



**BANGLADESH ECONOMIC ZONES AUTHORITY (BEZA)  
NATIONAL SPECIAL ECONOMIC ZONE DEVELOPMENT PROJECT  
CHIEF ADVISER'S OFFICE**

---

**Environmental and Social Impact Assessment (ESIA)  
for the Gas Pipeline Network in Zone 2A-2B and its adjacent Area  
of the National Special Economic Zone (NSEZ)**

---

**Volume 2: Data Book**



*Prepared by:*



**BCL Associates Limited**  
Consulting Engineers & Planners

DECEMBER, 2024

## **Table of Contents**

|                                                                                            |      |
|--------------------------------------------------------------------------------------------|------|
| Annex 1: Cross-Section Designs and Standard Details of Proposed Gas Pipeline Network ..... | 2    |
| Annex 2: Gas Pipelines Route Topo Survey Data and Soil Investigation Results .....         | 10   |
| Annex 3: Baseline Details.....                                                             | 32   |
| Annex 4: Road Traffic Count Sheet.....                                                     | 106  |
| Annex 5: KII, FGD and Stakeholder’s Engagement.....                                        | 1067 |
| Annex 6: Occupational Health And Safety Plan (OHSP).....                                   | 128  |
| Annex 7: Waste Management Plan (WMP).....                                                  | 134  |
| Annex 8: Drainage Management Plan (DMP).....                                               | 136  |
| Annex 9: Spill Management Plan (SMP).....                                                  | 140  |
| Annex 10: Emergency Response And Disaster Management Plan.....                             | 141  |
| Annex 11: Traffic Management Plan (TMP).....                                               | 147  |
| Annex 12: Air Modelling.....                                                               | 149  |
| Annex 13: Tree Plantation For Greenery Plan.....                                           | 160  |
| Annex 14: Grievance Redress Mechanism .....                                                | 164  |
| Annex 15: Environmental and Social Code of Practices (ESCoPS).....                         | 170  |

ANNEX 1: CROSS-SECTION DESIGNS AND STANDARD DETAILS OF PROPOSED GAS PIPELINE NETWORK

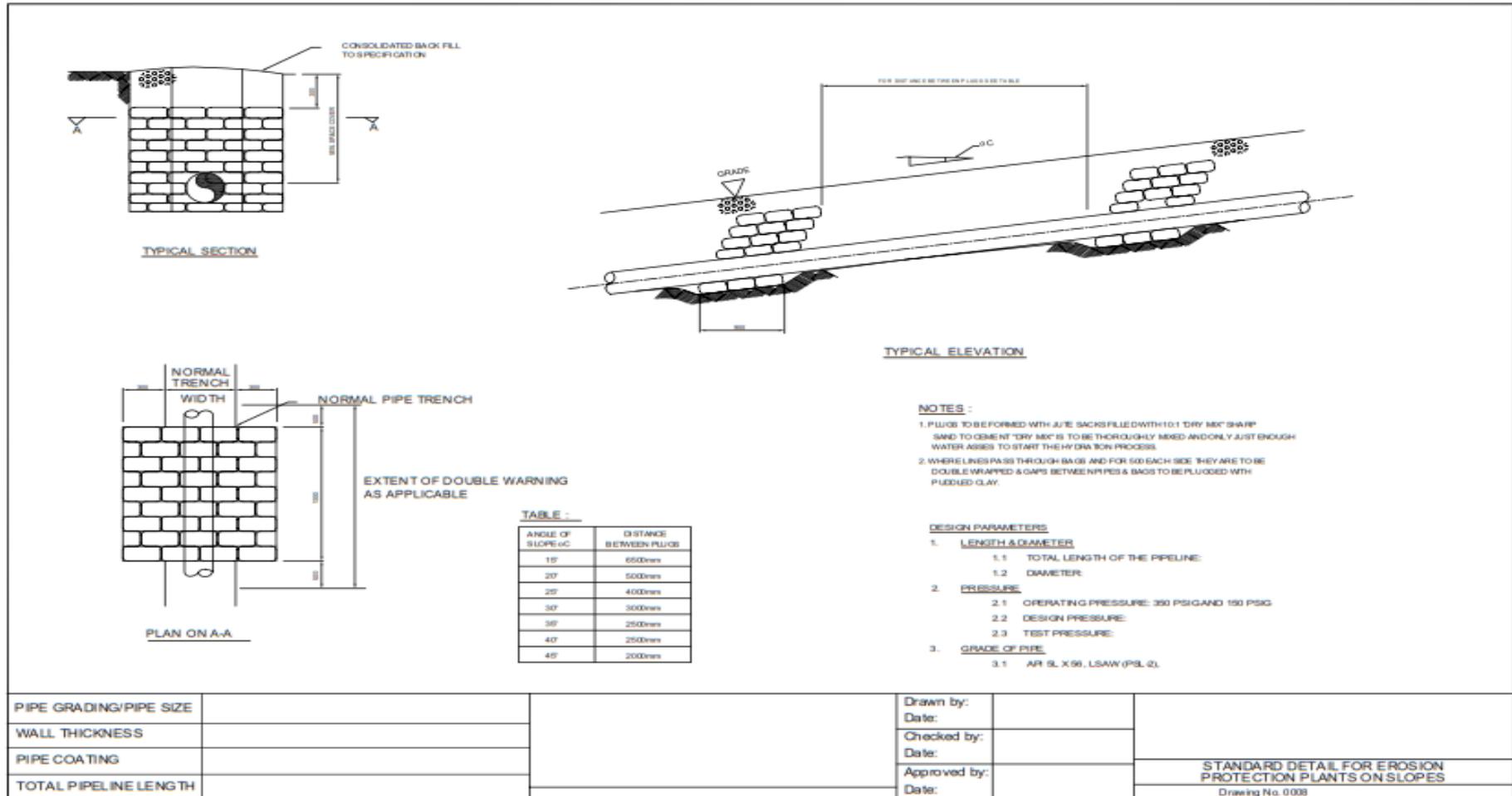


Figure 1: Standard detail for erosion protection plan on slopes

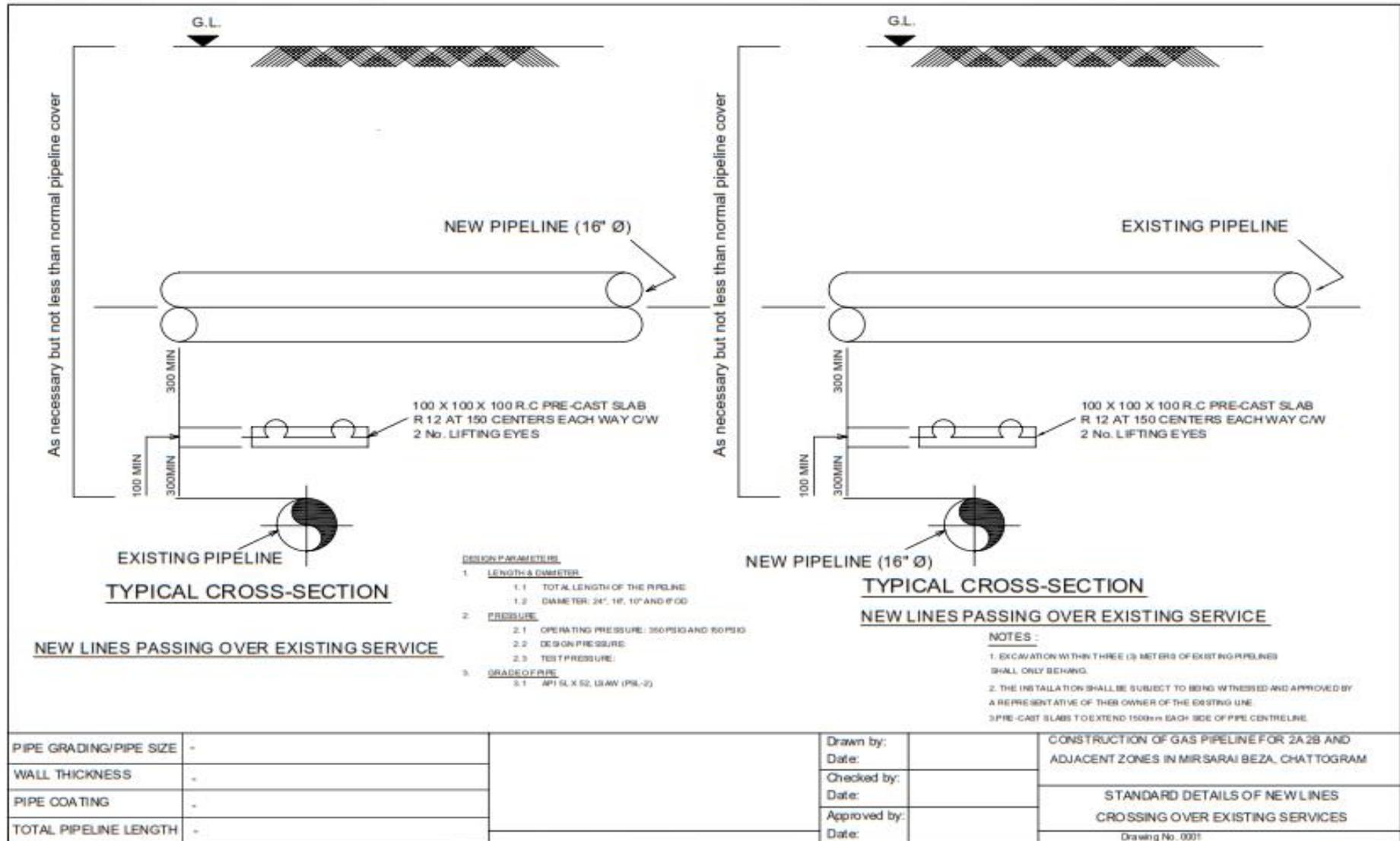


Figure 2: Typical cross-section of new lines passing over existing service

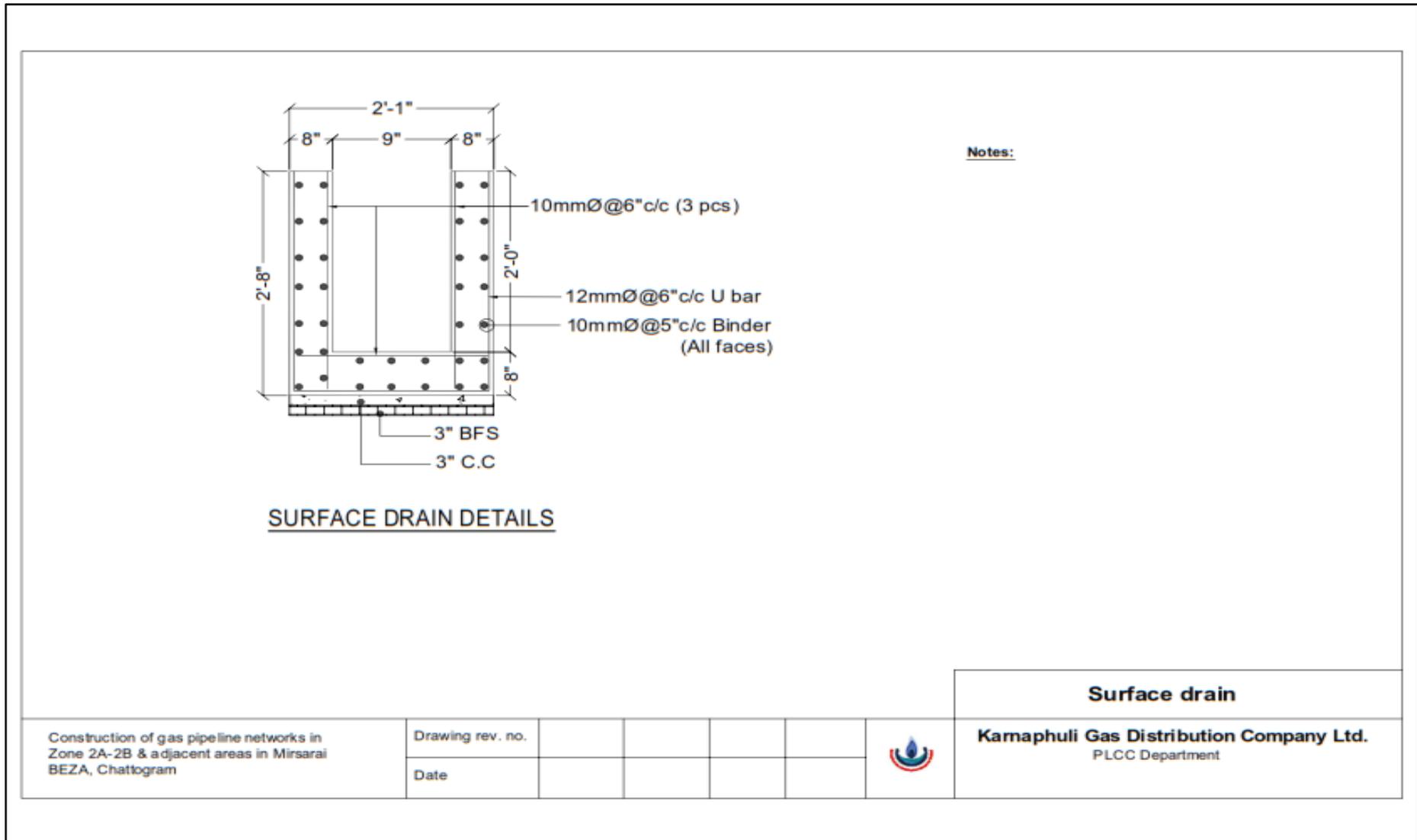


Figure 3: Standard detail surface drains design

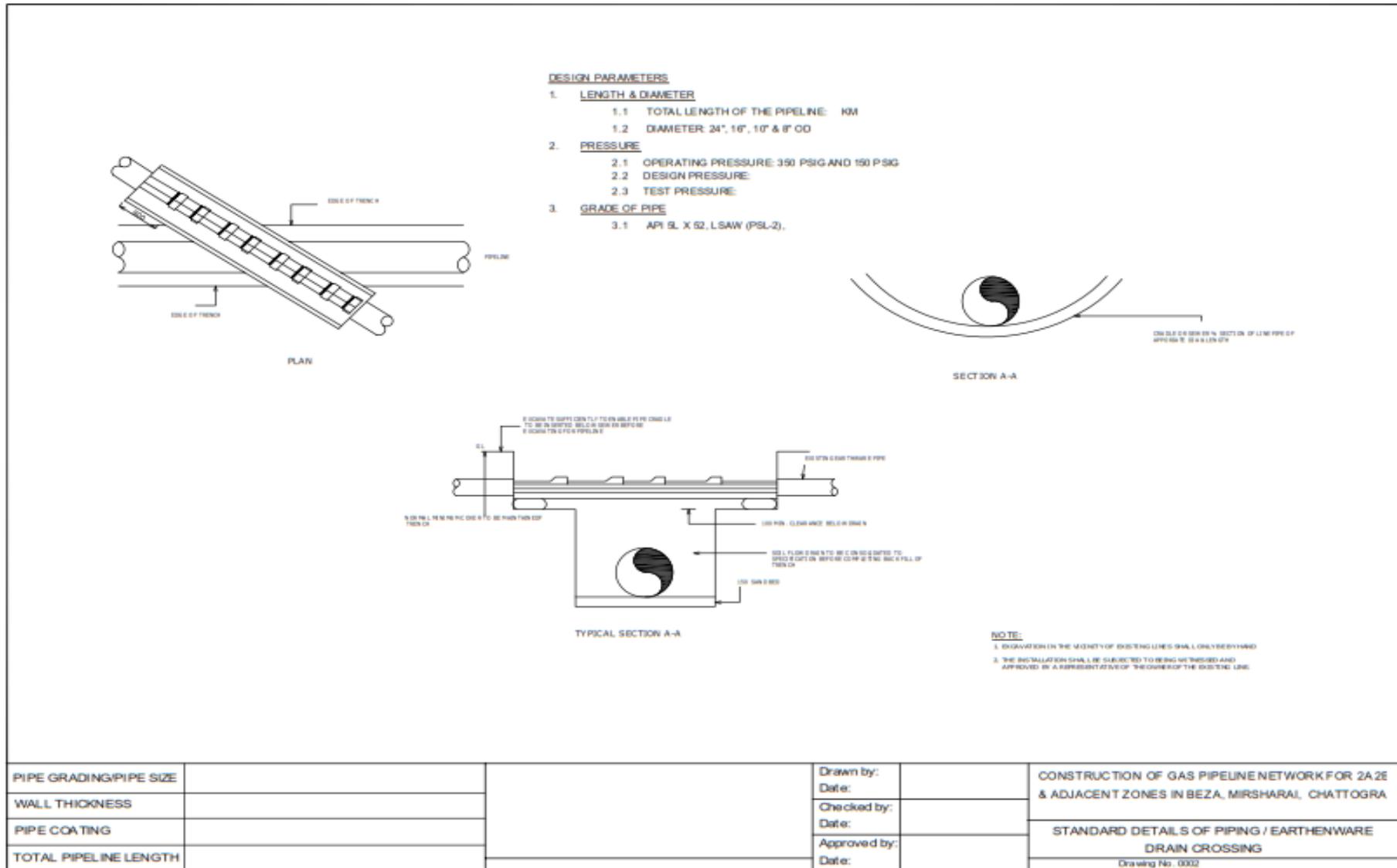


Figure 4: Standard detail of drains crossing

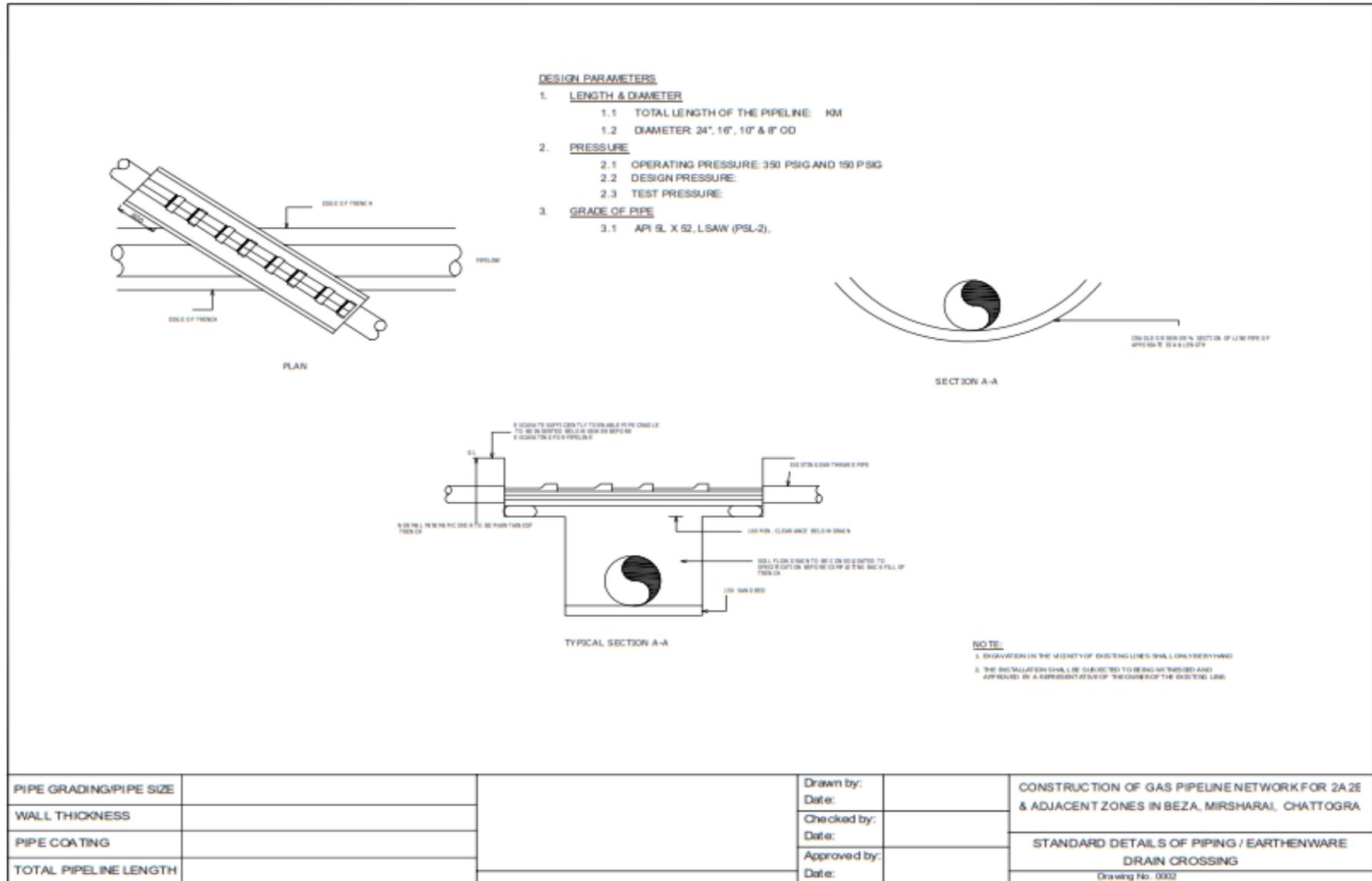


Figure 5: Control building

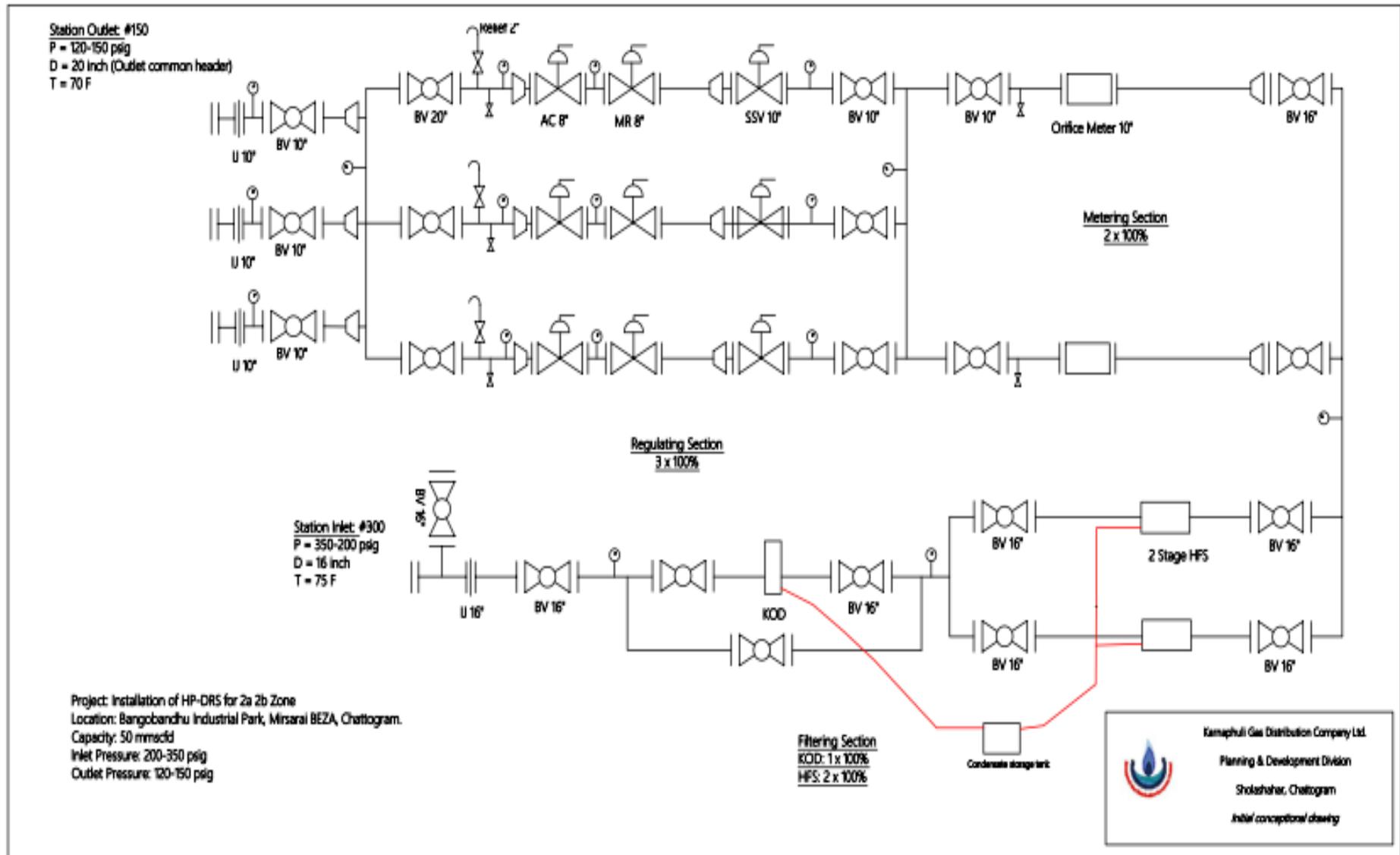


Figure 6: Standard of design of HP-DRS for 2A and 2B zones

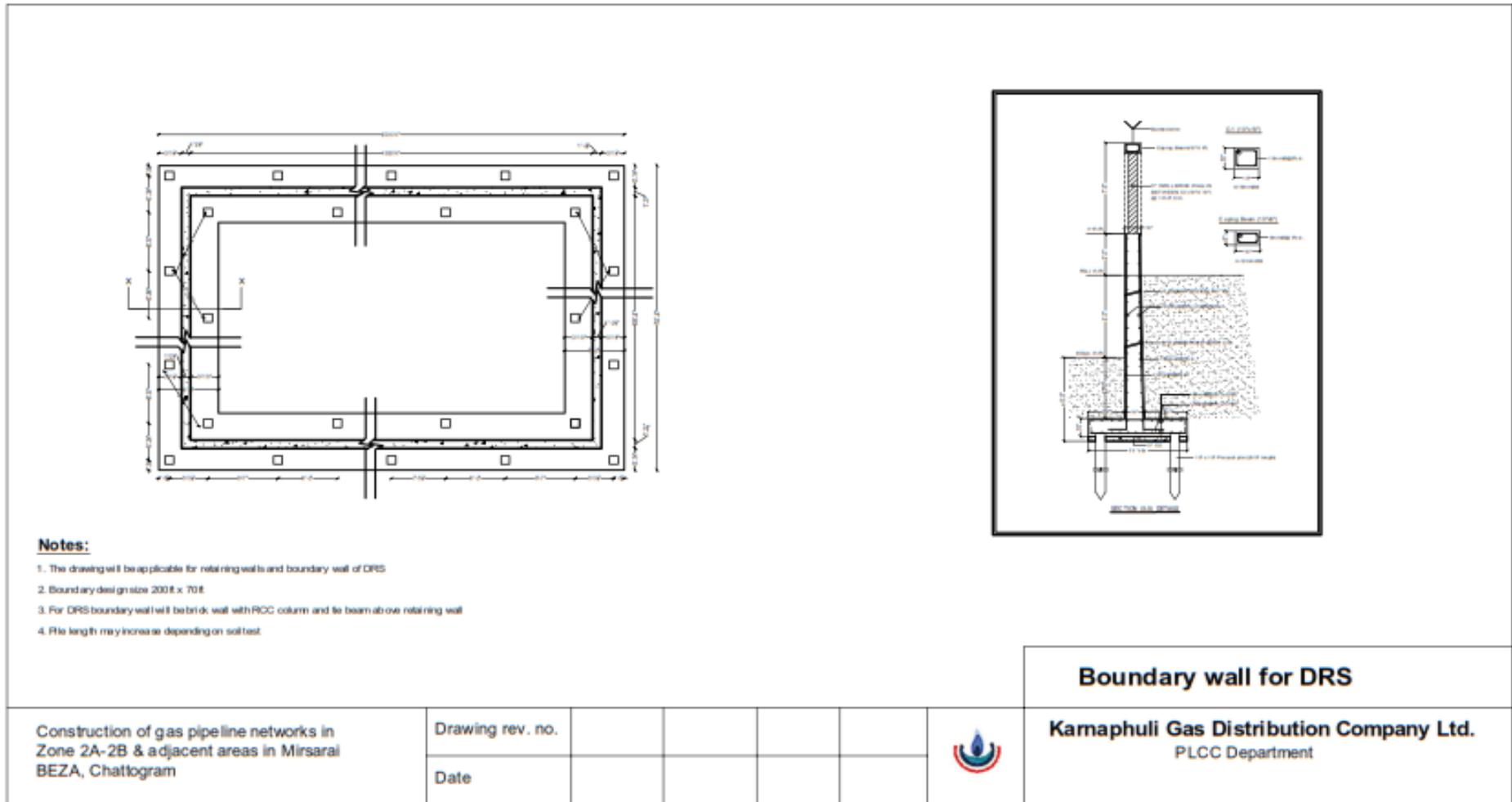


Figure 7: Standard design of boundary wall for drs

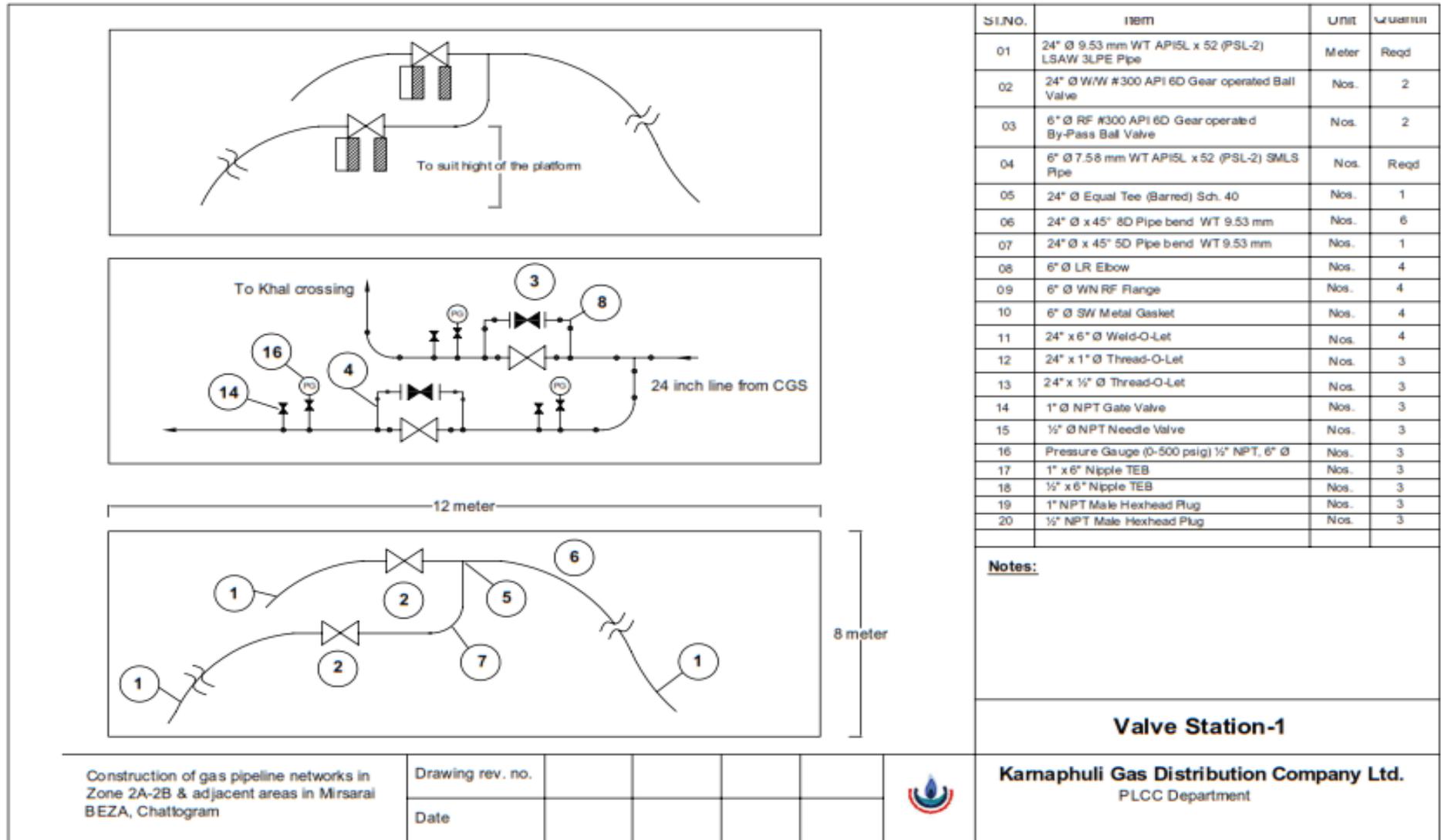


Figure 8: Standard design of valve station-1

**ANNEX 2: GAS PIPELINES ROUTE TOPO SURVEY DATA AND SOIL INVESTIGATION RESULTS**

| Table 1: Different types of features at close proximate of the proposed gas pipelines |                  |                      |        |                      |    |                             |    |               |    |                              |    |       |        |          |    |                 |
|---------------------------------------------------------------------------------------|------------------|----------------------|--------|----------------------|----|-----------------------------|----|---------------|----|------------------------------|----|-------|--------|----------|----|-----------------|
| Sl. No.                                                                               | Chain age No.(m) | No. of EP (Distance) |        | No. of LP (Distance) |    | No. of Structure (Distance) |    |               |    | No. of Water Body (Distance) |    |       |        |          |    |                 |
|                                                                                       |                  | LS                   | RS     | LS                   | RS | Building                    |    | Boundary wall |    | Ditch                        |    | Canal |        | Low Land |    | Water Pipe Line |
|                                                                                       |                  |                      |        |                      |    | LS                          | RS | LS            | RS | LS                           | RS | LS    | RS     | LS       | RS | LS              |
| 1200m Road Length                                                                     |                  |                      |        |                      |    |                             |    |               |    |                              |    |       |        |          |    |                 |
| 1                                                                                     | 0.0 to 500       | 2                    | 2      | 2                    |    |                             |    |               |    |                              |    |       |        |          |    |                 |
|                                                                                       |                  | (13m)                | (50 m) | (13.5m)              |    |                             |    |               |    |                              |    |       |        |          |    |                 |
|                                                                                       |                  | 16                   |        | 14                   |    |                             |    |               |    |                              |    |       |        |          |    |                 |
|                                                                                       |                  | (35m)                |        | (23 m)               |    |                             |    |               |    |                              |    |       |        |          |    |                 |
| 2                                                                                     | 500 to 1000      | 15                   |        | 17                   |    |                             |    | 1 Std.        |    |                              |    |       |        |          |    |                 |
|                                                                                       |                  | (38m)                |        | (30 m)               |    |                             |    | (40m)         |    |                              |    |       |        |          |    |                 |
| 3                                                                                     | 1000 to 1200     | 1                    |        | 1                    |    |                             |    |               |    |                              |    |       |        |          |    |                 |
|                                                                                       |                  | (40m)                |        | (40 m)               |    |                             |    |               |    |                              |    |       |        |          |    |                 |
|                                                                                       |                  | 4                    |        | 4                    |    |                             |    |               |    |                              |    |       |        |          |    |                 |
|                                                                                       |                  | (55m)                |        | (50 m)               |    |                             |    |               |    |                              |    |       |        |          |    |                 |
| 2650m Road Length                                                                     |                  |                      |        |                      |    |                             |    |               |    |                              |    |       |        |          |    |                 |
| 1                                                                                     | 0.0 to 500       |                      |        |                      |    |                             |    |               |    |                              |    |       |        |          |    |                 |
| 2                                                                                     | 500 to 1000      |                      |        |                      |    |                             |    |               |    |                              |    |       |        |          |    |                 |
| 3                                                                                     | 1000 to 1500     |                      |        |                      |    |                             |    |               |    |                              |    |       | 1 (0m) |          |    |                 |
| 4                                                                                     | 1500 to 2000     | 4                    |        |                      |    |                             |    |               |    |                              |    |       |        |          |    |                 |
|                                                                                       |                  | (9m)                 |        |                      |    |                             |    |               |    |                              |    |       |        |          |    |                 |
|                                                                                       |                  | 6                    |        |                      |    |                             |    |               |    |                              |    |       |        |          |    |                 |
|                                                                                       |                  | (12m)                |        |                      |    |                             |    |               |    |                              |    |       |        |          |    |                 |



**ESIA Data Book to Gas Pipeline Network in Zone 2A-2B and its Adjacent area, NSEZ.  
Annex 2: Gas Pipelines Route Topo Survey Data and Soil investigation Results**

|                  |              |         |          |   |         |               |                   |  |           |  |  |  |  |  |  |  |  |               |                |
|------------------|--------------|---------|----------|---|---------|---------------|-------------------|--|-----------|--|--|--|--|--|--|--|--|---------------|----------------|
| 1                | 0.0 to 500   |         |          |   |         |               |                   |  |           |  |  |  |  |  |  |  |  |               |                |
| 2                | 500 to 1000  | 4 (6m)  |          |   |         | 1 Tin<br>(0m) |                   |  | 1<br>(2m) |  |  |  |  |  |  |  |  |               |                |
|                  |              | 1 (21m) |          |   |         |               |                   |  |           |  |  |  |  |  |  |  |  | 1 (880-1440)m |                |
| 3                | 1000 to 1500 | 6 (6m)  |          |   |         |               | NDE Ltd.<br>(23m) |  |           |  |  |  |  |  |  |  |  |               | 1 (1470-2965)m |
|                  |              |         |          |   |         |               |                   |  |           |  |  |  |  |  |  |  |  |               |                |
| 4                | 1500 to 2000 | 3 (6m)  | 10 (5m)  |   |         | 1 Tin<br>(0m) | 1WP<br>(5m)       |  |           |  |  |  |  |  |  |  |  |               |                |
|                  |              |         |          |   |         |               |                   |  |           |  |  |  |  |  |  |  |  |               |                |
| 5                | 2000 to 2500 | 9 (3m)  | 1 (<1 m) |   |         |               | 1 T<br>(25m)      |  |           |  |  |  |  |  |  |  |  |               |                |
| 6                | 2500 to 2965 | 12 (1m) | 1 (7m)   |   |         | 1 (7m)        |                   |  |           |  |  |  |  |  |  |  |  |               |                |
|                  |              | 0       | 1 (35 m) | 0 | 1 (32m) |               |                   |  |           |  |  |  |  |  |  |  |  |               |                |
|                  |              |         |          |   |         |               |                   |  |           |  |  |  |  |  |  |  |  |               |                |
| 625m Road Length |              |         |          |   |         |               |                   |  |           |  |  |  |  |  |  |  |  |               |                |
| 1                | 0.0 to 625   |         |          |   |         |               |                   |  |           |  |  |  |  |  |  |  |  |               |                |
| 1                | 0.0 to 500   | 2 (0m)  | 1 (8m)   |   |         |               |                   |  |           |  |  |  |  |  |  |  |  |               |                |
|                  |              | 1 (33m) | 2 (14 m) |   |         |               |                   |  |           |  |  |  |  |  |  |  |  |               | 1 (25-1345) m  |
|                  |              |         |          |   |         |               |                   |  |           |  |  |  |  |  |  |  |  |               |                |

**ESIA Data Book to Gas Pipeline Network in Zone 2A-2B and its Adjacent area, NSEZ.**  
**Annex 2: Gas Pipelines Route Topo Survey Data and Soil investigation Results**

|                      |                           |            |                 |  |  |                |  |             |            |   |                 |  |  |  |  |  |  |
|----------------------|---------------------------|------------|-----------------|--|--|----------------|--|-------------|------------|---|-----------------|--|--|--|--|--|--|
|                      |                           |            | 3<br>(19<br>m)  |  |  |                |  |             |            |   |                 |  |  |  |  |  |  |
|                      |                           |            | 13<br>(22<br>m) |  |  |                |  |             |            |   |                 |  |  |  |  |  |  |
| 2                    | 500 to<br>1000            | 5 (1m)     | 17<br>(20<br>m) |  |  |                |  |             |            |   |                 |  |  |  |  |  |  |
| 3                    | 1000<br>to<br>1345        | <1 (m)     | 12<br>(18<br>m) |  |  | 1 Tin<br>(14m) |  | 2 (50m)     |            |   |                 |  |  |  |  |  |  |
|                      |                           | 1<br>(42m) | 1<br>(13<br>m)  |  |  |                |  |             |            |   |                 |  |  |  |  |  |  |
| 530m Road Length     |                           |            |                 |  |  |                |  |             |            |   |                 |  |  |  |  |  |  |
| 1                    | 0.0 to<br>530             |            |                 |  |  | 1 Tin<br>(14m) |  |             | 1<br>(29m) | 0 | 1 Drain<br>(0m) |  |  |  |  |  |  |
| 1049m Road Length    |                           |            |                 |  |  |                |  |             |            |   |                 |  |  |  |  |  |  |
| 1                    | 0.0 to<br>776             |            |                 |  |  |                |  |             |            |   |                 |  |  |  |  |  |  |
| 1490.36m Road Length |                           |            |                 |  |  |                |  |             |            |   |                 |  |  |  |  |  |  |
| 1                    | 0.0 to<br>500             |            |                 |  |  |                |  | 1WP<br>(7m) |            |   |                 |  |  |  |  |  |  |
| 2                    | 500 to<br>1049            | 1<br>(14m) |                 |  |  |                |  |             |            |   |                 |  |  |  |  |  |  |
| 1490.36m Road Length |                           |            |                 |  |  |                |  |             |            |   |                 |  |  |  |  |  |  |
| 1                    | 0.0 to<br>500             |            |                 |  |  |                |  |             |            |   |                 |  |  |  |  |  |  |
| 2                    | 500 to<br>1000            |            |                 |  |  |                |  | 1WP<br>(0m) |            |   |                 |  |  |  |  |  |  |
| 3                    | 1000<br>to<br>1490.3<br>6 | 10<br>(0m) | 2<br>(40<br>m)  |  |  |                |  | 1WP<br>(m)  |            |   |                 |  |  |  |  |  |  |
|                      |                           | 4 (3m)     | 1<br>(30<br>m)  |  |  |                |  |             |            |   |                 |  |  |  |  |  |  |

**ESIA Data Book to Gas Pipeline Network in Zone 2A-2B and its Adjacent area, NSEZ.**  
**Annex 2: Gas Pipelines Route Topo Survey Data and Soil investigation Results**

|                   |                 |             |                |                |            |  |             |  |  |  |  |  |  |  |  |  |  |  |
|-------------------|-----------------|-------------|----------------|----------------|------------|--|-------------|--|--|--|--|--|--|--|--|--|--|--|
|                   |                 | 1<br>(32m)  | 1<br>(42<br>m) |                |            |  |             |  |  |  |  |  |  |  |  |  |  |  |
| 1                 | 0.0 to<br>385   |             |                |                |            |  |             |  |  |  |  |  |  |  |  |  |  |  |
| 1925m Road Length |                 |             |                |                |            |  |             |  |  |  |  |  |  |  |  |  |  |  |
| 1                 | 0.0 to<br>500   |             |                |                |            |  |             |  |  |  |  |  |  |  |  |  |  |  |
| 2                 | 500 to<br>1000  |             |                |                |            |  | 1WP<br>(0m) |  |  |  |  |  |  |  |  |  |  |  |
| 3                 | 1000 to<br>1500 |             |                |                |            |  |             |  |  |  |  |  |  |  |  |  |  |  |
| 4                 | 1500 to<br>1925 | 1<br>(6m)   | 1<br>(7m)      |                |            |  |             |  |  |  |  |  |  |  |  |  |  |  |
|                   |                 | 1<br>(39m)  | 3<br>(53<br>m) |                |            |  |             |  |  |  |  |  |  |  |  |  |  |  |
| 935m Road Length  |                 |             |                |                |            |  |             |  |  |  |  |  |  |  |  |  |  |  |
| 1                 | 0.0 to<br>500   | 1<br>(15m)  |                |                |            |  |             |  |  |  |  |  |  |  |  |  |  |  |
|                   |                 | 3<br>(21m)  |                |                |            |  |             |  |  |  |  |  |  |  |  |  |  |  |
|                   |                 | 13<br>(22m) |                |                |            |  |             |  |  |  |  |  |  |  |  |  |  |  |
|                   |                 | 6<br>(25m)  |                |                |            |  |             |  |  |  |  |  |  |  |  |  |  |  |
|                   |                 | 20<br>(27m) |                |                |            |  |             |  |  |  |  |  |  |  |  |  |  |  |
|                   |                 |             |                |                |            |  |             |  |  |  |  |  |  |  |  |  |  |  |
| 2                 | 500 to<br>935   | 1<br>(10m)  | 1<br>(30<br>m) | 1<br>(15<br>m) | 1<br>(15m) |  |             |  |  |  |  |  |  |  |  |  |  |  |
|                   |                 | 15<br>(25m) | 1<br>(40<br>m) | 1<br>(45<br>m) | 1<br>(40m) |  |             |  |  |  |  |  |  |  |  |  |  |  |
|                   |                 |             |                |                |            |  |             |  |  |  |  |  |  |  |  |  |  |  |

