,770 | 10,715,540 | 400,000 | 800,000 | |
| Inlet Gate | Manual Sluice W-0.6m x H-0.6m | Nr | 8 | 1,690,960 | 13,527,680 | 120,000 | 960,000 | |
| Sludge Collector | W-7.45m x L-70m x 0.75kW | Nr | 8 | 27,992,740 | 223,941,920 | 200,000 | 1,600,000 | |
| De-sludge Valve | Motorized Eccentric D-200 x 0.4kW | Nr | 32 | 762,770 | 24,408,640 | 60,000 | 1,920,000 | |
| Drain Pump | Submersible Sump 0.2m ³ /min x 20m x 2.2kW | Nr | 4 | 523,830 | 2,095,320 | 40,000 | 160,000 | |
| Sampling Pump | Self-priming Centrifugal 0.06m ³ /min x 12m x 0.2kW | Nr | 2 | 238,940 | 477,880 | 20,000 | 40,000 | |
| Inflow Valve | Motorized Butterfly D-600 x 0.4kW | Nr | 12 | 3,032,700 | 36,392,400 | 150,000 | 1,800,000 | |
| Filtrated&Backwash Valve | Motorized Butterfly D-1000 x 1.5kW | Nr | 12 | 8,078,010 | 96,936,120 | 500,000 | 6,000,000 | |
| Surface wash Valve | Motorized Butterfly D-300 x 0.2kW | Nr | 12 | 2,076,940 | 24,923,280 | 120,000 | 1,440,000 | |
| Wash Waste Gate | Motorized Rectangular Butterfly W-0.9m x H-0.9m x 0.75kW | Nr | 12 | 3,758,710 | 45,104,520 | 150,000 | 1,800,000 | |
| Drain Pump | Submersible Sump 0.2m ³ /min x 20m x 2.2kW | Nr | 4 | 523,830 | 2,095,320 | 40,000 | 160,000 | |
| Sampling Pump | Self-priming Centrifugal Sump 0.06m ³ /min x 12m x 0.2kW | Nr | 4 | 238,940 | 955,760 | 20,000 | 80,000 | |
| Surface wash Pipe Unit | SUS 304 D-300-25 | Nr | 12 | 10,871,770 | 130,461,240 | 500,000 | 6,000,000 | |
| Inlet Gate | Manual Sluice W-0.6m x H-0.9m | Nr | 2 | 1,433,640 | 2,867,280 | 100,000 | 200,000 | |
| Wash Waste Pump | Horizontal End Suction Volute D-300 x 11m ³ /min x 16m x 45kW | Nr | 3 | 1,203,890 | 3,611,670 | 100,000 | 300,000 | |
| Suction Valve -1 | Manual Sluice D-350 | Nr | 3 | 643,300 | 1,929,900 | 50,000 | 150,000 | |
| Check Valve -1 | Swing D-350 | Nr | 3 | 1,121,180 | 3,363,540 | 90,000 | 270,000 | |
| Discharge Valve -1 | Manual Butterfly D-350 | Nr | 3 | 1,433,640 | 4,300,920 | 120,000 | 360,000 | |
| Maintenance Hoist | Manual Chain Block 2ton | Nr | 1 | 395,170 | 395,170 | 30,000 | 30,000 | |
| Inlet Gate | Manual Sluice W-0.6m x H-0.9m | Nr | 2 | 1,433,640 | 2,867,280 | 120,000 | 240,000 | |
| Sludge Discharge Pump | Horizontal End Suction Pump D-125 x 2m ³ /min x 10m x 5.5kW | Nr | 3 | 790,340 | 2,371,020 | 60,000 | 180,000 | |
| Suction Valve -1 | Manual Sluice D-150 | Nr | 3 | 147,040 | 441,120 | 10,000 | 30,000 | |
| Check Valve -1 | Swing D-150 | Nr | 3 | 376,790 | 1,130,370 | 30,000 | 90,000 | |
| Discharge Valve -1 | Manual Sluice D-150 | Nr | 3 | 147,040 | 441,120 | 12,960 | 38,880 | |
| Maintenance Hoist | Manual Chain Block 2ton | Nr | 1 | 395,170 | 395,170 | 34,830 | 34,830 | |
| Clear Water Pump | Horizontal Double Volute D-350 x 17.4m ³ /min x 50m x | Nr | 6 | 9,355,420 | 56,132,520 | 60,000 | 360,000 | |
| Suction Valve -1 | Manual Sluice D-400 | Nr | 6 | 882,240 | 5,293,440 | 70,000 | 420,000 | |
| Check Valve -1 | Swing with Dash-pot D-400 | Nr | 6 | 2,398,590 | 14,391,540 | 20,000 | 120,000 | |
| Discharge Valve -1 | Manual Butterfly D-400 | Nr | 6 | 1,608,250 | 9,649,500 | 100,000 | 600,000 | |
| Discharge Valve -1 | Motorized Butterfly D-400 x 0.2kW | Nr | 6 | 2,481,300 | 14,887,800 | 200,000 | 1,200,000 | |
| Surface wash Pump | Horizontal End Suction Volute D-300 x 14m ³ /min x 28m x 90kW | Nr | 3 | 1,608,250 | 4,824,750 | 100,000 | 300,000 | |
| Suction Valve -1 | Manual Sluice D-350 | Nr | 3 | 643,300 | 1,929,900 | 50,000 | 150,000 | |
| Check Valve -1 | Swing D-350 | Nr | 3 | 1,121,180 | 3,363,540 | 90,000 | 270,000 | |
| Discharge Valve -1 | Manual Butterfly D-350 | Nr | 3 | 1,433,640 | 4,300,920 | 100,000 | 300,000 | |
| Isolation Valve | Manual Butterfly D-300 | Nr | 1 | 1,203,890 | 1,203,890 | 106,110 | 106,110 | |
| Isolation Valve | Manual Sluice D-350 | Nr | 2 | 395,170 | 790,340 | 34,830 | 69,660 | |
| Drain Pump | Submersible Sump 0.2m ³ /min x 20m x 2.2kW | Nr | 4 | 523,830 | 2,095,320 | 46,170 | 184,680 | |
| Overhead Crane | Electrically Crane 3.0t | Nr | 1 | 1,203,890 | 1,203,890 | 106,110 | 106,110 | |
| Inlet Valve | Manual Butterfly D-1000 | Nr | 2 | 6,240,010 | 12,480,020 | 450,000 | 900,000 | |
| Suction Header Valve | Manual Butterfly D-1000 | Nr | 2 | 6,240,010 | 12,480,020 | 450,000 | 900,000 | |
| Isolation Valve | Manual Butterfly D-1000 | Nr | 3 | 6,240,010 | 18,720,030 | 500,000 | 1,500,000 | |
| Alum Mixer | Double Impeller Turban Mixer Peripheral Dia.1000 x 3.7kW | Nr | 2 | 1,672,580 | 3,345,160 | 100,000 | 200,000 | |