**ESIA Data Book to Gas Pipeline Network in Zone 2A-2B and its Adjacent area, NSEZ.  
Annex 2: Gas Pipelines Route Topo Survey Data and Soil investigation Results**

|                    |              |                |              |             |   |              |  |                   |  |  |  |  |                 |                         |  |  |                 |
|--------------------|--------------|----------------|--------------|-------------|---|--------------|--|-------------------|--|--|--|--|-----------------|-------------------------|--|--|-----------------|
|                    |              | 14<br>(30m)    | 0            | 0           | 0 |              |  |                   |  |  |  |  |                 |                         |  |  |                 |
| 12742m Road Length |              |                |              |             |   |              |  |                   |  |  |  |  |                 |                         |  |  |                 |
| 1                  | 0.0 to 500   | 1<br>(31m)     | 18<br>(7m)   |             |   | 1WP<br>(31m) |  | 1<br>(0.7m)       |  |  |  |  |                 |                         |  |  | 1 (137 to 1070) |
|                    |              | 0              | 2<br>(9m)    |             |   |              |  |                   |  |  |  |  |                 |                         |  |  |                 |
|                    |              | 0              | 6<br>(19 m)  |             |   |              |  |                   |  |  |  |  |                 |                         |  |  |                 |
|                    |              | 0              | 1<br>(39 m)  |             |   |              |  |                   |  |  |  |  |                 |                         |  |  |                 |
| 2                  | 500 to 1000  | 1<br>(8m)      | 18<br>(7m)   |             |   | 1WP<br>(41m) |  |                   |  |  |  |  |                 |                         |  |  |                 |
|                    |              | 1<br>(13m)     | 5<br>(19 m)  |             |   |              |  |                   |  |  |  |  |                 |                         |  |  |                 |
|                    |              | 1<br>(31m)     |              |             |   |              |  |                   |  |  |  |  |                 |                         |  |  |                 |
| 3                  | 1000 to 1500 | 13<br>(15m)    | 12<br>(4m)   | 8<br>(10 m) |   |              |  |                   |  |  |  |  | 1 Ditch<br>(3m) |                         |  |  |                 |
|                    |              | 9<br>(0m)      | 10<br>(8m)   | 0           |   |              |  |                   |  |  |  |  | 1 Ditch<br>(5m) | 1 (Susham Canal<br>(0m) |  |  |                 |
| 4                  | 1500 to 2000 | 12<br>(16.5m ) | 17<br>(5m)   | 17<br>(8m)  |   |              |  |                   |  |  |  |  |                 |                         |  |  | 1(1850 - 2640)  |
|                    |              |                | 15<br>(22 m) | 1<br>(17 m) |   |              |  |                   |  |  |  |  |                 |                         |  |  |                 |
| 5                  |              |                | 9            |             |   | 1WP          |  | 1 (CBL)<br>(1.5m) |  |  |  |  |                 |                         |  |  |                 |

**ESIA Data Book to Gas Pipeline Network in Zone 2A-2B and its Adjacent area, NSEZ.  
Annex 2: Gas Pipelines Route Topo Survey Data and Soil investigation Results**

|    |                |         |           |           |  |                 |            |                     |  |                     |                 |                     |                 |  |                   |  |            |
|----|----------------|---------|-----------|-----------|--|-----------------|------------|---------------------|--|---------------------|-----------------|---------------------|-----------------|--|-------------------|--|------------|
|    | 7650 to 8000   |         | (32 m)    |           |  | (36m)           | 7800-9340) |                     |  |                     | 1 [Bridge (0m)] |                     |                 |  | 1(WPL)(7920-8540) |  |            |
| 6  | 8000 to 8500   |         | 11 (35 m) |           |  | 0               |            |                     |  |                     |                 |                     |                 |  | 1(WPL)(8540-8770) |  |            |
| 7  | 8500 to 9000   |         | 11 (35 m) |           |  | 1WP             |            | 1 (BCI) (29m)       |  |                     |                 |                     |                 |  |                   |  |            |
|    |                |         |           |           |  | (45m)           |            |                     |  |                     |                 |                     |                 |  |                   |  | 8770-8950) |
|    |                |         | 0         |           |  | 1 GVS           |            |                     |  |                     |                 |                     |                 |  |                   |  |            |
|    |                |         |           |           |  | (45m)           |            |                     |  |                     |                 |                     |                 |  |                   |  |            |
|    | 0              |         |           | 1 (2 Std. |  |                 |            |                     |  |                     |                 |                     |                 |  |                   |  |            |
|    |                |         |           | (60m)     |  |                 |            |                     |  |                     |                 |                     |                 |  |                   |  |            |
| 8  | 9000 to 9500   |         | 8 (25 m)  |           |  | 1 Mosq.(4 0m)   |            | 1(0.7m)(89 65-9340) |  | 1(0.7m)(90 40-9295) |                 | 1 (0m) (8970-9700)  |                 |  |                   |  |            |
|    |                |         | 2 (35 m)  |           |  | 1 (8 Std. (48m) |            |                     |  |                     |                 |                     |                 |  |                   |  |            |
| 9  | 9500 to 10000  |         | 6 (34 m)  |           |  | 1 (2 Std.       |            |                     |  |                     |                 | 1 (0m)(97 00-9760)  |                 |  |                   |  |            |
|    |                |         |           |           |  | (43m)           |            |                     |  |                     |                 |                     |                 |  |                   |  |            |
| 10 | 10000 to 12400 | 2 (20m) |           |           |  | 1 SP (65m)      |            |                     |  |                     |                 | 1 (2m)(97 60-12400) | <1 m<br>Culvert |  |                   |  |            |
| 11 | 12400 to 12744 | 1 (9m)  | 1 (0m)    |           |  |                 |            |                     |  | 1 (46 m)            |                 |                     |                 |  |                   |  |            |
|    |                | 1 (13m) |           |           |  |                 |            |                     |  |                     |                 |                     |                 |  |                   |  |            |
|    |                | 5 (20m) |           |           |  | 1 (13m) GR      | KGSS (0m)  |                     |  |                     |                 |                     |                 |  |                   |  |            |

| Table 2: Water bodies & low land within row of gas lines |                 |                   |              |            |               |           |                  |            |               |           |                       |
|----------------------------------------------------------|-----------------|-------------------|--------------|------------|---------------|-----------|------------------|------------|---------------|-----------|-----------------------|
| Sl. No.                                                  | Chainage No.(m) | No. of Water Body |              |            |               |           |                  |            |               | Low Land  |                       |
|                                                          |                 | Ditch             |              |            |               | Canal     |                  |            |               |           |                       |
|                                                          |                 | Left Side         |              | Right Side |               | Left Side |                  | Right Side |               | Left Side |                       |
|                                                          |                 | Nos               | Distance (m) | Nos        | Distance (m)  | Nos       | Distance (m)     | Nos        | Distance(m)   | Nos       | Distance(m)           |
| 1                                                        | 0.0 to 500      |                   |              |            |               |           |                  | 1          | 0(20 to 1000) |           |                       |
| 1                                                        | 1000 to1500     |                   |              |            |               |           |                  | 1          | <1            |           |                       |
| 1                                                        | 500 to 1000     |                   |              |            |               |           |                  |            |               | 1         | Chainage (880-1440)   |
| 2                                                        | 1000 to 1500    |                   |              |            |               |           |                  |            |               | 1         | (1470-2965)           |
| 3                                                        | 1500 to 2000    |                   |              |            |               |           |                  |            |               | 1         | Near to Gas line      |
| 4                                                        | 2000 to 2500    |                   |              |            |               |           |                  |            |               | 1         | Near to Gas line      |
| 5                                                        | 2500 to 2965    |                   |              |            |               |           |                  |            |               | 1         | Near to Gas line      |
| 1                                                        | 0.0 to 500      |                   |              |            |               |           |                  |            |               | 1         | Near to Gas line      |
| 1                                                        | 0.0 to 530      |                   |              | 1          | <(Drain)      |           |                  |            |               |           |                       |
|                                                          |                 |                   |              | 1          | 3 (Ditch)     |           |                  |            |               |           |                       |
| 1                                                        | 1000 to 1500    |                   |              | 1          | 5 (Ditch)     | 1         | <1(Susham Canal) |            |               |           |                       |
| 2                                                        | 1500 to 2000    |                   |              |            |               |           |                  |            |               | 1         | Chainage 1(1850-2640) |
| 3                                                        | 7650 to 8000    |                   |              |            |               | 1         | <1(Bridge)       |            |               |           |                       |
| 4                                                        | 9000 to 9500    |                   |              | 1          | 0 (8970-9700) |           |                  |            |               |           |                       |
| 5                                                        | 9500 to 10000   |                   |              |            |               | 1         | <(9700-9760)     |            |               |           |                       |
| 6                                                        | 10000 to 12400  |                   |              |            |               | 1         | 2(9760-12400)    | 1          | <0(Culvert)   |           |                       |
| 7                                                        | 12400 to127442  | 1                 | 46           |            |               |           |                  |            |               |           |                       |
| Total                                                    |                 | 1                 |              | 4          |               | 4         |                  | 3          |               | 10        |                       |

| Table 3: Structures alongside the proposed gas pipeline RoW |                 |                  |             |            |              |               |             |            |             |
|-------------------------------------------------------------|-----------------|------------------|-------------|------------|--------------|---------------|-------------|------------|-------------|
| Sl. No.                                                     | Chainage No.(m) | No. of Structure |             |            |              |               |             |            |             |
|                                                             |                 | Building         |             |            |              | Boundary wall |             |            |             |
|                                                             |                 | Left Side        |             | Right Side |              | Left Side     |             | Right Side |             |
|                                                             |                 | Nos              | Distance(m) | Nos        | Distance (m) | Nos           | Distance(m) | Nos        | Distance(m) |
| 1200m Road Length                                           |                 |                  |             |            |              |               |             |            |             |
| 1                                                           | 500 to1000      |                  |             |            |              | 1             | Std. (40)   |            |             |
| Total                                                       |                 |                  |             |            |              | 1             |             |            |             |
| 2650m Road Length                                           |                 |                  |             |            |              |               |             |            |             |
| 1                                                           | 2000 to 2650    | 1                | 29(WP)      |            |              |               |             | 1          | 33          |
| Total                                                       |                 | 1                |             |            |              |               |             | 1          |             |
| 3200m Road Length                                           |                 |                  |             |            |              |               |             |            |             |
| 1                                                           | 1500 to 2000    | 1                | 10(WP)      |            |              |               |             |            |             |
| 2                                                           | 2500 to 3200    | 1                | 17(WP)      |            |              |               |             |            |             |
| Total                                                       |                 | 2                |             |            |              |               |             |            |             |
| 2965m Road Length                                           |                 |                  |             |            |              |               |             |            |             |
| 1                                                           | 500 to 1000     | 1                | 0(Tin)      |            |              |               |             | 1          | 2           |
| 2                                                           | 1000 to 1500    |                  |             | 1          | 23(NDE Ltd.) |               |             |            |             |
| 3                                                           | 1500 to 2000    | 1                | 0(Tin)      | 1          | 5(WP)        |               |             |            |             |
| 4                                                           | 2000 to 2500    |                  |             | 1          | 25(T)        |               |             |            |             |
| Total                                                       |                 | 2                |             | 3          |              |               |             | 1          |             |
| 1                                                           | 1000 to 1345    | 1                | 14(Tin)     |            |              | 2             | 50          |            |             |
| Total                                                       |                 | 1                |             |            |              | 2             |             |            |             |
| 530m Road Length                                            |                 |                  |             |            |              |               |             |            |             |
| 1                                                           | 0.0 to 530      | 1                | 14(Tin)     |            |              |               |             | 1          | 29          |
| Total                                                       |                 | 1                |             |            |              |               |             | 1          |             |
| 1049m Road Length                                           |                 |                  |             |            |              |               |             |            |             |
| 1                                                           | 0.0 to 500      |                  |             | 1          | 7(WP)        |               |             |            |             |
| Total                                                       |                 |                  |             | 1          |              |               |             |            |             |
| 1490.36m Road Length                                        |                 |                  |             |            |              |               |             |            |             |
| 1                                                           | 500 to 1000     |                  |             | 1          | 0(WP)        |               |             |            |             |
| 2                                                           | 1000 to 1490.36 |                  |             | 1          | 0(WP)        |               |             |            |             |
| Total                                                       |                 |                  |             | 2          |              |               |             |            |             |
| 385m Road Length                                            |                 |                  |             |            |              |               |             |            |             |
| 1                                                           | 500 to1000      |                  |             | 1          | 0(WP)        |               |             |            |             |
| Total                                                       |                 |                  |             | 1          |              |               |             |            |             |

| 12742m Road Length |                 |    |        |    |            |   |                     |   |                    |
|--------------------|-----------------|----|--------|----|------------|---|---------------------|---|--------------------|
| 1                  | 0.0 to 500      | 1  | 31(WP) |    |            | 1 | 1(0.7m)             |   |                    |
| 2                  | 500 to 1000     | 1  | 41(WP) |    |            |   |                     |   |                    |
| 3                  | 7650 to 8000    |    |        | 1  | 36(WP)     | 1 | 1.5(7800-9340)(CBL) |   |                    |
| 4                  | 8500 to 9000    |    |        | 1  | 45(WP)     |   |                     | 1 | 29(BCI)(8770-8950) |
|                    |                 |    |        | 1  | 45(GVS)    |   |                     |   |                    |
|                    |                 |    |        | 1  | 60(2 Std.) |   |                     |   |                    |
| 5                  | 9000 to 9500    |    |        | 1  | 40(Mosq.)  | 1 | 0.7(8965-9340)      | 1 | 0.7(9040-9295)     |
|                    |                 |    |        | 1  | 48(8 Std.) |   |                     |   |                    |
| 6                  | 9500 to 10000   |    |        | 1  | 43(2 Std.) |   |                     |   |                    |
| 7                  | 10000 to 12400  |    |        | 1  | 65(SP)     |   |                     |   |                    |
| 8                  | 12400 to 127442 | 1  | 13(GR) | 1  | 0(KGSS)    |   |                     |   |                    |
| Total              |                 | 3  |        | 9  |            | 3 |                     | 2 |                    |
| Grand Total        |                 | 10 |        | 16 |            | 6 |                     | 5 |                    |

**Table 4: Electric pole, light post & water pipeline alongside the gas pipeline alignment at different distance**

| +Sl. No.          | Chainage No.(m) | No. of Electric Pole (EP) |             |            |             | No. of Light Post (LP) |             |            |             | Water Pipeline |             |            |             |
|-------------------|-----------------|---------------------------|-------------|------------|-------------|------------------------|-------------|------------|-------------|----------------|-------------|------------|-------------|
|                   |                 | Left Side                 |             | Right Side |             | Left Side              |             | Right Side |             | Left Side      |             | Right Side |             |
|                   |                 | Nos                       | Distance(m) | Nos        | Distance(m) | Nos                    | Distance(m) | Nos        | Distance(m) | Nos            | Distance(m) | Nos        | Distance(m) |
| 1200m Road Length |                 |                           |             |            |             |                        |             |            |             |                |             |            |             |
| 1                 | 0.0 to 500      | 2                         | 13          | 2          | 50          | 2                      | 13.5        |            |             |                |             |            |             |
|                   |                 | 16                        | 35          |            |             | 14                     | 23          |            |             |                |             |            |             |
| 2                 | 500 to 1000     | 15                        | 38          |            |             | 17                     | 30          |            |             |                |             |            |             |
| 3                 | 1000 to 1200    | 1                         | 40          |            |             | 1                      | 40          |            |             |                |             |            |             |
|                   |                 | 1                         | 55          |            |             | 4                      | 50          |            |             |                |             |            |             |
| Total             |                 | 35                        |             | 2          |             | 38                     |             |            |             |                |             |            |             |
| 2650m Road Length |                 |                           |             |            |             |                        |             |            |             |                |             |            |             |
| 1                 | 1500 to 2000    | 4                         | 9           |            |             |                        |             |            |             |                |             |            |             |
|                   |                 | 6                         | 12          |            |             |                        |             |            |             |                |             |            |             |
| 2                 | 2000 to 2650    | 19                        | 11          | 2          | 23          |                        |             | 1          | 16          |                |             |            |             |
| Total             |                 | 29                        |             | 2          |             |                        |             | 1          |             |                |             |            |             |
| 3200m Road Length |                 |                           |             |            |             |                        |             |            |             |                |             |            |             |
| 1                 | 1500 to 2000    | 5                         | 0           |            |             |                        |             |            |             |                |             |            |             |
| 2                 | 2000 to 2500    | 11                        | 0           | 4          | 3           |                        |             |            |             |                |             |            |             |
| 3                 | 2500 to 3200    | 4                         | 0           | 2          | 3           | 1                      | 17          | 1          | 36          |                |             |            |             |

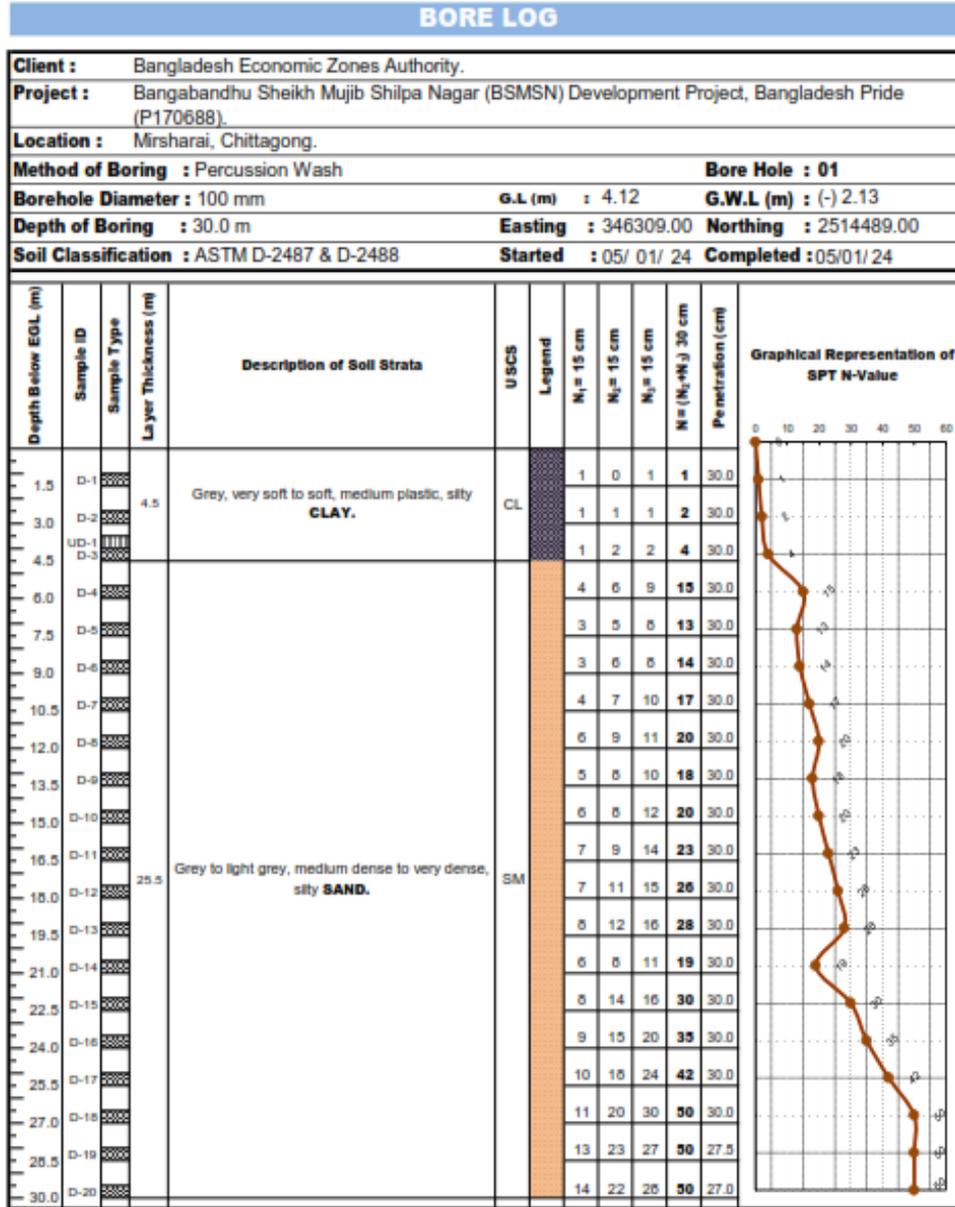
**ESIA Data Book to Gas Pipeline Network in Zone 2A-2B and its Adjacent area, NSEZ.  
Annex 2: Gas Pipelines Route Topo Survey Data and Soil investigation Results**

|                      |                 |    |    |    |    |   |    |   |    |  |  |  |  |  |
|----------------------|-----------------|----|----|----|----|---|----|---|----|--|--|--|--|--|
|                      |                 | 1  | 12 | 4  | 35 | 1 | 44 |   |    |  |  |  |  |  |
| Total                |                 | 21 |    | 10 |    | 2 |    | 1 |    |  |  |  |  |  |
| 1                    | 0.0 to 162.0    | 1  | 5  |    |    |   |    |   |    |  |  |  |  |  |
|                      |                 | 1  | 48 | 1  | 54 |   |    |   |    |  |  |  |  |  |
| Total                |                 | 2  |    | 1  |    |   |    |   |    |  |  |  |  |  |
| 2965m Road Length    |                 |    |    |    |    |   |    |   |    |  |  |  |  |  |
| 1                    | 500 to 1000     | 4  | 6  |    |    |   |    |   |    |  |  |  |  |  |
|                      |                 | 1  | 21 |    |    |   |    |   |    |  |  |  |  |  |
| 2                    | 1000 to 1500    | 6  | 6  |    |    |   |    |   |    |  |  |  |  |  |
| 3                    | 1500 to 2000    | 3  | 6  | 10 | 5  |   |    |   |    |  |  |  |  |  |
| 4                    | 2000 to 2500    | 9  | 3  | 1  | 2  |   |    |   |    |  |  |  |  |  |
| 5                    | 2500 to 2965    | 12 | 1  | 1  | 7  |   |    | 1 | 7  |  |  |  |  |  |
|                      |                 |    |    | 1  | 35 |   |    | 1 | 32 |  |  |  |  |  |
| Total                |                 | 35 |    | 13 |    |   |    | 2 |    |  |  |  |  |  |
| 1345m Road Length    |                 |    |    |    |    |   |    |   |    |  |  |  |  |  |
| 1                    | 0.0 to 500      | 2  | 0  | 1  | 8  |   |    |   |    |  |  |  |  |  |
|                      |                 | 1  | 33 | 2  | 14 |   |    |   |    |  |  |  |  |  |
|                      |                 |    |    | 3  | 19 |   |    |   |    |  |  |  |  |  |
|                      |                 |    |    | 13 | 22 |   |    |   |    |  |  |  |  |  |
| 2                    | 500 to 1000     | 5  | 1  | 17 | 20 |   |    |   |    |  |  |  |  |  |
| 3                    | 1000 to 1345    | 1  | 0  | 12 | 18 |   |    |   |    |  |  |  |  |  |
|                      |                 | 1  | 42 | 1  | 13 |   |    |   |    |  |  |  |  |  |
| Total                |                 | 10 |    | 49 |    |   |    |   |    |  |  |  |  |  |
| 1049m Road Length    |                 |    |    |    |    |   |    |   |    |  |  |  |  |  |
| 1                    | 500 to 1049     | 1  | 14 |    |    |   |    |   |    |  |  |  |  |  |
| Total                |                 | 1  |    |    |    |   |    |   |    |  |  |  |  |  |
| 1490.36m Road Length |                 |    |    |    |    |   |    |   |    |  |  |  |  |  |
| 1                    | 1000 to 1490.36 | 10 | 0  | 2  | 40 |   |    |   |    |  |  |  |  |  |
|                      |                 | 4  | 3  | 1  | 30 |   |    |   |    |  |  |  |  |  |
|                      |                 | 1  | 32 | 1  | 42 |   |    |   |    |  |  |  |  |  |
| Total                |                 | 15 |    | 4  |    |   |    |   |    |  |  |  |  |  |
| 385m Road Length     |                 |    |    |    |    |   |    |   |    |  |  |  |  |  |
| 1                    | 0.0 to 385      |    |    |    |    |   |    |   |    |  |  |  |  |  |
| 1925m Road Length    |                 |    |    |    |    |   |    |   |    |  |  |  |  |  |
| 1                    | 1500 to 1925    | 1  | 6  | 1  | 7  |   |    |   |    |  |  |  |  |  |
|                      |                 | 1  | 39 | 3  | 53 |   |    |   |    |  |  |  |  |  |
| Total                |                 | 2  |    | 4  |    |   |    |   |    |  |  |  |  |  |
| 935m Road Length     |                 |    |    |    |    |   |    |   |    |  |  |  |  |  |

**ESIA Data Book to Gas Pipeline Network in Zone 2A-2B and its Adjacent area, NSEZ.**  
**Annex 2: Gas Pipelines Route Topo Survey Data and Soil investigation Results**

|                           |                 |            |      |            |    |           |    |          |          |                   |               |  |
|---------------------------|-----------------|------------|------|------------|----|-----------|----|----------|----------|-------------------|---------------|--|
| 1                         | 0.0 to 500      | 1          | 15   |            |    |           |    |          |          |                   |               |  |
|                           |                 | 3          | 21   |            |    |           |    |          |          |                   |               |  |
|                           |                 | 13         | 22   |            |    |           |    |          |          |                   |               |  |
|                           |                 | 6          | 25   |            |    |           |    |          |          |                   |               |  |
|                           |                 | 20         | 27   |            |    |           |    |          |          |                   |               |  |
| 2                         | 500 to 935      | 1          | 10   | 1          | 30 | 1         | 15 | 1        | 15       |                   |               |  |
|                           |                 | 15         | 25   | 1          | 40 | 1         | 45 | 1        | 40       |                   |               |  |
|                           |                 | 14         | 30   |            |    |           |    |          |          |                   |               |  |
| <b>Total</b>              |                 | <b>73</b>  |      | <b>2</b>   |    | <b>2</b>  |    | <b>2</b> |          |                   |               |  |
| <b>12742m Road Length</b> |                 |            |      |            |    |           |    |          |          |                   |               |  |
| 1                         | 0.0 to 500      | 1          | 31   | 18         | 7  |           |    |          |          | 1                 | (137 to 1070) |  |
|                           |                 |            |      | 2          | 9  |           |    |          |          |                   |               |  |
|                           |                 |            |      | 6          | 19 |           |    |          |          |                   |               |  |
|                           |                 |            |      | 1          | 39 |           |    |          |          |                   |               |  |
| 2                         | 500 to 1000     | 1          | 8    | 18         | 7  |           |    |          |          |                   |               |  |
|                           |                 | 1          | 13   | 5          | 19 |           |    |          |          |                   |               |  |
|                           |                 | 1          | 31   | 0          | 0  |           |    |          |          |                   |               |  |
| 3                         | 1000 to 1500    | 13         | 15   | 12         | 4  | 8         | 10 |          |          |                   |               |  |
|                           |                 | 9          | 0    | 10         | 8  |           |    |          |          |                   |               |  |
| 4                         | 1500 to 2000    | 12         | 16.5 | 17         | 5  | 17        | 8  |          |          |                   |               |  |
|                           |                 |            |      | 15         | 22 | 1         | 17 |          |          |                   |               |  |
| 5                         | 7650 to 8000    |            |      | 9          | 32 |           |    |          | 1        | (7920-8540) (WPL) |               |  |
| 6                         | 8000 to 8500    |            |      | 11         | 35 |           |    |          | 1        | (8540-8770) (WPL) |               |  |
| 7                         | 8500 to 9000    |            |      | 11         | 35 |           |    |          |          |                   |               |  |
| 8                         | 9000 to 9500    |            |      | 8          | 25 |           |    |          |          |                   |               |  |
|                           |                 |            |      | 2          | 35 |           |    |          |          |                   |               |  |
| 9                         | 9500 to 10000   |            |      | 6          | 34 |           |    |          |          |                   |               |  |
| 10                        | 10000 to 12400  | 2          | 20   |            |    |           |    |          |          |                   |               |  |
| 11                        | 12400 to 127442 | 1          | 9    | 1          | 0  |           |    |          |          |                   |               |  |
|                           |                 | 1          | 13   |            |    |           |    |          |          |                   |               |  |
|                           |                 | 5          | 20   |            |    |           |    |          |          |                   |               |  |
| <b>Total</b>              |                 | <b>47</b>  |      | <b>152</b> |    | <b>26</b> |    |          | <b>3</b> |                   |               |  |
| <b>Grand Total</b>        |                 | <b>270</b> |      | <b>239</b> |    | <b>68</b> |    | <b>6</b> | <b>3</b> |                   |               |  |