| | | | | | | | | |
|--|--|------|----|-------------|---------------|---------|----------------------|-----|
| Alum Pump | Diaphragm 0.75kW | Nr | 4 | 2,242,360 | 8,969,440 | 100,000 | 400,000 | |
| Lime Mixer | Double Impeller Turban Mixer Peripheral Dia.1000 x 3.7kW | Nr | 2 | 1,672,580 | 3,345,160 | 100,000 | 200,000 | |
| Lime Pump | Diaphragm 0.75kW | Nr | 3 | 2,242,360 | 6,727,080 | 100,000 | 300,000 | |
| Chemical Crane | Electrically Chain Brock 3.0t | Nr | 1 | 3,997,650 | 3,997,650 | 200,000 | 200,000 | |
| Drain Pump | Submersible Sump 0.2m ³ /min x 20m x 2.2kW | Nr | 2 | 643,300 | 1,286,600 | 50,000 | 100,000 | |
| Chlorine Cylinder | Cylindrical Convexed Container 1000kg | Nr | 14 | 1,203,890 | 16,854,460 | 100,000 | 1,400,000 | |
| Weight Scale | Load Cell 0 to 2ton | Nr | 2 | 3,437,060 | 6,874,120 | 200,000 | 400,000 | |
| Chlorinator | Self-Stand Vacuum 40kg/hr | Nr | 3 | 4,806,370 | 14,419,110 | 200,000 | 600,000 | |
| Chlorine Booster Pump | End Suction Volute 0.3m ³ /min x 50m x 7.5kW | Nr | 3 | 321,650 | 964,950 | 28,350 | 85,050 | |
| Chlorine Crane | Electrically Chain Block 3.0t | Nr | 1 | 3,997,650 | 3,997,650 | 200,000 | 200,000 | |
| Exhaust Fan | Unit Fan 50m ³ /min x 0.25kW | Nr | 7 | 358,410 | 2,508,870 | 20,000 | 140,000 | |
| Chlorine Leak Detector | Cl ₂ Gas Leak Detector Sencer 5sets / detector | Nr | 1 | 82,710 | 82,710 | 5,000 | 5,000 | |
| Inlet Valve | Manual sluice D-200 | Nr | 8 | 202,180 | 1,617,440 | 10,000 | 80,000 | |
| Stop Log | | Nr | 16 | 156,230 | 2,499,680 | 10,000 | 160,000 | |
| All Pipework,, steel work, fitting, etc | | Item | 1 | 282,450,000 | 282,450,000 | 600,000 | 600,000 | |
| Import Cost | | Item | 1 | 235,100,000 | 235,100,000 | 0 | 0 | |
| sub-total cost | | | | | 1,395,783,160 | | 37,314,320 | |
| Miscellaneous | | | | | 348,945,790 | | 9,328,580 | 25% |
| Total cost | | | | | 1,744,728,950 | | 46,642,900 | |
| Total Cost (FC+LC) | | | | | | | 1,791,371,850 | |

Construction Cost of SWTP Electrical Works

| Items | Specification | Unit | Qty | FC Portion (Yen) | | LC Portion (Yen) | | Reference |
|--|---------------------------------------|------|-----|------------------|------------|------------------|-----------|-----------------------|
| | | | | Unit Price | Amount | Unit Price | Amount | |
| MV Incoming Switchgear | 11kV VCB Incoming Panel | set | 1 | 5,870,000 | 5,870,000 | 450,000 | 450,000 | |
| MV Fedder Switchgear | 11 k V VCB Feeder Panel | set | 1 | 6,560,000 | 6,560,000 | 500,000 | 500,000 | |
| Transformer | 1,200kVA 3phase Oil Type | sets | 2 | 6,900,000 | 13,800,000 | 530,000 | 1,060,000 | |
| LV Incoming Panel-1/2 | 2000A Busbar MCCB Panel | sets | 2 | 4,840,000 | 9,680,000 | 370,000 | 740,000 | MCCB |
| LV Bus-tie Panel | 2000A Busbar MCCB Panel | set | 1 | 3,300,000 | 3,300,000 | 250,000 | 250,000 | MCCB2000A |
| LV Feeder Panel-1 | 2000A Busbar MCCB Panel | set | 1 | 3,750,000 | 3,750,000 | 290,000 | 290,000 | MCCB1000A*1 |
| LV Feeder Panel-2 | 2000A Busbar MCCB Panel | set | 1 | 3,750,000 | 3,750,000 | 290,000 | 290,000 | MCCB1000A*1 |
| Static Capacitors Panel-1/2 | 20kVA+SR1.2kVar | sets | 2 | 2,650,000 | 5,300,000 | 200,000 | 400,000 | |
| LV Incoming Panel-1/2 | 1000A Busbar MCCB Panel | sets | 2 | 3,690,000 | 7,380,000 | 280,000 | 560,000 | Clear Water Pump |
| LV Bus-tie Panel | 1000A Busbar MCCB Panel | set | 1 | 3,460,000 | 3,460,000 | 260,000 | 260,000 | Clear Water Pump |
| LV Feeder Panel-1 | 1000A Busbar MCCB Panel | set | 1 | 3,120,000 | 3,120,000 | 240,000 | 240,000 | Clear Water Pump |
| LV Feeder Panel-2 | 1000A Busbar MCCB Panel | set | 1 | 3,120,000 | 3,120,000 | 240,000 | 240,000 | |
| Generator System | 1000kVA Package | sets | 2 | 49,450,000 | 98,900,000 | 3,000,000 | 6,000,000 | Inclu. Starting Panel |
| Synchronous Panel | Selfstanding Indoor Use Panel | set | 1 | 6,460,000 | 6,460,000 | 490,000 | 490,000 | |
| Sedimentation Basin MCC-1 | Motor Control Center | set | 1 | 11,630,000 | 11,630,000 | 890,000 | 890,000 | |
| Sedimentation Basin MCC-2 | Motor Control Center | set | 1 | 11,660,000 | 11,660,000 | 890,000 | 890,000 | |
| Rapid Filter MCC-3 | Motor Control Center | set | 1 | 15,050,000 | 15,050,000 | 1,150,000 | 1,150,000 | |
| Rapid Filter MCC-4 | Motor Control Center | set | 1 | 15,510,000 | 15,510,000 | 1,190,000 | 1,190,000 | |
| Chemical Facilities MCC-5 | Motor Control Center | set | 1 | 5,930,000 | 5,930,000 | 450,000 | 450,000 | |
| Chemical Facilities MCC-6 | Motor Control Center | set | 1 | 6,150,000 | 6,150,000 | 470,000 | 470,000 | |
| Sedimentation Basin RY-1 | Selfstanding Indoor Panel | set | 1 | 12,550,000 | 12,550,000 | 960,000 | 960,000 | Both Side Use |
| Sedimentation Basin RY-2 | Selfstanding Indoor Panel | set | 1 | 12,190,000 | 12,190,000 | 930,000 | 930,000 | |
| Rapid Filter RY-3 | Selfstanding Indoor Panel | set | 1 | 12,900,000 | 12,900,000 | 990,000 | 990,000 | |