Soil Investigation: Results of Borehols



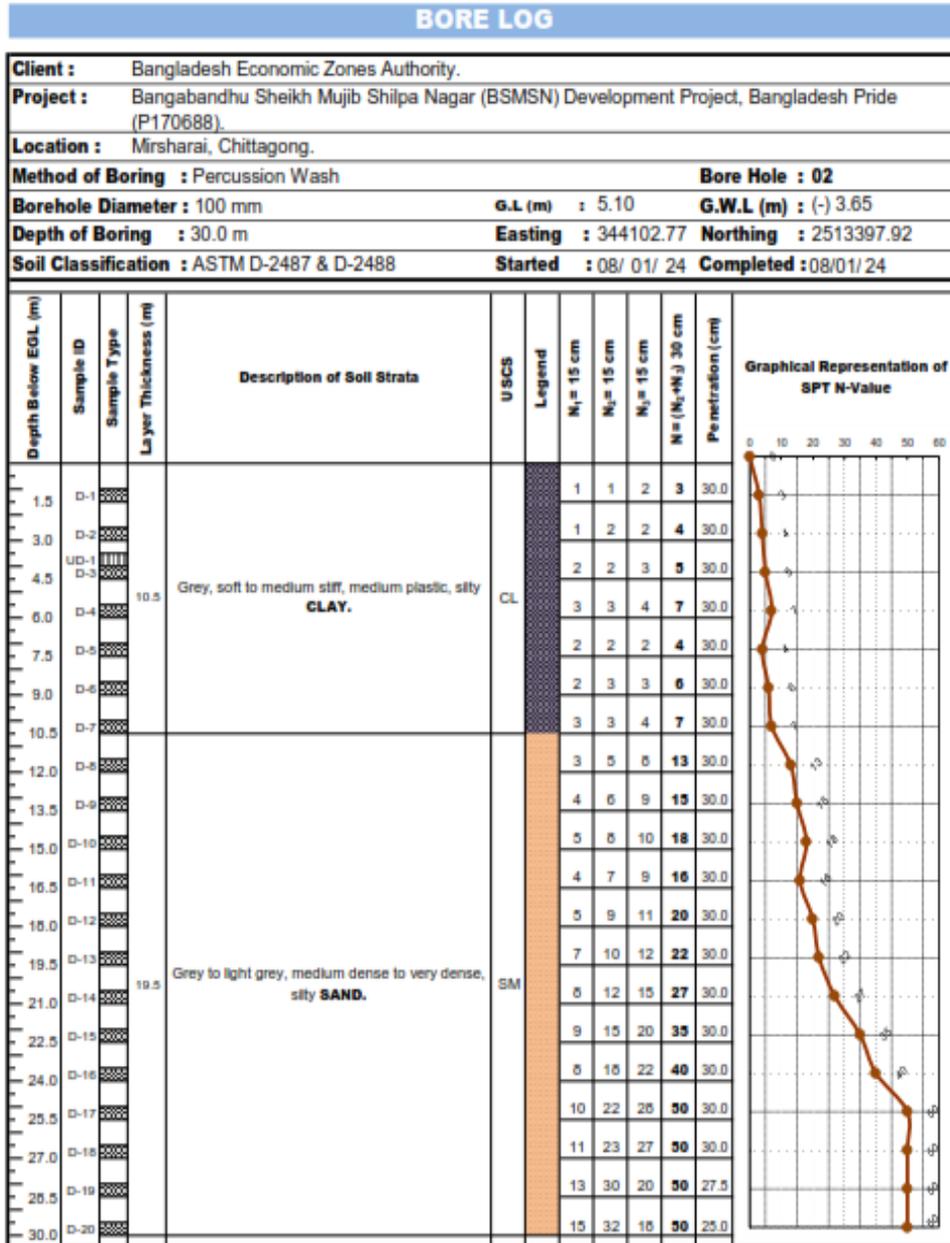
**Legend:**

- Split Spoon Sample
- Shelby Tube Sample

- Silty SAND
- Sandy SILT
- Clayey SILT
- Silty CLAY
- PEAT/ORGANIC SOIL

NATIONAL SURVEY ORGANISATION

Soil Investigation: Results of Borehols



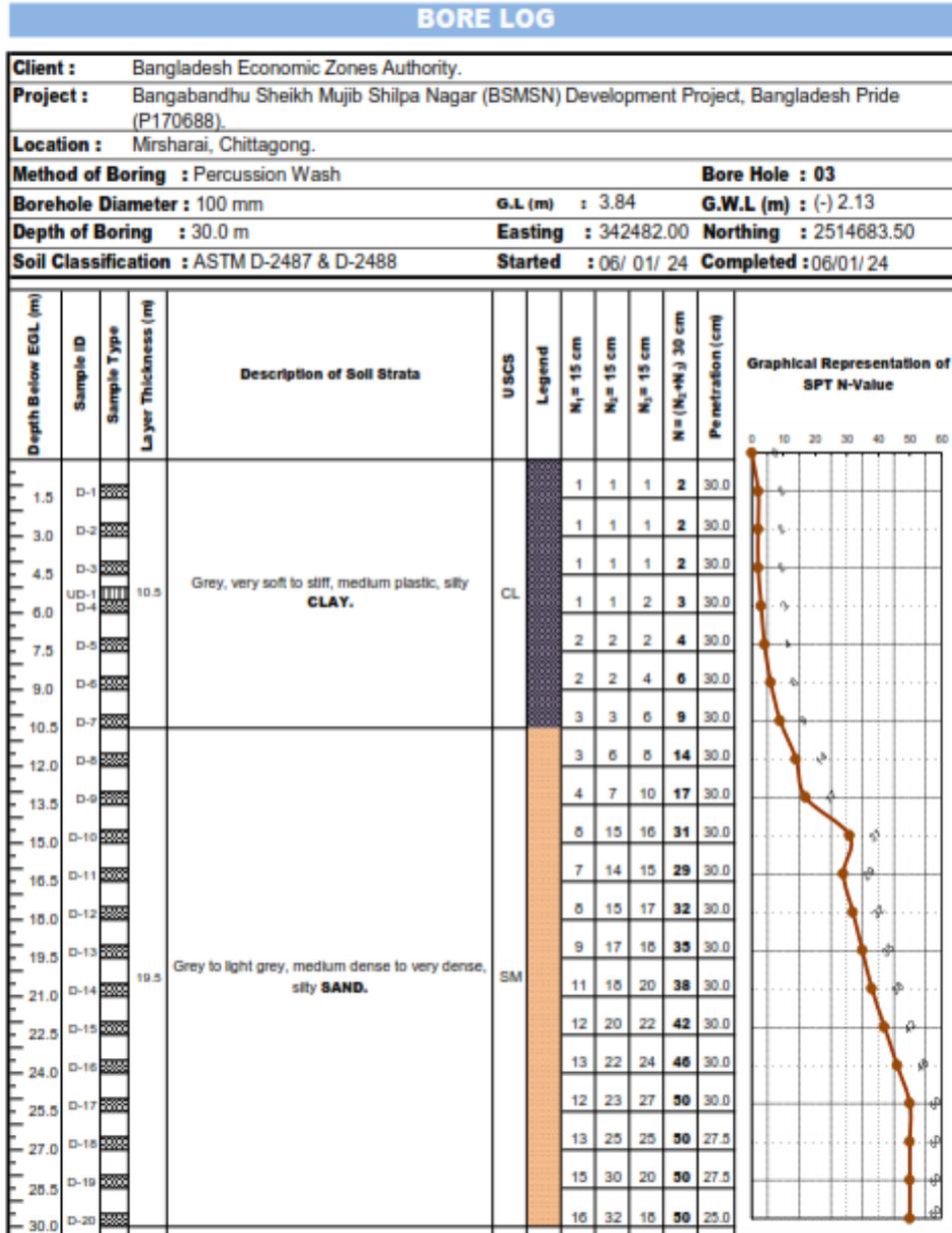
**Legend:**

- Shelby Tube Sample
- Split Spoon Sample

- Silty SAND
- Sandy SILT
- Clayey SILT
- Silty CLAY
- PEAT/ORGANIC SOIL

NATIONAL SURVEY ORGANISATION

Soil Investigation: Results of Borehols



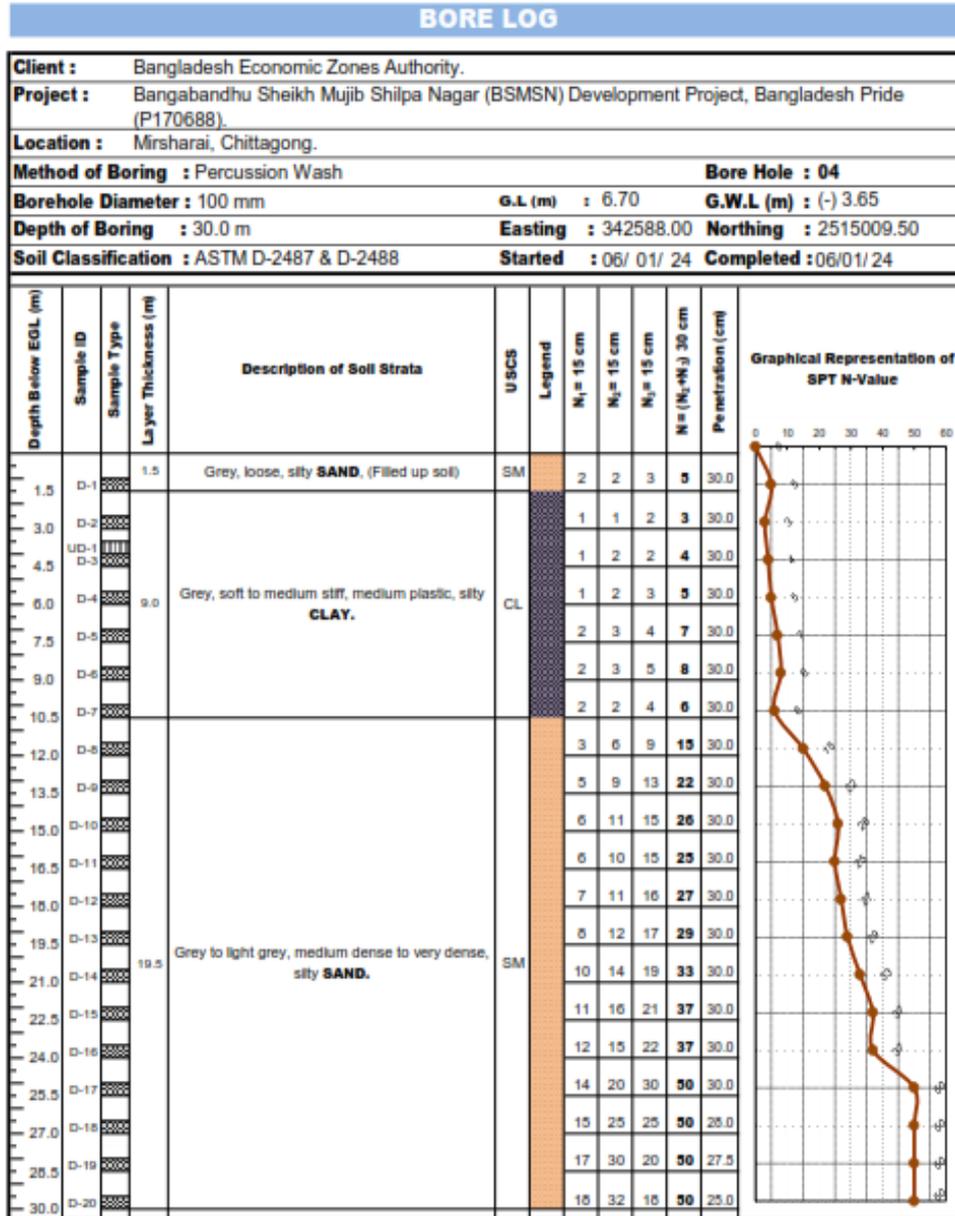
**Legend:**

- Split Spoon Sample
- Shelby Tube Sample

- Silty SAND
- Sandy SILT
- Clayey SILT
- Silty CLAY
- PEAT/ORGANIC SOIL

NATIONAL SURVEY ORGANISATION

Soil Investigation: Results of Borehols



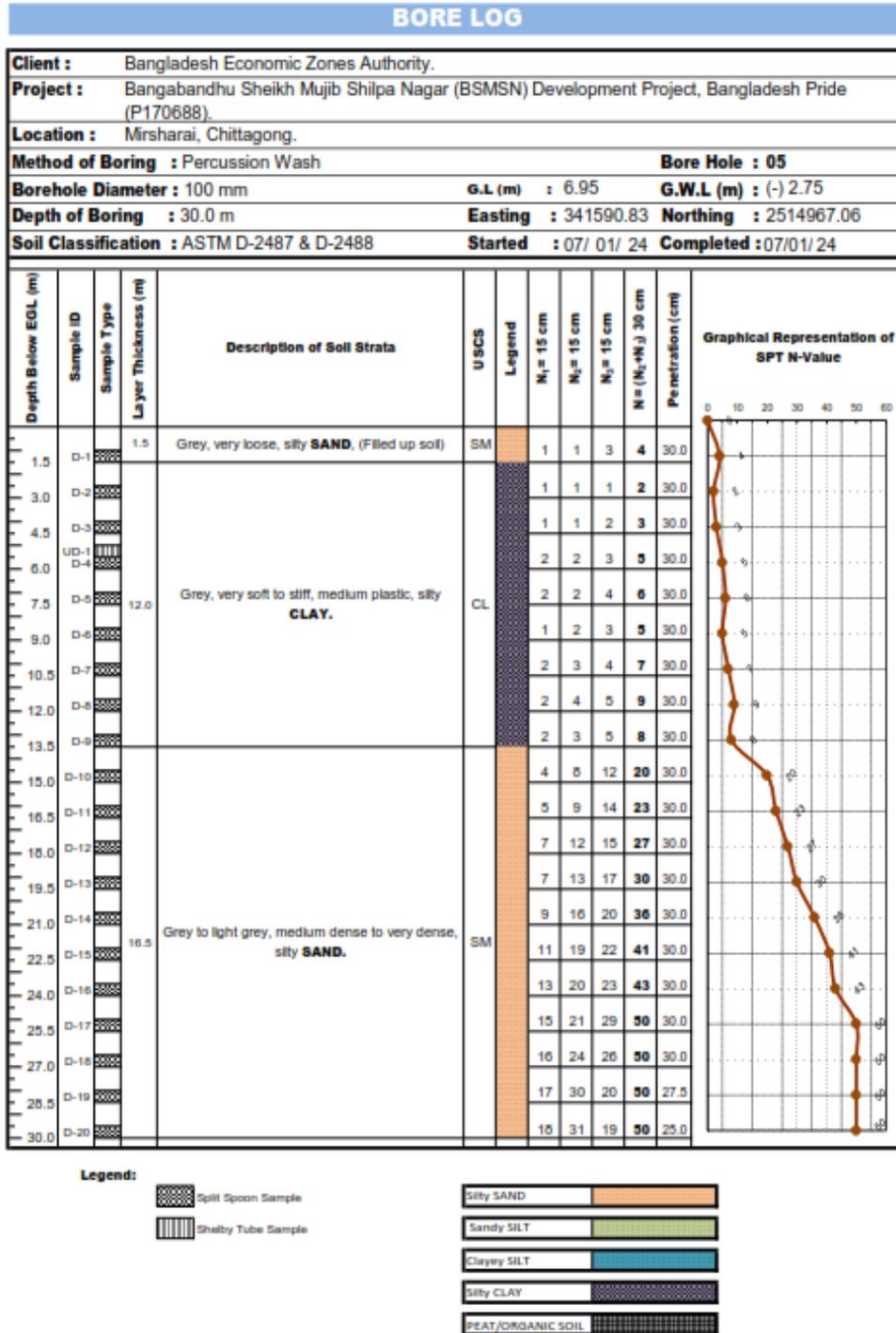
**Legend:**

- Shelby Tube Sample
- Split Spoon Sample

- Silty SAND
- Sandy SILT
- Clayey SILT
- Silty CLAY
- PEAT/ORGANIC SOIL

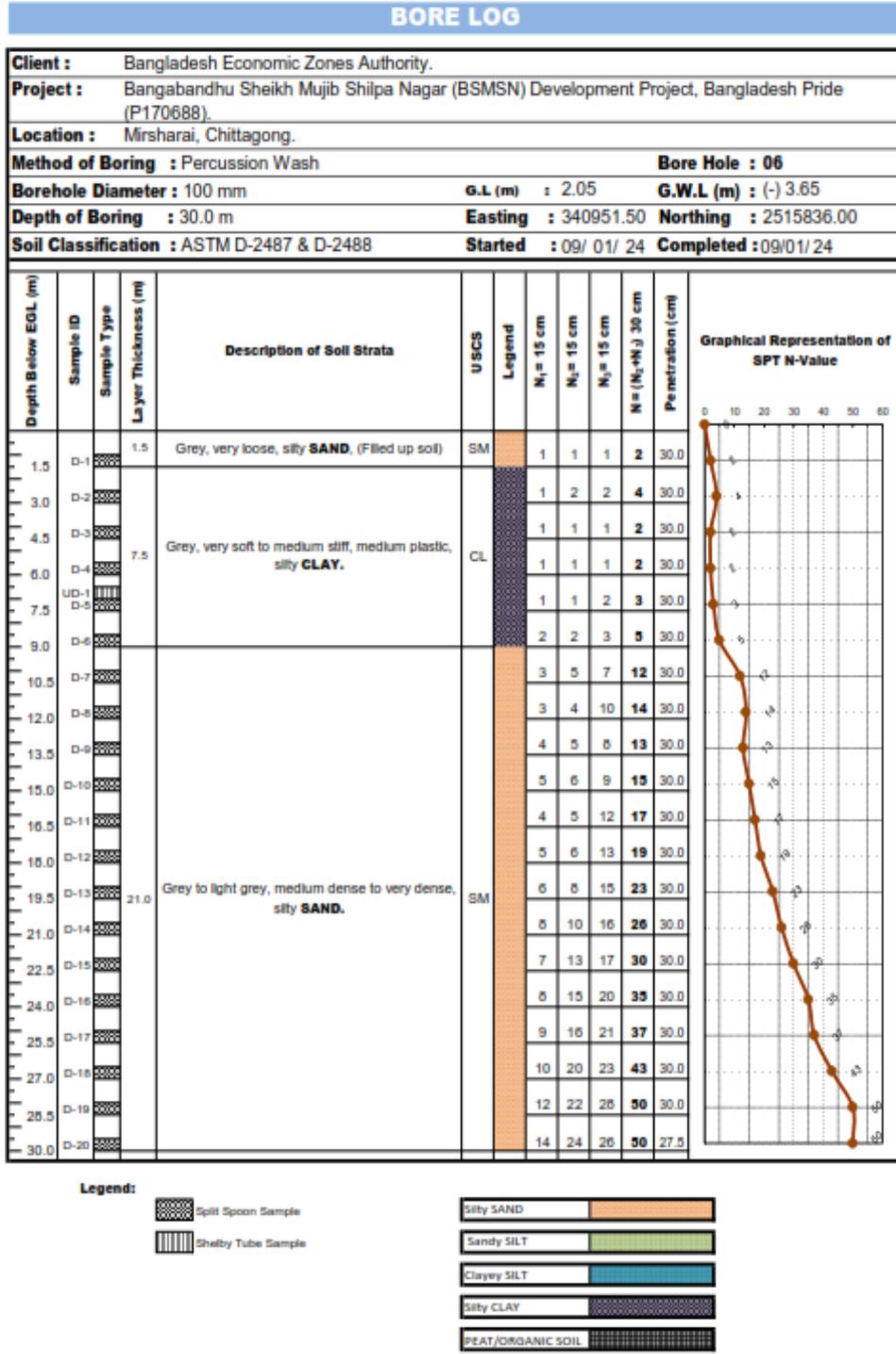
NATIONAL SURVEY ORGANISATION

Soil Investigation: Results of Borehols



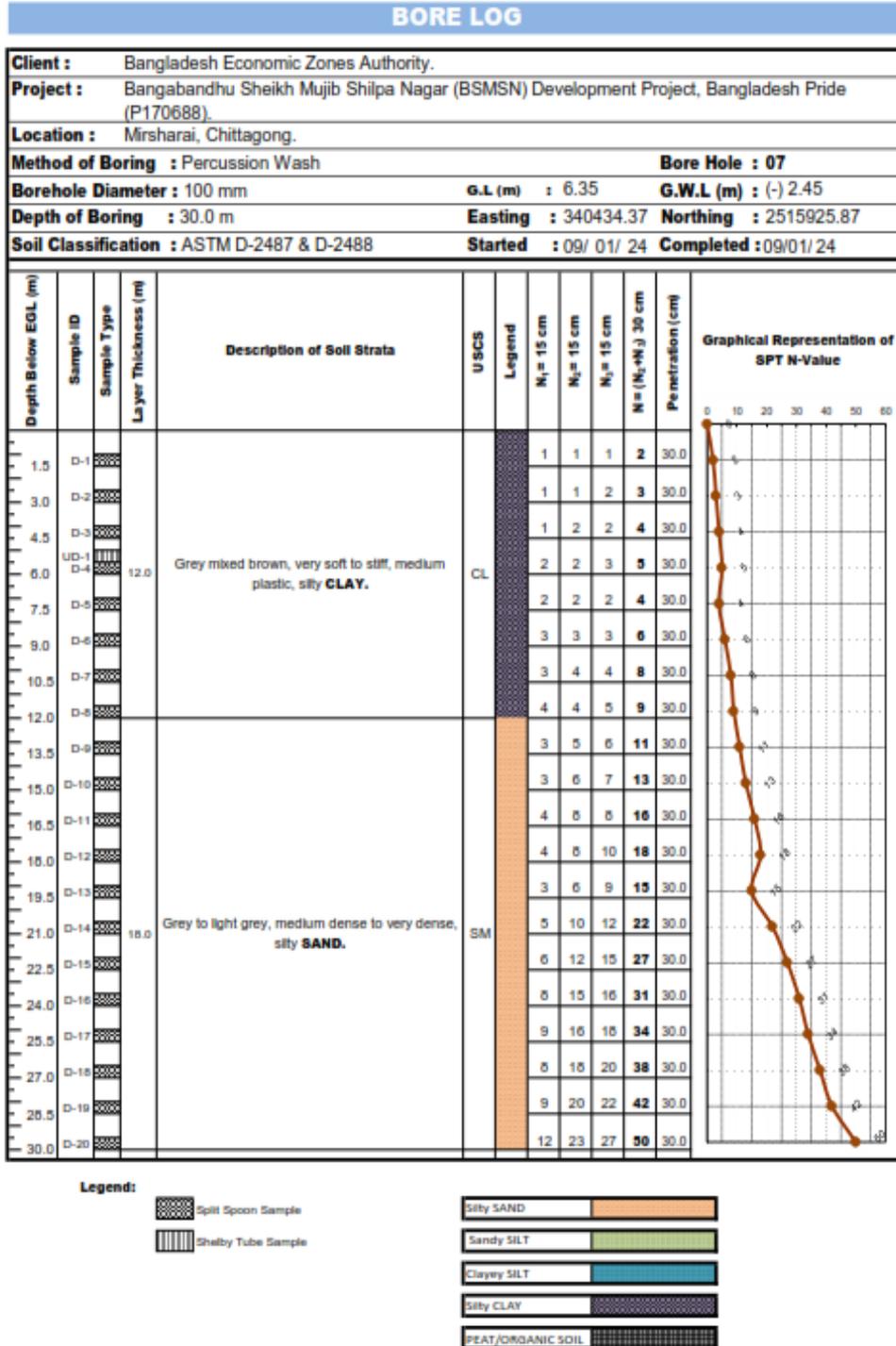
NATIONAL SURVEY ORGANISATION

Soil Investigation: Results of Borehols



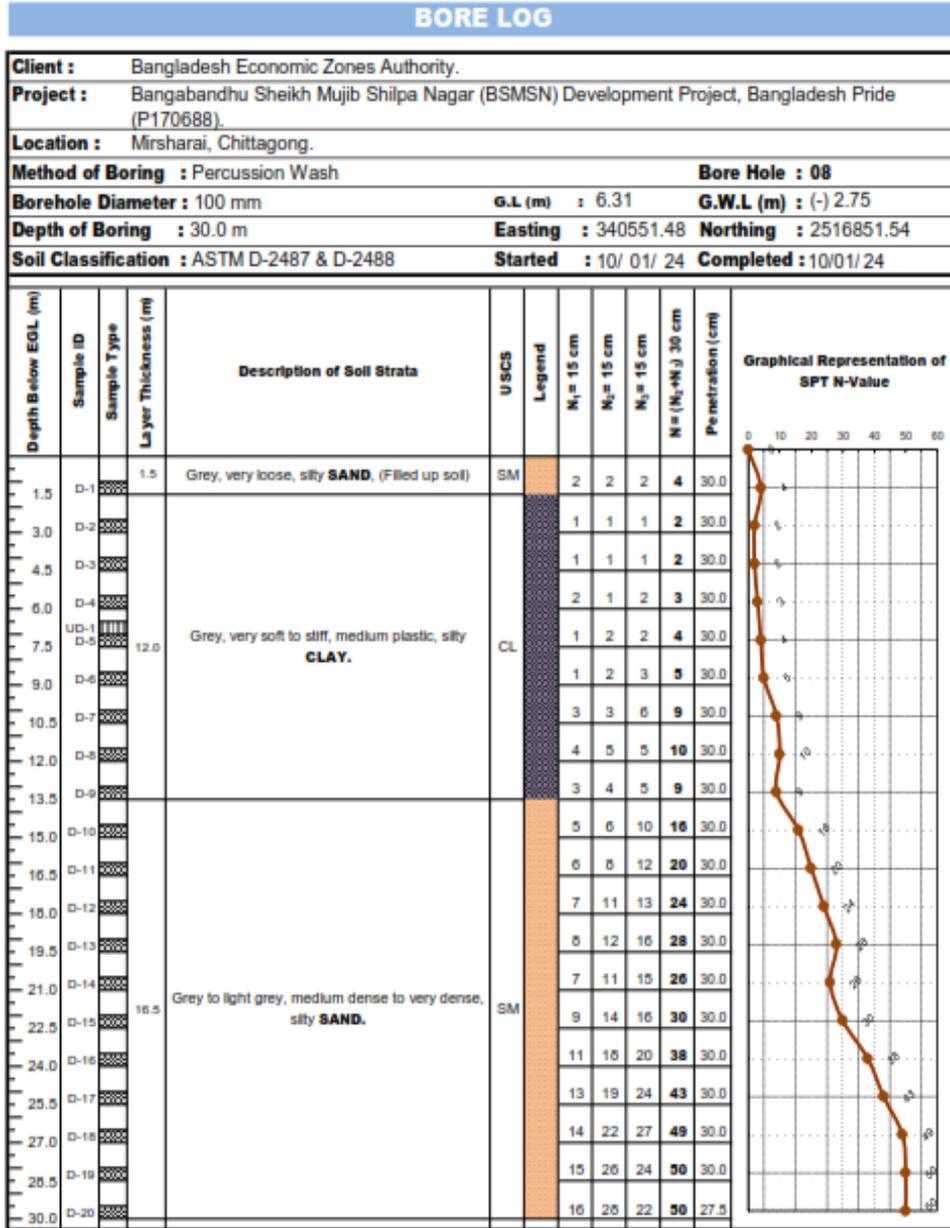
NATIONAL SURVEY ORGANISATION

Soil Investigation: Results of Borehols



NATIONAL SURVEY ORGANISATION

Soil Investigation: Results of Borehols



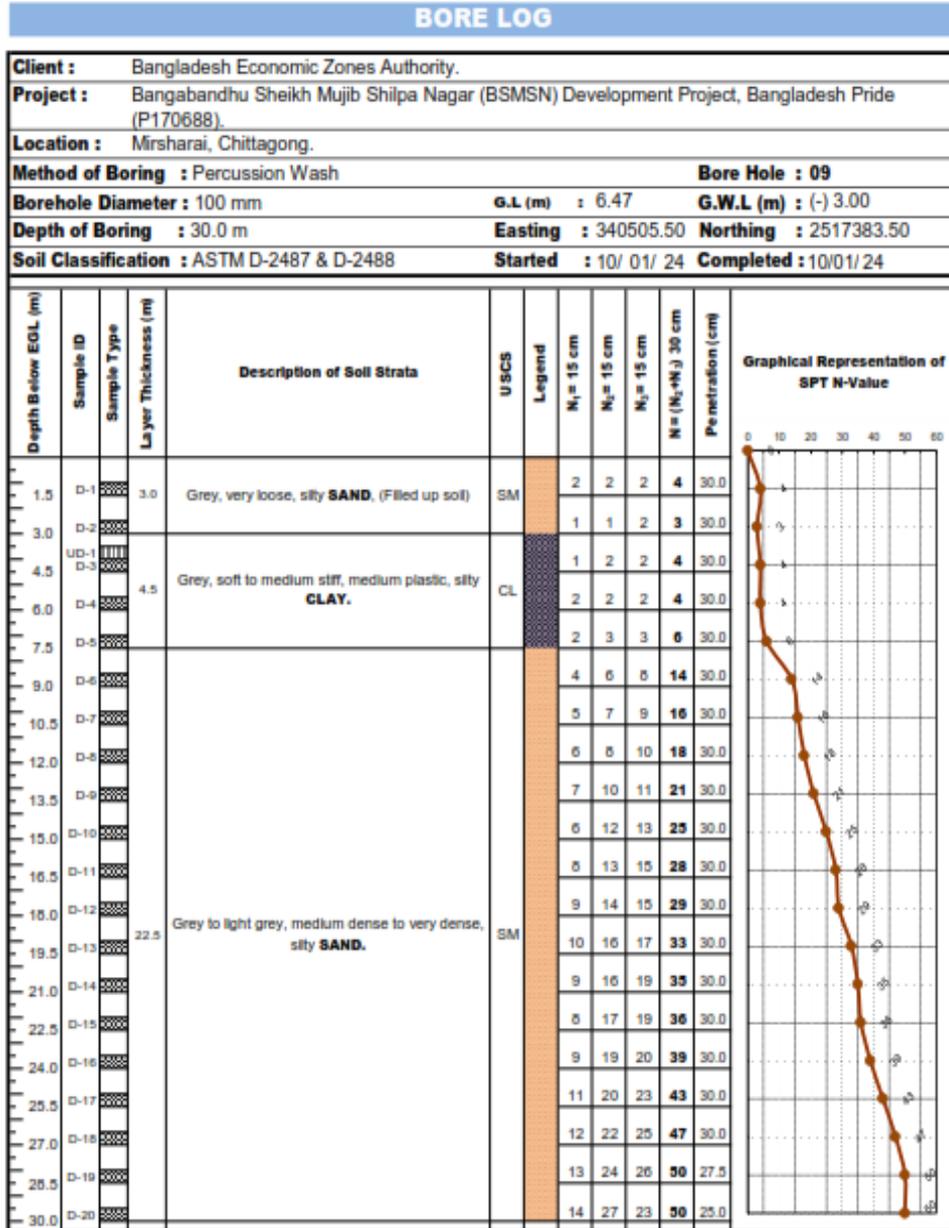
**Legend:**

- Split Spoon Sample
- Shelby Tube Sample

|                   |  |
|-------------------|--|
| Silty SAND        |  |
| Sandy SILT        |  |
| Clayey SILT       |  |
| Silty CLAY        |  |
| PEAT/ORGANIC SOIL |  |

NATIONAL SURVEY ORGANISATION

Soil Investigation: Results of Borehols



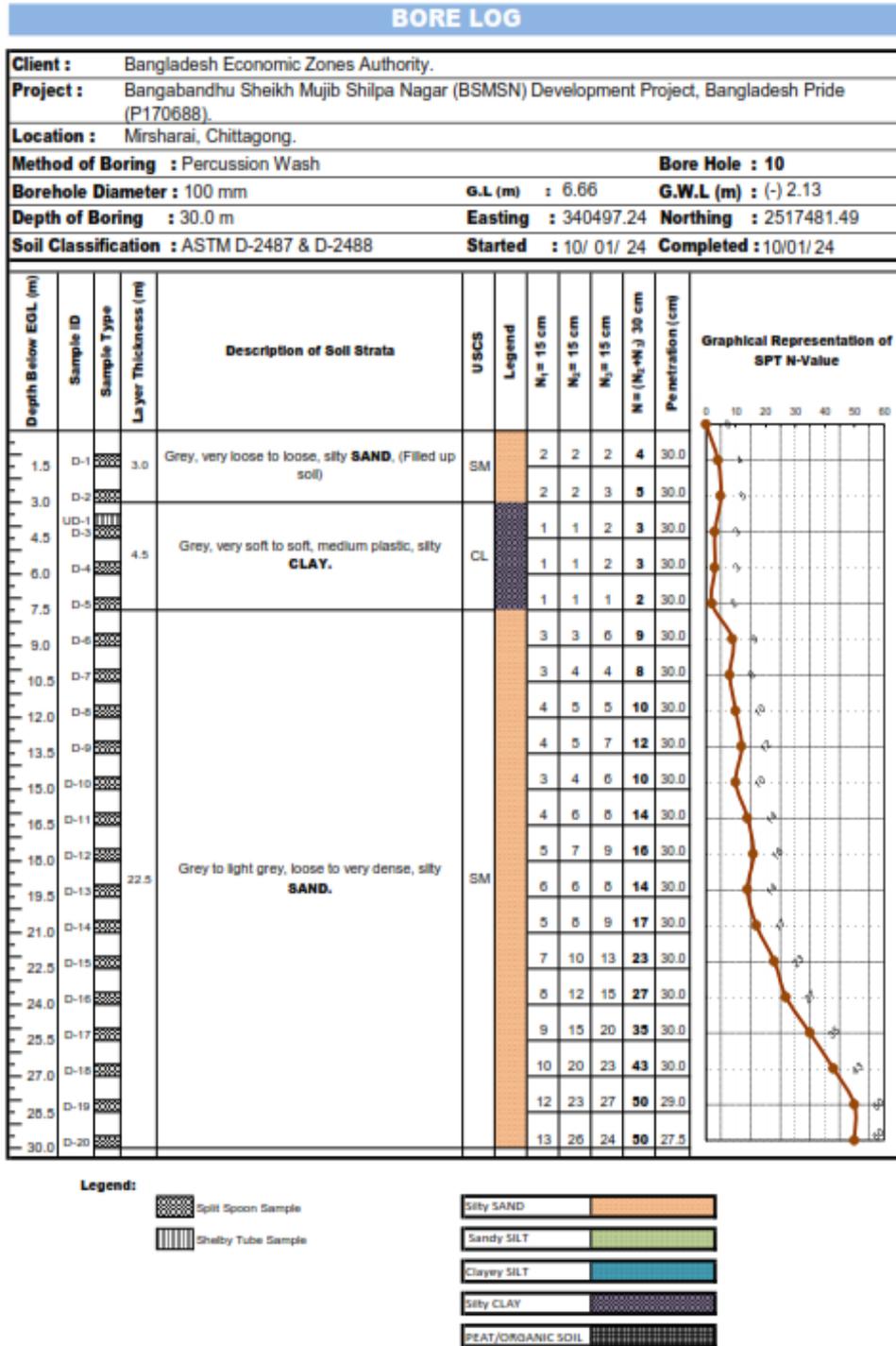
**Legend:**

- Spill Spoon Sample
- Shelby Tube Sample

|                   |  |
|-------------------|--|
| Silty SAND        |  |
| Sandy SILT        |  |
| Clayey SILT       |  |
| Silty CLAY        |  |
| PEAT/ORGANIC SOIL |  |

NATIONAL SURVEY ORGANISATION

Soil Investigation: Results of Borehols

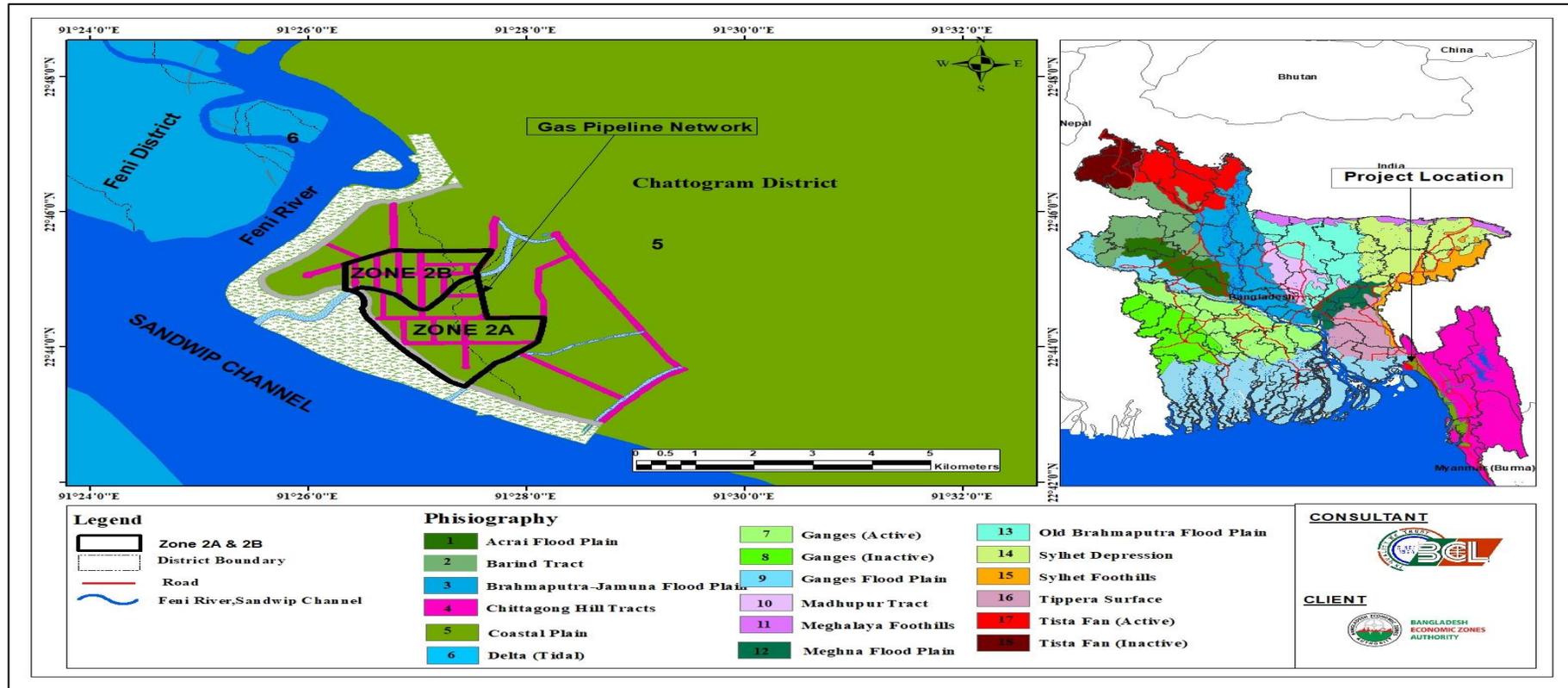


NATIONAL SURVEY ORGANISATION

Figure 9: Soil investigation at 10 boring locations within the sub-project areas

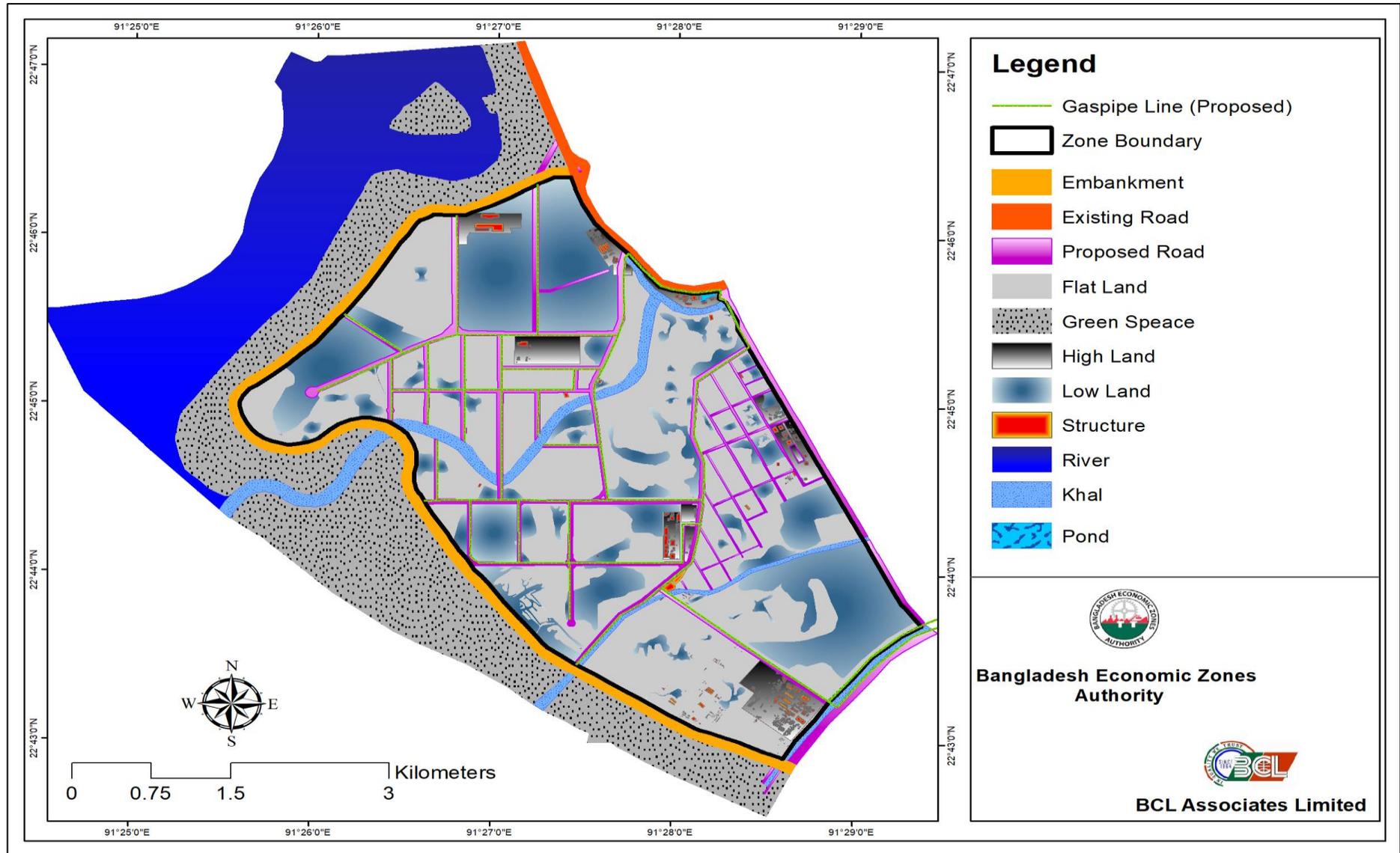
## ANNEX 3: BASELINE DETAILS

### A. Physical Environmental Baseline

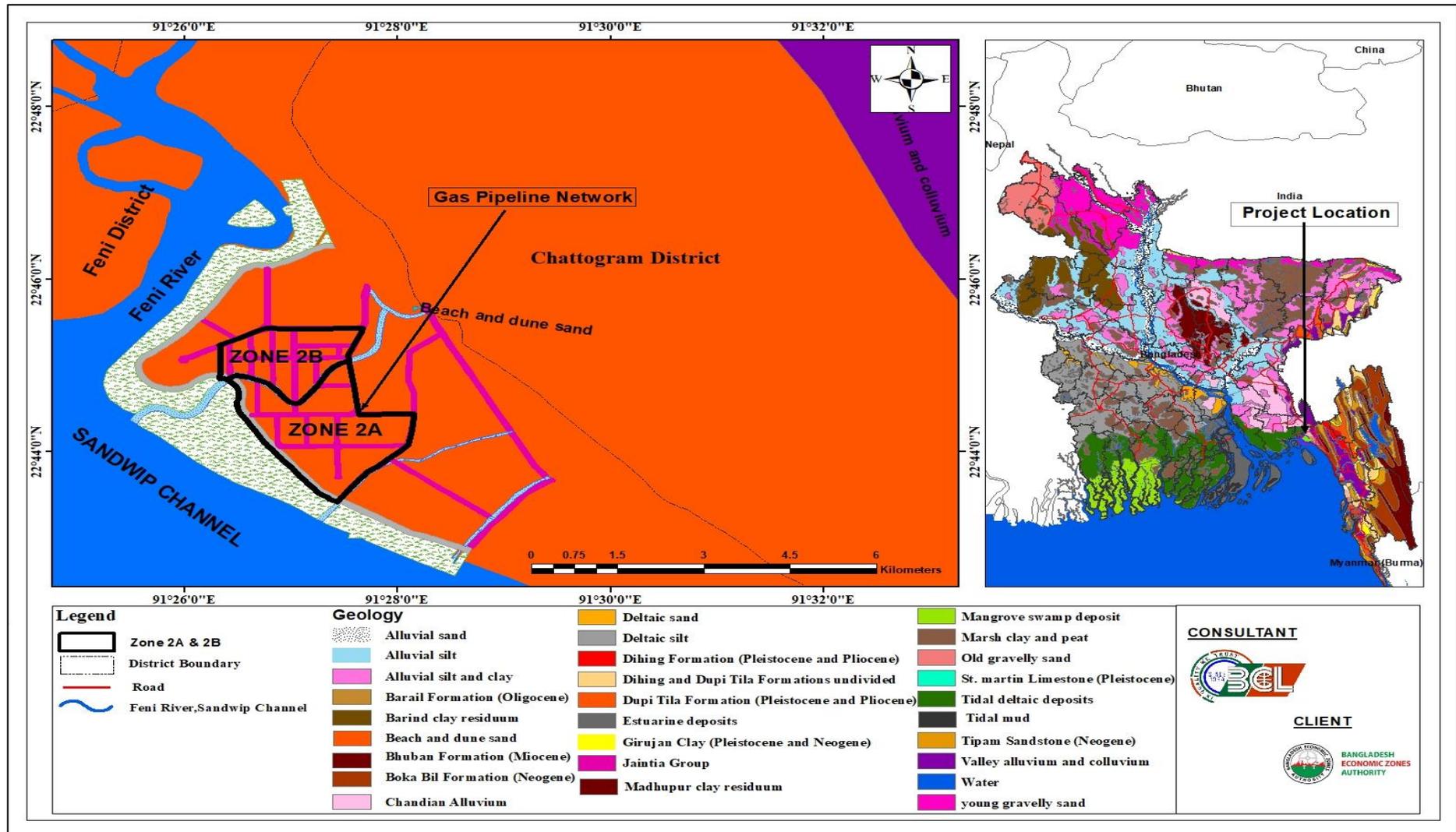


Map-1: Physiography map of the study area

Source: Preparatory Survey on Ocean Front Economic Zone Development Project (Japan International Cooperation Agency, June 2022)

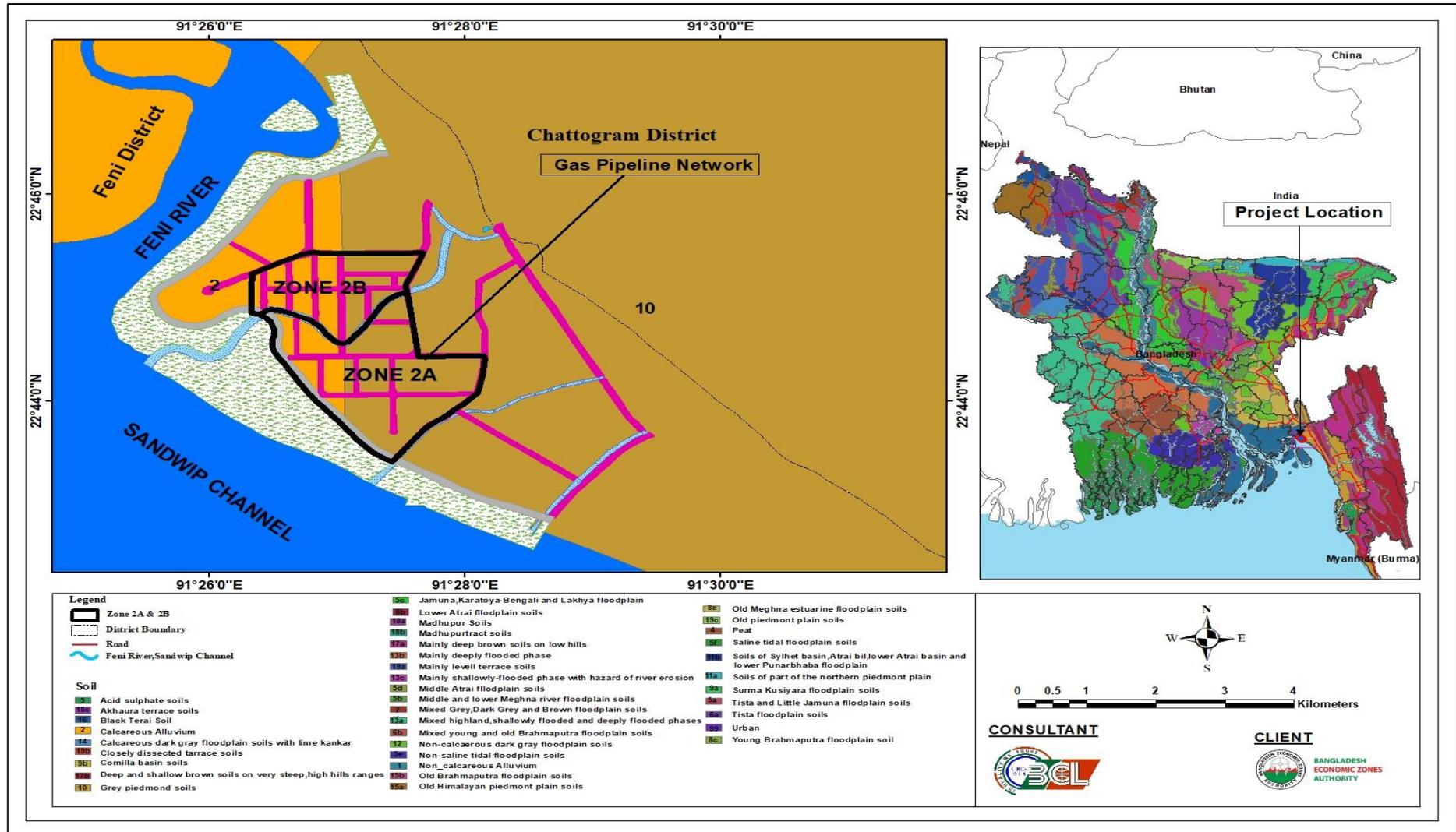


Map-2: Land use map of project area  
Field survey and Image 2023-24



Map-3: Geological map of Bangladesh showing the project area

Source: Urban Development Directorate (UDD) Center for Geoservices & Research August, 2018

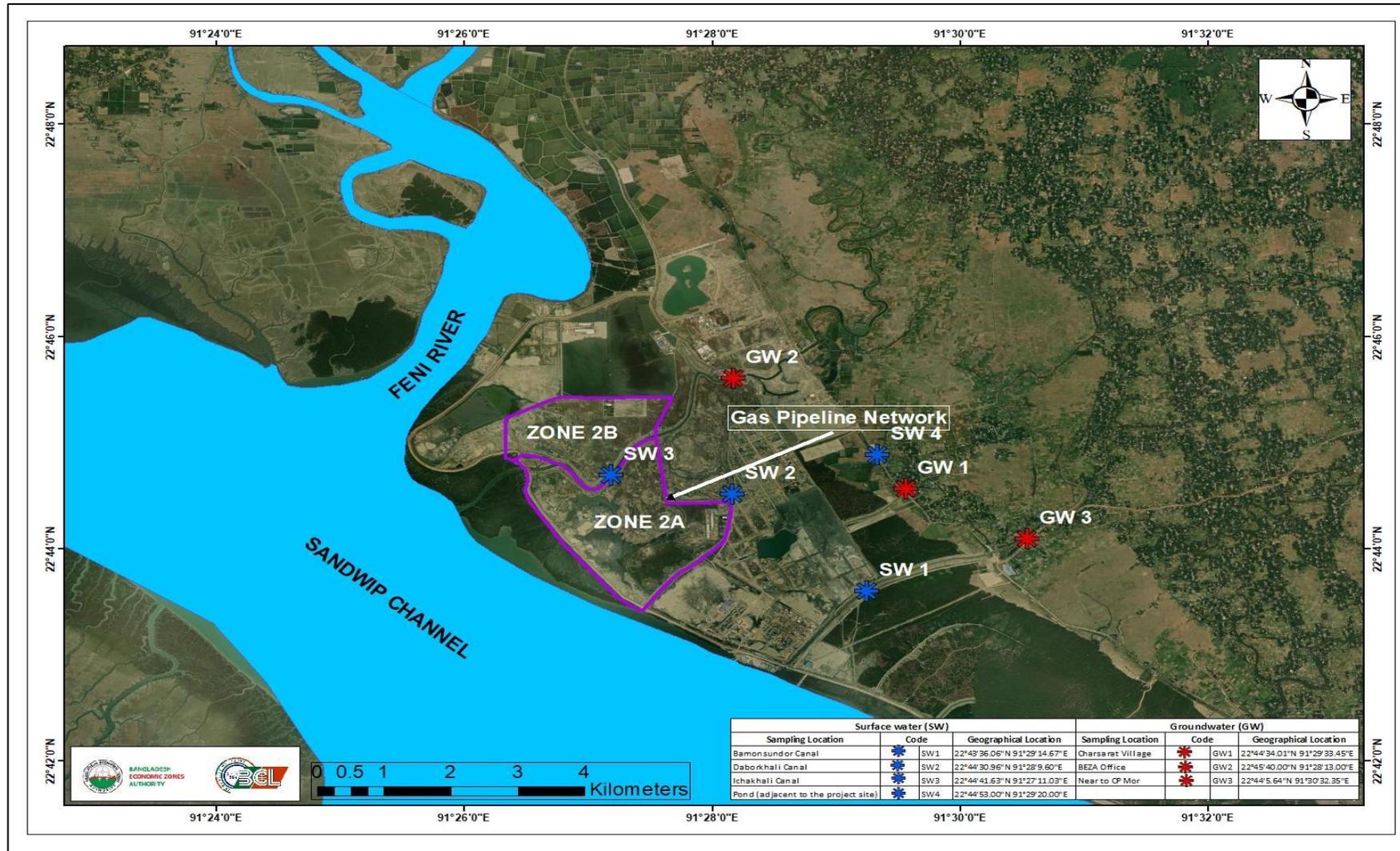


Map- 4: Soil map of the study area  
Source: Mirsarai Economic Zone-II (SRDI December 2016)



Map-5: Drainage networks in the study area of Zones 2A and 2B.

Source: Master Plan 2020



**Map- 6: Surface and groundwater sampling location map**  
Source: Environment Team of BCL Associates Limited, December 2023

## Surface Water Laboratory Report

Form No. QSF-22

Revision No. 12

Revision Date: 04 November, 2022

জীবনের জন্য বিজ্ঞান



"শেখ হাসিনার মর্শন, সব মানুষের উন্নয়ন"



বাংলাদেশ বিজ্ঞান ও শিল্প গবেষণা পরিষদ

BANGLADESH COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

Institute of National Analytical Research and Service (INARS)

### ANALYSIS REPORT

ASC Ref No. : IN-751 of Analytical Service Cell, BCSIR, 14/12/2023

Lab/Sample ID : A-910-913

Client's Details : Md. Shafiqul Islam

**Environmental and Social Consultancy Services**  
(Package No. PMC-16 BSMSN-BEZA) of  
**Bangabandhu Sheikh Mujib Shilpa Nagar Development**  
**Project; Bangladesh PRIDE (P170688)**  
**BANGLADESH ECONOMIC ZONES AUTHORITY**  
**BCL Associates Ltd.**

Project Office: Noorani Tower (2<sup>nd</sup> Floor), 1 Mohakhali C/A,  
Bir Uttam AK Khandaker Sarak, Dhaka-1212.

Number of Sample : 04 (Four)

Sample Description : Surface Water পরীক্ষণ প্রসঙ্গে, তারিখ ১০/১২/২০২৩ ইং।

Test Commencement Date : 14/12/2023

Test Completion Date : 10/01/2024

| Lab ID | Particulars of supplied sample | Parameters                     | Results              | Test Method (APHA)     |
|--------|--------------------------------|--------------------------------|----------------------|------------------------|
| A-910  | Surface Water (SW-01)          | TDS (Total dissolved solids)   | 2168 mg/L            | 2540.C                 |
|        |                                | TSS (Total Suspended Solid)    | 84.0 mg/L            | 2540.D                 |
|        |                                | Electrical Conductivity        | 3910 $\mu$ S/cm      | 2510.B                 |
|        |                                | Turbidity                      | 42.8 NTU             | Turbidimeter           |
|        |                                | pH at 24.8 <sup>o</sup> C      | 7.32                 | 4500-H <sup>+</sup> .B |
|        |                                | Salinity                       | 2.1 ppt              | --                     |
|        |                                | COD (Chemical Oxygen Demand)   | 5.64 mg/L            | 5220.B                 |
|        |                                | BOD (Biological Oxygen Demand) | 2.32 mg/L            | 5210.B                 |
|        |                                | Mercury (Hg)                   | Less than 0.001 mg/L | 3112.B                 |
|        |                                | Lead (Pb)                      | Less than 0.01 mg/L  | 3111.B                 |
|        |                                | Cadmium (Cd)                   | Less than 0.001 mg/L | 3111.B                 |
|        |                                | Oil and Grease                 | Less than 2.0 mg/L   | 5520.B                 |

Page 1 of 3

Note:

- The results reported here are based only on the supplied samples in this laboratory.
- Any complain about test report will not be acceptable after one month from the date of issuing of the said report.
- This report/result shall not be reproduced/published without prior approval of the authority.

Analytical Service Cell

Dr. Qudrat-I-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh  
Telephone: 9671108, Fax: 88-02-9671108 E-mail: asc@bcsir.gov.bd Website: [www.bcsir.gov.bd](http://www.bcsir.gov.bd)

Form No. QSF-22

Revision No. 12

Revision Date: 04 November, 2022

জীবনের জন্য বিজ্ঞান



“শেখ হাসিনার মর্শন, সব মানুষের উন্নয়ন”



বাংলাদেশ বিজ্ঞান ও শিল্প গবেষণা পরিষদ

BANGLADESH COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

| Lab ID | Particulars of supplied sample | Parameters                     | Results              | Test Method (APHA)     |
|--------|--------------------------------|--------------------------------|----------------------|------------------------|
| A-911  | Surface Water (SW-02)          | TDS (Total dissolved solids)   | 1332 mg/L            | 2540.C                 |
|        |                                | TSS (Total Suspended Solid)    | 34.0 mg/L            | 2540.D                 |
|        |                                | Electrical Conductivity        | 2750 $\mu$ S/cm      | 2510.B                 |
|        |                                | Turbidity                      | 81.2 NTU             | Turbidimeter           |
|        |                                | pH at 24.7 <sup>o</sup> C      | 8.02                 | 4500-H <sup>+</sup> .B |
|        |                                | Salinity                       | 1.4 ppt              | --                     |
|        |                                | COD (Chemical Oxygen Demand)   | 1.88 mg/L            | 5220.B                 |
|        |                                | BOD (Biological Oxygen Demand) | Less than 0.2 mg/L   | 5210.B                 |
|        |                                | Mercury (Hg)                   | Less than 0.001 mg/L | 3112.B                 |
|        |                                | Lead (Pb)                      | Less than 0.01 mg/L  | 3111.B                 |
|        |                                | Cadmium (Cd)                   | Less than 0.001 mg/L | 3111.B                 |
|        |                                | Oil and Grease                 | Less than 2.0 mg/L   | 5520.B                 |
| A-912  | Surface Water (SW-03)          | TDS (Total dissolved solids)   | 166 mg/L             | 2540.C                 |
|        |                                | TSS (Total Suspended Solid)    | 6.0 mg/L             | 2540.D                 |
|        |                                | Electrical Conductivity        | 327 $\mu$ S/cm       | 2510.B                 |
|        |                                | Turbidity                      | 65.6 NTU             | Turbidimeter           |
|        |                                | pH at 25.1 <sup>o</sup> C      | 7.09                 | 4500-H <sup>+</sup> .B |
|        |                                | Salinity                       | Less than 0.1 ppt    | --                     |
|        |                                | COD (Chemical Oxygen Demand)   | 2.82 mg/L            | 5220.B                 |
|        |                                | BOD (Biological Oxygen Demand) | Less than 0.2 mg/L   | 5210.B                 |
|        |                                | Mercury (Hg)                   | Less than 0.001 mg/L | 3112.B                 |
|        |                                | Lead (Pb)                      | Less than 0.01 mg/L  | 3111.B                 |
|        |                                | Cadmium (Cd)                   | Less than 0.001 mg/L | 3111.B                 |
|        |                                | Oil and Grease                 | Less than 2.0 mg/L   | 5520.B                 |

Page 2 of 3

Note:

- The results reported here are based only on the supplied samples in this laboratory.
- Any complain about test report will not be acceptable after one month from the date of issuing of the said report.
- This report/result shall not be reproduced/published without prior approval of the authority.

Analytical Service Cell

Dr. Quadrat-I-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh  
Telephone: 9671108, Fax: 88-02-9671108 E-mail: asc@bcsir.gov.bd Website: [www.bcsir.gov.bd](http://www.bcsir.gov.bd)

Form No. QSF-22

Revision No. 12

Revision Date: 04 November, 2022

শীতলের জন্য বিজ্ঞান

"শেখ হাসিনার দর্শন, সব মানুষের উন্নয়ন"



বাংলাদেশ বিজ্ঞান ও শিল্প গবেষণা পরিষদ

BANGLADESH COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

| Lab ID | Particulars of supplied sample | Parameters                     | Results              | Test Method (APHA)     |
|--------|--------------------------------|--------------------------------|----------------------|------------------------|
| A-913  | Surface Water (SW-04)          | TDS (Total dissolved solids)   | 304 mg/L             | 2540.C                 |
|        |                                | TSS (Total Suspended Solid)    | 5.0 mg/L             | 2540.D                 |
|        |                                | Electrical Conductivity        | 540 $\mu$ S/cm       | 2510.B                 |
|        |                                | Turbidity                      | 46.9 NTU             | Turbidimeter           |
|        |                                | pH at 25.2 <sup>o</sup> C      | 7.08                 | 4500-H <sup>+</sup> .B |
|        |                                | Salinity                       | 0.2 ppt              | --                     |
|        |                                | COD (Chemical Oxygen Demand)   | 3.76 mg/L            | 5220.B                 |
|        |                                | BOD (Biological Oxygen Demand) | 0.58 mg/L            | 5210.B                 |
|        |                                | Mercury (Hg)                   | Less than 0.001 mg/L | 3112.B                 |
|        |                                | Lead (Pb)                      | Less than 0.01 mg/L  | 3111.B                 |
|        |                                | Cadmium (Cd)                   | Less than 0.001 mg/L | 3111.B                 |
|        |                                | Oil and Grease                 | Less than 2.0 mg/L   | 5520.B                 |

Aka Sha 10/01/2024

Analyst

M. A. Tanzil Ahamed Shawon  
Scientific Officer  
In-charge of National Analytical Research &  
Service (INARS)  
BCSIR, Dhanmondi, Dhaka-1205

10/01/24

Supervisor

Dr. Muhammad Abdolrah Al-Mansur  
Principal Scientific Officer  
Institute of National Analytical  
Research & Service (INARS)  
BCSIR, Dhaka-1205

10/11/24

Director

Sarker Kamruzzaman  
Institute (Add. Charge)  
Institute of National Analytical  
Research & Service (INARS)  
BCSIR, Dhaka-1205

Page 3 of 3

Note:

- The results reported here are based only on the supplied samples in this laboratory.
- Any complain about test report will not be acceptable after one month from the date of issuing of the said report.
- This report/result shall not be reproduced/published without prior approval of the authority.

Analytical Service Cell

Dr. Qudrat-I-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh

Telephone: 9671108, Fax: 88-02-9671108 E-mail: asc@bcsir.gov.bd Website: [www.bcsir.gov.bd](http://www.bcsir.gov.bd)

Form No. QSF-22

Revision No. 12

Revision Date: 04 November, 2022

জীবনের জন্য বিজ্ঞান

"শেখ হাসিনার দর্শন, সব মানুষের উন্নয়ন"



বাংলাদেশ বিজ্ঞান ও শিল্প গবেষণা পরিষদ

BANGLADESH COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

Institute of National Analytical Research and Service (INARS)

### ANALYSIS REPORT

ASC Ref No. : IN-751 of Analytical Service Cell, BCSIR, 14/12/2023

Lab/Sample ID : A-910-913

Client's Details : Md. Shafiqul Islam

**Environmental and Social Consultancy Services**

**(Package No. PMC-16 BSMSN-BEZA) of**

**Bangabandhu Sheikh Mujib Shilpa Nagar Development**

**Project; Bangladesh PRIDE (P170688)**

**BANGLADESH ECONOMIC ZONES AUTHORITY**

**BCL Associates Ltd.**

Project Office: Noorani Tower (2<sup>nd</sup> Floor), 1 Mohakhali C/A,  
Bir Uttam AK Khandaker Sarak, Dhaka-1212.

Number of Sample : 04 (Four)

Sample Description : Surface Water পরীক্ষণ প্রসঙ্গে, তারিখঃ ১৩/১২/২০২৩ ইং।

Test Commencement Date : 14/12/2023

Test Completion Date : 10/01/2024

| Lab ID | Particulars of supplied sample | Parameters            | Results   | Test Method (APHA) |
|--------|--------------------------------|-----------------------|-----------|--------------------|
| A-910  | Surface Water (SW-01)          | DO (Dissolved Oxygen) | 5.39 mg/L | 4500-O-G           |
| A-911  | Surface Water (SW-02)          | DO (Dissolved Oxygen) | 7.56 mg/L | 4500-O-G           |
| A-912  | Surface Water (SW-03)          | DO (Dissolved Oxygen) | 7.51 mg/L | 4500-O-G           |
| A-913  | Surface Water (SW-04)          | DO (Dissolved Oxygen) | 6.47 mg/L | 4500-O-G           |

Page 1 of 2

Note:

- The results reported here are based only on the supplied samples in this laboratory.
- Any complain about test report will not be acceptable after one month from the date of issuing of the said report.
- This report/result shall not be reproduced/published without prior approval of the authority.

Analytical Service Cell

Dr. Qudrat-I-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh

Telephone: 9671108, Fax: 88-02-9671108 E-mail: asc@bcsir.gov.bd Website: [www.bcsir.gov.bd](http://www.bcsir.gov.bd)

Form No. QSF-22

Revision No. 12

Revision Date: 04 November, 2022

জীবনের জন্য বিজ্ঞান

"শেখ হাসিনার মর্দন, সব মানুষের উন্নয়ন"



বাংলাদেশ বিজ্ঞান ও শিল্প গবেষণা পরিষদ

BANGLADESH COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

| Particulars of supplied sample | Test Parameters             | Results | BDS Standard 1240: 2021 | Test Method (APHA) |
|--------------------------------|-----------------------------|---------|-------------------------|--------------------|
| Surface Water<br>SW-01 (A-910) | Fecal Coliform (MPN/100 ml) | 2.0     | Absent                  | 9221B-C            |
|                                | Total Coliform (MPN/100 ml) | 2.0     | Absent                  | 9221B-C            |
| Surface Water<br>SW-02 (A-911) | Fecal Coliform (MPN/100 ml) | < 1.8*  | Absent                  | 9221B-C            |
|                                | Total Coliform (MPN/100 ml) | 2.0     | Absent                  | 9221B-C            |
| Surface Water<br>SW-03 (A-912) | Fecal Coliform (MPN/100 ml) | 2.0     | Absent                  | 9221B-C            |
|                                | Total Coliform (MPN/100 ml) | 2.0     | Absent                  | 9221B-C            |
| Surface Water<br>SW-04 (A-913) | Fecal Coliform (MPN/100 ml) | < 1.8*  | Absent                  | 9221B-C            |
|                                | Total Coliform (MPN/100 ml) | < 1.8*  | Absent                  | 9221B-C            |

\*As per MPN (most probable number) chart (APHA-22<sup>nd</sup> edition), MPN <1.8 indicates absence of test organism in the supplied sample. <1.8\*

*Aha Sha 10/01/2024*

Analyst

Md. Tanzil Ahamed Shawon  
Scientific Officer  
Institute of National Analytical Research &  
Service (INARS)  
BCSIR, Dhanmondi, Dhaka-1205

*[Signature]*

Supervisor

Dr. Muhammad Abdulhaji-Mansur  
Principal Scientific Officer  
Institute of National Analytical  
Research & Service (INARS)  
BCSIR, Dhaka-1205

*[Signature]*

Director

Sarker Kamruzzaman  
Director (Addl. Charge)  
Institute of National Analytical  
Research & Service (INARS)  
BCSIR, Dhaka-1205

Page 2 of 2

Note:

- The results reported here are based only on the supplied samples in this laboratory.
- Any complain about test report will not be acceptable after one month from the date of issuing of the said report.
- This report/result shall not be reproduced/published without prior approval of the authority.

Analytical Service Cell

Dr. Qudrat-I-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh  
Telephone: 9671108, Fax: 88-02-9671108 E-mail: asc@bcsir.gov.bd Website: [www.bcsir.gov.bd](http://www.bcsir.gov.bd)

**Photographs of Surface Water Sampling**



**SW1 (Bamonsundor Canal)**



**SW2 (Daborkhali Canal)**



**SW3 (Ichakhali Canal)**



**SW4 [Pond (adjacent to the project site)]**

Laboratory Analysis Report of Groundwater

Form No. QSF-22

Revision No. 12

Revision Date: 04 November, 2022

জীবনের জন্য বিজ্ঞান



"শেখ হাসিনার দর্শন, সব মানুষের উন্নয়ন"



বাংলাদেশ বিজ্ঞান ও শিল্প গবেষণা পরিষদ

BANGLADESH COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

| Lab ID | Particulars of supplied sample | Parameters                          | Results              | Test Method (APHA)     |
|--------|--------------------------------|-------------------------------------|----------------------|------------------------|
| A-915  | Ground Water (GW-02)           | TDS (Total dissolved solids)        | 332 mg/L             | 2540.C                 |
|        |                                | Electrical Conductivity             | 587 $\mu$ S/cm       | 2510.B                 |
|        |                                | Turbidity                           | 0.83 NTU             | Turbidimeter           |
|        |                                | pH at 24.7 <sup>0</sup> C           | 7.30                 | 4500-H <sup>+</sup> .B |
|        |                                | Salinity                            | 0.3 ppt              | --                     |
|        |                                | Total hardness as CaCO <sub>3</sub> | 118 mg/L             | 2340.C                 |
|        |                                | Iron (Fe)                           | 1.82 mg/L            | 3111.B                 |
|        |                                | Arsenic (As)                        | Less than 0.005 mg/L | 3114.C                 |
| A-916  | Ground Water (GW-03)           | Manganese (Mn)                      | Less than 0.05 mg/L  | 3111.B                 |
|        |                                | TDS (Total dissolved solids)        | 2544 mg/L            | 2540.C                 |
|        |                                | Electrical Conductivity             | 5580 $\mu$ S/cm      | 2510.B                 |
|        |                                | Turbidity                           | 90.8 NTU             | Turbidimeter           |
|        |                                | pH at 24.8 <sup>0</sup> C           | 7.31                 | 4500-H <sup>+</sup> .B |
|        |                                | Salinity                            | 2.4 ppt              | --                     |
|        |                                | Total hardness as CaCO <sub>3</sub> | 944 mg/L             | 2340.C                 |
|        |                                | Iron (Fe)                           | 7.18 mg/L            | 3111.B                 |
| A-916  | Ground Water (GW-03)           | Arsenic (As)                        | Less than 0.005 mg/L | 3114.C                 |
|        |                                | Manganese (Mn)                      | 0.38 mg/L            | 3111.B                 |

*Ala Sha 10/01/2024*  
Analyst

**Md. Tazil Ahamed Shaheen**  
Scientific Officer  
In-charge of National Analytical Research & Service (INARS)  
BCSIR, Dhanmondi, Dhaka-1205

*10.01.2024*  
Supervisor

**Dr. Muhammad Abdullah Al-Mansur**  
Principal Scientific Officer  
Institute of National Analytical Research & Service (INARS)  
BCSIR, Dhaka-1205

*10/01/24*  
Director

**Sarker Kamruzzaman**  
Director (Addl. Charge)  
Institute of National Analytical Research & Service (INARS)  
BCSIR, Dhaka-1205

Page 2 of 2

Note:

- The results reported here are based only on the supplied samples in this laboratory.
- Any complain about test report will not be acceptable after one month from the date of issuing of the said report.
- This report/result shall not be reproduced/published without prior approval of the authority.

Analytical Service Cell

Dr. Qudrat-I-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh  
Telephone: 9671108, Fax: 88-02-9671108 E-mail:asc@bcsir.gov.bd Website: [www.bcsir.gov.bd](http://www.bcsir.gov.bd)

Form No. QSF-22

Revision No. 12

Revision Date: 04 November, 2022

জীবনের জন্য বিজ্ঞান

“শেখ হাসিনার মর্শন, সব মানুষের উন্নয়ন”



বাংলাদেশ বিজ্ঞান ও শিল্প গবেষণা পরিষদ  
BANGLADESH COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

Institute of National Analytical Research and Service (INARS)

## ANALYSIS REPORT

ASC Ref No. : IN-752 of Analytical Service Cell, BCSIR, 14/12/2023

Lab/Sample ID : A-914-916

Client's Details : Md. Shafiqul Islam

**Environmental and Social Consultancy Services**

**(Package No. PMC-16 BSMSN-BEZA) of**

**Bangabandhu Sheikh Mujib Shilpa Nagar**

**Development Project; Bangladesh PRIDE (P170688)**

**BANGLADESH ECONOMIC ZONES AUTHORITY**

**BCL Associates Ltd.**

Project Office: Noorani Tower (2<sup>nd</sup> Floor), 1 Mohakhali C/A,  
Bir Uttam AK Khandaker Sarak, Dhaka-1212.

Number of Sample : 03 (Three)

Sample Description : Ground Water পরীক্ষণ প্রসঙ্গে, তারিখঃ ১৩/১২/২০২৩ ইং।

Test Commencement Date : 14/12/2023

Test Completion Date : 10/01/2024

| Lab ID | Particulars of supplied sample | Parameters | Results   | Test Method (APHA) |
|--------|--------------------------------|------------|-----------|--------------------|
| A-914  | Ground Water, GW-01            | Odour      | Agreeable | In-house           |
| A-915  | Ground Water, GW-02            | Odour      | Agreeable | In-house           |
| A-916  | Ground Water, GW-03            | Odour      | Agreeable | In-house           |

Page 1 of 2

Note:

- The results reported here are based only on the supplied samples in this laboratory.
- Any complain about test report will not be acceptable after one month from the date of issuing of the said report.
- This report/result shall not be reproduced/published without prior approval of the authority.

Analytical Service Cell

Dr. Qudrat-I-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh

Telephone: 9671108, Fax: 88-02-9671108 E-mail: asc@bcsir.gov.bd Website: [www.bcsir.gov.bd](http://www.bcsir.gov.bd)

Form No. QSF-22

Revision No. 12

Revision Date: 04 November, 2022

জীবনের জন্য বিজ্ঞান

"শেখ হাসিনার দর্শন, সব মানুষের উন্নয়ন"



বাংলাদেশ বিজ্ঞান ও শিল্প গবেষণা পরিষদ

BANGLADESH COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

| Particulars of supplied sample       | Test Parameters             | Results | BDS Standard 1240: 2021 | Test Method (APHA) |
|--------------------------------------|-----------------------------|---------|-------------------------|--------------------|
| Ground Water<br><b>GW-01 (A-914)</b> | Fecal Coliform (MPN/100 ml) | < 1.8*  | Absent                  | 9221B-C            |
|                                      | Total Coliform (MPN/100 ml) | < 1.8*  | Absent                  | 9221B-C            |
| Ground Water<br><b>GW-02 (A-915)</b> | Fecal Coliform (MPN/100 ml) | < 1.8*  | Absent                  | 9221B-C            |
|                                      | Total Coliform (MPN/100 ml) | < 1.8*  | Absent                  | 9221B-C            |
| Ground Water<br><b>GW-03 (A-916)</b> | Fecal Coliform (MPN/100 ml) | < 1.8*  | Absent                  | 9221B-C            |
|                                      | Total Coliform (MPN/100 ml) | < 1.8*  | Absent                  | 9221B-C            |

\*As per MPN (most probable number) chart (APHA-22<sup>nd</sup> edition), MPN <1.8 indicates absence of test organism in the supplied sample. <1.8\*

*Alaska 10/01/2024*  
Analyst

*[Signature]*  
Supervisor

*[Signature]*  
Director

Md. Tanzil Ahamed Shown  
Scientific Officer  
Institute of National Analytical Research & Service (INARS)  
BCSIR, Dhanmondi, Dhaka-1205

Dr. Muhammad Abdulrah Al-Mansur  
Principal Scientific Officer  
Institute of National Analytical Research & Service (INARS)  
BCSIR, Dhaka-1205

Sarker Kamruzzaman  
Director (Addl. Charge)  
Institute of National Analytical Research & Service (INARS)  
BCSIR, Dhaka-1205

Page 2 of 2

Note:

- The results reported here are based only on the supplied samples in this laboratory.
- Any complain about test report will not be acceptable after one month from the date of issuing of the said report.
- This report/result shall not be reproduced/published without prior approval of the authority.

Analytical Service Cell

Dr. Oudrat-I-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh  
Telephone: 9671108, Fax: 88-02-9671108 E-mail: asc@bcsir.gov.bd Website: [www.bcsir.gov.bd](http://www.bcsir.gov.bd)

**Photographs of Ground water Sampling**



**GW1 (Charsarat Village)**



**GW2 (BEZA Office)**



**GW3 (Near to CP Mor)**

## METEOROLOGICAL DATA

Bangladesh is situated in the central part of the Asiatic monsoon region, characterized by a tropical climate. The project area falls within the South-eastern region of the country, specifically, it is classified under the South-eastern zone (A), encompassing the Chittagong sub-region. From a climatic point of view, the project area experiences a humid subtropical climate, marked by substantial fluctuations between summer and winter temperatures. The climate can be categorized into three distinct seasons:

- ◆ **Summer/Pre-monsoon: March to May**
- ◆ **Rainy Season/Monsoon: June to September**
- ◆ **Post-Monsoon: October to November**
- ◆ **Winter Season: December to February**

### Temperature

The average minimum and maximum temperature in Sitakunda station is 12.28°C & 32.94 °C, respectively. In Mirsharai area temperatures vary from 6-9°C in winters and 37-41°C in summers. Details Temperature of Sitakunda area is recored from the Sitakunda Meterological station, which is closest distance from the study area.

The data of one station has been considered for establishing temperature profile of the project area. The average minimum temperature varies between 12.28 to 25.91 °C whereas maximum temperature ranges from 27.16 to 32.94 °C. Monthly minimum and maximum temperatures and average minimum and maximum temperatures for the period 2013-2022 for Sitakunda Station are given in below tables and figures.

**Table 1: Monthly average minimum temperature (°c) in sitakunda station (2013 to 2022)**

| Year                       | Jan          | Feb          | Mar          | Apr          | May          | Jun          | Jul          | Aug          | Sep          | Oct          | Nov          | Dec          |
|----------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| <b>Sitakunda</b>           |              |              |              |              |              |              |              |              |              |              |              |              |
| 2013                       | 8.5          | 13.9         | 18.0         | 21.3         | 23.9         | 23.9         | 26.9         | 26.2         | 26.0         | 22.3         | 15.1         | 12.3         |
| 2014                       | ***          | ***          | ***          | ***          | ***          | ***          | ***          | ***          | ***          | ***          | ***          | ***          |
| 2015                       | 11.4         | 14.2         | 18.8         | 22.9         | 24.5         | 26.1         | 25.4         | 25.7         | 25.3         | 23.5         | 18.4         | 14.4         |
| 2016                       | 11.9         | 17.7         | 21.4         | 26.6         | 24.9         | 25.8         | 25.6         | 25.8         | 25.8         | 24.2         | 18.6         | 14.9         |
| 2017                       | 12.2         | 15.4         | 19.3         | 23.4         | 25.6         | 25.5         | 25.7         | 25.6         | 25.4         | 23.8         | 19.0         | 15.0         |
| 2018                       | 12.6         | 17.2         | 21.2         | 23.0         | 23.8         | 25.7         | 25.7         | 25.8         | 25.5         | 22.4         | 17.1         | 13.5         |
| 2019                       | 12.5         | 15.6         | 20.1         | 23.4         | 25.7         | 26.4         | 25.7         | 26.3         | 25.9         | 24.1         | 20.0         | 14.5         |
| 2020                       | ***          | ***          | ***          | ***          | ***          | ***          | ***          | ***          | ***          | ***          | ***          | ***          |
| 2021                       | 15.0         | 21.5         | 23.8         | 24.1         | 25.3         | 25.3         | 25.7         | 25.6         | 26.0         | 25.3         | 19.4         | 15.7         |
| 2022                       | 14.1         | 13.9         | 20.3         | 25.8         | 25.3         | 25.9         | 26.3         | 26.3         | 25.7         | 24.1         | 19.3         | 14.7         |
| <b>Average of 10 Years</b> | <b>12.28</b> | <b>16.18</b> | <b>20.36</b> | <b>23.81</b> | <b>24.88</b> | <b>25.58</b> | <b>25.88</b> | <b>25.91</b> | <b>25.70</b> | <b>23.71</b> | <b>18.36</b> | <b>14.38</b> |

Source: BMD & BBS-Statistical Yearbook 2013 to 2022 (Station: Sitakunda)

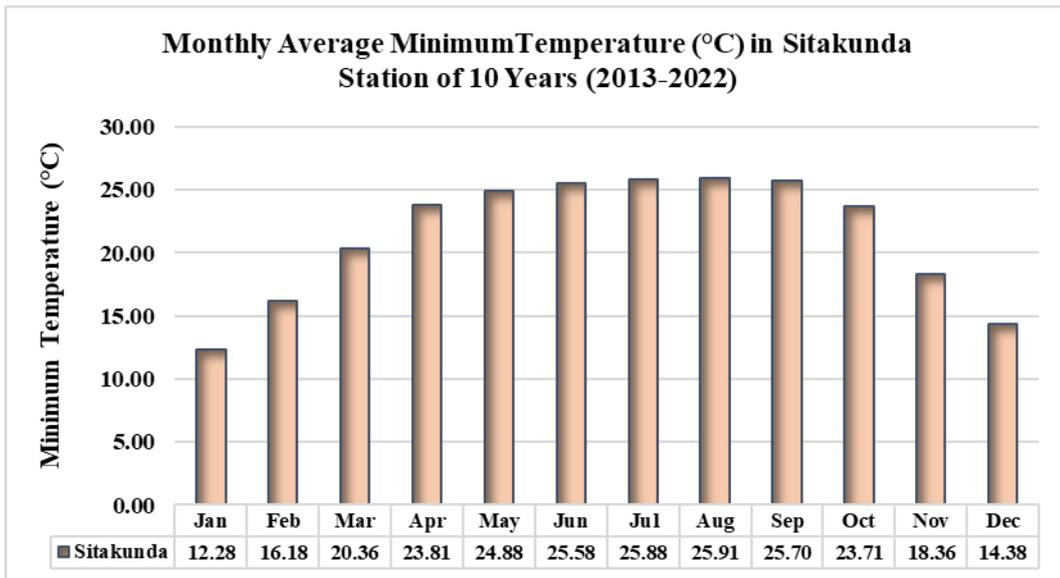
(Note: \*\*\* means data missing)

**Table 2: Monthly average maximum temperature (°c) in sitakunda station (2013 to 2022)**

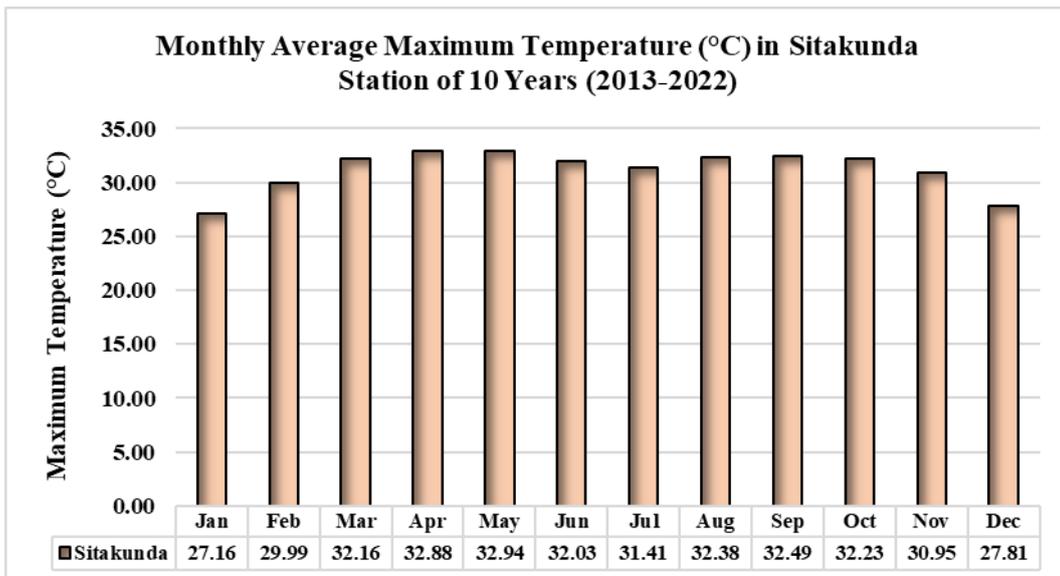
| Year                       | Jan          | Feb          | Mar          | Apr          | May          | Jun          | Jul          | Aug          | Sep          | Oct          | Nov          | Dec          |
|----------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| <b>Sitakunda</b>           |              |              |              |              |              |              |              |              |              |              |              |              |
| 2013                       | 27.0         | 31.6         | 32.9         | 33.5         | 31.3         | 33.0         | 31.5         | 31.2         | 32.8         | 31.6         | 31.2         | 27.7         |
| 2014                       | ***          | ***          | ***          | ***          | ***          | ***          | ***          | ***          | ***          | ***          | ***          | ***          |
| 2015                       | 25.8         | 27.7         | 30.8         | 31.5         | 32.7         | 31.5         | 29.7         | 34.7         | 31.7         | 31.3         | 29.9         | 26.6         |
| 2016                       | 26.4         | 30.2         | 32.9         | 32.8         | 33.5         | 32.7         | 30.9         | 31.6         | 32.9         | 32.7         | 29.9         | 29.2         |
| 2017                       | 28.5         | 30.9         | 30.3         | 31.4         | 34.2         | 31.9         | 30.6         | 31.4         | 32.0         | 32.4         | 31.7         | 28.2         |
| 2018                       | 25.8         | 29.3         | 31.7         | 33.5         | 31.9         | 31.6         | 31.8         | 32.5         | 33.1         | 31.3         | 31.0         | 27.8         |
| 2019                       | 27.9         | 28.7         | 31.3         | 33.4         | 33.4         | 33.0         | 31.5         | 32.6         | 32.1         | 32.1         | 30.6         | 25.8         |
| 2020                       | ***          | ***          | ***          | ***          | ***          | ***          | ***          | ***          | ***          | ***          | ***          | ***          |
| 2021                       | 29.5         | 33.1         | 34.0         | 34.3         | 33.9         | 31.0         | 32.0         | 31.7         | 32.8         | 33.2         | 31.3         | 28.0         |
| 2022                       | 26.4         | 28.4         | 33.4         | 32.6         | 32.6         | 31.5         | 33.3         | 33.3         | 32.5         | 33.2         | 32.0         | 29.2         |
| <b>Average of 10 Years</b> | <b>27.16</b> | <b>29.99</b> | <b>32.16</b> | <b>32.88</b> | <b>32.94</b> | <b>32.03</b> | <b>31.41</b> | <b>32.38</b> | <b>32.49</b> | <b>32.23</b> | <b>30.95</b> | <b>27.81</b> |

Source: BMD & BBS-Statistical Yearbook 2013 to 2022 (Station: Sitakunda)

(Note: \*\*\* means data missing)



**Figure 1: Monthly average minimum temperature (°c) of sitakunda station**  
Source: BMD & BBS-Statistical Yearbook 2013 to 2022 (Station: Sitakunda)



**Figure 2: Monthly average maximum temperature (°c) of sitakunda station**  
Source: BMD & BBS-Statistical Yearbook 2013 to 2022 (Station: Sitakunda)

### Rainfall

Like other coastal regions of the country, the monsoon season is very important in this region. The nearest weather station (BMD) to the site is Sitakunda, which is app. 25.0 km from EZ site in SW direction. The average annual rainfall of the Mirershorai region is 2540 mm. June July and August are the months of maximum rainfall in the project area. Average monthly rainfall varies from 0.0 to 898.5 mm. The highest rainfall was recorded in the coastal areas of Chittagong district Sitakunda Area and the lowest rainfall was observed in the western and northern parts of the country. The maximum rainfall in 2019 was 1589.0 mm in the month of July. The average monthly rainfall data (obtained from BMD) is given in below table and graph.

**Table 3: Monthly total rainfall (in mm) in sitakunda station (2013 to 2022)**

| Year             | Jan | Feb | Mar  | Apr  | May   | Jun   | Jul   | Aug   | Sep    | Oct   | Nov | Dec |
|------------------|-----|-----|------|------|-------|-------|-------|-------|--------|-------|-----|-----|
| <b>Sitakunda</b> |     |     |      |      |       |       |       |       |        |       |     |     |
| 2013             | 0.0 | 0.0 | 13.0 | 56.0 | 479.0 | 594.0 | 317.0 | 517.0 | 3244.0 | 260.0 | 1.0 | 0.0 |

| Year                       | Jan        | Feb         | Mar         | Apr          | May          | Jun          | Jul          | Aug          | Sep          | Oct          | Nov         | Dec         |
|----------------------------|------------|-------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-------------|-------------|
| 2014                       | ***        | ***         | ***         | ***          | ***          | ***          | ***          | ***          | ***          | ***          | ***         | ***         |
| 2015                       | 3.0        | 0.0         | 41.0        | 149.0        | 190.0        | 750.0        | 1324.0       | 685.0        | 438.0        | 214.0        | 3.0         | 5.0         |
| 2016                       | 3.0        | 56.0        | 140.0       | 14.0         | 336.0        | 337.0        | 771.0        | 493.0        | 312.0        | 247.0        | 102.0       | 0.0         |
| 2017                       | 0.0        | 0.0         | 113.0       | 291.0        | 261.0        | 940.0        | 1316.0       | 812.0        | 790.0        | 173.0        | 1.0         | 41.0        |
| 2018                       | 18.0       | 0.0         | 0.0         | 259.0        | 270.0        | 1158.0       | 1087.0       | 444.0        | 157.0        | 227.0        | 0.0         | 3.0         |
| 2019                       | 18.0       | 37.0        | 40.0        | 199.0        | 274.0        | 226.0        | 1589.0       | 420.0        | 337.0        | 151.0        | 117.0       | 14.0        |
| 2020                       | ***        | ***         | ***         | ***          | ***          | ***          | ***          | ***          | ***          | ***          | ***         | ***         |
| 2021                       | 0.0        | 0.0         | 0.0         | 0.0          | 94.0         | 1051.0       | 587.0        | 656.0        | 211.0        | 129.0        | 0.0         | 66.0        |
| 2022                       | 6.0        | 24.0        | 6.0         | 79.0         | 439.0        | 743.0        | 197.0        | 123.0        | 535.0        | 147.0        | 0.0         | 50.0        |
| <b>Average of 10 Years</b> | <b>6.0</b> | <b>14.6</b> | <b>44.1</b> | <b>130.9</b> | <b>292.9</b> | <b>724.9</b> | <b>898.5</b> | <b>518.8</b> | <b>753.0</b> | <b>193.5</b> | <b>28.0</b> | <b>22.4</b> |

Source: BMD & BBS-Statistical Yearbook, 2013 to 2022 (Station: Chattogram & Sitakunda)  
(Note: \*\*\* means data missing)

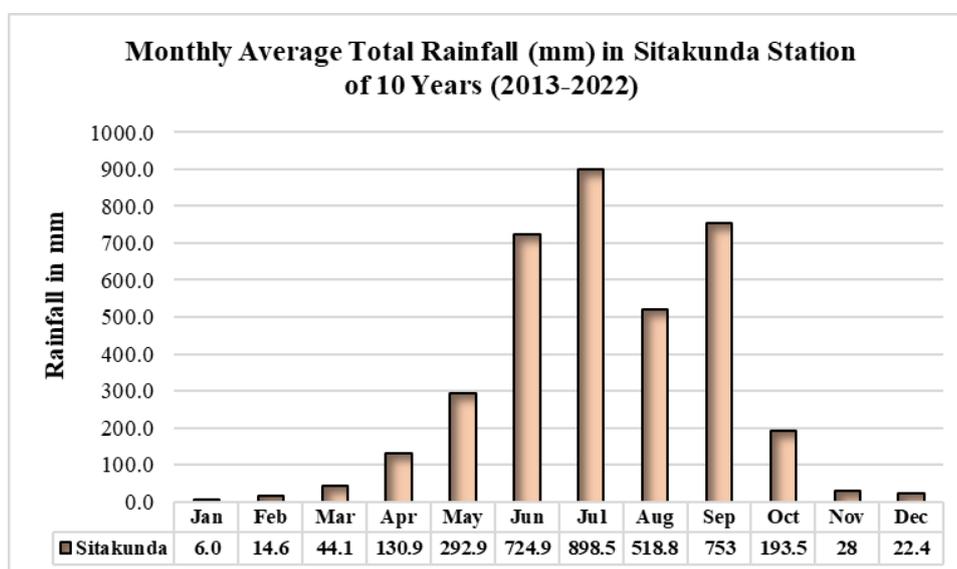


Figure 3: Monthly average total rainfall data in Sitakunda station

Source: BMD & BBS-Statistical Yearbook 2013 to 2022 (Station: Sitakunda)

The data shows that the rainy season in the project area prevails mainly from May to September. Like other coastal regions of the country, monsoon season is very important in this region.

### Humidity

Humidity in Chattogram district varies from 40% during the day in February to 90% in July and August. The spatial and temporal variation of relative humidity is very low in Bangladesh throughout the year. Data from Sitakunda station have been considered to determine the moisture content of the project area. Monthly normal relative humidity in the project area varies between 72% in February (Sitakunda) and 87% in July (Sitakunda). The data show that monthly normal humidity does not vary much with seasonal changes and is relatively high. Monthly normal humidity data for Sitakunda areas are given below table and graph.

Table 4: Monthly normal humidity in Sitakunda station

| Sl.No. | Month    | Monthly Normal Relative Humidity (%) |
|--------|----------|--------------------------------------|
|        |          | Sitakunda                            |
| 01     | January  | 75                                   |
| 02     | February | 72                                   |
| 03     | March    | 74                                   |
| 04     | April    | 78                                   |
| 05     | May      | 81                                   |

|    |           |    |
|----|-----------|----|
| 06 | June      | 85 |
| 07 | July      | 87 |
| 08 | August    | 86 |
| 09 | September | 85 |
| 10 | October   | 83 |
| 11 | November  | 80 |
| 12 | December  | 78 |

Source: BMD

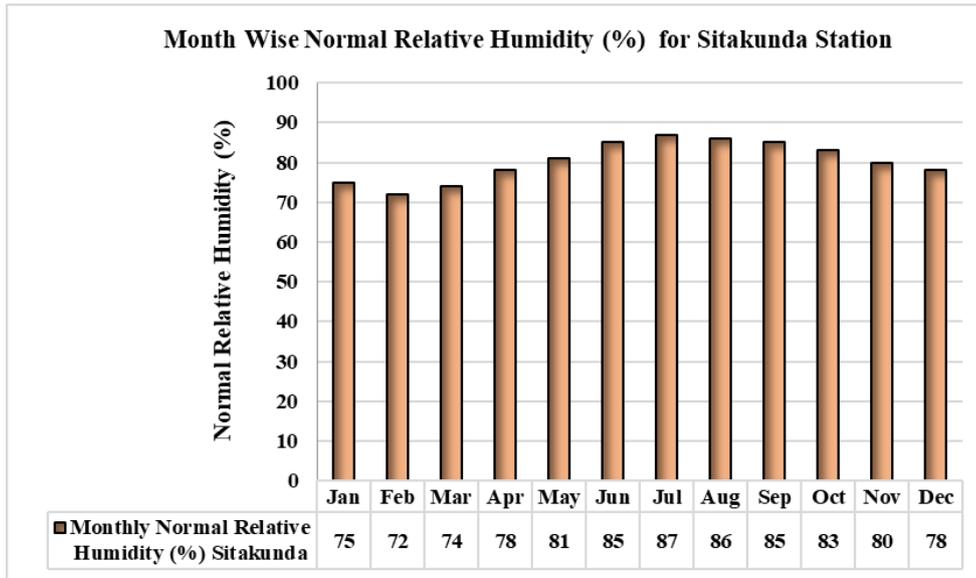


Figure 4: Humidity of chattogram & sitakunda station

Source: BMD (Bangladesh Meteorological Department)

### Evaporation

Evaporation in the project area reaches its maximum during April-May when temperature, sunshine and wind are at or near their maximum levels for the year. Evapo-transpiration peaks in April. The app distance from the nearest NNW direction to the Feni site is 15.0 km.

### Wind Speed

The Project area is characterized by southerly wind from the Bay of Bengal during monsoon and north-westerly wind from Himalaya during winter, very similar to the national pattern. The windiest months are April – July mostly. Highest wind speed was observed at Sitakunda station since this station is located at the nearest seashore. The monthly Normal Wind speeds for over the ten years (2013-2022) are shown in below figure. The Project area experiences by natural calamities such as cyclone tornados and surge by the coastal wind and high-risk zones of cyclones.

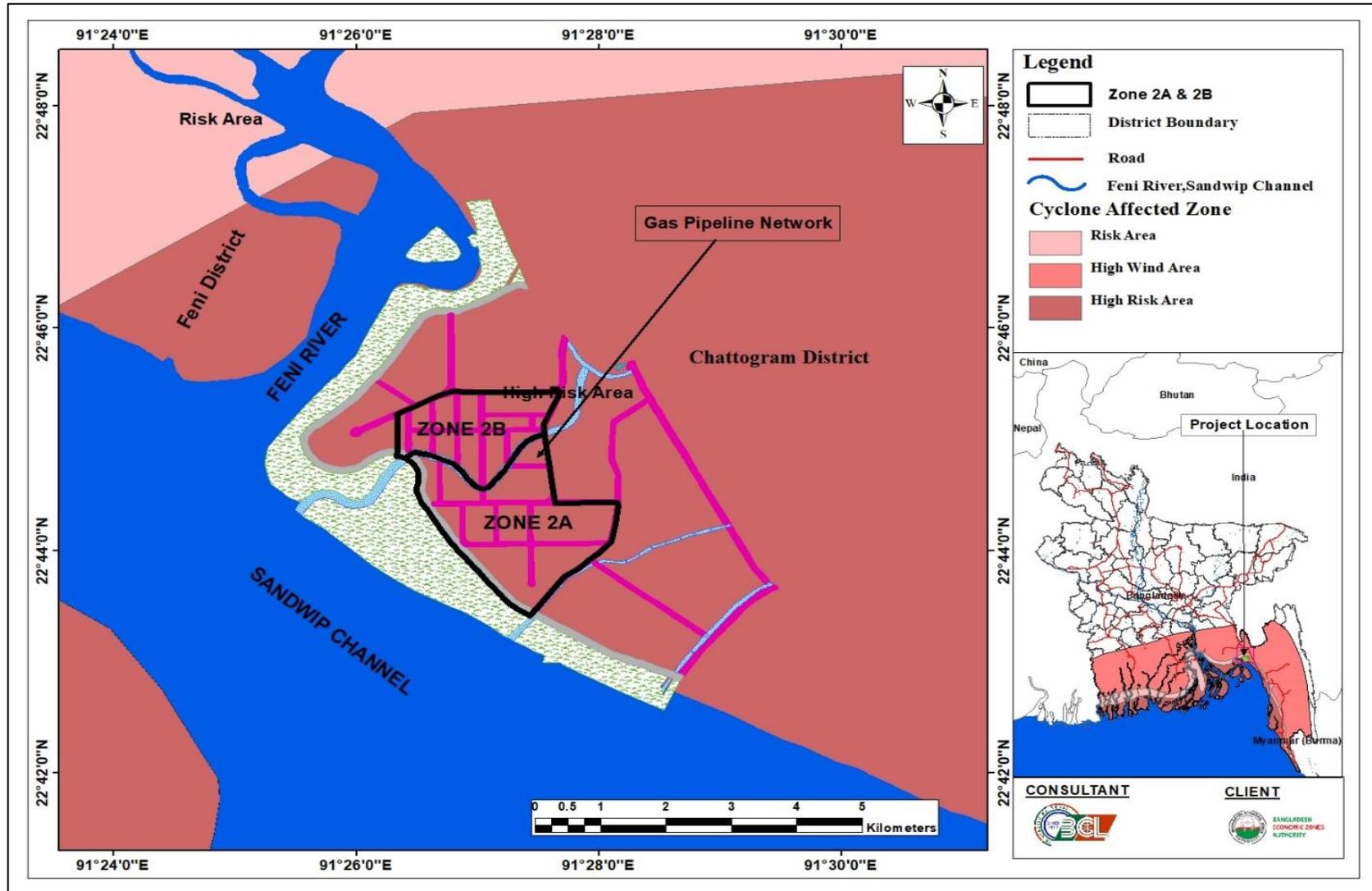


**Figure 5: Seasonal variation of wind rose in sitakunda station during the years of 2013-2022**

Units: m/s & Source: Sitakunda Meteorological Station, Bangladesh Meteorological Department (BMD), (2013-2022)

### Sunshine Hours

The monthly average sunshine hours in Sitakunda vary from 4 to 9 hours/day. Maximum sunshine hours are recorded in April, May, and June. In general, April, May and June have a maximum of 12 hours of sunlight per day.