| Rapid Filter RY-4 | Selfstanding Indoor Panel | set | 1 | 13,250,000 | 13,250,000 | 1,010,000 | 1,010,000 | Both Side Use |
| Chemical Facilities RY-5 | Selfstanding Indoor Panel | set | 1 | 5,380,000 | 5,380,000 | 410,000 | 410,000 | Both Side Use |
| Chemical Facilities RY-6 | Selfstanding Indoor Panel | set | 1 | 6,100,000 | 6,100,000 | 470,000 | 470,000 | Both Side Use |
| Papid Mixer LCP-1/2 | Site Control Panel | sets | 2 | 750,000 | 1,500,000 | 60,000 | 120,000 | Outdoor Use Type |
| Sludge Collector LCP-3/4/5/6/7/8/9/10 | Site Control Panel | sets | 8 | 750,000 | 6,000,000 | 60,000 | 480,000 | Outdoor Use Type |
| De-sludge Valve | Site Control Panel | sets | 8 | 1,160,000 | 9,280,000 | 90,000 | 720,000 | Outdoor Use Type |
| Sedimentation Drain Pump LCP-19/20 | Site Control Panel | sets | 2 | 980,000 | 1,960,000 | 70,000 | 140,000 | Outdoor Use Type |
| Sludge Discharge Pump LCP-21 | Site Control Panel | set | 1 | 1,160,000 | 1,160,000 | 90,000 | 90,000 | Outdoor Use Type |
| Inlet Water Sampling Pump LCP-22 | Site Control Panel | set | 1 | 980,000 | 980,000 | 70,000 | 70,000 | Outdoor Use Type |
| Front of Filter Sampling Pump LCP-23 | Site Control Panel | set | 1 | 980,000 | 980,000 | 70,000 | 70,000 | Outdoor Use Type |
| Papid Filter Valves & Gate LCP-24 - 35 | Site Control Panel | sets | 12 | 840,000 | 10,080,000 | 60,000 | 720,000 | Outdoor Use Type |
| Papid Filter Drain Pump LCP-36/37 | Site Control Panel | sets | 2 | 660,000 | 1,320,000 | 50,000 | 100,000 | Indoor UseType |
| Wash Waste Pump LCP-38 | Site Control Panel | set | 1 | 840,000 | 840,000 | 60,000 | 60,000 | Indoor UseType |
| Front of Filter Sampling Pump LCP-39 | Site Control Panel | set | 1 | 980,000 | 980,000 | 70,000 | 70,000 | Outdoor Use Type |
| Alum Mixer LCP-40 | Site Control Panel | set | 1 | 660,000 | 660,000 | 50,000 | 50,000 | Indoor UseType |
| Alum Dosing Pump LCP-41/42 | Site Control Panel | sets | 2 | 660,000 | 1,320,000 | 50,000 | 100,000 | Indoor UseType |
| Lime Mixer LCP-43 | Site Control Panel | set | 1 | 660,000 | 660,000 | 50,000 | 50,000 | Indoor UseType |
| Lime Dosing Pump LCP-44/45 | Site Control Panel | sets | 2 | 660,000 | 1,320,000 | 50,000 | 100,000 | Indoor UseType |
| Chemical Building Drain Pump LCP-46/47 | Site Control Panel | sets | 2 | 660,000 | 1,320,000 | 50,000 | 100,000 | Indoor UseType |
| Chlorine Booster Pump LCP-48 | Site Control Panel | set | 1 | 840,000 | 840,000 | 60,000 | 60,000 | Indoor UseType |
| Exhaust Fan LCP-49 | Site Control Panel | set | 1 | 1,520,000 | 1,520,000 | 120,000 | 120,000 | Indoor UseType |
| Clear Water Pump Panel | Selfstanding Indoor Use Starter Panel | sets | 6 | 2,990,000 | 17,940,000 | 230,000 | 1,380,000 | 210kW |
| Surface Wash Pump Panel | Selfstanding Indoor Panel | sets | 3 | 2,170,000 | 6,510,000 | 170,000 | 510,000 | 90kW |

| | | | | | | | | |
|-------------------------------------|-----------------------------------|------|---|------------|-------------|---------|--------------------|-----------------------|
| Drain Pump Panel | Selfstanding Indoor Panel | sets | 2 | 1,280,000 | 2,560,000 | 100,000 | 200,000 | 2.2kW Starter |
| Instrumentation Pane | Selfstanding Indoor Panel | set | 1 | 1,270,000 | 1,270,000 | 100,000 | 100,000 | |
| Instrumentation Pane | Selfstanding Indoor Panel | set | 1 | 1,270,000 | 1,270,000 | 100,000 | 100,000 | |
| Instrumentation Pane | Selfstanding Indoor Panel | set | 1 | 1,270,000 | 1,270,000 | 100,000 | 100,000 | Clear Water P Station |
| Inflow Flow Meter | EMF 1200mm | set | 1 | 11,940,000 | 11,940,000 | 910,000 | 910,000 | |
| Alum Dosing Flow Meter | EMF 25mm | set | 1 | 1,480,000 | 1,480,000 | 110,000 | 110,000 | |
| Lime Dosing Flow Meter | EMF 25mm | set | 1 | 1,480,000 | 1,480,000 | 110,000 | 110,000 | |
| Pre-Chlorine Dosing Flow Meter | EMF 25mm | set | 1 | 1,480,000 | 1,480,000 | 110,000 | 110,000 | |
| Chlorine Dosing Flow Meter | EMF 25mm | set | 1 | 1,480,000 | 1,480,000 | 110,000 | 110,000 | |
| Wash Waste Return Flow Meter | EMF 350mm | set | 1 | 4,530,000 | 4,530,000 | 350,000 | 350,000 | |
| Sludge Discharge Tank Level | Pressure Level Meter | set | 1 | 760,000 | 760,000 | 60,000 | 60,000 | |
| Filter Drain Tank Level | Pressure Level Meter | set | 1 | 760,000 | 760,000 | 60,000 | 60,000 | |
| Transmission Flow Meter | EMF 1000mm | set | 1 | 11,200,000 | 11,200,000 | 860,000 | 860,000 | |
| Clear Water Reservoir Level | Pressure Level Meter | sets | 2 | 760,000 | 1,520,000 | 60,000 | 120,000 | |
| Clear Water Pump | Discharge Valve Opening Indicator | sets | 6 | 120,000 | 720,000 | 10,000 | 60,000 | |
| Surface Wash Pump | Discharge Valve Opening | sets | 3 | 120,000 | 360,000 | 10,000 | 30,000 | |
| PLC for Teremeter | Plogramable Logic Controller | set | 1 | 4,140,000 | 4,140,000 | 320,000 | 320,000 | |
| PLC for Rapid Filter Control Room | Plogramable Logic Controller | set | 1 | 5,980,000 | 5,980,000 | 460,000 | 460,000 | |
| PLC for Chemical Building | Plogramable Logic Controller | set | 1 | 4,140,000 | 4,140,000 | 320,000 | 320,000 | |
| PLC for Clear Water Pump Station | Plogramable Logic Controller | set | 1 | 4,140,000 | 4,140,000 | 320,000 | 320,000 | |
| PLC for Power Receiving & DGE | Plogramable Logic Controller | set | 1 | 4,140,000 | 4,140,000 | 320,000 | 320,000 | |
| Opereters Work Station-1 | Tower Type Workstation | set | 1 | 10,120,000 | 10,120,000 | 330,000 | 330,000 | W/T Wide Monitor |
| Opereters Work Station-2 | Tower Type Workstation | set | 1 | 10,120,000 | 10,120,000 | 330,000 | 330,000 | W/T Wide Monitor |
| Data Server-1 | 1 Terabite Dater Server | set | 1 | 13,430,000 | 13,430,000 | 300,000 | 300,000 | W/T Wide Monitor |
| Alalm Plinter | Laser Color Printer | set | 1 | 740,000 | 740,000 | 60,000 | 60,000 | |
| Document Plinter | Laser Color Printer | set | 1 | 740,000 | 740,000 | 60,000 | 60,000 | |
| UPS | 5kVA UPS | set | 1 | 3,000,000 | 3,000,000 | 60,000 | 60,000 | |
| Others, Cable, etc. | | LS | 1 | | | | 10,900,000 | |
| Installation of Electrical Material | | LS | 1 | | | | 34,300,000 | |
| | | | | | | | | |
| | | | | | | | | |
| sub-total | | | | | 474,690,000 | | 78,160,000 | |
| Miscellaneous | | | | | 118,672,500 | | 19,540,000 | 25% |
| Total cost | | | | | 593,362,500 | | 97,700,000 | |
| Total Cost (FC+LC) | | | | | | | 691,062,500 | |