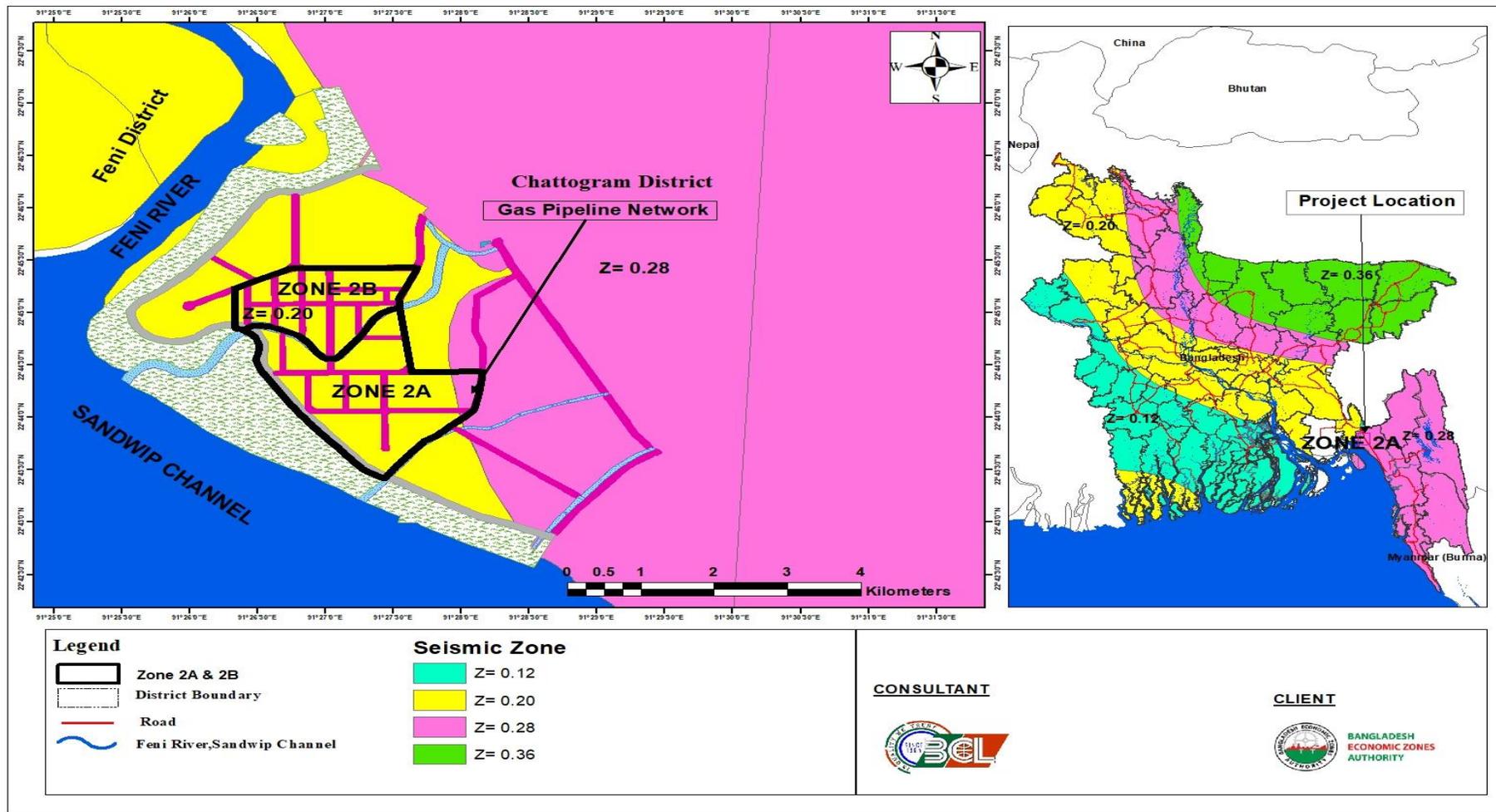


Map-7: Cyclone risk map of the project study area  
Source: SPARRSO, Bangladesh

Table 5: List of major cyclonic storms from 1960 to 2022

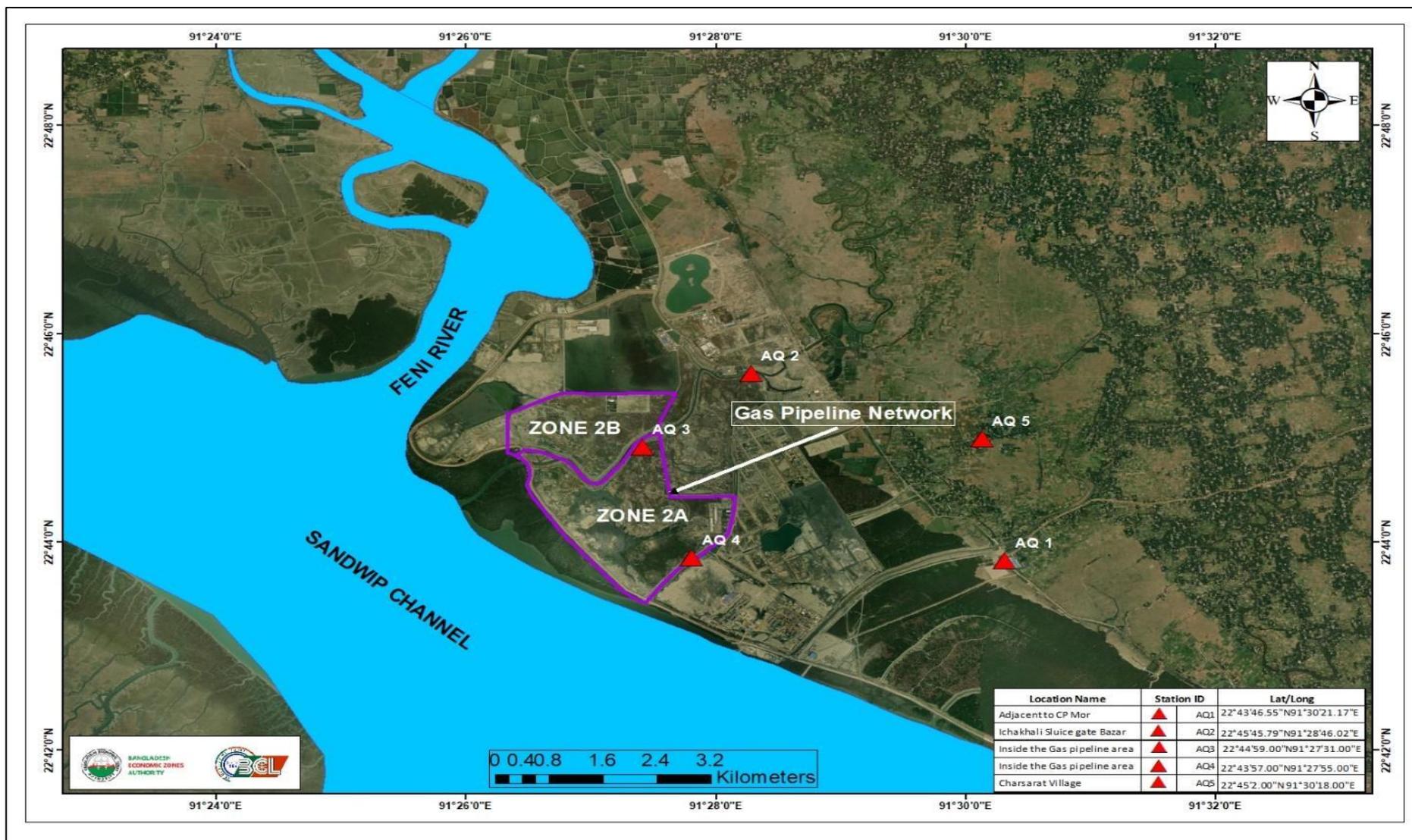
| Date of Occurrence | Nature of Phenomenon                                | Landfall Area                              | Maximum Wind Speed in km/hr. | Direction of Max. Wind Speed | Tidal Surge Height in ft. | Central Pressure (mbs) |
|--------------------|-----------------------------------------------------|--------------------------------------------|------------------------------|------------------------------|---------------------------|------------------------|
| 11.10.60           | Severe Cyclonic Storm                               | Chattogram                                 | 160                          | South-East                   | 15                        | -                      |
| 31.10.60           | Severe Cyclonic Storm                               | Chattogram                                 | 193                          | South-East                   | 20                        | -                      |
| 09.05.61           | Severe Cyclonic Storm                               | Chattogram                                 | 160                          | South-East                   | 8-10                      | -                      |
| 30.05.61           | Severe Cyclonic Storm                               | Chattogram (Near Feni)                     | 160                          | South-South-East             | 6-15                      | -                      |
| 28.05.63           | Severe Cyclonic Storm                               | Chattogram-Cox's Bazar                     | 209                          | South-East                   | 8-12                      | -                      |
| 11.05.65           | Severe Cyclonic Storm                               | Chattogram-Barisal Coast                   | 160                          | South-South-East             | 12                        | -                      |
| 05.11.65           | Severe Cyclonic Storm                               | Chattogram                                 | 160                          | South-East                   | 8-12                      | -                      |
| 01.11.66           | Severe Cyclonic Storm                               | Chattogram                                 | 120                          | South-East                   | 20-22                     | -                      |
| 12.11.70           | Severe Cyclonic Storm with a core of hurricane wind | Chattogram                                 | 224                          | South-East                   | 10-33                     | -                      |
| 15.10.83           | Cyclonic Storm                                      | Chattogram                                 | 93                           | South-East                   | -                         | 995                    |
| 24.05.85           | Severe Cyclonic Storm                               | Chattogram                                 | 154                          | South-East                   | 15                        | 982                    |
| 29.04.91           | Severe Cyclonic Storm with a core of hurricane wind | Chattogram                                 | 225                          | South-East                   | 12-22                     | 940                    |
| 19.05.97           | Severe Cyclonic Storm with a core of hurricane wind | Sitakunda                                  | 232                          | South-East                   | 15                        | 965                    |
| 27.09.97           | Severe Cyclonic Storm with a core of hurricane wind | Sitakunda                                  | 150                          | South-South-East             | 10-15                     | -                      |
| 20.05.98           | Severe Cyclonic Storm with a core of hurricane wind | Chattogram Coast near Sitakunda            | 173                          | South-South-East             | 3                         | -                      |
| 16.05.13           | Cyclonic Storm (MAHASAN)                            | Chattogram-Noakhali-Coast                  | 100                          | South-South-East             | -                         | -                      |
| 30.07.15           | Cyclonic Storm (KOMEN)                              | Chattogram-Cox's Bazar Coast               | 65                           | South-East                   | 5-7                       | 988                    |
| 21.05.16           | Cyclonic Storm (ROANU)                              | Barisal Chattogram Coast near Patenga      | 128                          | West -South-West             | 4-5                       | 992                    |
| 30.05.17           | Severe Cyclonic Storm (MORA)                        | Chattogram-Cox's Bazar Coast near Kutubdia | 146                          | South-East                   | -                         | -                      |
| 24.10.22           | Cyclonic Storm (SITRANG)                            | Barisal-Chattogram Coast near Bhola        | 88                           | NE-Bay and Adjoining NW-Bay  | -                         | -                      |

Source: BMD & BBS-Statistical Yearbook 2022



Map-8: Seismic zoning of the study area

Source: BNBC 2020



**Map- 9: Ambient Air quality monitoring location map**

*Source: Primary Data Collection by the Environment Team of BCL Associates Limited, December 202*

## Air Quality Monitoring Result Reports and Photographs



REF NO.: BCL/AAQ/08122023001

### BCL ASSOCIATES LIMITED

#### Ambient Air Quality Monitoring Report

**Project Name** : Environmental and Social Impact Assessment (ESIA) for the Gas Pipeline Network in Zone-2A and Zone-2B of the NSEZ Under National Special Economic Zone (NSEZ) Development Project

**Activities** : Ambient Air Quality Monitoring

**Sampling ID and Locations** : AAQ1, Adjacent to CP Mor, Mirsarai, Gas pipeline Area.

**Field Officer/Manager** : Md. Mustafizur Rahman, Environmentalist, BCL Associates Limited

**Monitoring/Sampling Date** : 08.12.2023

**Reporting Date** : 12.01.2024

**Description of Results** :

| Sampling ID                 | Date and Time             | GPS Coordinates                | Concentrations (µg/m <sup>3</sup> ) |                  |                                  |                 |                | CO (ppm) | CO <sub>2</sub> (ppm) |
|-----------------------------|---------------------------|--------------------------------|-------------------------------------|------------------|----------------------------------|-----------------|----------------|----------|-----------------------|
|                             |                           |                                | PM <sub>2.5</sub>                   | PM <sub>10</sub> | SO <sub>2</sub>                  | NO <sub>2</sub> | O <sub>3</sub> |          |                       |
| AAQ1                        | 08.12.2023<br>11:30:23 AM | 22°43'46.55"N<br>91°30'21.17"E | 7.93                                | 17.50            | 66.73                            | 10.26           | 8.79           | 0.80     | 156.75                |
| <b>*Bangladesh Standard</b> |                           |                                | 65                                  | 150              | 80                               | 80              | 100            | 5        | -                     |
| <b>**WHO Standard</b>       |                           |                                | 15                                  | 45               | 40                               | 25              | 100            | 10       | -                     |
| <b>Methods</b>              |                           |                                | Light Scattering Nephotometer       |                  | High Sensitivity Electrochemical |                 |                |          |                       |

Note: \*Bangladesh Air Pollution (Control) Rules, 2022;

\*\*WHO Ambient Air Quality Guideline Values (2021), which are also being referred in the World Bank and IFC's General EHS Guidelines

PM<sub>10</sub>- Particulate Matter of a diameter of 10 micron or less; PM<sub>2.5</sub>- Particulate Matter of a diameter of 2.5 micron or less; NO<sub>2</sub>- Nitrogen Dioxides; SO<sub>2</sub>- Sulphur Dioxides; O<sub>3</sub>- Ozone; CO- Carbon Monoxides; CO<sub>2</sub>- Carbon Dioxides;

#### Micro-Meteorological Monitoring Results:

| Parameters     | Air Temperature | Relative Humidity | Air Pressure | Wind Speed | Wind Direction |
|----------------|-----------------|-------------------|--------------|------------|----------------|
| Units          | (°C)            | (%)               | (hPa)        | (m/s)      | (Degree)       |
| Concentrations | 29.94           | 46.72             | 1013.98      | 2.28       | 106.57 (ESE)   |

Analyzed By

**Md. Mustafizur Rahman**  
MS in Environmental Science  
B.Sc in Environmental Science  
and Resource Management  
Environmentalist  
BCL Associates Limited

**Khadiza Akter**  
M.Engg. in Civil (Environmental)  
B.Sc in Civil, MIEB  
Environmentalist  
BCL Associates Limited

Approved By

**Dr. Nahid Amin**  
Director  
Socio-Economic and Environmental  
Safeguard  
BCL Associates Limited



Noorani Tower (2<sup>nd</sup> Floor), 1 Mohakhali Commercial Area,  
Bir Uttam A K Khandakar Sarak, Dhaka-1212, Bangladesh  
Telephone: +880 2 4881 0072-5  
Fax: +880 2 985 3032  
E-mail: bcl@bcigroup.com





REF NO.: BCL/AAQ/10122023002

## BCL ASSOCIATES LIMITED

### Ambient Air Quality Monitoring Report

**Project Name** : Environmental and Social Impact Assessment (ESIA) for the Gas Pipeline Network in Zone-2A and Zone-2B of the NSEZ Under National Special Economic Zone (NSEZ) Development Project

**Activities** : Ambient Air Quality Monitoring

**Sampling ID and Locations** : AAQ2, Ichakhali Sluice Gate Bazar

**Field Officer/Manager** : Md. Mustafizur Rahman, Environmentalist, BCL Associates Limited

**Monitoring/Sampling Date** : 10.12.2023

**Reporting Date** : 12.01.2024

**Description of Results** :

| Sampling ID                 | Date and Time             | GPS Coordinates                | Concentrations (µg/m <sup>3</sup> ) |                  |                                  |                 |                | CO (ppm) | CO <sub>2</sub> (ppm) |
|-----------------------------|---------------------------|--------------------------------|-------------------------------------|------------------|----------------------------------|-----------------|----------------|----------|-----------------------|
|                             |                           |                                | PM <sub>2.5</sub>                   | PM <sub>10</sub> | SO <sub>2</sub>                  | NO <sub>2</sub> | O <sub>3</sub> |          |                       |
| AAQ2                        | 10.12.2023<br>10:12:35 AM | 22°45'45.79"N<br>91°28'46.02"E | 10.47                               | 13.07            | 72.65                            | 18.36           | 24.11          | 0.72     | 171.57                |
| <b>*Bangladesh Standard</b> |                           |                                | 65                                  | 150              | 80                               | 80              | 100            | 5        | -                     |
| <b>**WHO Standard</b>       |                           |                                | 15                                  | 45               | 40                               | 25              | 100            | 10       | -                     |
| <b>Methods</b>              |                           |                                | Light Scattering Nephelometer       |                  | High Sensitivity Electrochemical |                 |                |          |                       |

Note: \*Bangladesh Air Pollution (Control) Rules, 2022;

\*\*WHO Ambient Air Quality Guideline Values (2021), which are also being referred in the World Bank and IFC's General EHS Guidelines

PM<sub>10</sub>- Particulate Matter of a diameter of 10 micron or less; PM<sub>2.5</sub>- Particulate Matter of a diameter of 2.5 micron or less; NO<sub>2</sub>- Nitrogen Dioxides; SO<sub>2</sub>- Sulphur Dioxides; O<sub>3</sub>- Ozone; CO- Carbon Monoxides; CO<sub>2</sub>- Carbon Dioxides;

#### Micro-Meteorological Monitoring Results:

| Parameters     | Air Temperature | Relative Humidity | Air Pressure | Wind Speed | Wind Direction |
|----------------|-----------------|-------------------|--------------|------------|----------------|
| Units          | (°C)            | (%)               | (hPa)        | (m/s)      | (Degree)       |
| Concentrations | 32.66           | 63.84             | 1001.56      | 0.47       | 47.05 (NE)     |

Analyzed By

**Md. Mustafizur Rahman**  
MS in Environmental Science  
B.Sc in Environmental Science  
and Resource Management  
Environmental  
BCL Associates Limited

**Khadiza Akter**  
M.Engg. in Civil (Environmental)  
B.Sc in Civil, MIEB  
Environmental  
BCL Associates Limited



Approved By

**Dr. Nahid Amin**  
Director  
Bio-Economic and Environmental  
Safeguard  
BCL Associates Limited



Noorani Tower (2<sup>nd</sup> Floor), 1 Mohakhali Commercial Area,  
Bir Uttam A K Khandakar Sarak, Dhaka-1212, Bangladesh  
Telephone: +880 2 4881 0072-5  
Fax: +880 2 985 3032  
E-mail: bcl@bclgroup.com





REF NO.: BCL/AAQ/11122023003

## BCL ASSOCIATES LIMITED

### Ambient Air Quality Monitoring Report

**Project Name** : Environmental and Social Impact Assessment (ESIA) for the Gas Pipeline Network in Zone-2A and Zone-2B of the NSEZ Under National Special Economic Zone (NSEZ) Development Project

**Activities** : Ambient Air Quality Monitoring

**Sampling ID and Locations** : AAQ3, Inside the Gas pipeline Area

**Field Officer/Manager** : Md. Mustafizur Rahman, Environmentalist, BCL Associates Limited

**Monitoring/Sampling Date** : 11.12.2023

**Reporting Date** : 12.01.2024

**Description of Results** :

| Sampling ID                 | Date and Time            | GPS Coordinates                | Concentrations (µg/m <sup>3</sup> ) |                  |                                  |                 |                | CO (ppm) | CO <sub>2</sub> (ppm) |
|-----------------------------|--------------------------|--------------------------------|-------------------------------------|------------------|----------------------------------|-----------------|----------------|----------|-----------------------|
|                             |                          |                                | PM <sub>2.5</sub>                   | PM <sub>10</sub> | SO <sub>2</sub>                  | NO <sub>2</sub> | O <sub>3</sub> |          |                       |
| AAQ3                        | 11.12.2023<br>9:08:17 AM | 22°44'59.00"N<br>91°27'31.00"E | 19.89                               | 38.24            | 63.58                            | 10.84           | 37.71          | 0.56     | 165.97                |
| <b>*Bangladesh Standard</b> |                          |                                | 65                                  | 150              | 80                               | 80              | 100            | 5        | -                     |
| <b>**WHO Standard</b>       |                          |                                | 15                                  | 45               | 40                               | 25              | 100            | 10       | -                     |
| <b>Methods</b>              |                          |                                | Light Scattering Nephotometer       |                  | High Sensitivity Electrochemical |                 |                |          |                       |

Note: \*Bangladesh Air Pollution (Control) Rules, 2022;

\*\*WHO Ambient Air Quality Guideline Values (2021), which are also being referred in the World Bank and IFC's General EHS Guidelines

PM<sub>10</sub>- Particulate Matter of a diameter of 10 micron or less; PM<sub>2.5</sub>- Particulate Matter of a diameter of 2.5 micron or less; NO<sub>2</sub>- Nitrogen Dioxides; SO<sub>2</sub>- Sulphur Dioxides; O<sub>3</sub>- Ozone; CO- Carbon Monoxides; CO<sub>2</sub>- Carbon Dioxides;

#### Micro-Meteorological Monitoring Results:

| Parameters     | Air Temperature | Relative Humidity | Air Pressure | Wind Speed | Wind Direction |
|----------------|-----------------|-------------------|--------------|------------|----------------|
| Units          | (°C)            | (%)               | (hPa)        | (m/s)      | (Degree)       |
| Concentrations | 27.92           | 59.25             | 1012.84      | 2.79       | 70.20 (ENE)    |

#### Analyzed By

**Md. Mustafizur Rahman**  
MS in Environmental Science  
B.Sc in Environmental Science  
and Resource Management  
Environmentalist  
BCL Associates Limited

**Khadiza Akter**  
M.Egg. in Civil (Environmental)  
B.Sc in Civil, MIEB  
Environmentalist  
BCL Associates Limited

#### Approved By

**Dr. Nahid Amin**  
Director  
Socio-Economic and Environmental  
Safeguard  
BCL Associates Limited



Noorani Tower (2<sup>nd</sup> Floor), 1 Mohakhali Commercial Area,  
Bir Uttam A K Khandakar Sarak, Dhaka-1212, Bangladesh  
Telephone: +880 2 4881 0072-5  
Fax: +880 2 985 3032  
E-mail: bcl@bcigroup.com





REF NO.: BCL/AAQ/11122023004

## BCL ASSOCIATES LIMITED

### Ambient Air Quality Monitoring Report

**Project Name** : Environmental and Social Impact Assessment (ESIA) for the Gas Pipeline Network in Zone-2A and Zone-2B of the NSEZ Under National Special Economic Zone (NSEZ) Development Project

**Activities** : Ambient Air Quality Monitoring

**Sampling ID and Locations** : AAQ4, Inside the Gas pipeline Area

**Field Officer/Manager** : Md. Mustafizur Rahman, Environmentalist, BCL Associates Limited

**Monitoring/Sampling Date** : 11.12.2023

**Reporting Date** : 12.01.2024

**Description of Results** :

| Sampling ID                 | Date and Time            | GPS Coordinates                | Concentrations (µg/m <sup>3</sup> ) |                  |                                  |                 |                | CO (ppm) | CO <sub>2</sub> (ppm) |
|-----------------------------|--------------------------|--------------------------------|-------------------------------------|------------------|----------------------------------|-----------------|----------------|----------|-----------------------|
|                             |                          |                                | PM <sub>2.5</sub>                   | PM <sub>10</sub> | SO <sub>2</sub>                  | NO <sub>2</sub> | O <sub>3</sub> |          |                       |
| AAQ4                        | 11.12.2023<br>2:15:23 PM | 22°43'57.00"N<br>91°27'55.00"E | 9.83                                | 16.53            | 70.05                            | 14.45           | 30.87          | 0.65     | 169.72                |
| <b>*Bangladesh Standard</b> |                          |                                | 65                                  | 150              | 80                               | 80              | 100            | 5        | -                     |
| <b>**WHO Standard</b>       |                          |                                | 15                                  | 45               | 40                               | 25              | 100            | 10       | -                     |
| <b>Methods</b>              |                          |                                | Light Scattering Nephelometer       |                  | High Sensitivity Electrochemical |                 |                |          |                       |

Note: \*Bangladesh Air Pollution (Control) Rules, 2022;

\*\*WHO Ambient Air Quality Guideline Values (2021), which are also being referred in the World Bank and IFC's General EHS Guidelines

PM<sub>10</sub>- Particulate Matter of a diameter of 10 micron or less; PM<sub>2.5</sub>- Particulate Matter of a diameter of 2.5 micron or less; NO<sub>2</sub>- Nitrogen Dioxides; SO<sub>2</sub>- Sulphur Dioxides; O<sub>3</sub>- Ozone; CO- Carbon Monoxides; CO<sub>2</sub>- Carbon Dioxides;

#### Micro-Meteorological Monitoring Results:

| Parameters     | Air Temperature | Relative Humidity | Air Pressure | Wind Speed | Wind Direction |
|----------------|-----------------|-------------------|--------------|------------|----------------|
| Units          | (°C)            | (%)               | (hPa)        | (m/s)      | (Degree)       |
| Concentrations | 25.00           | 69.66             | 1014.65      | 3.85       | 218.77 (SW)    |

Analyzed By

**Md. Mustafizur Rahman**  
MS in Environmental Science  
B.Sc in Environmental Science  
and Resource Management  
Environmentalist  
BCL Associates Limited

**Khadiza Akter**  
M.Engg. in Civil (Environmental)  
B.Sc in Civil, MIEB  
Environmentalist  
BCL Associates Limited

Approved By

**Dr. Nahid Amin**  
Director  
Economic and Environmental  
Safeguard  
BCL Associates Limited



Noorani Tower (2<sup>nd</sup> Floor), 1 Mohakhali Commercial Area,  
Bir Uttam A K Khandakar Sarak, Dhaka-1212, Bangladesh  
Telephone: +880 2 4881 0072-5  
Fax: +880 2 985 3032  
E-mail: bcl@bcigroup.com





REF NO.: BCL/AAQ/12122023005

## BCL ASSOCIATES LIMITED

### Ambient Air Quality Monitoring Report

**Project Name** : Environmental and Social Impact Assessment (ESIA) for the Gas Pipeline Network in Zone-2A and Zone-2B of the NSEZ Under National Special Economic Zone (NSEZ) Development Project

**Activities** : Ambient Air Quality Monitoring

**Sampling ID and Locations** : AAQ5, Charsarat Village

**Field Officer/Manager** : Md. Mustafizur Rahman, Environmentalist, BCL Associates Limited

**Monitoring/Sampling Date** : 12.12.2023

**Reporting Date** : 12.01.2024

**Description of Results** :

| Sampling ID                 | Date and Time            | GPS Coordinates               | Concentrations (µg/m <sup>3</sup> ) |                  |                                  |                 |                | CO (ppm) | CO <sub>2</sub> (ppm) |
|-----------------------------|--------------------------|-------------------------------|-------------------------------------|------------------|----------------------------------|-----------------|----------------|----------|-----------------------|
|                             |                          |                               | PM <sub>2.5</sub>                   | PM <sub>10</sub> | SO <sub>2</sub>                  | NO <sub>2</sub> | O <sub>3</sub> |          |                       |
| AAQ5                        | 12.12.2023<br>2:21:14 PM | 22°45'2.00"N<br>91°30'18.00"E | 18.37                               | 30.27            | 58.04                            | 8.75            | 15.15          | 0.50     | 170.49                |
| <b>*Bangladesh Standard</b> |                          |                               | 65                                  | 150              | 80                               | 80              | 100            | 5        | -                     |
| <b>**WHO Standard</b>       |                          |                               | 15                                  | 45               | 40                               | 25              | 100            | 10       | -                     |
| <b>Methods</b>              |                          |                               | Light Scattering Nephelometer       |                  | High Sensitivity Electrochemical |                 |                |          |                       |

Note: \*Bangladesh Air Pollution (Control) Rules, 2022;

\*\*WHO Ambient Air Quality Guideline Values (2021), which are also being referred in the World Bank and IFC's General EHS Guidelines

PM<sub>10</sub>- Particulate Matter of a diameter of 10 micron or less; PM<sub>2.5</sub>- Particulate Matter of a diameter of 2.5 micron or less; NO<sub>2</sub>- Nitrogen Dioxides; SO<sub>2</sub>- Sulphur Dioxides; O<sub>3</sub>- Ozone; CO- Carbon Monoxides; CO<sub>2</sub>- Carbon Dioxides;

#### Micro-Meteorological Monitoring Results:

| Parameters     | Air Temperature | Relative Humidity | Air Pressure | Wind Speed | Wind Direction |
|----------------|-----------------|-------------------|--------------|------------|----------------|
| Units          | (°C)            | (%)               | (hPa)        | (m/s)      | (Degree)       |
| Concentrations | 23.98           | 61.68             | 1012.01      | 0.21       | 236.78 (WSW)   |

Analyzed By

**Md. Mustafizur Rahman**  
MS in Environmental Science  
B.Sc in Environmental Science  
and Resource Management  
Environmentalist  
BCL Associates Limited

**Khadiza Akter**  
M.Engg. in Civil (Environmental)  
B.Sc in Civil, MIEB  
Environmentalist  
BCL Associates Limited

Approved By

**Dr. Nahid Amin**  
Director  
Bio-Economic and Environmental  
Safeguard  
BCL Associates Limited



Noorani Tower (2<sup>nd</sup> Floor), 1 Mohakhali Commercial Area,  
Bir Uttam A K Khandakar Sarak, Dhaka-1212, Bangladesh  
Telephone: +880 2 4881 0072-5  
Fax: +880 2 985 3032  
E-mail: bcl@bclgroup.com



## Photographs of Ambient Air Quality Monitoring



**AQ1 (Adjacent to CP Mor)**



**AQ2 (Ichakhali Sluice gate Bazar)**



**AQ3 (Inside the Gas pipeline area)**



**AQ4 (Inside the Gas pipeline area)**



**AQ5 (Charsarat Village)**

*Source: Primary Data Collection by the Environment Team of BCL Associates Limited, December 2023*

### **Methodology of Air Quality Calculation**

To align the air qualities measurement data with the standard time frame, a conversion equation was applied. Numerous agencies, including the New York State Dept. of Environmental Conservation, California Office of Environmental Health Hazards Assessment, USEPA, and Ontario Ministry of Environment, utilize a conversion process based on Pasqual's (1961) air mass dispersion tables.

Following tables define six air mass stability classes and corresponding meteorological conditions. Schroeder and Jugloff (2012) outlined a conversion approach using the simple power law to transform eight-hour readings

into 24-hour/annual values. The stability classes are correlated with average wind speed, daytime solar radiation, and night-time cloud cover, with further refinement of these relationships developed by Pasquill.

**Table 6: Pasquill-Gifford air dispersion stability classes and associated dispersion exponents**

| Stability Class | P     | Definition        |
|-----------------|-------|-------------------|
| A               | 0.5   | Very Unstable     |
| B               | 0.5   | Unstable          |
| C               | 0.333 | Slightly Unstable |
| D               | 0.2   | Neutral           |
| E               | 0.167 | Slightly Stable   |
| F               | 0.167 | Stable            |

Source: Julie Schroeder and Denis Jugloff (2012), *Interpretation of 24-hour sampling data: Development of 24-hour ambient air quality criteria and their use in Ontario*, Human Toxicology & Air Standards Section, Standards Development Branch, Ontario Ministry of the Environment, Toronto, ON, Canada

**Table 7: Meteorological conditions used to define the stability classes**

| Surface Wind Speed | Day Time Incoming Solar Radiation | Nighttime Cloud Cover | Surface Wind Speed | Day Time Incoming Solar Radiation | Nighttime Cloud Cover |
|--------------------|-----------------------------------|-----------------------|--------------------|-----------------------------------|-----------------------|
| m/s                | Strong                            | Moderate              | Slight             | >50%                              | <50%                  |
| <2                 | A                                 | A-B                   | B                  | E                                 | F                     |
| 2-3                | A-B                               | B                     | C                  | E                                 | F                     |
| 3-5                | B                                 | B-C                   | C                  | D                                 | E                     |
| 5-6                | C                                 | C-D                   | D                  | D                                 | D                     |
| >6                 | C                                 | D                     | D                  | D                                 | D                     |
| m/s                | Strong                            | Moderate              | Slight             | >50%                              | <50%                  |

The average wind speed in all air quality survey locations is less than 2 m/s. Therefore, taking the simple average of these three values from the Project stability class was calculated as 0.39 (see below).

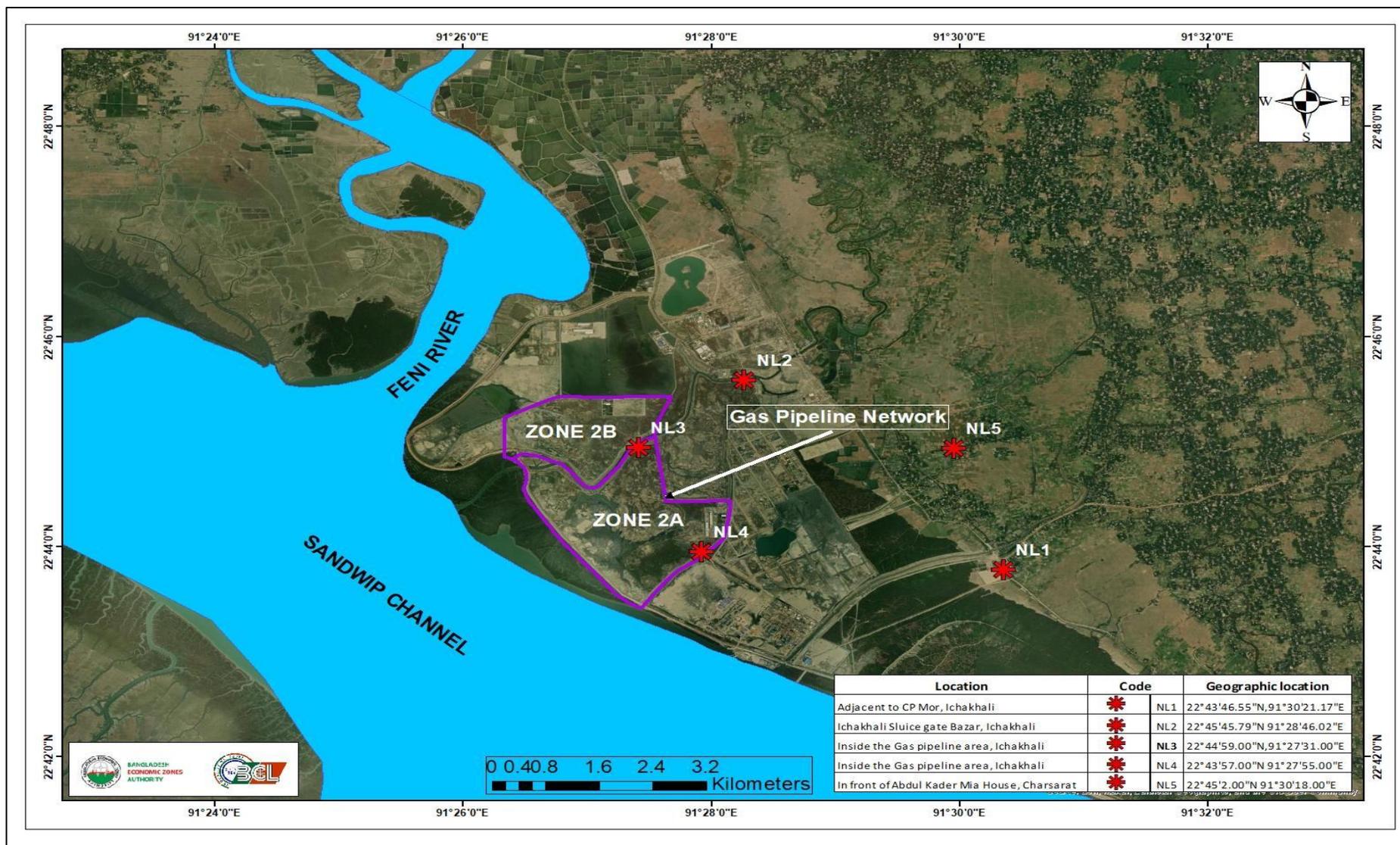
$$P = 0.5 + 0.5 + \frac{0.167}{3} = 0.389 \approx 0.39$$

This suggests a somewhat unstable air mass, resulting in considerable dilution of an Eight-hour sample when spread out over a 24-hour period. In order to provide 24-hour averages for SO<sub>2</sub>, PM<sub>2.5</sub>, and PM<sub>10</sub> parameters, the following power-law equation, as defined in Schroeder and Jugloff was applied:

$$C_{\text{long}} = C_{\text{short}} \left( \frac{t_{\text{short}}}{t_{\text{long}}} \right)^P$$

Where,

- C<sub>long</sub> = Expected output in a specific time
- C<sub>short</sub> = Outcome during Monitoring Period
- t<sub>short</sub> = Specific time period during monitoring (in minutes)
- t<sub>long</sub> = Expected time period (in minutes)
- p = Exponential factor where the value is 0.39



**Map- 10: Ambient noise monitoring location**

*Source: Data Collection by the Environment Team of BCL Associates Limited, December 2023*

## Noise Level Monitoring Analysis Report and Photographs



REF NO.: BCL/ANL/08122023001

### BCL ASSOCIATES LIMITED

#### Ambient Noise Level Monitoring Report

**Project Name** : Environmental and Social Impact Assessment (ESIA) for the Gas Pipeline Network in Zone-2A and Zone-2B of the NSEZ Under National Special Economic Zone (NSEZ) Development Project

**Activities** : Ambient Noise Level Monitoring

**Location Settings** : Mixed / Commercial Zone

**Sampling ID and Locations** : ANL1, Adjacent to CP Mor, Ichakhali, Mirsarai

**Field Officer/Manager** : Md. Mustafizur Rahman, Environmentalist, BCL Associates Limited

**Monitoring/Sampling Date** : 08.12.2023

**Reporting Date** : 14.01.2024

**Description of Results** :

| Code | GPS Coordinates                | Category of Locations  | Noise Level (dBA) |      |      |          |      |      | *BD Standard (dBA) |       | **IFC EHS Guideline (2017) |       |
|------|--------------------------------|------------------------|-------------------|------|------|----------|------|------|--------------------|-------|----------------------------|-------|
|      |                                |                        | Leqday            | Lmax | Lmin | Leqnight | Lmax | Lmin | Day                | Night | Day                        | Night |
| ANL1 | 22°43'46.55"N<br>91°30'21.17"E | Mixed /Commercial Zone | 52.7              | 68.2 | 35.1 | 37.9     | 55.6 | 32.5 | 60                 | 50    | 70                         | 70    |

Note: \*Bangladesh Noise Pollution (Control) Rules, 2006.

\*\*Guidelines values are for noise levels measured out of doors. Guidelines for Community Noise, World Health Organization (WHO), 1999

#### Analyzed By

**Md. Mustafizur Rahman**  
MS in Environmental Science  
B.Sc in Environmental Science  
and Resource Management  
Environmentalist  
BCL Associates Limited

**Khadiza Akter**  
M.Engg. in Civil (Environmental)  
B.Sc in Civil, MIEB  
Environmentalist  
BCL Associates Limited

#### Approved By

**Dr. Nahid Amin**  
Director  
Socio-Economic and Environmental  
Safeguard  
BCL Associates Limited



Noorani Tower (2<sup>nd</sup> Floor), 1 Mohakhali Commercial Area,  
Bir Uttam A K Khandakar Sarak, Dhaka-1212, Bangladesh  
Telephone: +880 2 4881 0072-5  
Fax: +880 2 985 3032  
E-mail: bcl@bcigroup.com





REF NO.: BCL/ANL/10122023002

## BCL ASSOCIATES LIMITED

### Ambient Noise Level Monitoring Report

**Project Name** : Environmental and Social Impact Assessment (ESIA) for the Gas Pipeline Network in Zone-2A and Zone-2B of the NSEZ Under National Special Economic Zone (NSEZ) Development Project

**Activities** : Ambient Noise Level Monitoring

**Location Settings** : Commercial

**Sampling ID and Locations** : ANL2, Ichakhali Sluice gate Bazar

**Field Officer/Manager** : Md. Mustafizur Rahman, Environmentalist, BCL Associates Limited

**Monitoring/Sampling Date** : 10.12.2023

**Reporting Date** : 13.01.2024

**Description of Results** :

| Code | GPS Coordinates                | Category of Locations | Noise Level (dBA)  |                  |                  |                      |                  |                  | *BD Standard (dBA) |       | **IFC EHS Guideline (2017) |       |
|------|--------------------------------|-----------------------|--------------------|------------------|------------------|----------------------|------------------|------------------|--------------------|-------|----------------------------|-------|
|      |                                |                       | L <sub>eqday</sub> | L <sub>max</sub> | L <sub>min</sub> | L <sub>eqnight</sub> | L <sub>max</sub> | L <sub>min</sub> | Day                | Night | Day                        | Night |
| ANL2 | 22°45'45.79"N<br>91°28'46.02"E | Commercial            | 67.4               | 84.2             | 38.6             | 44.3                 | 57.0             | 33.8             | 70                 | 60    | 70                         | 70    |

Note: \*Bangladesh Noise Pollution (Control) Rules, 2006.

\*\*Guidelines values are for noise levels measured out of doors. Guidelines for Community Noise, World Health Organization (WHO), 1999

Analyzed By

**Md. Mustafizur Rahman**  
MS in Environmental Science  
B.Sc in Environmental Science  
and Resource Management  
Environmentalist  
BCL Associates Limited

**Khadiza Akter**  
M.Engg. in Civil (Environmental)  
B.Sc in Civil, MIEB  
Environmentalist  
BCL Associates Limited



Approved By

**Dr. Nahid Amin**  
Director  
Economic and Environmental  
Safeguard  
BCL Associates Limited



Noorani Tower (2<sup>nd</sup> Floor), 1 Mohakhali Commercial Area,  
Bir Uttam A K Khandakar Sarak, Dhaka-1212, Bangladesh  
Telephone: +880 2 4881 0072-5  
Fax: +880 2 985 3032  
E-mail: bcl@bclgroup.com





REF NO.: BCL/ANL/11122023003

## BCL ASSOCIATES LIMITED

### Ambient Noise Level Monitoring Report

**Project Name** : Environmental and Social Impact Assessment (ESIA) for the Gas Pipeline Network in Zone-2A and Zone-2B of the NSEZ Under National Special Economic Zone (NSEZ) Development Project

**Activities** : Ambient Noise Level Monitoring

**Location Settings** : Industrial/Commercial Zone

**Sampling ID and Locations** : ANL3, Inside the Gas pipeline Area

**Field Officer/Manager** : Md. Mustafizur Rahman, Environmentalist, BCL Associates Limited

**Monitoring/Sampling Date** : 11.12.2023

**Reporting Date** : 13.01.2024

**Description of Results** :

| Code | GPS Coordinates                | Category of Locations             | Noise Level (dBA) |      |      |          |      |      | *BD Standard (dBA) |       | **IFC EHS Guideline (2017) |       |
|------|--------------------------------|-----------------------------------|-------------------|------|------|----------|------|------|--------------------|-------|----------------------------|-------|
|      |                                |                                   | Leqday            | Lmax | Lmin | Leqnight | Lmax | Lmin | Day                | Night | Day                        | Night |
| ANL3 | 22°44'59.00"N<br>91°27'31.00"E | Industrial/<br>Commercial<br>Zone | 45.0              | 59.6 | 34.3 | 33.9     | 41.5 | 32.2 | 75                 | 70    | 70                         | 70    |

Note: \*Bangladesh Noise Pollution (Control) Rules, 2006.

\*\*Guidelines values are for noise levels measured out of doors. Guidelines for Community Noise, World Health Organization (WHO), 1999

Analyzed By

**Md. Mustafizur Rahman**  
MS in Environmental Science  
B.Sc in Environmental Science  
and Resource Management  
Environmentalist  
BCL Associates Limited

**Khadiza Akter**  
M.Engg. in Civil (Environmental)  
B.Sc in Civil, MIEB  
Environmentalist  
BCL Associates Limited



Approved By

**Dr. Nahid Amin**  
Director  
Socio-Economic and Environmental  
Safeguard  
BCL Associates Limited



Noorani Tower (2<sup>nd</sup> Floor), 1 Mohakhali Commercial Area,  
Bir Uttam A K Khandakar Sarak, Dhaka-1212, Bangladesh  
Telephone: +880 2 4881 0072-5  
Fax: +880 2 985 3032  
E-mail: bcl@bclgroup.com





REF NO.: BCL/ANL/12122023004

## BCL ASSOCIATES LIMITED

### Ambient Noise Level Monitoring Report

**Project Name** : Environmental and Social Impact Assessment (ESIA) for the Gas Pipeline Network in Zone-2A and Zone-2B of the NSEZ Under National Special Economic Zone (NSEZ) Development Project

**Activities** : Ambient Noise Level Monitoring

**Location Settings** : Industrial/Commercial Zone

**Sampling ID and Locations** : ANL4, Inside the Gas pipeline Area

**Field Officer/Manager** : Md. Mustafizur Rahman, Environmentalist, BCL Associates Limited

**Monitoring/Sampling Date** : 12.12.2023

**Reporting Date** : 14.01.2024

**Description of Results** :

| Code | GPS Coordinates                | Category of Locations             | Noise Level (dBA) |      |      |         |      |      | *BD Standard (dBA) |       | **IFC EHS Guideline (2017) |       |
|------|--------------------------------|-----------------------------------|-------------------|------|------|---------|------|------|--------------------|-------|----------------------------|-------|
|      |                                |                                   | Leqday            | Lmax | Lmin | Leqnigh | Lmax | Lmin | Day                | Night | Day                        | Night |
| ANL4 | 22°43'57.00"N<br>91°27'55.00"E | Industrial/<br>Commercial<br>Zone | 47.1              | 88.7 | 35.4 | 36.7    | 43.2 | 32.0 | 75                 | 70    | 70                         | 70    |

Note: \*Bangladesh Noise Pollution (Control) Rules, 2006.

\*\*Guidelines values are for noise levels measured out of doors. Guidelines for Community Noise, World Health Organization (WHO), 1999

#### Analyzed By

**Md. Mustafizur Rahman**  
MS in Environmental Science  
B.Sc in Environmental Science  
and Resource Management  
Environmentalist  
BCL Associates Limited

**Khadiza Akter**  
M.Engg. in Civil (Environmental)  
B.Sc in Civil, MIEB  
Environmentalist  
BCL Associates Limited



#### Approved By

**Dr. Nahid Amin**  
Director  
Socio-Economic and Environmental  
Safeguard  
BCL Associates Limited



Noorani Tower (2<sup>nd</sup> Floor), 1 Mohakhali Commercial Area,  
Bir Uttam A K Khandakar Sarak, Dhaka-1212, Bangladesh  
Telephone: +880 2 4881 0072-5  
Fax: +880 2 985 3032  
E-mail: bcl@bclgroup.com





REF NO.: BCL/ANL/14122023005

## BCL ASSOCIATES LIMITED

### Ambient Noise Level Monitoring Report

**Project Name** : Environmental and Social Impact Assessment (ESIA) for the Gas Pipeline Network in Zone-2A and Zone-2B of the NSEZ Under National Special Economic Zone (NSEZ) Development Project

**Activities** : Ambient Noise Level Monitoring

**Location Settings** : Residential

**Sampling ID and Locations** : ANL5, In front of Abdul Kader Mia House, Charsarat

**Field Officer/Manager** : Md. Mustafizur Rahman, Environmentalist, BCL Associates Limited

**Monitoring/Sampling Date** : 14.12.2023

**Reporting Date** : 15.01.2024

**Description of Results** :

| Code | GPS Coordinates               | Category of Locations | Noise Level (dBA) |      |      |          |      |      | *BD Standard (dBA) |       | **IFC EHS Guideline (2017) |       |
|------|-------------------------------|-----------------------|-------------------|------|------|----------|------|------|--------------------|-------|----------------------------|-------|
|      |                               |                       | Leqday            | Lmax | Lmin | Leqnight | Lmax | Lmin | Day                | Night | Day                        | Night |
| ANL5 | 22°45'2.00"N<br>91°30'18.00"E | Residential           | 38.5              | 61.5 | 33.1 | 34.9     | 51.3 | 32.6 | 55                 | 45    | 55                         | 45    |

Note: \*Bangladesh Noise Pollution (Control) Rules, 2006.

\*\*Guidelines values are for noise levels measured out of doors. Guidelines for Community Noise, World Health Organization (WHO), 1999

Analyzed By

**Md. Mustafizur Rahman**  
MS in Environmental Science  
B.Sc in Environmental Science  
and Resource Management  
Environmentalist  
BCL Associates Limited

**Khadiza Akter**  
M.Engg. in Civil (Environmental)  
B.Sc in Civil, MIEB  
Environmentalist  
BCL Associates Limited



Approved By

**Dr. Nahid Amin**  
Director  
Socio-Economic and Environmental  
Safeguard  
BCL Associates Limited



Noorani Tower (2<sup>nd</sup> Floor), 1 Mohakhali Commercial Area,  
Bir Uttam A K Khandakar Sarak, Dhaka-1212, Bangladesh  
Telephone: +880 2 4881 0072-5  
Fax: +880 2 985 3032  
E-mail: bcl@bclgroup.com



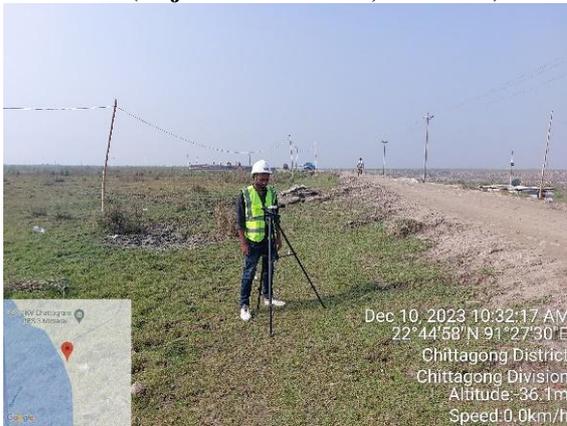
**Photographs of Ambient Noise Monitoring**



**NL1 (Adjacent to CP Mor, Ichakhali)**



**NL2 (Ichakhali Sluice gate Bazar, Ichakhali)**



**NL3 (Inside the Gas pipeline area, Ichakhali)**

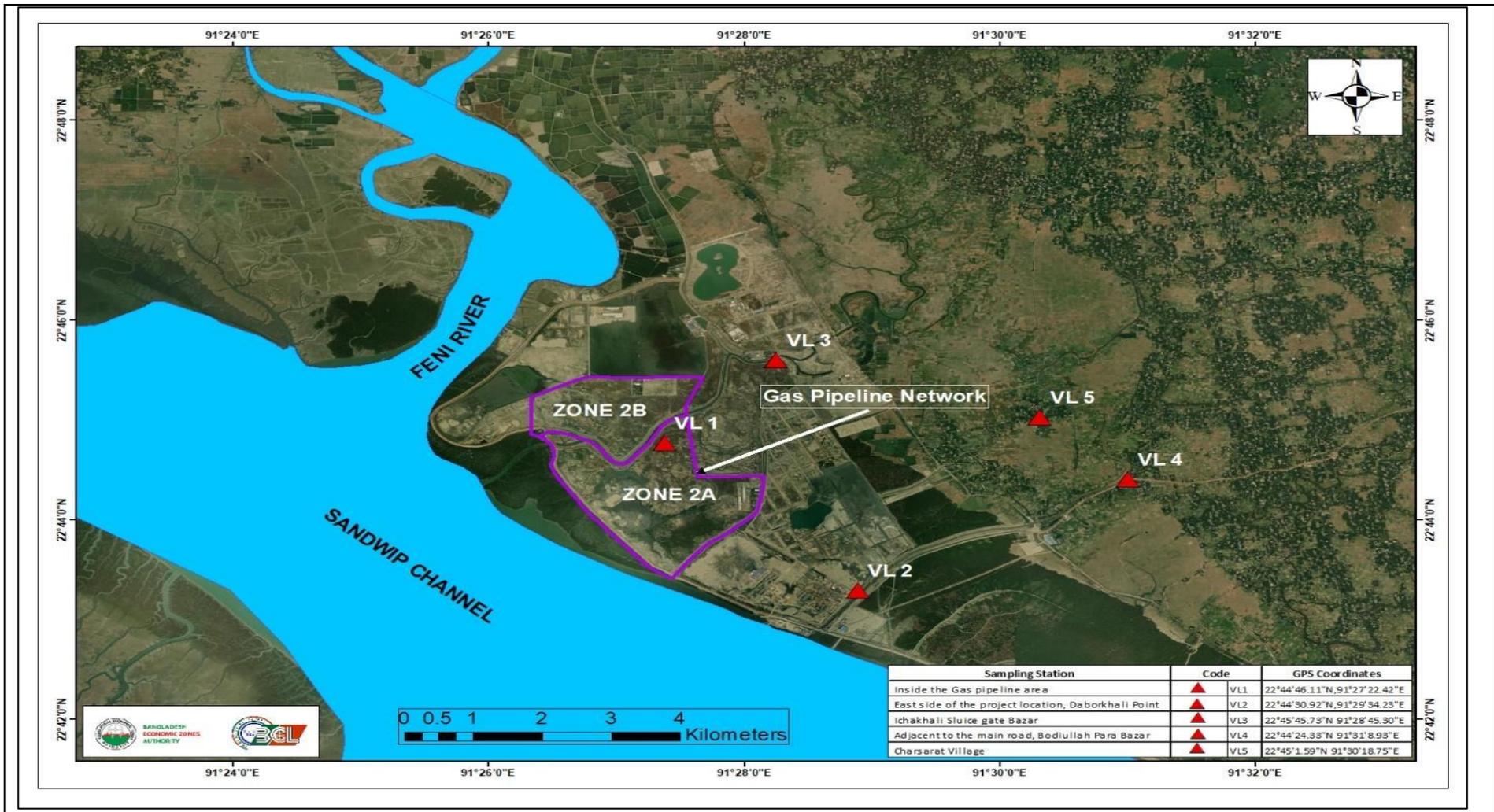


**NL4 (Inside the Gas pipeline area, Ichakhali)**



**NL5 (In front of Abdul Kader Mia House, Charsarat)**

Source: Primary Data Collection by the Environment Team of BCL Associates Limited, December



**Map- 11: Locations of the vibration monitoring**  
 Source: Data Collection by the Environment Team of BCL Associates Limited, December 2023

Vibration Level Monitoring Analysis Report and Photographs



REF NO.: BCL/VL/ 10122023001

**BCL ASSOCIATES LIMITED**

**Vibration Level Monitoring Report**

**Project Name** : Environmental and Social Impact Assessment (ESIA) for the Gas Pipeline Network in Zone-2A and Zone-2B of the NSEZ Under National Special Economic Zone (NSEZ) Development Project

**Activities** : Vibration Level Monitoring

**Sampling ID and Locations** : VL1, Inside the Gas pipeline Area

**Field Officer/Manager** : Md. Mustafizur Rahman, Environmentalist, BCL Associates Limited

**Monitoring/Sampling Date** : 10.12.2023

**Reporting Date** : 13.01.2024

**Description of Results** :

| Code | Date and Time          | GPS Coordinates                | Vibration Level (mm/s) |         |         | Standard (mm/s)            |
|------|------------------------|--------------------------------|------------------------|---------|---------|----------------------------|
|      |                        |                                | Average                | Maximum | Minimum |                            |
| VL1  | 10.12.2023<br>10.25 AM | 22°44'46.11"N<br>91°27'22.42"E | 0.35                   | 1.06    | 0.24    | Not Set Yet for Bangladesh |

**Analyzed By**

**Md. Mustafizur Rahman**  
MS in Environmental Science  
B.Sc in Environmental Science  
and Resource Management  
Environmentalist  
BCL Associates Limited

**Khadiza Akter**  
M.Engg. in Civil (Environmental)  
B.Sc in Civil, MIEB  
Environmentalist  
BCL Associates Limited



**Approved By**

**Dr. Nahid Amin**  
Director  
Socio-Economic and Environmental  
Safeguard  
BCL Associates Limited



Noorani Tower (2<sup>nd</sup> Floor), 1 Mohakhali Commercial Area,  
Bir Uttam A K Khandakar Sarak, Dhaka-1212, Bangladesh  
Telephone: +880 2 4881 0072-5  
Fax: +880 2 985 3032  
E-mail: bcl@bclgroup.com





REF NO.: BCL/VL/ 10122023002

## BCL ASSOCIATES LIMITED

### Vibration Level Monitoring Report

**Project Name** : Environmental and Social Impact Assessment (ESIA) for the Gas Pipeline Network in Zone-2A and Zone-2B of the NSEZ Under National Special Economic Zone (NSEZ) Development Project

**Activities** : Vibration Level Monitoring

**Sampling ID and Locations** : VL2, East side of the project location, Daborkhali Point

**Field Officer/Manager** : Md. Mustafizur Rahman, Environmentalist, BCL Associates Limited

**Monitoring/Sampling Date** : 10.12.2023

**Reporting Date** : 13.01.2024

**Description of Results** :

| Code | Date and Time         | GPS Coordinates                | Vibration Level (mm/s) |         |         | Standard (mm/s)            |
|------|-----------------------|--------------------------------|------------------------|---------|---------|----------------------------|
|      |                       |                                | Average                | Maximum | Minimum |                            |
| VL2  | 10.12.2023<br>4.35 AM | 22°44'30.92"N<br>91°29'34.23"E | 0.62                   | 1.23    | 0.09    | Not Set Yet for Bangladesh |

Analyzed By

**Md. Mustafizur Rahman**  
MS in Environmental Science  
B.Sc in Environmental Science  
and Resource Management  
Environmentalist  
BCL Associates Limited

**Khadiza Akter**  
M.Engg. in Civil (Environmental)  
B.Sc in Civil, MIEB  
Environmentalist  
BCL Associates Limited



Approved By

**Dr. Nahid Amin**  
Director  
Socio-Economic and Environmental  
Safeguard  
BCL Associates Limited



Noorani Tower (2<sup>nd</sup> Floor), 1 Mohakhali Commercial Area,  
Bir Uttam A K Khandakar Sarak, Dhaka-1212, Bangladesh  
Telephone: +880 2 4881 0072-5  
Fax: +880 2 985 3032  
E-mail: bcl@bclgroup.com





REF NO.: BCL/VL/ 11122023003

## BCL ASSOCIATES LIMITED

### Vibration Level Monitoring Report

**Project Name** : Environmental and Social Impact Assessment (ESIA) for the Gas Pipeline Network in Zone-2A and Zone-2B of the NSEZ Under National Special Economic Zone (NSEZ) Development Project

**Activities** : Vibration Level Monitoring

**Sampling ID and Locations** : VL3, Ichakhali Sluice Gate Bazar

**Field Officer/Manager** : Md. Mustafizur Rahman, Environmentalist, BCL Associates Limited

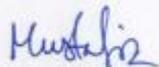
**Monitoring/Sampling Date** : 11.12.2023

**Reporting Date** : 13.01.2024

**Description of Results** :

| Code | Date and Time         | GPS Coordinates                | Vibration Level (mm/s) |         |         | Standard (mm/s)            |
|------|-----------------------|--------------------------------|------------------------|---------|---------|----------------------------|
|      |                       |                                | Average                | Maximum | Minimum |                            |
| VL3  | 11.12.2023<br>9.54 AM | 22°45'45.73"N<br>91°28'45.30"E | 0.63                   | 1.20    | 0.13    | Not Set Yet for Bangladesh |

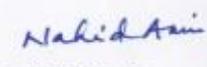
#### Analyzed By

  
**Md. Mustafizur Rahman**  
MS in Environmental Science  
B.Sc in Environmental Science  
and Resource Management  
Environmentalist  
BCL Associates Limited

  
**Khadiza Akter**  
M.Engg. in Civil (Environment)  
B.Sc in Civil, MIEB  
Environmentalist  
BCL Associates Limited



#### Approved By

  
**Dr. Nahid Amin**  
Director  
Socio-Economic and Environmental  
Safeguard  
BCL Associates Limited



Noorani Tower (2<sup>nd</sup> Floor), 1 Mohakhali Commercial Area,  
Bir Uttam A K Khandakar Sarak, Dhaka-1212, Bangladesh  
Telephone: +880 2 4881 0072-5  
Fax: +880 2 985 3032  
E-mail: bcl@bclgroup.com





REF NO.: BCL/VL/ 11122023004

## BCL ASSOCIATES LIMITED

### Vibration Level Monitoring Report

**Project Name** : Environmental and Social Impact Assessment (ESIA) for the Gas Pipeline Network in Zone-2A and Zone-2B of the NSEZ Under National Special Economic Zone (NSEZ) Development Project

**Activities** : Vibration Level Monitoring

**Sampling ID and Locations** : VL4, Adjacent to the main road, Bodiullah Para Bazar

**Field Officer/Manager** : Md. Mustafizur Rahman, Environmentalist, BCL Associates Limited

**Monitoring/Sampling Date** : 11.12.2023

**Reporting Date** : 13.01.2024

**Description of Results** :

| Code | Date and Time         | GPS Coordinates               | Vibration Level (mm/s) |         |         | Standard (mm/s)            |
|------|-----------------------|-------------------------------|------------------------|---------|---------|----------------------------|
|      |                       |                               | Average                | Maximum | Minimum |                            |
| VL4  | 11.12.2023<br>3:24 PM | 22°44'24.33"N<br>91°31'8.93"E | 0.74                   | 1.27    | 0.11    | Not Set Yet for Bangladesh |

#### Analyzed By

**Md. Mustafizur Rahman**  
MS in Environmental Science  
B.Sc in Environmental Science  
and Resource Management  
Environmentalist  
BCL Associates Limited

**Khadiza Akter**  
M.Engg. in Civil (Environment)  
B.Sc in Civil, MIEB  
Environmentalist  
BCL Associates Limited



#### Approved By

**Dr. Nahid Amin**  
Director  
Socio-Economic and Environmental  
Safeguard  
BCL Associates Limited



Noorani Tower (2<sup>nd</sup> Floor), 1 Mohakhali Commercial Area,  
Bir Uttam A K Khandakar Sarak, Dhaka-1212, Bangladesh  
Telephone: +880 2 4881 0072-5  
Fax: +880 2 985 3032  
E-mail: bcl@bclgroup.com





REF NO.: BCL/VL/ 12122023005

## BCL ASSOCIATES LIMITED

### Vibration Level Monitoring Report

**Project Name** : Environmental and Social Impact Assessment (ESIA) for the Gas Pipeline Network in Zone-2A and Zone-2B of the NSEZ Under National Special Economic Zone (NSEZ) Development Project

**Activities** : Vibration Level Monitoring

**Sampling ID and Locations** : VL5, Charsarat Village

**Field Officer/Manager** : Md. Mustafizur Rahman, Environmentalist, BCL Associates Limited

**Monitoring/Sampling Date** : 12.12.2023

**Reporting Date** : 13.01.2024

**Description of Results** :

| Code | Date and Time         | GPS Coordinates               | Vibration Level (mm/s) |         |         | Standard (mm/s)            |
|------|-----------------------|-------------------------------|------------------------|---------|---------|----------------------------|
|      |                       |                               | Average                | Maximum | Minimum |                            |
| VL5  | 12.12.2023<br>9.12 AM | 22°45'1.59"N<br>91°30'18.75"E | 0.36                   | 0.57    | 0.24    | Not Set Yet for Bangladesh |

#### Analyzed By

**Md. Mustafizur Rahman**  
MS in Environmental Science  
B.Sc in Environmental Science  
and Resource Management  
Environmentalist  
BCL Associates Limited

**Khadiza Akter**  
M.Engg. in Civil (Environmental)  
B.Sc in Civil, MIEB  
Environmentalist  
BCL Associates Limited



#### Approved By

**Dr. Nahid Amin**  
Director  
Socio-Economic and Environmental  
Safeguard  
BCL Associates Limited



Noorani Tower (2<sup>nd</sup> Floor), 1 Mohakhali Commercial Area,  
Bir Uttam A K Khandakar Sarak, Dhaka-1212, Bangladesh  
Telephone: +880 2 4881 0072-5  
Fax: +880 2 985 3032  
E-mail: bcl@bclgroup.com



**Photographs of Vibration Level Monitoring**



**VL1 (Inside the Gas pipeline area)**



**VL2 (East side of the project location, Daborkhali Point)**



**VL3 (Ichakhali Sluice gate Bazar)**



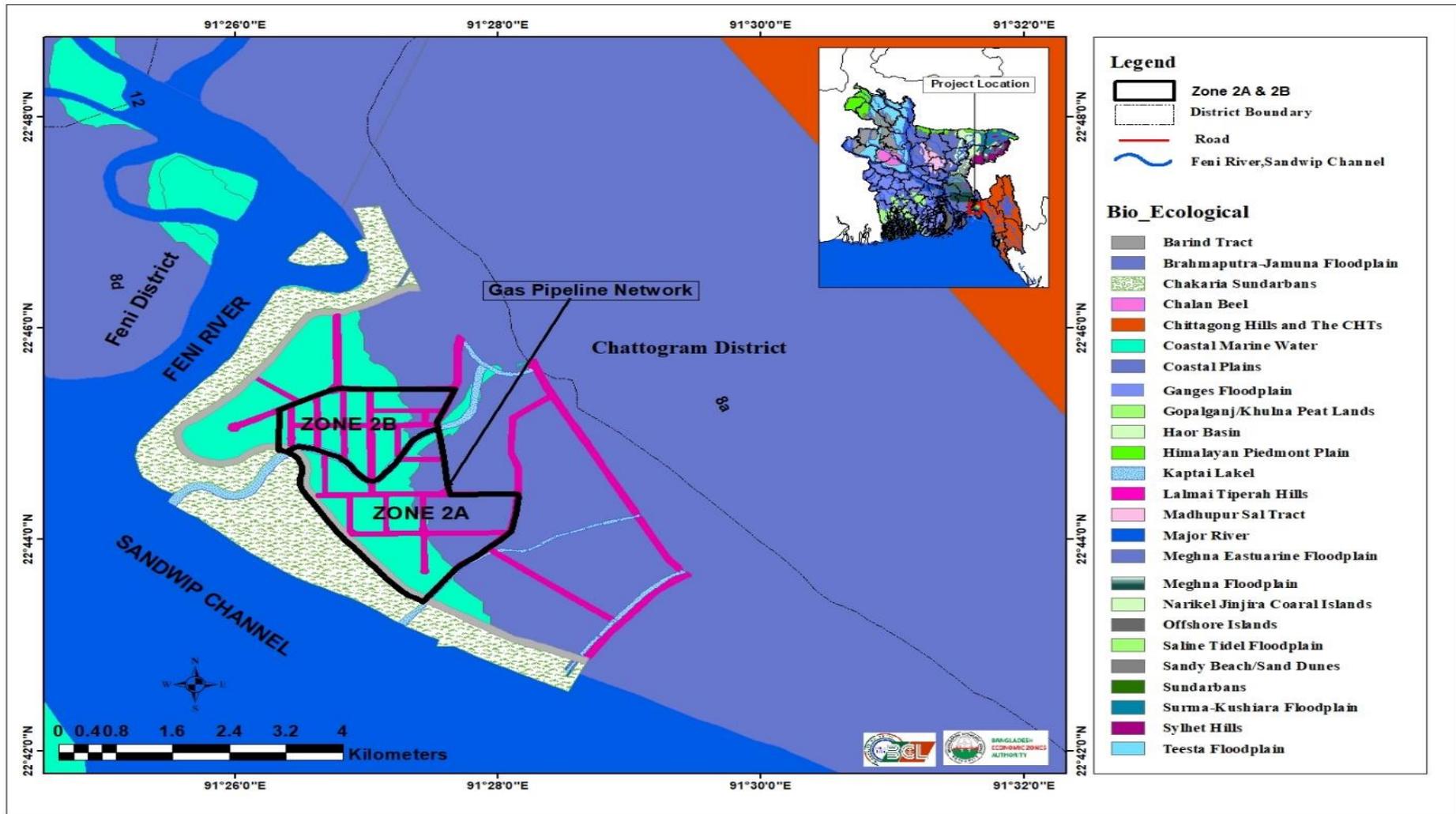
**VL4 (Adjacent to the main road, Bodiullah Para Bazar)**



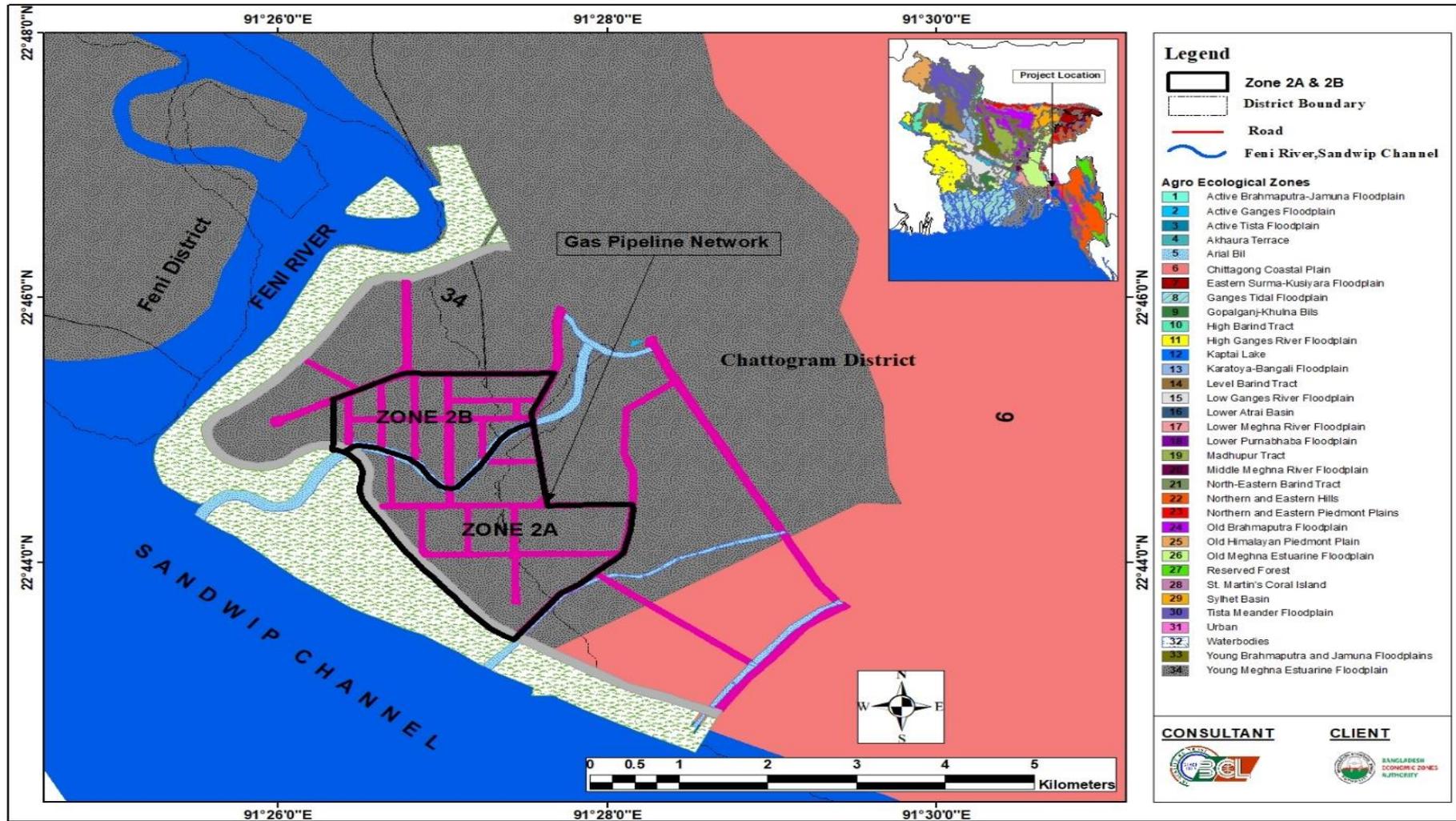
**VL5 (Charsarat Village)**

Source: Primary Data Collection by the Environment Team of BCL Associates Limited, December 2023

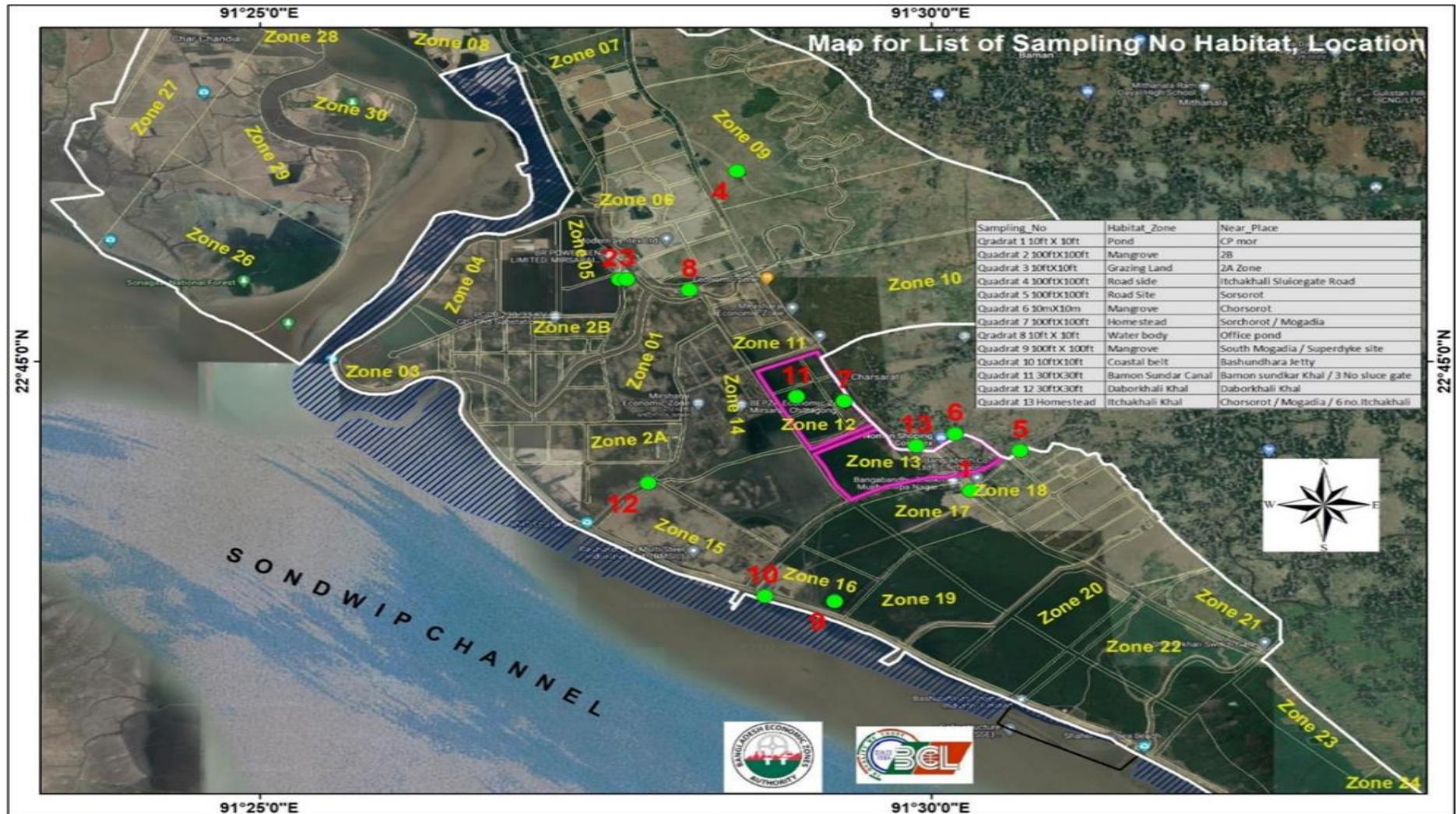
B. Ecological Baseline



Map-12: Bio-ecological zones in the study area  
Source: IUCN, 2013



Map-13: Agro-ecological zones of Bangladesh and the project area  
Source IWM, Environmental and Social Assessment (ESA) January 2020



**Map-14: Quadrat sampling locations in the study area**

Source: Data Collection by the Environment Team of BCL Associates Limited, December 2023

Table 9: Terrestrial plant's scientific names, family, uses and iucn global status

| S/N | Local Name    | English name       | Scientific name                 | Family         | Relative abundance | Type  | Use         | IUCN-Global |
|-----|---------------|--------------------|---------------------------------|----------------|--------------------|-------|-------------|-------------|
| 1.  | Binna grass   | Vetiver            | <i>Chrysopogon zizanioides</i>  | Poaceae        | C                  | Herb  | Cattle food | Unknown     |
| 2.  | Shimul        | Red silk cotton    | <i>Bombax ceiba</i>             | Bombacaceae    | R                  | Tree  | Cotton      | LC          |
| 3.  | Nol           | Reed               | <i>Phgmities karka</i>          | Poaceae        | C                  | Herb  | Cow shade   | Unknown     |
| 4.  | Khejur        | Date palm          | <i>Phoenix sylvestris</i>       | Arecaceae      | C                  | Shrub | Fruit       | Unknown     |
| 5.  | Supari        | Bettle Nut         | <i>Areca catechu</i>            | Arecaceae      | C                  | Tree  | Fruit       | DD          |
| 6.  | Narikel       | Coconut            | <i>Cococs nucifera</i>          | Arecaceae      | C                  | Tree  | Fruit       | Unknown     |
| 7.  | Lichu         | Litchi             | <i>Litchi chinensis</i>         | Sapidaeae      | C                  | Tree  | Fruit       | Unknown     |
| 8.  | Aam           | Mango              | <i>Mangifera indica</i>         | Anacardiaceae  | C                  | Tree  | Fruit       | DD          |
| 9.  | Boroi         | Jujubi             | <i>Zizyphus mauritiana</i>      | Rhamnaceae     | C                  | Tree  | Fruit       | Unknown     |
| 10. | Peyara        | Guava              | <i>Psidium guajava</i>          | Myrtaceae      | F                  | Herb  | Fruit       | LC          |
| 11. | Kathal        | Jackfruit Tree     | <i>Artocarpus heterophyllus</i> | Moraceae       | F                  | Tree  | Fruit       | Unknown     |
| 12. | Kodbel        | Wood apple         | <i>Limonia acidissima</i>       | Rutaceae       | F                  | Tree  | Fruit       | Unknown     |
| 13. | Sajna         | Drumstick          | <i>Moringa olefera</i>          | Moringanaceae  | F                  | Tree  | Fruit       | Unknown     |
| 14. | Jalpai        | Olive              | <i>Elaeocarpus robustus</i>     | Elaeocarpaceae | R                  | Herb  | Fruit       | Unknown     |
| 15. | Jambura       | Pomelo             | <i>Citrus grandis</i>           | Rutaceae       | R                  | Shrub | Fruit       | LC          |
| 16. | Bel           | Wood Apple         | <i>Angle marmelos</i>           | Rutaceae       | R                  | Tree  | Fruit       | Unknown     |
| 17. | Sarifa        | Custard apple      | <i>Annona reticulata</i>        | Annonaceae     | R                  | Tree  | Fruit       | LC          |
| 18. | Ata           | Bullock's Heart    | <i>Annona squamosa</i>          | Annonaceae     | R                  | Tree  | Fruit       | LC          |
| 19. | Kamranga      | Star fruit         | <i>Avarrhoa carambola</i>       | Avarrhoaceae   | R                  | Tree  | Fruit       | Unknown     |
| 20. | Tal           | Palm               | <i>Borassus flabollifer</i>     | Arecaceae      | R                  | Tree  | Fruit       | Unknown     |
| 21. | Lebu          | Lemon              | <i>Citrus aurantifolia</i>      | Rutaceae       | R                  | Tree  | Fruit       | Unknown     |
| 22. | Chalta        | Elephant Apple     | <i>Dillenia indica</i>          | Dilleniaceae   | R                  | Tree  | Fruit       | LC          |
| 23. | Bilati gub    | Valvet apple       | <i>Diospyros blancoi</i>        | Ebenaceae      | R                  | Tree  | Fruit       | Unknown     |
| 24. | Kadbel        | Wood-apple         | <i>Feronia limonia</i>          | Rutaceae       | R                  | Tree  | Fruit       | Unknown     |
| 25. | Safeda        | Sapota             | <i>Manilkara sapota</i>         | Sapotaceae     | R                  | Tree  | Fruit       | Unknown     |
| 26. | Amloki        | Indian gooseberry  | <i>Phyllanthus emblica</i>      | Phyllanthaceae | R                  | Tree  | Fruit       | Unknown     |
| 27. | Dalim         | Palm granate       | <i>Punica granatum</i>          | Punicaceae     | R                  | Tree  | Fruit       | LC          |
| 28. | Amra          | Wild Mango         | <i>Spondias pinata</i>          | Anacardiaceae  | R                  | Tree  | Fruit       | Unknown     |
| 29. | Kola          | Banana             | <i>Musa paradisiaca</i>         | Musaceae       | VC                 | Shrub | Fruit       | Unknown     |
| 30. | None Jhau     | Tamarix            | <i>Tamarix dioica</i>           | Tamaricaceae   | C                  | Shrub | Fuel        | Unknown     |
| 31. | Dalkalmi      | Pink morning glory | <i>Ipomea carnea</i>            | Convolvulaceae | C                  | Shrub | Fuel        | Unknown     |
| 32. | Bajna         | Cape yellow wood   | <i>Xanthoxylum rhetsa</i>       | Rutaceae       | R                  | Shrub | Fuel        | Unknown     |
| 33. | Jiga          | Indian ash tree    | <i>Lannea coromandelica</i>     | Anacardiaceae  | VC                 | Shrub | Fuel        | LC          |
| 34. | Ghrita Kumari | Aloe vera          | <i>Aloe vera</i>                | Liliaceae      | C                  | Herb  | Medicinal   | Unknown     |
| 35. | Arahor        | Gandule bean       | <i>Cajanus cajan</i>            | Fabaceae       | C                  | Herb  | Medicinal   | NT          |

| S/N | Local Name | English name              | Scientific name              | Family         | Relative abundance | Type  | Use       | IUCN-Global |
|-----|------------|---------------------------|------------------------------|----------------|--------------------|-------|-----------|-------------|
| 36. | Kalkasundi | Kasunda, Baner            | <i>Cassia sophera</i>        | Fabaceae       | C                  | Herb  | Medicinal | Unknown     |
| 37. | Jhonjhoni  | Crotalaria                | <i>Crotalaria saltiana</i>   | Fabaceae       | C                  | Herb  | Medicinal | Unknown     |
| 38. | Dhotura    | Downy thorn apple         | <i>Datura metel</i>          | Solanaceae     | C                  | Herb  | Medicinal | Unknown     |
| 39. | Dutura     | Jimson weed or datura     | <i>Datura stramonium</i>     | Solanaceae     | C                  | Herb  | Medicinal | Unknown     |
| 40. | Tulsi      | Holy Basil                | <i>Ocimum sanctum</i>        | Lamiaceae      | C                  | Herb  | Medicinal | Unknown     |
| 41. | Futki      | Gooseberry                | <i>Physalis minima</i>       | Solanaceae     | C                  | Herb  | Medicinal | LC          |
| 42. | Berela     | flannel weed              | <i>Sida cordifolia</i>       | Malvaceae      | C                  | Herb  | Medicinal | Unknown     |
| 43. | Tit begun  | Eggplant                  | <i>Solanum nigrum</i>        | Solanaceae     | C                  | Herb  | Medicinal | Unknown     |
| 44. | Kantakiri  | Yellow Berried Nightshade | <i>Solanum xanthocarpum</i>  | Solanaceae     | C                  | Herb  | Medicinal | Unknown     |
| 45. | Kauri      | Toothache Plant           | <i>Spilentes acmela</i>      | Poaceae        | C                  | Herb  | Medicinal | Unknown     |
| 46. | Akondo     | Sodom apple               | <i>Calotropis gigantea</i>   | Menispermaceae | C                  | Shrub | Medicinal | Unknown     |
| 47. | Papaw      | Carica papaw              | <i>Carica papaya</i>         | Caricaceae     | C                  | Shrub | Medicinal | DD          |
| 48. | Joggodumur | Fig                       | <i>Ficus racemosa</i>        | Moraceae       | C                  | Shrub | Medicinal | LC          |
| 49. | Shetodron  | Thumbai                   | <i>Leucas aspera</i>         | Lamiaceae      | C                  | Shrub | Medicinal | Unknown     |
| 50. | Bherenda   | Seed oil                  | <i>Ricinus communis</i>      | Euphorbiaceae  | C                  | Shrub | Medicinal | Unknown     |
| 51. | Ghoraneem  | China berry tree          | <i>Melia azadarach</i>       | Meliaceae      | F                  | Tree  | Medicinal | Unknown     |
| 52. | Neem       | Margosa tree              | <i>Azadirachta indica</i>    | Meliaceae      | R                  | Tree  | Medicinal | LC          |
| 53. | Tetul      | Tamarind                  | <i>Tamarindus indica</i>     | Caesalpinaceae | R                  | Tree  | Medicinal | LC          |
| 54. | Arjun      | Arjuna Myrobalan          | <i>Terminalia aurjuna</i>    | Combretaceae   | R                  | Tree  | Medicinal | Unknown     |
| 55. | Muktajhuri | Indian acalypha           | <i>Acalypha indica</i>       | Euphorbiaceae  | VC                 | Herb  | Medicinal | Unknown     |
| 56. | Apang      | Handicapped               | <i>Achyrenthes aspera</i>    | Amaranthaceae  | VC                 | Herb  | Medicinal | Unknown     |
| 57. | Shialkanta | Mexican poppy             | <i>Argemone mexicana</i>     | Papaveraceae   | VC                 | Herb  | Medicinal | unknown     |
| 58. | Brammisak  | water hyssop              | <i>Bacopa monnieri</i>       | Plantaginaceae | VC                 | Herb  | Medicinal | LC          |
| 59. | Thankoni   | Indian Pennywort          | <i>Centella asiatica</i>     | Apiaceae       | VC                 | Herb  | Medicinal | LC          |
| 60. | Batua shak | Wild spinach              | <i>Chenopodium album</i>     | Chenopodiaceae | VC                 | Herb  | Medicinal | Unknown     |
| 61. | Bhat       | Glorybower                | <i>Clerodendrum viscosum</i> | Verbanaceae    | VC                 | Herb  | Medicinal | Unknown     |
| 62. | Telakucha  | Little Gourd              | <i>Coccinia cordifolia</i>   | Cucubitaceae   | VC                 | Herb  | Medicinal | Unknown     |
| 63. | Kachu      | Aram                      | <i>Colocasia esculenta</i>   | Araceae        | VC                 | Herb  | Medicinal | LC          |
| 64. | Khanchira  | Bengal dayflower          | <i>Commelia benghalensis</i> | Commelinaceae  | VC                 | Herb  | Medicinal | Unknown     |
| 65. | Nanbhantur | Variegated laurel         | <i>Croton bonplandinus</i>   | Euphorbiaceae  | VC                 | Herb  | Medicinal | Unknown     |
| 66. | Durbagrass | Devils grass              | <i>Cynodon dactylon</i>      | Poaceae        | VC                 | Herb  | Medicinal | Unknown     |
| 67. | Dhekishak  | Vegetable Fern            | <i>Diplazium esculantum</i>  | Athyriaceae    | VC                 | Herb  | Medicinal | Unknown     |
| 68. | Kalokeshi  | Bhringraj                 | <i>Eclipta alba</i>          | Compositae     | VC                 | Herb  | Medicinal | LC          |
| 69. | Helench    | Spinach                   | <i>Enhydra fluctuans</i>     | Asteraceae     | VC                 | Herb  | Medicinal | LC          |
| 70. | Assamlata  | Christmas Bush            | <i>Eupatorium odoratum</i>   | Asteraceae     | VC                 | Herb  | Medicinal | Unknown     |