Construction Cost of Impounding Reservoir (Civil/Mechanical/Electrical Work)

For Q=110,000 m³/c

| Items | Specification | Unit | Qty | FC Portion (Yen) | | LC Portion (Yen) | | Reference |
|-----------------------------------|---------------|------|-----|------------------|-------------|------------------|----------------------|-----------|
| | | | | Unit Price | Amount | Unit Price | Amount | |
| Impounding Reservoir (civil) | | Ls | 1 | | 372,834,924 | | 482,995,592 | |
| Impounding Reservoir (Mechanical) | | Ls | 1 | | 119,615,723 | | 27,642,913 | |
| Impounding Reservoir (Electrical) | | Ls | 1 | | 102,560,000 | | 84,337,500 | |
| | | | | | | | | |
| Total Cost | | | | | 595,010,647 | | 594,976,005 | |
| Total Cost (FC+LC) | | | | | | | 1,189,986,651 | |

Construction Cost of Impounding Reservoir Civil Works

| Items | Specification | Unit | Qty | FC Portion (Yen) | | LC Portion (Yen) | | Reference |
|--------------------------------|------------------------|----------------|---------|------------------|-------------|------------------|--------------------|-------------|
| | | | | Unit Price | Amount | Unit Price | Amount | |
| Sheet Pile Driving Work | Type4, L = 21m | m | 44,520 | 300 | 13,356,000 | 1,700 | 75,684,000 | 89,040,000 |
| Sheet Pile | Type4, L = 21m, Remain | t | 4,118 | 68,010 | 280,065,180 | 11,200 | 46,121,600 | 326,186,780 |
| Tie-rod Anchor | | t | 72 | 90,312 | 6,502,464 | 22,578 | 1,625,616 | 8,128,080 |
| Supprting Beam | | t | 76.0 | 72,000 | 5,472,000 | 8,000 | 608,000 | 6,080,000 |
| Supporting Works | | t | 76.0 | 2,100 | 159,600 | 11,900 | 904,400 | 1,064,000 |
| Excavation (Backhoe) | | m ³ | 452,200 | 35 | 15,827,000 | 195 | 88,179,000 | 104,006,000 |
| Excavation (Clam Shell) | | m ³ | 323,000 | 35 | 11,305,000 | 195 | 62,985,000 | 74,290,000 |
| Gravel | | m ³ | 32,300 | 485 | 15,665,500 | 2,748 | 88,760,400 | 104,425,900 |
| Surplus Soil Transport | | m ³ | 430,000 | 0 | 0 | 0 | 0 | 0 |
| Embankment | | m ³ | 45,200 | 80 | 3,616,000 | 452 | 20,430,400 | 24,046,400 |
| Reinforced Concrete | | m ³ | 1,102 | 2,638 | 2,907,076 | 14,950 | 16,474,900 | 19,381,976 |
| Rebar Fabrication and Assembly | | t | 42 | 90,312 | 3,793,104 | 22,578 | 948,276 | 4,741,380 |
| Land Improvement | | m ² | 35,400 | 300 | 10,620,000 | 1,700 | 60,180,000 | 70,800,000 |
| Fence | | m | 1,300 | 2,700 | 3,510,000 | 15,300 | 19,890,000 | 23,400,000 |
| Gate | | pcs | 1 | 36,000 | 36,000 | 204,000 | 204,000 | 240,000 |
| | | | | | | | | 0 |
| Total Cost | | | | | 372,834,924 | | 482,995,592 | 855,830,516 |
| Total Cost (FC+LC) | | | | | | | 855,830,516 | |

Construction Cost of Impounding Reservoir Mechanical Works

| Items | Specification | Unit | Qty | FC Portion (Yen) | | LC Portion (Yen) | | Reference |
|---|--|------|-----|------------------|-------------|------------------|--------------------|------------------|
| | | | | Unit Price | Amount | Unit Price | Amount | |
| Raw Water Pump | Submersible non-clog Submersible Sump | Nr | 6 | 4,058,304 | 24,349,824 | 980,000 | 5,880,000 | 19.1/mx18mx110kW |
| Drain Pump | 0.2m ³ /min x 20m x 5.5kW | Nr | 2 | 314,298 | 628,596 | 46,170 | 92,340 | |
| Check Valve | Swing D-450 | Nr | 6 | 1,439,154 | 8,634,924 | 211,410 | 1,268,460 | |
| Discharge Valve | Manual Butterfly D-450 | Nr | 6 | 1,108,314 | 6,649,884 | 162,810 | 976,860 | |
| Discharge Valve | Motorized Butterfly D-450 x 0.2kw | Nr | 6 | 1,731,396 | 10,388,376 | 254,340 | 1,526,040 | |
| Flow Control Valve | Manual Butterfly D-1000 | Nr | 1 | 3,744,006 | 3,744,006 | 688,880 | 688,880 | |
| Isolation Valve | Manual Butterfly D-1000 | Nr | 3 | 3,744,006 | 11,232,018 | 580,000 | 1,740,000 | |
| Overhead Crane | Electrically Crane 3.0t | Nr | 1 | 964,950 | 964,950 | 141,750 | 141,750 | |
| All Pipework,, steel work, fitting, etc | | Item | 1 | 8,900,000 | 8,900,000 | 9,800,000 | 9,800,000 | |
| Import Cost | | Item | 1 | 20,200,000 | 20,200,000 | 0 | 0 | |
| | | | | | | | | |
| | | | | | | | | |
| sub-total | | | | | 95,692,578 | | 22,114,330 | |
| Miscellaneous | | | | | 23,923,145 | | 5,528,583 | 25% |
| Total Cost | | | | | 119,615,723 | | 27,642,913 | |
| Total Cost (FC+LC) | | | | | | | 147,258,635 | |