| S/N | Local Name  | English name           | Scientific name                | Family            | Relative abundance | Type  | Use       | IUCN-Global |
|-----|-------------|------------------------|--------------------------------|-------------------|--------------------|-------|-----------|-------------|
| 71. | Dhudilata   | Asthma plant           | <i>Euphorba hirta</i>          | Euphorbiaceae     | VC                 | Herb  | Medicinal | Unknown     |
| 72. | Gimashak    | Slender carpet-weed    | <i>Glinus oppositifolia</i>    | Mulluginacea      | VC                 | Herb  | Medicinal | Unknown     |
| 73. | Hatishur    | Indian heliotrope      | <i>Heliotropium indicum</i>    | Boraginaceae      | VC                 | Herb  | Medicinal | Unknown     |
| 74. | Lalbherenda | bellyache bush         | <i>Jatropha gossipifolia</i>   | Euphorbiaceae     | VC                 | Herb  | Medicinal | Unknown     |
| 75. | Matmatia    | Lemon bush             | <i>Lippia geminata</i>         | Verbenaceae       | VC                 | Herb  | Medicinal | Unknown     |
| 76. | Shushnishak | 4-leaf clover          | <i>Marsilea quadrifolia</i>    | Marsileaceae      | VC                 | Herb  | Medicinal | LC          |
| 77. | Taralata    | Climbing hemp weed     | <i>Mikania scandens</i>        | Asteraceae        | VC                 | Herb  | Medicinal | Unknown     |
| 78. | Lajjabati   | Sensitive plant        | <i>Mimosa pudica</i>           | Mimosoideae       | VC                 | Herb  | Medicinal | LC          |
| 79. | Bishkatali  | Water-pepper           | <i>Persicaria hydropiper</i>   | Polygonaceae      | VC                 | Herb  | Medicinal | LC          |
| 80. | Bhoiamra    | Chamber bitter         | <i>Phyllanthus urinaria</i>    | Euohorbiaceae     | VC                 | Herb  | Medicinal | Unknown     |
| 81. | Bishkhatali | Pepperwort             | <i>Polygonum orientale</i>     | Polygonaceae      | VC                 | Herb  | Medicinal | Unknown     |
| 82. | Mistridana  | Sweet broom            | <i>Scoparia dulcis</i>         | Schrophulariaceae | VC                 | Herb  | Medicinal | Unknown     |
| 83. | Kumari lata | Prickly-ivy            | <i>Smilax macrophylla</i>      | Smilacaceae       | VC                 | Herb  | Medicinal | Unknown     |
| 84. | Tridara     | Coatbuttons            | <i>Tridax procumbens</i>       | Compositae        | VC                 | Herb  | Medicinal | Unknown     |
| 85. | Nayantara   | Pri winkle             | <i>Vinca rosea</i>             | Apocynaceae       | VC                 | Herb  | Medicinal | Unknown     |
| 86. | Nishinda    | Five leaved caste tree | <i>Vitex negundo</i>           | Verbenaceae       | VC                 | Herb  | Medicinal | Unknown     |
| 87. | Katamaira   | Slender amaranth       | <i>Amiranthus viridis</i>      | Amaranthaceae     | VC                 | Shrub | Medicinal | Unknown     |
| 88. | Swarnalata  | Lustrous               | <i>Cuscuta reflexa</i>         | Cuscutaceae       | VC                 | Shrub | Medicinal | LC          |
| 89. | Radhachura  | Pea cock flower        | <i>Caesalpinia pulcherrima</i> | Caesalpinaceae    | C                  | Herb  | Ornament  | LC          |
| 90. | Rangan      | jungle geranium        | <i>Ixora coccinea</i>          | Rubiaceae         | C                  | Herb  | Ornament  | Unknown     |
| 91. | Mehendi     | Henna                  | <i>Lawsonia inermis</i>        | Lythraceae        | C                  | Herb  | Ornament  | LC          |
| 92. | Jaba        | China rose             | <i>Hibiscus rosa chinensis</i> | Poaceae           | C                  | Shrub | Ornament  | Unknown     |
| 93. | Kulekhara   | Swamp weed             | <i>Hygrophila auriculata</i>   | Acanthaceae       | C                  | Shrub | Ornament  | LC          |
| 94. | Kanchon     | Orchid tree            | <i>Bauhinia purpurea</i>       | Fabaceae          | C                  | Tree  | Ornament  | LC          |
| 95. | Jarul       | Pride of India         | <i>Lagerstroemia speciosa</i>  | Lythraceae        | C                  | Tree  | Ornament  | LC          |
| 96. | Debdaru     | Mast tree              | <i>Polyalthia longifolia</i>   | Annonaceae        | C                  | Tree  | Ornament  | Unknown     |
| 97. | Bansh       | Bamboo                 | <i>Bambosa spp.</i>            | Poaceae           | C                  | Herb  | Timber    | Unknown     |
| 98. | Akashmoni   | Ear-pod Wattle         | <i>Acacia auriculiformis</i>   | Mimosaceae        | C                  | Tree  | Timber    | LC          |
| 99. | Babla       | Black Babool           | <i>Acacia nilotica</i>         | Mimosaceae        | C                  | Tree  | Timber    | LC          |
| 100 | Shirish     | Siris Tree             | <i>Albizia lebbek</i>          | Mimosaceae        | C                  | Tree  | Timber    | LC          |
| 101 | Chatim      | Black board tree       | <i>Alstonia scholaris</i>      | Apocynaceae       | C                  | Tree  | Timber    | LC          |
| 102 | Sada Bayen  | Indian mangrove        | <i>Avicennia officinalis</i>   | Avicennaceae      | C                  | Tree  | Timber    | LC          |
| 103 | Sonalu      | Golden shower          | <i>Cassia fistula</i>          | Caesalpinioideae  | C                  | Tree  | Timber    | LC          |

| S/N | Local Name   | English name       | Scientific name                 | Family         | Relative abundance | Type | Use    | IUCN-Global |
|-----|--------------|--------------------|---------------------------------|----------------|--------------------|------|--------|-------------|
| 104 | Jhau         | Coastal sea-oak    | <i>Casuarina equisetifolia</i>  | Casuarinaceae  | C                  | Tree | Timber | LC          |
| 105 | Eucalyptus   | Gum tree           | <i>Eucalyptus camaldulensis</i> | Myrtaceae      | C                  | Tree | Timber | NT          |
| 106 | Pitali       | False white teak   | <i>Mallotus nudiflorus</i>      | Euphorbiaceae  | C                  | Tree | Timber | LC          |
| 107 | Kadam        | Burflower-Tree     | <i>Neolamarckia cadamba</i>     | Rubiaceae      | C                  | Tree | Timber | Unknown     |
| 108 | Raintree     | Rain tree          | <i>Samanea saman</i>            | Mimisceae      | C                  | Tree | Timber | Unknown     |
| 109 | Keora        | Mangrove apple     | <i>Sonneratia apetala</i>       | Lythraceae     | C                  | Tree | Timber | Unknown     |
| 110 | Mehogani     | American mahogany, | <i>Swietenia mahagoni</i>       | Meliaceae      | C                  | Tree | Timber | NT          |
| 111 | Jam          | Black berry        | <i>Syzygium cuminii</i>         | Myrtaceae      | C                  | Tree | Timber | Unknown     |
| 112 | Katbadam     | Almond             | <i>Terminalia catappa</i>       | Combretaceae   | C                  | Tree | Timber | LC          |
| 113 | Koroi        | White siris        | <i>Albizia procera</i>          | Mimosaceae     | R                  | Tree | Timber | LC          |
| 114 | Barun        | Three leaved caper | <i>Crataeva nurvala</i>         | Capparaceae    | R                  | Tree | Timber | Unknown     |
| 115 | Krishnochura | Flamboyant         | <i>Delonix regia</i>            | Caesalpinaceae | R                  | Tree | Timber | LC          |
| 116 | Gab          | River ebony        | <i>Diospyros eregrine</i>       | Ebeanaceae     | R                  | Tree | Timber | Unknown     |
| 117 | Mandar       | Indian coral tree  | <i>Erythrina indica</i>         | Fabaceae       | R                  | Tree | Timber | LC          |
| 118 | Bot          | Banayan tree       | <i>Ficus bengalensis</i>        | Moraceae       | R                  | Tree | Timber | Unknown     |
| 119 | Janglidumur  | Opposite leaf fig  | <i>Ficus hispida</i>            | Moraceae       | R                  | Tree | Timber | LC          |
| 120 | Dumur        | Cluster fig        | <i>Ficus racemosa</i>           | Moraceae       | R                  | Tree | Timber | LC          |
| 121 | Pakur        | Sacred fig tree    | <i>Ficus religiosa</i>          | Moraceae       | R                  | Tree | Timber | LC          |
| 122 | Assath       | Banyan tree        | <i>Ficus sp.</i>                | Moraceae       | R                  | Tree | Timber | Unknown     |
| 123 | Ipil-Ipil    | White lead tree    | <i>Leucaena leucocephala</i>    | Fabaceae       | R                  | Tree | Timber | Unknown     |

Data source: Field survey, November- December 2023

Note: VC=Very Common, C=Common, R=Rare, F=Few

Table 10: Amphibians and relative abundance with iucn's local & global status within AOI

| Sl. No. | Local Name                 | English Name                     | Scientific Name                   | Family         | Relative abundance | Status     |             |           |
|---------|----------------------------|----------------------------------|-----------------------------------|----------------|--------------------|------------|-------------|-----------|
|         |                            |                                  |                                   |                |                    | IUCN-Local | IUCN-Global | WCSA,2012 |
| 1       | Jhorna Sundari Bang        | Ranid frog                       | <i>Amolops marmoratus</i>         | Ranidae        | VC                 | VU         | LC          | Sch--1    |
| 2.      | Doriaer Khudey Gecho Bang  | Doria's Asian tree frog          | <i>Chiromantis doriae</i>         | Rhacoporidae   | C                  | EN         | LC          | Unknown   |
| 3.      | Dui-dagi Khudey Gecho Bang | Two-striped bubble-nest treefrog | <i>Chiromantis vitatus</i>        | Rhacoporidae   | C                  | LC         | LC          | Unknown   |
| 4.      | Kuno Bang                  | Asian Common Toad                | <i>Duttaphrynus melanostictus</i> | Bufonidae      | VC                 | LC         | LC          | Sch - II  |
| 5.      | Katkati Bang               | Skipper Frog                     | <i>Euphyctis cyanophytis</i>      | Dicroglossidae | VC                 | LC         | LC          | Sch- II   |
| 6.      | Shobuj Bang                | Green pond frog,                 | <i>Euphyctis hexadactylus</i>     | Dicroglossidae | VC                 | LC         | LC          | Sch-1     |
| 7.      | Kakrabhuk Bang             | Crab-eating Frog                 | <i>Fejervarya cancrivora</i>      | Dicroglossidae | C                  | LC         | LC          | Unknown   |

| Sl. No. | Local Name           | English Name             | Scientific Name                 | Family         | Relative abundance | Status     |             |           |
|---------|----------------------|--------------------------|---------------------------------|----------------|--------------------|------------|-------------|-----------|
|         |                      |                          |                                 |                |                    | IUCN-Local | IUCN-Global | WCSA,2012 |
| 8.      | Syhadra Jhi-jhi Bang | Bombay Wart Frog         | <i>Fejervarya syhadrensis</i>   | Dicroglossidae | F                  | LC         | LC          | Sch – II  |
| 9.      | Nepali Jhi-jhi Bang  | Nepal Wart Frog          | <i>Fejervarya nepalensis</i>    | Dicroglossidae | FC                 | LC         | LC          | Sch – II  |
| 10.     | Preirir Jhi-jhi Bang | Pierre’s Cricket Frog    | <i>Fejervarya pierrei</i>       | Dicroglossidae | FC                 | LC         | LC          | Sch – II  |
| 11.     | Terai Jhi-jhi Bang   | Terai Cricket Frog       | <i>Fejervarya teraiensis</i>    | Dicroglossidae | C                  | LC         | LC          | Sch – II  |
| 12.     | Upokulio Sona Bang   | Bangladesh Bull frog     | <i>Hoplobatrachus litoralis</i> | Dicroglossidae | VC                 | NT         | LC          | Unknown   |
| 13.     | Sona Bang            | Indian Bullfrog          | <i>Hoplobatrachus tigerinus</i> | Dicroglossidae | C                  | LC         | LC          | Sch-1     |
| 14.     | Bhamo Bang           | Bhamo Frog               | <i>Humerana humeralis</i>       | Ranidae        | F                  | LC         | LC          | Sch – I   |
| 15.     | Murgi Daka Bang      | Cope’s Frog              | <i>Hylarana leptoglossa</i>     | Ranidae        | FC                 | LC         | LC          | Sch - II  |
| 16.     | Sobuj Dhani Bang     | Taipei frog              | <i>Hylaranataipehensis</i>      | Ranidae        | C                  | DD         | LC          | Unknown   |
| 17.     | -                    | Two-striped Grass Frog   | <i>Hylarana taipehensis</i>     | Ranidae        | F                  | DD         | LC          | Sch - II  |
| 18.     | panabang             | Green puddle frog        | <i>Occidozygalima</i>           | Ranidae        | C                  | LC         | Unknown     | Sch-1     |
| 19.     | Pana Bang            | Bengal Leaping Frog      | <i>Polypedates bengalensis,</i> | Ranidae        | FC                 | LC         | LC          | Sch – II  |
| 20.     | Venpu Bang           | Painted Bull Frog        | <i>Kaloula pulchra</i>          | Microhylidae   | F                  | NT         | LC          | Sch - I   |
| 21.     | Lal-chokhBang        | Smith's litter frog      | <i>Leptobrachiu smithi</i>      | Megophryidae   | F                  | LC         | LC          | Unknown   |
| 22.     | Lal Laubichi Bang    | Large pygmyfrog          | <i>Microhyla berdmorei</i>      | Microhylidae   | F                  | LC         | LC          | Unknown   |
| 23.     | Chhoto Laobichi Bang | Ornate Microhylid Frog   | <i>Microhyla ornata</i>         | Microhylidae   | F                  | LC         | LC          | Sch - II  |
| 24.     | Lal Cheena Bang      | Narrow-mouthed frog      | <i>Microhyla rubra</i>          | Microhylidae   | FC                 | LC         | LC          | Unknown   |
| 25.     | KhudeyGechoBang      | Dwarf bushfrog           | <i>Philautus parvulus</i>       | Rhacopharidae  | FC                 | NT         | LC          | Unknown   |
| 26.     | Dorakata Gechho Bang | Common Tree Frog         | <i>Polypedates leucomystax</i>  | Rhacophoridae  | FC                 | LC         | LC          | Sch – II  |
| 27.     | Chitra Gecho Bang    | Indian tree frog         | <i>Polypedates maculatus</i>    | Rhacophoridae  | C                  | LC         | LC          | Unknown - |
| 28.     | Mukut Bang           | Crown Frog               | <i>Xenophry sparva</i>          |                | C                  | NT         | DD          | Sch - I   |
| 29.     | Jhi-jhi bang         | Long-legged cricket frog | <i>Zakerana Syhandrensis</i>    | Dicroglossidae | VC                 | LC         | DD          | Unknown - |

Source: Field survey and local consultations 2023

\*Abbreviation: VC=Very Common, C=Common, F=Few, O=Occasional, CR=Critically Endangered, EN =Endangered, Vu=Vulnerable, LR=Lower Risk ,DD=Data Deficient, M=Migratory, R=Resident, Bh=Bush, Op=Openplace, Hh=Human habitation, Cl=Cultivated land, Tt=Tall tree, H=Hole, R=River, P= Pond, C=Canal, Dt =Ditch, We=Water-edge, Ri =River

Table 11: Reptiles in the project AOI and their IUCN local status, distribution and habitat

| S/N | Local Name  | English Name             | Scientific Name                     | Relative abundance | IUCN Localstatus | IUCN Global status | Habitat        |
|-----|-------------|--------------------------|-------------------------------------|--------------------|------------------|--------------------|----------------|
| 1   | Tiktiki     | House Gecko              | <i>Hemidactylus laviviridis</i>     | C                  | LR               | Unknown            | Bh, Op, Hh, Tt |
| 2   | Tiktiki     | Spotted House Lizard     | <i>Hemidactylus brookii</i>         | C                  | LR               | LC                 | Bh, Op         |
| 3   | Tiktiki     | Bowring's House Lizard   | <i>Hemidactylus bowringii</i>       | C                  | VU               | LC                 | Bh             |
| 4   | Takkhak     | Wall Gecko               | <i>Gekko gekko</i>                  | C                  | VU               | LC                 | Bh, Op         |
| 5   | Rokto-chosa | Common Lizard            | Garden<br><i>Calotis versicolor</i> | VC                 | LR               | Unknown            | Bh, Op         |
| 6   | Anjoni      | Common Skink             | <i>Mabuya carinata</i>              | VC                 | LR               | LC                 | Bh, Op         |
| 7   | Anjoni      | Stripped Skink           | <i>Mabuya dissimilis</i>            | C                  | VU               | LC                 | Bh, Op         |
| 8   | GuiShap     | Bengal Monitor           | <i>Varanus bengalensis</i>          | FC                 | VU               | NT                 | Bh, P          |
| 9   | Holdy-gui   | Yellow Monitor           | <i>Varanus flavescens</i>           | F                  | EN               | EN                 | Bh, Cl         |
| 10  | Dhora-shap  | Cheeked Keel back Snake  | <i>Xenochorphis piscator</i>        | C                  | LR               | Unknown            | P, C, Dt       |
| 11  | Dhora-shap  | Stripped Keelback snake  | <i>Amphiesma stolatum</i>           | C                  | LR               | LC                 | Bh, Op         |
| 12  | Darash shap | Rat Snake                | <i>Coluber mucosus</i>              | C                  | LR               | LC                 | Bh, Op         |
| 13  | Girgiti     | Grey Indian Monitor      | <i>Varanus benghalensis</i>         | C                  | LR               | Unknown            | Tt, Op         |
| 14  | Kocchop     | Ganges Soft Shell Turtle | <i>Nilssonina gangetica</i>         | O                  | VU               | EN                 | Ri             |
| 15  | Kocchop     | River Terrapin           | <i>Batagur baska</i>                | O                  | CR               | CR                 | Ri             |
| 16  | Kocchop     | Striped Roof Turtle      | <i>Kachuga dhongoka</i>             | O                  | EN               | CR                 | Ri             |
| 17  | Girgiti     | Chameleo                 | <i>Chamaeleo chamaeleon</i>         | FC                 | LC               | LC                 | Hh             |

Source: Field Survey and Local consultation 2023, EIA report Sitakundo, 2018

\*Abbreviation: VC=Very Common, C=Common, F=Few, O=Occasional, CR=Critically Endangered, EN = Endangered, Vu = Vulnerable, LR = Lower Risk, DD = Data Deficient, M = Migratory, R = Resident, Bh = Bush, Op = Open place, Hh = Human habitation, Cl = Cultivated land, Tt = Tall tree, H = Hole, R = River, P = Pond, C = Canal, Dt = Ditch, We = Water edge, Ri = River.

Table 12: Mammals found in the project AOI and their local IUCN status

| S/N | Local Name        | English Name                  | Scientific Name                 | Family       | IUCN-Global |
|-----|-------------------|-------------------------------|---------------------------------|--------------|-------------|
| 1   | Balu-shuor        | Hog badger                    | <i>Arctonyx collaris</i>        | Mustelidae   | VU          |
| 2   | Metho-indur       | Lesser bandicoot rat          | <i>Bandicota bengalensis</i>    | Muridae      | LC          |
| 3   | Badami Kathbirali | Irrawaddy squirrel            | <i>Callosciurus pygerythrus</i> | Sciuridae    | LC          |
| 4   | PatiShial         | Golden jackal                 | <i>Canis aureus Linnaeus</i>    | Canidae      | LC          |
| 5   | RamKutta          | Ussuri dhole                  | <i>Cuon alpinus</i>             | Canidae      | EN          |
| 6   | KolaBadur         | greater short-nosed fruit bat | <i>Cynopterus sphinx</i>        | Pteropodidae | LC          |
| 7   | BonBilal          | Jungle cat                    | <i>Felis chaus schreber</i>     | Felidae      | NT          |
| 8   | BoroBeji          | Indian Gray Mongoose          | <i>Herpestes edwardsi</i>       | mongoose     | LC          |
| 9   | Moucha Bejji      | Crab-eating mongoose          | <i>Herpestes surva</i>          | Herpestidae  | NT          |
| 10  | Ulluk             | Western hoolock gibbon        | <i>Hoolock</i>                  | Hylobatidae  | EN          |
| 11  | Khorgosh          | Indian hare                   | <i>Lepus nigricollis</i>        | Leporidae    | LR          |

| S/N | Local Name             | English Name              | Scientific Name                 | Family           | IUCN-Global |
|-----|------------------------|---------------------------|---------------------------------|------------------|-------------|
| 12  | Vodor                  | Eurasian otter            | <i>Lutra</i>                    | Mustelidae       | NT          |
| 13  | Banor                  | Rhesus macaque            | <i>Maca camulatta</i>           | Cercopithecidae  | LC          |
| 14  | Indian pangolin        | Indian pangolin           | <i>Manis crassicaudata</i>      | Manida           | LC          |
| 15  | Muntjac                | Northern red muntjac      | <i>Muntia cusvagnalis</i>       | Cervidae         | LC          |
| 16  | Chitah Bagh            | Leopard cat               | <i>Panther apardus</i>          | Felidae          | NT          |
| 17  | Chita Biral            | Mainland Leopard cat      | <i>Prionailurus bengalensis</i> | Felidae          | LC          |
| 18  | Mesobiral              | Fishing cat               | <i>Prionailurus viverinus</i>   | Felidae          | VU          |
| 19  | BaroBadur              | Indian flying fox         | <i>Pteropus giganteus</i>       | Pteropodidae     | LC          |
| 20  | Indur                  | Black rat                 | <i>Rattus</i>                   | Muridae          | LC          |
| 21  | Choto Holdey Chamchika | lesser Asiatic yellow bat | <i>Scotophilus kuhlii</i>       | Vespertilionidae | LC          |
| 22  | Chika                  | Asian house shrew         | <i>Suncus murinus</i>           | Shrews           | LC          |
| 23  | Buno Shukar            | Wild boar                 | <i>Suscrofa Linnaeus</i>        | Suidae           | LC          |
| 24  | Mukhpora Hanuman       | Capped langur             | <i>Trachypithecus pileatus</i>  | Cercopithecidae  | VU          |
| 25  | Civet                  | Large Indian Civet        | <i>Viverra zibetha</i>          | Viverrid         | LC          |
| 26  | Kheki                  | Bengal fox                | <i>Vulpes bengalensis</i>       | Canidae          | LC          |

Source: Field Survey 2023 and Literature review

\* Abbreviation of IUCN data CR = Critically Endangered, EN = Endangered, VU=Vulnerable, LC=Least Concern, NT= Near Threatened, LR=Lower risk

**Table 13: List of avifauna reported in the project AIO**

| Sl. No. | Bengali Name    | Common Name             | Scientific Name                 | Family       | Relative Abundance | IUCN- GL | WCSA (2012) BD |
|---------|-----------------|-------------------------|---------------------------------|--------------|--------------------|----------|----------------|
| 1.      | Jhuti Shalik    | Jungle Myna             | <i>Acridotheres fuscus</i>      | Sturnidae    | VC                 | LC       | Sch- II        |
| 2.      | Gang Shalik     | Bank Myna               | <i>Acridotheres ginginianus</i> | Sturnidae    | C                  | LC       | Sch- I         |
| 3.      | Bhat Shalik     | Common Myna             | <i>Acridotheres tristis</i>     | Sturnidae    | VC                 | LC       | Sch- II        |
| 4.      | Passerine bird  | Clamorous Reed Warbler  | <i>Acrocephalus stentoreus</i>  | Sylviidae    | C                  | LC       | Sch- I         |
| 5.      | Pati Batan      | Common Sandpiper        | <i>Actitis hypoleucos</i>       | Scolopacidae | C                  | LC       | Sch- II        |
| 6.      | Pati Machranga  | Common Kingfisher       | <i>Alcedo atthis</i>            | Alcedinidae  | C                  | LC       | Sch- II        |
| 7.      | Dahuk           | White-breasted Waterhen | <i>Amaurornis phoenicurus</i>   | Rallidae     | C                  | LC       | Sch- II        |
| 8.      | LenjaHans       | Northern Pintail        | <i>Anasacuta</i>                | Ciconidae    | C                  | LC       | Unknown        |
| 9.      | Sam Khol        | Asian Openbill          | <i>Anastomus oscitans</i>       | Ciconidae    | FC                 | LC       | Sch- I         |
| 10.     | Sap Pakhi       | Oriental Darter         | <i>Anhinga melanogaster</i>     | Anhingidae   | F                  | NT       | Sch- I         |
| 11.     | Metey Rajhash   | Greylag goose           | <i>Anseranser</i>               | Anatidae     | C                  | LC       | Unknown        |
| 12.     | Dhani Tulika    | Paddy field Pipit       | <i>Anthus rufulus</i>           | Motacillidae | F                  | LC       | Sch- II        |
| 13.     | Go Bok          | Great Egret             | <i>Ardea alba</i>               | Ardeidae     | VC                 | LC       | Sch- II        |
| 14.     | Kani Bok        | Indian Pond Heron       | <i>Ardeola grayii</i>           | Ardeidae     | VC                 | LC       | Sch- I         |
| 15.     | Mete Bon Ababil | Ashy Wood shallow       | <i>Artamus fuscus</i>           | Artamidae    | C                  | LC       | Sch- II        |
| 16.     | Khurule Pecha   | Spotted Owlet           | <i>Athene brama</i>             | Strigidae    | FC                 | LC       | Sch- I         |

| Sl. No. | Bengali Name           | Common Name               | Scientific Name        | Family         | Relative Abundance | IUCN- GL | WCSA (2012) BD |
|---------|------------------------|---------------------------|------------------------|----------------|--------------------|----------|----------------|
| 17.     | Morche-rong Bhuti Hans | Ferruginous Duck          | Aythya nyroca          | Anatidae       | F                  | NT       | Sch -I         |
| 18.     | TikiHash               | Tufted duck               | Aythyafuligula         | Anatidae       | C                  | LC       | Unknown        |
| 19.     | Korno Papia            | Plaintive Cuckoo          | Cacomantis merulinus   | Cuculidae      | FC                 | LC       | Sch -I         |
| 20.     | Lenja Ratchara         | Large-tailed Nightjar     | Caprimulgus macrurus   | Caprimulgidae  | C                  | LC       | Sch -I         |
| 21.     | Boro Boga              | Great Egret               | Casmerodius albus      | Ardeidae       | C                  | LC       | Sch- II        |
| 22.     | Khoira Kathkurali      | Rufous Woodpecker         | Celeus brachyurus      | Picidae        | FC                 | LC       | Sch -I         |
| 23.     | Kana Ko                | Greater Coucal            | Centropus sinensis     | Cuculidae      | C                  | LC       | Sch -I         |
| 24.     | -                      | Little Ringed Plover      | Charadrius dubius      | Charadriidae   | FC                 | LC       | Sch -I         |
| 25.     | Chhoto Duljiria        | Lesser Sand Plover        | Charadrius mongolus    | Charadriidae   | FC                 | LC       | Sch- II        |
| 26.     | Julphi Panchil         | Whiskered Tern            | Chlidonias hybrida     | Laridae        | FC                 | LC       | Sch -I         |
| 27.     | Jalali Kobutor         | Common Pigeon             | Columba livia          | Columbidae     | VC                 | LC       | Sch -I         |
| 28.     | ShobujDhumkol          | Green imperial pigeon     | Columbaeanea           | Columbidae     | FC                 | NT       | Unknown        |
| 29.     | Doel                   | Oriental Magpie Robin     | Copsychus salaris      | Muscicapidae   | C                  | LC       | Sch- II        |
| 30.     | Bangla Nilkanto        | Indian Rollar             | Coracias benghalensis  | Coraciidae     | FC                 | LC       | Sch -I         |
| 31.     | Boro Kabashi           | Large Cuckoo shrike       | Coracina macei         | Campephagidae  | FC                 | LC       | Sch- II        |
| 32.     | Dar Kak                | Jungle Crow               | Corvus leuallantii     | Corvidae       | FC                 | LC       | Sch- II        |
| 33.     | Pati Kak               | House Crow                | Corvus splendens       | Corvidae       | C                  | LC       | Sch- II        |
| 34.     | Boukothakou Papia      | Indian Cuckoo             | Cuculus micropterus    | Cuculidae      | C                  | LC       | Sch- II        |
| 35.     | Asio Talbatashi        | Asian Palm Swift          | Cypsiurus balasiensis  | Apodidae       | VC                 | LC       | Sch -I         |
| 36.     | Harichacha             | Rufous Treepie            | Dendrocitta vagabunda  | Corvidae       | C                  | LC       | Sch- II        |
| 37.     | Boro Sorali            | Fulvous Whistling Duck    | Dendrocygna bicolor    | Dendrocygnidae | FC                 | LC       | Sch -I         |
| 38.     | Pati Sorali            | Lesser Whistling Duck     | Dendrocygna javanica   | Dendrocygnidae | C                  | LC       | Sch -I         |
| 39.     | Finge                  | Black Drongo              | Dicrurus macrocercus   | Dicruridae     | VC                 | LC       | Sch- II        |
| 40.     | Bangla Kaththokra      | Black-rumped Flameback    | Dinopium benghalensis  | Picidae        | C                  | LC       | Sch- II        |
| 41.     | Chhoto Boga            | Little Egret              | Egretta garzetta       | Ardeidae       | C                  | LC       | Sch- II        |
| 42.     | Asio Kokil             | Western Koel              | Eudynamis scolopacea   | Cuculidae      | C                  | LC       | Sch- II        |
| 43.     | -                      | Common Kestrel            | Falco tinnunculus      | Falconidae     | FC                 | LC       | Sch- II        |
| 44.     | KalaTitir              | Black francolin           | Francolinusfrancolinus | Phasianidae    | C                  | LC       | Unknown        |
| 45.     | Kora                   | Watercock                 | Gallix cinerea         | Rallidae       | FC                 | LC       | Sch -I         |
| 46.     | Pati Chega             | Common Snipe              | Gallinago              | Scolopacidae   | FC                 | LC       | Sch -I         |
| 47.     | Lenja Chega            | Pin-tailed Snipe          | Gallinago stenura      | Scolopacidae   | C                  | LC       | Sch -I         |
| 48.     | Jal Murgi              | Common Moorhen            | Gallinula chloropus    | Rallidae       | F                  | LC       | Sch -I         |
| 49.     | Dholagola Machranga    | White Throated Kingfisher | Halcyon smyrnensis     | Alcedinidae    | C                  | LC       | Sch- II        |
| 50.     | Baluapakhi             | Pallas's fish eagle       | Haliaeetus leucoryphus | Accipitridae   | R                  | EN       | Unknown        |
| 51.     | Sonkho Chil            | Brahminy Kite             | Haliastur indus        | Accipitridae   | C                  | LC       | Sch- II        |
| 52.     | JhutialGachbatashi     | Crested treeswift         | Hemiprocneconata       | Hemiprocnidae  | C                  | LC       | Unknown        |
| 53.     | Pati Chokhgelo         | Common Hawk Cuckoo        | Hierococyx varius      | Cuculidae      | FC                 | LC       | Sch- II        |

| Sl. No. | Bengali Name             | Common Name                | Scientific Name           | Family            | Relative Abundance | IUCN- GL | WCSA (2012) BD |
|---------|--------------------------|----------------------------|---------------------------|-------------------|--------------------|----------|----------------|
| 54.     | Metematha Kuraeagle      | Grey-headed Fish Eagle     | Ichthyophaga echthyaetus  | Accipitridae      | R                  | NT       | Sch- II        |
| 55.     | Lal Bogi                 | Cinnamon Bittern           | Ixobrychus cinnamomeus    | Ardeidae          | C                  | LC       | Sch -I         |
| 56.     | Hutum Pecha              | Brown Fish Owl             | Ketupa zeylonensis        | Strigidae         | F                  | LC       | Sch -I         |
| 57.     | Khoira Latora            | Brown Shrike               | Lanius cristatus          | Lanidae           | VC                 | LC       | Sch- II        |
| 58.     | Lenja Latora             | Long-tailed Shrike         | Lanius schach             | Lanidae           | C                  | LC       | Sch- II        |
| 59.     | Khoira Matha Jol Kobutor | Brown-headed Gull          | Larus brunnicephalus      | Laridae           | R                  | LC       | Sch- II        |
| 60.     | Kala Matha Jol Kobutor   | Black-headed Gull          | Larus ridibundus          | Laridae           | F                  | LC       | Sch- II        |
| 61.     | Dhola Munia              | White-throated Munia       | Lonchura malabarica       | Estrillidae       | FC                 | LC       | Sch -I         |
| 62.     | Butibuk Munia            | Scally-breasted Munia      | Lonchura puntulata        | Estrillidae       | F                  | LC       | Sch -I         |
| 63.     | BoroKanchora             | Great eared nightjar       | Lyncornismacroctis        | Caprimulgidae     | C                  | LC       | Unknown        |
| 64.     | Gadwall                  | Gadwall                    | Mareca strepera           | Anatidae          | FC                 | LC       | Sch -I         |
| 65.     | Dagi Ghas Pakhi          | Striated Grassbird         | Megalurus palustris       | Sylviidae         | FC                 | LC       | Sch- II        |
| 66.     | Sobuj Suichora           | Asian Green Bee-eater      | Merops orientalis         | Meropidae         | FC                 | LC       | Sch- II        |
| 67.     | Majhla Boga              | Intermediate Egret         | Mesophoyx intermedia      | Ardeidae          | C                  | LC       | Sch- II        |
| 68.     | Kalo Chil                | Black Kite                 | Milvus migrans            | Accipitridae      | C                  | LC       | Sch- II        |
| 69.     | Sada Khonjon             | White Wagtail              | Motacilla alba            | Motacillidae      | C                  | LC       | Sch- II        |
| 70.     | Dholabhru Khonjon        | White-browed Wagtail       | Motacilla maderaspatensis | Motacillidae      | FC                 | LC       | Sch -I         |
| 71.     | Beguni Moutushi          | Purple Sunbird             | Nectarinia asiatica       | Nectariniidae     | FC                 | LC       | Sch -I         |
| 72.     | Beguni Komor Moutushi    | Purple-rumped Sunbird      | Nectarinia zeylonica      | Nectariniidae     | FC                 | LC       | Sch -I         |
| 73.     | Bali Hans                | Cotton Pigmy Goose         | Nettapus coromandelianus  | Anatidae          | FC                 | LC       | Sch -I         |
| 74.     | LaljhutiBhutihash        | Red-crested pochard        | Nettarufina               | Anatidae          | C                  | LC       | Unknown        |
| 75.     | Nishi Bok                | Black-crowned Night Heron  | Nycticorax                | Ardeidae          | FC                 | LC       | Sch -I         |
| 76.     | Holde Pakhi              | Black-hooded Oriole        | Oriolus xanthornus        | Oriolidae         | C                  | LC       | Sch- II        |
| 77.     | Tuntuni                  | Common Tailorbird          | Orthotomus sutorius       | Sylviidae         | VC                 | LC       | Sch- II        |
| 78.     | Boro Tit                 | Great Tit                  | Parus major               | Paridae           | C                  | LC       | Sch -I         |
| 79.     | Ghor Chorui              | House Sparrow              | Passer domesticus         | Passeridae        | VC                 | LC       | Sch- II        |
| 80.     | Gechho Chorai            | Eurasian Tree Sparrow      | Passer montanus           | Passeridae        | F                  | LC       | Sch- II        |
| 81.     | Small passerine bird     | Small Minivet              | Pericrocotus cinnamomeus  | Campephagidae     | F                  | LC       | Sch -I         |
| 82.     | Boro Pankouri            | Great Cormorant            | Phalacrocorax niger       | Phalacrocoracidae | F                  | LC       | Sch -I         |
| 83.     | Pati Pankouri            | Little Cormorant           | Phalacrocorax niger       | Phalacrocoracidae | VC                 | LC       | Sch -I         |
| 84.     | Kalche Futki             | Dusky Warbler              | Phylloscopus fuscatus     | Sylviidae         | FC                 | LC       | Sch- II        |
| 85.     | Metematha Kathkurali     | Black-napped Woodpecker    | Picus guerini             | Picidae           | C                  | LC       | Sch- II        |
| 86.     | Dagigola Kathkurali      | Streak-throated Woodpecker | Picus xanthopygaeus       | Picidae           | FC                 | LC       | Sch -I         |
| 87.     | Deshi Babui              | Baya Weaver                | Ploceus philippinus       | Passeridae        | FC                 | LC       | Sch -I         |
| 88.     | Sabuj Tia                | Rose-ringed Parakeet       | Psittacula krameri        | Psittacidae       | F                  | LC       | Sch- II        |
| 89.     | Laltala Bulbul           | Red-vented Bulbul          | Pycnonotus cafer          | Pycnonotidae      | VC                 | LC       | Sch- II        |
| 90.     | Sipahi Bulbul            | Red-whiskered Bulbul       | Pycnonotus jocosus        | Pycnonotidae      | FC                 | LC       | Sch -I         |

| Sl. No. | Bengali Name         | Common Name                | Scientific Name            | Family        | Relative Abundance | IUCN- GL | WCSA (2012) BD |
|---------|----------------------|----------------------------|----------------------------|---------------|--------------------|----------|----------------|
| 91.     | Lal Chega            | Greater Painted Snipe      | Rostratula benghalensis    | Rostratulidae | FC                 | LC       | Sch- II        |
| 92.     | Tila Nag eagle       | Crested Serpent Eagle      | Spilornis cheela           | Accipitridae  | FC                 | LC       | Sch- II        |
| 93.     | Choto Panchil        | Little Tern                | Sterna albifrons           | Laridae       | FC                 | LC       | Sch -I         |
| 94.     | Nadia Panchil        | River Tern                 | Sterna aurantia            | Laridae       | R                  | NT       | Sch -I         |
| 95.     | Eurasio Kanthi Ghugu | Eurasian Collared Dove     | Streptopelia decaocto      | Columbidae    | C                  | LC       | Sch -I         |
| 96.     | Udoyi Raj Ghugu      | Oriental Turtle Dove       | Streptopelia orientalis    | Columbidae    | C                  | LC       | Sch -I         |
| 97.     | Tila Ghugu           | Eastern Spotted Dove       | Streptopelia suratensis    | Columbidae    | VC                 | LC       | Sch -I         |
| 98.     | Lal Kanthi Ghugu     | Red Turtle Dove            | Streptopelia tranquebarica | Columbidae    | FC                 | LC       | Sch -I         |
| 99.     | Go Shalik            | Asian Pied Starling        | Sturnus contra             | Sturnidae     | VC                 | LC       | Sch- II        |
| 100.    | Chhoto Duburi        | Little Grebe               | Tachybaptus ruficollis     | Podicipedidae | FC                 | LC       | Sch -I         |
| 101.    | KhoiraChokachoki     | Ruddy shelduck             | Tadorna ferruginea         | Anatidae      | C                  | LC       | Unknown        |
| 102.    | Sobuj Ghughu         | Yellow-footed Green Pigeon | Treron phaeocopterus       | Columbidae    | F                  | LC       | Sch -I         |
| 103.    | Ban Batan            | Wood Sandpiper             | Tringa glareola            | Scolopacidae  | FC                 | LC       | Sch- II        |
| 104.    | Dagi Chhatore        | Striated Babbler           | Turdoides earlei           | Timalidae     | FC                 | LC       | Sch -I         |
| 105.    | Lokhi Pecha          | Common Barn Owl            | Tyto alba                  | Tytonidae     | C                  | LC       | Sch -I         |
| 106.    | Pati Hudhud          | Common Hoopoe              | Upupa epops                | Upupidae      | C                  | LC       | Sch -I         |
| 107.    | Metematha Titi       | Grey-headed Lapwing        | Vanellus cinereus          | Charadriidae  | F                  | LC       | Sch- II        |
| 108.    | Hot Titi             | Red-wattled Lapwing        | Vanellus indicus           | Charadriidae  | FC                 | LC       | Sch -I         |
| 109.    | Udoyi Dholachokh     | Oriental White-eye         | Zosterops palpebrosus      | Zosteropidae  | FC                 | LC       | Sch -I         |

Source: Field survey and local consultation 2023

\*Abbreviation:VC=Very Common, C=Common, FC=Fairly Common, F=Few, R=Rare, CR=Critically Endangered, EN= Endangered, VU = Vulnerable, LC=Least Concern, LR = Lower Risk, DD = Data Deficient.Sch-1=Schedule-1, Sch-11=Schedule-11