Construction Cost of Impounding Reservoir Electrical Works

| Items | Specification | Unit | Qty | FC Portion (Yen) | | LC Portion (Yen) | | Reference |
|-------------------------------------|-----------------------------|------|-----|------------------|-------------|------------------|--------------------|-----------------------|
| | | | | Unit Price | Amount | Unit Price | Amount | |
| MV Incoming Switchgear | 11 k V VCB Incoming Panel | set | 1 | 5,870,000 | 5,870,000 | 450,000 | 450,000 | |
| MV Fedder Switchgear | 11 k V VCB Feeder Panel | set | 1 | 6,560,000 | 6,560,000 | 500,000 | 500,000 | |
| Transformer Panel-1/2 | 500kVA 3phase Dry Type | sets | 2 | 3,570,000 | 7,140,000 | 450,000 | 900,000 | |
| LV Incoming Panel-1 | 1200A Busbar MCCB Panel | set | 1 | 1,668,000 | 1,668,000 | 210,000 | 210,000 | MCCB800A |
| LV Bus-tie Panel | 1200A Busbar MCCB Panel | set | 1 | 1,692,000 | 1,692,000 | 220,000 | 220,000 | MCCB1200A |
| LV Incoming Panel-2 | 1200A Busbar MCCB Panel | set | 1 | 2,382,000 | 2,382,000 | 300,000 | 300,000 | MCCB800A&1200A |
| LV Feeder Panel-1 | 1200A Busbar MCCB Panel | set | 1 | 2,112,000 | 2,112,000 | 270,000 | 270,000 | 200A*3, 100A*3 |
| LV Feeder Panel-2 | 1200A Busbar MCCB Panel | set | 1 | 2,178,000 | 2,178,000 | 280,000 | 280,000 | |
| Static Capacitors Panel-1/2 | 7.5kVA+SR0.45kVar | sets | 2 | 1,440,000 | 2,880,000 | 180,000 | 360,000 | |
| Generator System | 700kVA Package | set | 1 | 25,806,000 | 25,806,000 | 2,500,000 | 2,500,000 | Inclu. Starting Panel |
| Raw Water Pump Panel | Selfstanding Indoor Starter | sets | 6 | 1,536,000 | 9,216,000 | 200,000 | 1,200,000 | 110kW Starter |
| Drain Pump Panel | Selfstanding Indoor Starter | set | 1 | 774,000 | 774,000 | 100,000 | 100,000 | 5.5kW Starter |
| Control Relay Panel | Selfstanding Indoor Starter | set | 1 | 3,870,000 | 3,870,000 | 490,000 | 490,000 | |
| Instrumentation Panel | Selfstanding Indoor Starter | set | 1 | 762,000 | 762,000 | 100,000 | 100,000 | |
| Intake Flow Meter | EMF 1000mm | set | 1 | 6,720,000 | 6,720,000 | 860,000 | 860,000 | |
| Reservoir Water Level | Submersible Level Meter | set | 1 | 648,000 | 648,000 | 80,000 | 80,000 | |
| Discharge Valve Opening Indicator | Indicator | sets | 6 | 72,000 | 432,000 | 10,000 | 60,000 | |
| Telemetry Monitoring System | Raidio Telemeter | set | 1 | 1,242,000 | 1,242,000 | 160,000 | 160,000 | (Send and Receive) |
| UPS | 1kVA UPS | set | 1 | 96,000 | 96,000 | 10,000 | 10,000 | |
| Others, Cable, etc. | | LS | 1 | | | | 9,920,000 | |
| Installation of Electrical Material | | LS | 1 | | | | 48,500,000 | |
| sub-total | | | | | 82,048,000 | | 67,470,000 | |
| Miscellaneous | | | | | 20,512,000 | | 16,867,500 | 25% |
| Total Cost | | | | | 102,560,000 | | 84,337,500 | |
| Total Cost (FC+LC) | | | | | | | 186,897,500 | |

Construction Cost of Diversion of Irrigation Canal

| Items | Specification | Unit | Qty | FC Portion (Yen) | | LC Portion (Yen) | | Reference |
|---------------------------|---------------|----------------|--------|------------------|--------|------------------|-------------------|-----------|
| | | | | Unit Price | Amount | Unit Price | Amount | |
| Excavation | | m ³ | 63,500 | 0 | 0 | 195 | 12,382,500 | |
| Surplus Soil Transport | | m ³ | 14,500 | 0 | 0 | 0 | 0 | |
| Embankment | | m ³ | 49,000 | 0 | 0 | 452 | 22,148,000 | |
| Gravel | | m ³ | 3,800 | 0 | 0 | 2,748 | 10,442,400 | |
| Plain Concrete | | m ³ | 3,800 | 0 | 0 | 8,924 | 33,911,200 | |
| Land Improvement | | m ² | 5,500 | 0 | 0 | 1,700 | 9,350,000 | |
| Fence | | m | 220 | 0 | 0 | 15,300 | 3,366,000 | |
| Gate | | pcs | 2 | 0 | 0 | 204,000 | 408,000 | |
| Total Cost | | | | | 0 | | 92,008,100 | |
| Total Cost (FC+LC) | | | | | | | 92,008,100 | |

Breakdown of O&M Training Cost

(Yen/year)

| Item | unit | Qty | Unit Price (Yen) | FC Portion (Yen) | LC Portion (Yen) | Reference |
|-----------------------------|------|-----|---------------------|---------------------|---------------------|------------------------|
| A) Person Cost | | | | | | |
| (1) Water Supply Expert | M/M | 8 | 2,500,000 | 20,000,000 | 0 | |
| (2) Mechanical Expert | M/M | 3 | 2,500,000 | 7,500,000 | 0 | |
| (3) Electrical Expert | M/M | 3 | 2,500,000 | 7,500,000 | 0 | |
| (4) Water Quality Expert | M/M | 2 | 2,500,000 | 5,000,000 | 0 | |
| (5) Accommodation/ Per Diem | M/M | 16 | 400,000 | 6,400,000 | 0 | |
| (6) Others | % | 5 | | 2,320,000 | 0 | Air Fare, Vehicle etc. |
| Total | | | | 48,720,000 | 0 | |
| | | | | | | |
| Round UP | | | | 50,000,000 | 0 | for one year |