Table 14: List aquatic plants in the project area

| Sl. No. | Local Name  | Common Name         | Scientific Name                    | Family         | IUCN-Global status |
|---------|-------------|---------------------|------------------------------------|----------------|--------------------|
| 1.      | Mushak Dana | Musk Mallow         | <i>Abelmoschus moschatus</i>       | Malvaceae      | Unknown            |
| 2.      | Malanchai   | Alligator Weed      | <i>Alternanthera philoxeroides</i> | Amaranthaceae  | Unknown            |
| 3.      | Brahmisak   | Water Hyssop        | <i>Bacopa monnieri</i>             | Plantaginaceae | LC                 |
| 4.      | Phutki      | Balloon Vine        | <i>Cardiospermum halicacabum</i>   | Sapindaceae    | Unknown            |
| 5.      | Kochu       | Arum                | <i>Colocasia esculenta</i>         | Araceae        | LC                 |
| 6.      | Kanaidoga   | Day Flower          | <i>Commelina appendiculata</i>     | Commelinaceae  | Unknown            |
| 7.      | Kachuripana | Water Hyacinth      | <i>Eichhornia crassipes</i>        | Pontederiaceae | Unknown            |
| 8.      | Helencha    | Water cress         | <i>Enhydra fluctuans</i>           | Asteraceae     | Unknown            |
| 9.      | Hatishur    | Indian Heliotrope   | <i>Heliotropium indicum</i>        | Boraginaceae   | Unknown            |
| 10.     | Kalmishak   | Water spinach       | <i>Ipomea aquatica</i>             | Convolvulaceae | Unknown            |
| 11.     | Kolmishak   | Swamp Morning Glory | <i>Ipomoea aquatica</i>            | Convolvulaceae | LC                 |
| 12.     | Dholkolmi   | Pink Morning Glory  | <i>Ipomoea carnea</i>              | Convolvulaceae | Unknown            |
| 13.     | Arail       | Southern Cutgrass   | <i>Leersia hexandra</i>            | Poaceae        | LC                 |

|     |                 |                      |                             |               |         |
|-----|-----------------|----------------------|-----------------------------|---------------|---------|
| 14. | Khudipana       | Duckweed             | <i>Lemna minor</i>          | Araceae       | LC      |
| 15. | Matmatia        | Bushy Lippia         | <i>Lippia geminata</i>      | Verbenaceae   | Unknown |
| 16. | Keshordam       | Water Primrose       | <i>Ludwigia adscendens</i>  | Onagraceae    | LC      |
| 17. | Sushnishak      | Water Clover         | <i>Marsilea quadrifolia</i> | Marsileaceae  | LC      |
| 18. | Chadmala        | Banana Lily          | <i>Nymphoides aquatica</i>  | Menyanthaceae | LC      |
| 19. | Amroolshak      | Creeping Wood sorrel | <i>Oxalis corniculata</i>   | Oxalidaceae   | Unknown |
| 20. | Futki           | Native Goose berry   | <i>Physalis minima</i>      | Solanaceae    | Unknown |
| 21. | Topapana        | Water Cabbage        | <i>Pistia stratiotes</i>    | Araceae       | LC      |
| 22. | Pani Biskhatali | Water Pepper         | <i>Poligonum lanatum</i>    | Poligonaceae  | Unknown |
| 23. | Bishkatali      | Water Pepper         | <i>Polygonum hydropiper</i> | Polygonaceae  | LC      |

Table 15: Fish species recorded within project's aoi, iucn status (local & global)

| SI No | Local Name  | English Name             | Scientific Name               | Family          | IUCN-Local | IUCN Global |
|-------|-------------|--------------------------|-------------------------------|-----------------|------------|-------------|
| 1.    | Kajuli      | Catfish                  | <i>Ailia coilia</i>           | Ailiidae        | NT         | Unknown     |
| 2.    | MolaCarplet | Mola carplet             | <i>Amblypharyngodonmola</i>   | Cyprinidae      | LC         | LC          |
| 3.    | Koi         | Climbing perch           | <i>Anabastestudineus</i>      | Cyprinidae      | LC         | LC          |
| 4.    | TeenChokha  | Blue panchax             | <i>Aplocheiluspanchax</i>     | Aplocheilidae   | LC         | LC          |
| 5.    | DalliChewa  | Minute Mudskipper        | <i>Apocryptesbato</i>         | Oxudercidae     | LC         | LC          |
| 6.    | QueenLoach  | Bengal loach             | <i>BotiaDario</i>             | Botiidae        | EN         | LC          |
| 7.    | Catla       | Bengal Carp              | <i>Catlacatla</i>             | Cyprinidae      | LC         | LC          |
| 8.    | NamaChanda  | Elongate glassy perchlet | <i>Chandanama*</i>            | Ambassidae      | LC         | LC          |
| 9.    | Gajar       | Bullseye snakehead       | <i>Channamarulius**</i>       | Channidae       | EN         | LC          |
| 10.   | TeloTaki    | Ceylon snakehead         | <i>Channaorientalis</i>       | Channidae       | LC         | VU          |
| 11.   | Taki        | spotted snakehead        | <i>Channapunctata</i>         | Channidae       | LC         | LC          |
| 12.   | Shol        | Striped snakehead        | <i>Channastrata</i>           | Channidae       | LC         | LC          |
| 13.   | Chhepchela  | Chela                    | <i>Chelacachius</i>           | Channidae       | VU         | LC          |
| 14.   | Mrigal      | mrigal carp              | <i>Cirrhinuscirrhosus</i>     | Carp            | NT         | VU          |
| 15.   | Magur       | Walking catfish          | <i>Clariasbatrachus</i>       | Clariidae       | LC         | LC          |
| 16.   | Ghaura      | Guarchacha               | <i>Clupisomagarua</i>         | Schilbeidae     | EN         | LC          |
| 17.   | Khailsha    | Labyrinth Fish           | <i>Colisafasciata</i>         | Trichogastrinae | LC         | LC          |
| 18.   | Kachki      | Ganges river sprat       | <i>Coricasoborna</i>          | Clupeidae       | LC         | LC          |
| 19.   | KukurJeeb   | Bengal tonguesole        | <i>Cynoglossuscynoglossus</i> | Cynoglossidae.  | LC         | LC          |
| 20.   | Commoncarp  | Common carp              | <i>Cyprinuscaurio</i>         | Cyprinidae      | VU         | VU          |
| 21.   | Nipati      | Moustached danio         | <i>Daniodangila</i>           | Cyprinidae      | VU         | LC          |
| 22.   | Darka       | Flying barb              | <i>Esomusdanricus</i>         | Rasborinae      | LC         | LC          |
| 23.   | Bacha       | Schilbid catfish         | <i>Eutropiichthysvacha</i>    | Schilbeidae     | LC         | LC          |
| 24.   | Bailla      | Bareye Goby              | <i>Glossogobiusgiuris</i>     | Gobiidae        | LC         | LC          |
| 25.   | Chapila     | Indian river shad        | <i>Gudusiachapra</i>          | Clupeidae       | VU         | LC          |

| SI No | Local Name             | English Name                      | Scientific Name                 | Family           | IUCN-Local | IUCN Global |
|-------|------------------------|-----------------------------------|---------------------------------|------------------|------------|-------------|
| 26.   | Shingee                | Fossil cat                        | <i>Heteropneustesfossilis</i>   | Heteropneustidae | LC         | LC          |
| 27.   | DecrePoa               | Koitor poa                        | <i>Johniuscoitor</i>            | Sciaenidae       | LC         | LC          |
| 28.   | Koitor                 | Coitor croaker                    | <i>Johniuscoitor</i>            | Sciaenidae       | LC         | LC          |
| 29.   | Bata                   | Batafish/Minor carp               | <i>Labeobata</i>                | Cyprinidae       | LC         | LC          |
| 30.   | Baus                   | orangefin labeo                   | <i>Labeocalbasu</i>             | Cyprinidae       | LC         | LC          |
| 31.   | Gonia                  | Kuria labeo                       | <i>Labeogonius</i>              | Cyprinidae       | NT         | LC          |
| 32.   | Rui                    | Multipurpose carp                 | <i>Labeorohita</i>              | Cyprinidae       | LC         | LC          |
| 33.   | Tara Baim              | Lesser spiny eel                  | <i>Macragnathusaculeatus</i>    | Mastacembelidae  | NT         | LC          |
| 34.   | Kuchia                 | Eel fish                          | <i>Monopterusuchia</i>          | Synbranchidae    | VU         | LC          |
| 35.   | Nuna-tengra            | Long whiskers catfish             | <i>Mystusgulio</i>              | Bagridae         | NT         | LC          |
| 36.   | TengaraMystus          | Tengara                           | <i>Mystus tengara**</i>         | Bagridae         | LC         | LC          |
| 37.   | Tengra                 | Striped dwarf catfish             | <i>Mystus vittatus</i>          | Bagridae         | LC         | LC          |
| 38.   | Bheda                  | Gangetic leaffish                 | <i>Nandusnandus</i>             | Nandidae         | NT         | LC          |
| 39.   | Indian Potasi/Bashpata | Emerald shiner                    | <i>Neotropiusatherinoides</i>   | Schilbeidae      | LC         | LC          |
| 40.   | Foli                   | Bronze featherback                | <i>Notopterusnotopterus</i>     | Notopteridae     | VU         | LC          |
| 41.   | BoaliPabda             | Butter catfish                    | <i>Ompokbimaculatus</i>         | Siluridae        | EN         | NT          |
| 42.   | Pabda                  | Pabdah catfish                    | <i>Ompokpabda</i>               | Siluridae        | EN         | NT          |
| 43.   | Pangas                 | Mild-flavored, white-fleshed fish | <i>Pangasiuspangasius</i>       | Pangasiidae      | EN         | LC          |
| 44.   | Tapasi                 | paradise threadfin                | <i>Polynemusparadiseus</i>      | Polynemidae      | NT         | LC          |
| 45.   | Chewa                  | bony fishes                       | <i>Pseudapocrypteselongatus</i> | Gobiidae         | LC         | LC          |
| 46.   | PoolBarb               | The pool barb                     | <i>Puntiusphore</i>             | Cyprinidae       | LC         | LC          |
| 47.   | TeriPunti              | One spot barb                     | <i>Puntiussterio</i>            | Cyprinidae       | LC         | LC          |
| 48.   | Titpunti               | Ticto barb                        | <i>Puntius ticto</i>            | Cyprinidae       | VU         | LC          |
| 49.   | Darkina                | Rasbora                           | <i>Rasborarasbora</i>           | Cyprinidae       | NT         | LC          |
| 50.   | Chela                  | large razorbelly minnow           | <i>Salmostomabacaila</i>        | Cyprinidae       | LC         | LC          |
| 51.   | Phasa                  | Gangetic hairfin anchovy          | <i>Setipinnaphasa</i>           | Engraulidae      | LC         | LC          |
| 52.   | TeliPhasa              | Scaly hairfin anchovy             | <i>Setipinnataty</i>            | Engraulidae      | LC         | LC          |
| 53.   | Dhain                  | Silond catfish                    | <i>Siloniasilondia</i>          | Schilbeidae      | LC         | LC          |
| 54.   | Bhangat                | Long-whiskered catfish            | <i>Sperataaor</i>               | Bagridae         | VU         | LC          |
| 55.   | Baila                  | Knight Goby                       | <i>Stigmatogobiussadanundio</i> | Gobionellinae    | LC         | Unknown     |
| 56.   | SadaChewa              | Burrowing goby                    | <i>Trypauchenvagina</i>         | Gobionellinae.   | LC         | LC          |
| 57.   | Boal                   | Helicopter fish                   | <i>Wallagoattu</i>              | Siluridae        | VU         | VU          |
| 58.   | Boa                    | Great white sheatfish             | <i>Wallagoattu</i>              | Siluridae        | VU         | VU          |
| 59.   | Kankila                | Freshwater garfish                | <i>Xenentodoncancila</i>        | Belonidae        | LC         | LC          |

Source: Field survey and consultation with local people, 2023

. \*Abbreviation: EN = Endangered, Vu = Vulnerable, LC=Least Concern, LR = Lower Risk, NT=Near Threatene

## C. Social Baseline

### Socio-Economic Profile of the study area

#### 1 Introduction

The Government of Bangladesh (GOB) plans to create 100 economic zones all over the country in the next decade using a wide variety of arrangements. The NSEZ will be one of the largest of this kind to be set up on 30,000 acres of land located in Mirsharai, Sonagazi and Sitakunda Upazilla of Chattogram and Feni Districts. A master plan of NSEZ has been prepared under the current PSDS project financed by the World Bank. The World Bank's Private Investment & Digital Entrepreneurship (PRIDE) project would support phased development of the NSEZ. The sub-project Gas pipeline network under the PRIDE project will be established in zones 2A-2B and its adjacent area in NSEZ. The study is located in Mirsharai Upazila of Chattogram district that will impact Iccakhali Union and Sharkhali union in Mirsharai Upazila under Chattogram district.

#### 2 Administrative Structure of the Study area

Chattogram district is located south-eastern region in Bangladesh. The biggest Port city of Chattogram which is the second largest city of Bangladesh located in Chattogram District. Chittagong Town about 25 km away from the sub-project site, the main seaport of Bangladesh, is located at the estuary of the river Karnafuli. Total area of Chattogram district 5282.92 Sq.Km. According to the BBS 2022 census, Chittagong district has a total number of 2,143,958 households. A total of 9,169,464 people live in this district. Out of total population 4,570,113 males and 4,598,926 females. Out of them 4,284,249 people live in rural areas and 4,885,216 live in cities.

#### Misharai Upazila

Misharai Upazila in Chattogram district is bounded by Tripura state of India, Chhagalnaiya and Feni Sadarr upazilas on the north, Shaunda upazila and Bay of Bengal on the south, Fatikchari upazila on the east, Sona Gazi and Campaniganj (Noakhali) upazilas on the west. Mirsharai Upazila area 482.88 sq km. According to BBS data of 2022, total population 111009; male 472777, female 228303; Mirsharai Thana was formed in 1901 and it was turned into an upazila in 1983. In Mirsharai Upazila, Municipality 2, Union 16, Mouza 109, Village 216, Urban population 31206, Rural population 387510., Population density 826 per sqkm.



Map 15: Mirsharai upazila map

Main sources of income Agriculture 38.93%, non-agricultural labourer 3.61%, industry 0.57%, commerce 13.26%, transport and communication 2.93%, service 18%, construction 1.19%, religious service 0.34%, rent and remittance 8.84% and others 12.33%. Literacy rate average 55.1%; male 57.1%, female 53.3%. Access to electricity all the wards and unions of the upazila are under rural electrification network. However, 56.0% of the dwelling households

have access to electricity. Sources of drinking water Tube-well 93.9%, tap 1.6% and others 4.5%. The presence of arsenic has been detected in 39% of the shallow tube-well water of the upazila. Sanitation 76.2% of dwelling households of the upazila use sanitary latrines and 21.7% of dwelling households use non-sanitary latrines; 2.1% of households do not have latrine facilities. Health centres in Upazila health complex 1, family planning centre 16, satellite clinic 11. BRAC, Proshika, Seba, ASA, CARE, Hunger Project working in this Upazila.

**Social Field Survey:** To ensure all relevant information and representation of all categories of people within sub-project study area the social baseline surveys and field investigations were carried out, which focused on collection and analysis of information from the samples of:

- a) households, business enterprises, institutions and organizations located at the surrounding of the proposed sub-project area and likely to be permanently and/or temporarily affected during construction.
- b) households located within 1KM on each side of the sub-project.
- c) poorer community people of different trades and occupations.
- d) women and children of sampled households.

### Approach and Methodology

- a). Structured Questionnaires survey
- b) Consultation Meetings – with elected representatives of local govt. bodies, NGOs, civil society organizations and public.
- c) Observations –

### Sampling Techniques and Coverage

To ensure a reasonable representation of all categories of people, the samples have been selected from the Mirsharai area, ‘multi-stage sampling’ method was followed to have a balanced representation of the project area. A total of 112 HHs were being selected from different areas of Mirsharai.

## 3 Analysis of Sampled HH Characteristics

### a) Average Household Size

Table 16 presents the distribution of average household size and the percentage distribution of HHs by different sizes. The average family size of BEZA area is 4.38 persons. While 56.25% of total sample HHs have 4-5 members, 24.11% HHs have 3 members or less and the rest 19.64% have 5 or more members in their HHs.

**Table 16: Average family size and percentage distribution of sample hhs by family sizes**

| Total Number of samples HHs | Total number of HH members | Average HH Size | Distribution of HHs by different family sizes |                      |                            |
|-----------------------------|----------------------------|-----------------|-----------------------------------------------|----------------------|----------------------------|
|                             |                            |                 | HHs with 1-3 members                          | HHs with 4-5 members | HHs with 5 or more members |
| 112                         | 491                        | 4.38            | 27 (24.11%)                                   | 63 (56.25%)          | 22 (19.64%)                |

Source: social survey, 2023-2024

### b) AGE Structure off HH Population

**Table 17** shows the distribution of total population of the sampled households by age structure; showing that population aged between 16 and 60 years constitute 62.32% of total population of the sampled HHs - indicating the predominance of economically active members in the HHs. Male population within economically active age range is 33.20%; while female population of the same age is 29.12%. The reason for such difference between male and female is that male over 60 years of age is 2.04%, compared to 1.63% of female of that age group.

Notable that the children (aged up to 14) constitute 32.18%; while the adolescents (aged 15-17) represent 5.30% of the total population. Noteworthy that the juvenile work force within the age range 18-34 years constitute 29.53 of total HH population.

**Table 17: Distribution of sample hh population by gender and age group**

| Age         | Male | Female | Total | %     |
|-------------|------|--------|-------|-------|
| 0 to 5      | 26   | 30     | 56    | 11.41 |
| 6 to 10     | 29   | 21     | 50    | 10.18 |
| 11 to 15    | 27   | 34     | 61    | 12.42 |
| 16 to 20    | 19   | 23     | 42    | 8.55  |
| 21 to 30    | 47   | 54     | 101   | 20.57 |
| 31 to 40    | 46   | 32     | 78    | 15.89 |
| 41 to 50    | 26   | 21     | 47    | 9.57  |
| 51 to 60    | 25   | 13     | 38    | 7.74  |
| 61 to above | 10   | 8      | 18    | 3.67  |
|             | 255  | 236    | 491   | 100   |

### c) Dependency Ratio<sup>1</sup>

As Table 18 shows, total population aged in between 0-14 and aged above 65 years constitute about 34.22% of the total family members of the interviewed HHs who apparently are dependent on the rest 65.78% members of the same HHs. Thus, the dependency ratio comes around 52.01%.

**Table 18: Dependency ratio**

|     | Age Group |            |            |            | Total  | Dependency Ratio<br>$\frac{\sum \text{col.3 \& 6}}{\sum \text{col. 3 \& 4} \times 100}$ |
|-----|-----------|------------|------------|------------|--------|-----------------------------------------------------------------------------------------|
|     | 0-14 Year | 15-34 Year | 35-65 Year | > 65 Years |        |                                                                                         |
| 1   | 2         | 3          | 4          | 5          | 6      | 7                                                                                       |
| No. | 158       | 176        | 147        | 10         | 491    | 52.01                                                                                   |
| %   | 32.18     | 35.85      | 29.94      | 2.04       | 100.00 |                                                                                         |

### d) Marital Status of Population Aged >14 Years

As the Table 19 shows, 26.88% of male and 26.68% of total female population are being within marriageable age range, (aged above 14), 73.74% of male and 85.06% of female within that age range are already married.

**Table 19 Distribution of population aged >14 years by marital status**

|     | Percentage of Population aged above 14 years |        |           |        |               |        |          |        | Total (aged above 14 years) |        |
|-----|----------------------------------------------|--------|-----------|--------|---------------|--------|----------|--------|-----------------------------|--------|
|     | Married                                      |        | Unmarried |        | Widow/Widower |        | Divorced |        | Male                        | Female |
|     | Male                                         | Female | Male      | Female | Male          | Female | Male     | Female |                             |        |
| No. | 132                                          | 131    | 46        | 16     | 1             | 7      | 0        | 0      | 179                         | 154    |
| %   | 73.74                                        | 85.06  | 25.70     | 10.39  | 0.56          | 4.55   | 0        | 0      | 53.75                       | 46.27  |

### e) Educational Status of HH Population

Table 20 shows that about 73.52% of the total population have a certain level education as against 9.37% illiterate. Among the literate ones, nearly 20.98% of male and 19.35% of female have only primary level of education and 1.43% of male and only 0.20% of female received graduation/post-graduation level of education. 28.31% of people received Secondary Education and a total of 3.26% received Higher Secondary education.

**Table 20 Distribution of population by education level**

| Education Type and Level    | Male | Female | Total | %     |
|-----------------------------|------|--------|-------|-------|
| Children                    | 9    | 15     | 24    | 4.89  |
| Primary                     | 103  | 95     | 198   | 40.32 |
| Secondary                   | 71   | 68     | 139   | 28.31 |
| Higher Secondary            | 12   | 4      | 16    | 3.26  |
| Graduate                    | 2    | 1      | 3     | 0.61  |
| Postgraduate                | 5    | 0      | 5     | 1.02  |
| Literacy course/Self Taught | 0    | 0      | 0     | 0     |
| Illiterate                  | 26   | 20     | 46    | 9.37  |
| Underage or Child           | 27   | 33     | 60    | 12.22 |
| Total                       | 255  | 236    | 491   | 100   |

### vi) Occupation and Employment Status of the Surveyed HH Population

#### a) Main Occupation of Surveyed HH Population

Considering only the population within the age range 15-65 years, who constitute about 65.78% of the total population of the sampled HHs, the Table 21 shows the distribution of the 15-65 years aged population by main occupations. It appears that absolute unemployment rate in the BEZA influence zone is around 3.10%; absolute housewives who constitute about 39.32% of the total population of the considered age group. Students aged above 14 years comprise about 10.84% of population within the same age group Small and petty business being the single most common occupation for about 5.88% of the total population of the considered age group, service holders constitute 3.72%. Agriculture and day laboring being the main occupation for about 25.07%, agricultural labour is the main income source.

<sup>1</sup>The dependency ratio has been defined as follows:

$$\text{Dependency Ratio} = \frac{\text{Population Age group 0-14 yrs.} + \text{Population aged >65}}{\text{Population age group 15-65}} \times 100$$

**Table 21: Distribution of population aged 15-65 years by main occupation**

| Occupation           | Male       | Female     | Total      | %             |
|----------------------|------------|------------|------------|---------------|
| Agricultural farming | 13         | 0          | 13         | 4.02          |
| Business             | 19         | 0          | 19         | 5.88          |
| Service              | 10         | 2          | 12         | 3.72          |
| Housewife            | 0          | 127        | 127        | 39.32         |
| Day laboring         | 66         | 2          | 68         | 21.05         |
| Carpenter            | 1          | 0          | 1          | 0.31          |
| Electrician          | 1          | 0          | 1          | 0.31          |
| Fishermen            | 2          | 0          | 2          | 0.62          |
| Expatriate           | 3          | 0          | 3          | 0.93          |
| Driver               | 24         | 0          | 24         | 7.43          |
| Old/ Disable         | 4          | 4          | 8          | 2.48          |
| Student              | 22         | 13         | 35         | 10.84         |
| Unemployed           | 9          | 1          | 10         | 3.10          |
| <b>Total</b>         | <b>174</b> | <b>149</b> | <b>323</b> | <b>100.00</b> |

**b) Main Occupation of Surveyed HH Heads**

Table 22 shows the distribution of household head by occupation, and it shows that business, day labor and driver category dominate the project area as it accounts for 75.89 percent of the total HH head occupation. No other occupation dominates here. Farming is the main occupation of only 9.82 percent. 6.25 percent of them are service holders.

**Table 22: Distribution of population by occupation**

| Occupations          | Primary Occupations of the Household Heads |          |            |               |
|----------------------|--------------------------------------------|----------|------------|---------------|
|                      | Primary Occupations                        |          |            |               |
|                      | Male                                       | Female   | Total      | %             |
| Agricultural farming | 11                                         | 0        | 11         | 9.82          |
| Business             | 16                                         | 0        | 16         | 14.29         |
| Service              | 7                                          | 0        | 7          | 6.25          |
| Housewife            | 0                                          | 0        | 0          | 0             |
| Day laboring         | 51                                         | 0        | 51         | 45.54         |
| Expatriate           | 2                                          | 0        | 2          | 1.79          |
| Driver               | 18                                         | 0        | 18         | 16.07         |
| Electrician          | 1                                          | 0        | 1          | 0.89          |
| Old/ Disable         | 4                                          | 0        | 4          | 3.57          |
| Fisherman            | 2                                          | 0        | 2          | 1.79          |
| <b>Total</b>         | <b>112</b>                                 | <b>0</b> | <b>112</b> | <b>100.00</b> |

**c) Employment Status of HH Population**

As it is evident from the Table 23, while children (total 60) aged below 6 combined with students (131) constitute about 29.63% of total population (excluding housewives) of the surveyed HHs. While about 56.70% of total male and 34.43% of female are fully employed, 15.36% of male and 33.70% of female members are unemployed.

Taken male and female together (excluding the housewife), the overall unemployment rate in the district 23.30%.

**Table 23: Distribution of population by employment status**

| Employment Status         | Male       |            | Female     |            | Total      |            |
|---------------------------|------------|------------|------------|------------|------------|------------|
|                           | Number     | Percent    | Number     | Percent    | Number     | Percent    |
| Aged blow 6 year          | 27         | 10.59      | 33         | 13.98      | 60         | 12.22      |
| Students                  | 71         | 27.84      | 60         | 25.42      | 131        | 26.68      |
| Day labor                 | 66         | 25.88      | 2          | 0.85       | 68         | 13.85      |
| Agriculture and Fisheries | 15         | 5.88       | 0          | 0          | 15         | 3.05       |
| Service                   | 39         | 15.29      | 3          | 1.27       | 42         | 8.55       |
| Housewife                 | 0          | 0          | 128        | 54.24      | 128        | 26.07      |
| Unemployed                | 18         | 7.06       | 10         | 4.24       | 28         | 5.70       |
| Business                  | 19         | 7.45       | 0          | 0          | 19         | 3.87       |
| <b>Total</b>              | <b>255</b> | <b>100</b> | <b>236</b> | <b>100</b> | <b>491</b> | <b>100</b> |

## vii) Household Assets and Capital Resources

### a) Land

As it is evident from Table 24, 81.25 % of the interviewed HHs is being land less 8.93% HHs reported to have less than 10 acres of one or other type of land and, 4% has land in between 1 to 1.5 acres, while only 1% has land above 3.5 acres. The rest 4% have land in between 1.51-2.50 acres.

**Table 24: HHS by land ownership status**

| Percentage distribution of HHs reported to have cultivable land by land holding size : |                 |                  |                  |                  |                  |                 |       |
|----------------------------------------------------------------------------------------|-----------------|------------------|------------------|------------------|------------------|-----------------|-------|
| Landless                                                                               | Below 0.50 acre | 0.50 – 1.00 acre | 1.00 – 1.50 acre | 1.51 – 2.50 acre | 2.51 – 3.50 acre | Above 3.50 acre | Total |
| 91                                                                                     | 10              | 4                | 4                | 2                | 0                | 1               | 112   |
| 81.25                                                                                  | 8.93            |                  |                  |                  |                  |                 |       |

As it is shown in Table 25, the average land owned per HH is an acre; of which 6.97 acres is homestead land and 18.71acre is cultivable land.

**Table 25: Average amount of land per HH**

| Land types           | Average Land per HH (Acre) |              |     |           |     |        |     | Total Net Operated Land |
|----------------------|----------------------------|--------------|-----|-----------|-----|--------|-----|-------------------------|
|                      | Own                        | Sharecropped |     | Mortgaged |     | Leased |     |                         |
|                      |                            | In           | Out | In        | Out | In     | Out |                         |
| 1                    | 2                          | 3            | 4   | 5         | 6   | 7      | 8   | 9                       |
| Cultivable land      | 18.71                      |              |     |           |     |        |     | 18.71                   |
| Homestead land       | 6.97                       |              |     |           |     |        |     | 6.97                    |
| Orchard/Fruit Garden | 0                          |              |     |           |     |        |     | 0                       |
| Kitchen Garden       | 0                          |              |     |           |     |        |     | 0                       |
| Pond/Ditch           | 1.5                        |              |     |           |     |        |     | 1.5                     |
| Other                | 0                          |              |     |           |     |        |     | 0                       |
| <b>All category</b>  | <b>29.18</b>               |              |     |           |     |        |     | <b>36.18</b>            |

### b) Value of Land Owned by the Sampled HHS

Estimated at the average present market rate, the total value of land owned by the sampled HHs is shown in Table 26;

**Table 26: Value of land owned by the sampled HHS**

| Land Type   | Average amount of own land (Decimal/HH)                           | Average Value (TK/Decimal) | Total Value (TK/HH) | Remarks                                                                                                                 |
|-------------|-------------------------------------------------------------------|----------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------|
| Agriculture | 89.10                                                             | 130400                     | 243978400           | Value of land has been estimated based on the average present market rates given by the FGD participants and respondent |
| Homestead   | 10.72                                                             | 210570                     | 146767290           |                                                                                                                         |
| Pond /Ditch | 12.5                                                              | 95580                      | 14337000            |                                                                                                                         |
| Commercial  | None of the sample HH reported possibility of any commercial land |                            |                     |                                                                                                                         |

### c) Livestock and Poultry

As the Table 27 shows, about 58.93% interviewed HHs reported having one or other type of livestock, while another 47.32% of HHs reported have any poultry birds. The average number of livestock heads under the management of the sampled HHs is 2.42 per HH, including 7 HH having 18 bullocks.

**Table 27: Average number of livestock and poultry per household**

| Livestock types and poultry | Average Number Per HH |              |                  |              |                  |              |                         |              |
|-----------------------------|-----------------------|--------------|------------------|--------------|------------------|--------------|-------------------------|--------------|
|                             | Under Own Management  |              | Sharecropped-in  |              | Sharecropped-out |              | Net total per HH's mgt. |              |
|                             | Total No. of HHs      | Ave. Per HHs | Total No. of HHs | Ave. Per HHs | Total No. of HHs | Ave. Per HHs | Total No. of HHs        | Ave. Per HHs |
| <b>Livestock</b>            |                       |              |                  |              |                  |              |                         |              |
| Bullock                     | 7                     | 2.57         |                  |              |                  |              | 7                       | .57          |
| Cow                         | 40                    | 2.45         | 1                | 2            |                  |              | 41                      | 2.44         |
| Buffalo                     | 1                     | 1            |                  |              |                  |              | 1                       | 1            |
| Goat                        | 13                    | 1.62         |                  |              |                  |              | 13                      | 1.62         |
| Sheep                       | 2                     | 9            |                  |              |                  |              | 2                       | 9            |

| Livestock types and poultry | Average Number Per HH |              |                  |              |                  |              |                         |              |
|-----------------------------|-----------------------|--------------|------------------|--------------|------------------|--------------|-------------------------|--------------|
|                             | Under Own Management  |              | Sharecropped-in  |              | Sharecropped-out |              | Net total per HH's mgt. |              |
|                             | Total No. of HHs      | Ave. Per HHs | Total No. of HHs | Ave. Per HHs | Total No. of HHs | Ave. Per HHs | Total No. of HHs        | Ave. Per HHs |
| Pig                         | 3                     | 1.33         |                  |              |                  |              | 3                       | 1.33         |
| Total                       | 66                    |              | 1                |              |                  |              |                         |              |
| <b>Poultry</b>              |                       |              |                  |              |                  |              |                         |              |
| Chicken                     | 51                    | 6            |                  |              |                  |              | 51                      | 6            |
| Poultry farm                | 2                     | 557          |                  |              |                  |              | 2                       | 557          |
| Duck/Goose                  | 49                    | 4.53         |                  |              |                  |              | 49                      | 4.2          |
| Total                       |                       |              |                  |              |                  |              |                         |              |

**d) Average Value of Livestock and Poultry per Household**

Table 28 shows the estimated average value of livestock and poultry birds per household of the sampled households. The average value per unit of buffalo TK54890 cow per unit is Chickens TK 450 and duck TK 450. The total value of all livestock and poultry stands at BDT 7481970.

**Table 28: Average value of livestock and poultry**

| Type of Livestock and Poultry            | Average number per HH | Average Unit Price | Total Value <sup>i</sup> | Remarks                                                                                                    |
|------------------------------------------|-----------------------|--------------------|--------------------------|------------------------------------------------------------------------------------------------------------|
| Bullock                                  | 2.57                  | 54890              | 988020                   | Average per unit value is based on estimates made in consultation with FGD participants in different area. |
| Cow                                      | 2.45                  | 54890              | 5489000                  |                                                                                                            |
| Buffalo                                  | 1                     | 100000             | 100000                   |                                                                                                            |
| Goat                                     | 1.62                  | 7819               | 146200                   |                                                                                                            |
| Sheep                                    | 9                     | 7222               | 130000                   |                                                                                                            |
| Pig                                      | 1.33                  | 625                | 2500                     |                                                                                                            |
| <b>Sub-total -livestock</b>              |                       |                    |                          |                                                                                                            |
| Chicken                                  | 6                     | 450                | 523500                   |                                                                                                            |
| Duck/Goose                               | 4.53                  | 462                | 102750                   |                                                                                                            |
| <b>Sub-total -Poultry</b>                |                       |                    |                          |                                                                                                            |
| <b>Grand Total (livestock + poultry)</b> |                       |                    |                          |                                                                                                            |

**e) Other Household Assets**

As Table 29 shows, only 0.89% of interviewed HHs reported to have any type of agricultural equipment like tractor/power tiller and 32.14% have any type of transport like motorcycle and bicycle; while 28.57% households have TV/Radio, 90.18% household has mobile phones, 15.18% has fridges, 55.36% household has electric fan. The total value of various HHs assets amount to TK /-6,911,313

**Table 29: Household assets other than land, livestock and poultry**

| Asset types            | Total HH with Assets |              |                 | Average number Assets per HHs | Average Value |
|------------------------|----------------------|--------------|-----------------|-------------------------------|---------------|
|                        | Number of HHs        | Total Assets | Percent (n=112) | Number                        | (TK)          |
| Table                  | 93                   | 107          | 83.04           | 1.15                          | 3074          |
| Chair                  | 91                   | 140          | 81.25           | 1.54                          | 1764          |
| Almira                 | 77                   | 97           | 68.75           | 1.26                          | 8475          |
| Khat                   | 105                  | 116          | 93.75           | 1.10                          | 14473         |
| Bicycle                | 32                   | 32           | 28.57           | 1.00                          | 6703          |
| Television             | 32                   | 32           | 28.57           | 1.00                          | 10112         |
| Gas Cylinder           | 45                   | 45           | 40.18           | 1.00                          | 4811          |
| Fridge                 | 17                   | 17           | 15.18           | 1.00                          | 28176         |
| Auto Ricksha           | 5                    | 5            | 4.46            | 1.00                          | 106400        |
| Tractors/ Power Tillar | 1                    | 1            | 0.89            | 1.00                          | 80000         |
| Motorcycle             | 4                    | 4            | 3.57            | 1.00                          | 131625        |
| Mobile                 | 101                  | 125          | 90.18           | 1.24                          | 8687          |

| Asset types                      | Total HH with Assets |              |                 | Average number Assets per HHs | Average Value  |
|----------------------------------|----------------------|--------------|-----------------|-------------------------------|----------------|
|                                  | Number of HHs        | Total Assets | Percent (n=112) | Number                        | (TK)           |
| Fan                              | 62                   | 77           | 55.36           | 1.24                          | 1150           |
| Solar                            | 12                   | 12           | 10.71           | 1.0                           | 24000          |
| <b>Total value of all assets</b> |                      |              |                 |                               | <b>6911313</b> |

### viii) Living Standard

#### a) Ownership, Structural Conditions and Amenities in Residential Houses

To understand the standard of living of the sample HHs, the survey examined the ownership, structural condition, and availability of basic amenities in their residential houses. Table 30 shows that 58.04% of the interviewed HHs are residing in their own houses, 38.39 residing in rented house/Kash land and the rest 3.57% live in other houses.

**Table 30: Distribution of interviewed HHS by ownership status of living houses**

| Living in Own House |       | Living in Kash Land |       | Living in other House |      | Total      |     |
|---------------------|-------|---------------------|-------|-----------------------|------|------------|-----|
| No. of HHs          | %     | No. of HHs          | %     | No. of HHs            | %    | No. of HHs | %   |
| 65                  | 58.04 | 43                  | 38.39 | 4                     | 3.57 | 112        | 100 |

Notable that out of total 65 Table 31 shows that HHs residing in self-owned houses, only 23.08% are living in buildings, 21.54% live in semi-pucca, 32.30% live in tin-maid house and all others (23.08%) are living in Katcha houses.

**Table 31: Distribution of HHs living in self-owned houses by structural conditions.**

| House Type                        | HHs living in | Percent=(n=65) |
|-----------------------------------|---------------|----------------|
| 1. Buildings (Pucca walls & roof) | 15            | 23.08          |
| 2. Semi-pucca                     | 14            | 21.54          |
| 3. Tin walls & tin shed           | 21            | 32.30          |
| 4. Katcha                         | 15            | 23.08          |
| Total                             | 65            | 100            |

#### b) Amenities in the Residential Houses of the Sample HHS

As may be seen in the Table 32 below, only 5.36% of the HHs are connected to piped water supply system; while the 90.18% depends on hand tube wells and for 4.46% HHs collect water from other HH. Sanitary latrines only 17.86% HH have sanitary latrine and 82.14% HH have ring slub/Non-Sanitary Latrin. 84.82% of HHs have electric connection, 1.79% have no electric connection, 4.46% depend on other houses and 8.93% use other sources.

**Table 32: Amenities available in the residential houses of the sample HHs**

| Type of Amenities                        |                                          | HHs reported to have the amenity |                 |
|------------------------------------------|------------------------------------------|----------------------------------|-----------------|
|                                          |                                          | Number                           | Percent=(n=112) |
| <b>(A) Drinking Water Supply Sources</b> |                                          |                                  |                 |
| HHs Using:                               | Piped Water Supply                       | 6                                | 5.36%           |
|                                          | Own Deep/ Shallow Tube                   | 101                              | 90.18%          |
|                                          | Other                                    | 5                                | 4.46%           |
| <b>(B) Toilet Facility</b>               |                                          |                                  |                 |
| HHs using:                               | Sanitary Latrines                        | 20                               | 17.86%          |
|                                          | Non-Sanitary Latrines                    | 92                               | 82.14           |
| <b>(C) Energy sources</b>                |                                          |                                  |                 |
| HHs Using:                               | HHs connected to electricity supply line | 95                               | 84.82           |
|                                          | No electricity supply                    | 2                                | 1.79            |
|                                          | Connected to another house               | 5                                | 4.46            |
|                                          | Othe                                     | 10                               | 8.93            |

#### c) Accessibilities to Health Care Facilities

As it is evident from Table 33, 69.64% of people of the surveyed area mainly goes to the govt. hospitals and 2.68% HHs goes to private doctors/clinics for health care services, 99.11% HH goes to village doctor and 40.18% HH goes to pharmacy when any of their members are sick. Whereas 2.67% of HHs reported to have qualified doctor is available in their locality, 97.33% of HHs reported to have no qualified doctor is available in their locality.

**Table33: Accessibility to, and frequencies of visit to health care services centers**

| Types of Health Care                                  |                                          | Number | Percent=(n=112) |
|-------------------------------------------------------|------------------------------------------|--------|-----------------|
| <b>Human Health Care</b>                              |                                          |        |                 |
| <b>HHs contact first if any family member is sick</b> | Quack/Pharmacy                           | 45     | 40.18           |
|                                                       | Community Health Centre / Village Doctor | 111    | 99.11           |
|                                                       | Private Doctor/ Hospital/Clinic          | 3      | 2.68            |
|                                                       | Govt. Hospital                           | 78     | 69.64           |
| <b>Qualified doctor is available in your area</b>     | Yes                                      | 3      | 2.67            |
|                                                       | No                                       | 109    | 97.33           |

#### d) Income and Expenditure<sup>2</sup>

Estimated the income and expenditure of the sample HHs to have an idea of their overall economic conditions and standard of living, income estimate embraced: (i) Farm Income, (ii) Off-farm Income and (iii) Farm & Off-Farm Income of the HHs.

Estimate of 'Farm Income' covered all agricultural income including the sales proceeds of crops, vegetable, fruits, livestock, poultry, fish culture and the like; while the 'Off-farm Income' included Wage/Salary/Pension etc. as well as the income from Trade/Business, Transport operation and/or transport related business, Remittance, Rent, Interest (Bank, FDR etc.) and Sale of any Capital Asset. On the other hand, expenditure is the summation of agricultural farming costs, household consumption cost (covering healthcare, clothing, and education costs), transportations cost and purchase value of any capital asset during the same reference period.

Out of total 112 HHs interviewed, agricultural farming (including livestock, poultry, fishery) is the only income source for 24.11% HHs and 98.21% depends exclusively on off-farm income, while the rest 14.29% HHs depend both on farm and non-farm income sources.

**Table 34: Distribution of HHS by sources of income**

| District:                 | Distribution of HHs by Sources of Income |        |                 |       |                        |       |
|---------------------------|------------------------------------------|--------|-----------------|-------|------------------------|-------|
|                           | Farm Income                              |        | Off-Farm Income |       | Farm & Off-Farm Income |       |
| Number & Percentage of HH | 27                                       | 24.11% | 110             | 98.21 | 16                     | 14.29 |

#### e) Average Annual Income and Expenditure

Table 35 shows the average monthly income of surveyed HHs is TK 18016.07/- HH and annual average expenditure per HHs.

**Table 35: Average annual income (TK/HH)**

| Annual Income (TK/HH)           |                 |         |                        |
|---------------------------------|-----------------|---------|------------------------|
| Total income of all sampled HHs |                 |         | Average Income per HHs |
| Farm Income                     | Off-Farm Income | Both    |                        |
| 393800                          | 1624000         | 2017800 | 18016.07               |

#### f) Average Annual Expenditure

Table 36 presents the average monthly household expenditures on the major accounts - including agricultural farming cost, HH consumption expenditures, transportation cost and others etc. The overall area average of monthly expenditure is TK17177.59/HH; leaving a balance of TK 838.48/- per HH.

**Table 36: Household expenditure**

| Annual Expenditure (TK/HH)           |                                                        |                     |             |                   |                             |
|--------------------------------------|--------------------------------------------------------|---------------------|-------------|-------------------|-----------------------------|
| Total expenditure of all sampled HHs |                                                        |                     |             |                   | Average Expenditure per HHs |
| (A) Agril. Farming Cost              | (B)HH Consumption Cost (excluding transportation cost) | Transportation Cost | Health Cost | Total Expenditure |                             |
| 110400                               | 1820830                                                | 103060              | ?           | 1923890           | 17177.59                    |

#### ix) Overall Economic Condition Sample HH

Based on poverty rate in Bangladesh the overall economic status of the sampled HHs is presented in the Table 37, wherefrom is evident that 69.64% of total HHs have faced deficit and 14.29% fell deficit at times or medium income family. On the other hand, 16.07% of HHs have surpluses.

<sup>2</sup> Analysis is based on figures collected from 1001 HHs sampled from both sides within 1KM of the proposed road alignment.

**Table:37 Distribution of HHS by overall economic condition**

|     | Number and Percentage distribution of HHs by overall economic conditions |        |                     |
|-----|--------------------------------------------------------------------------|--------|---------------------|
|     | Poor                                                                     | Medium | Above Medium Income |
| No. | 78                                                                       | 16     | 18                  |
| %   | 69.64%                                                                   | 14.29% | 16.07%              |

Source: (Poverty rate 6.85 USD per day income):  
[https://en.wikipedia.org/wiki/Poverty\\_in\\_Bangladesh#Poverty\\_rate\\_by\\_division](https://en.wikipedia.org/wiki/Poverty_in_Bangladesh#Poverty_rate_by_division)

#### x) Prevalence of Borrower Households

Table 38 below shows that about 50.89% of total HHs took any loan during last one year for different purposes and from different sources. All the borrowing 27.68% HHs commonly took loans from NGOs and 10.71% HHs got loan from Banks and financial institutions, 4.46% from Cooperatives.

**Table 38: HHs borrowed from different sources**

|     | HHs borrowed any loan during last year | Number and Percentage distribution of HHs took loan from: |              |       |                           |                   |        |
|-----|----------------------------------------|-----------------------------------------------------------|--------------|-------|---------------------------|-------------------|--------|
|     |                                        | Institutional Sources                                     |              |       | Non-Institutional Sources |                   |        |
|     |                                        | Banks/Financial institutions                              | Cooperatives | NGOs  | Private Lender/Traders    | Friends/relatives | Others |
| No. | 57                                     | 12                                                        | 5            | 31    | 5                         | 4                 | 00     |
| %   | 50.89                                  | 10.71                                                     | 4.46         | 27.68 | 4.46                      | 3.57              | 00     |

#### xi) Average Loan for Different Purposes

As shown in Table 39, the purpose-wise percentage of loan recipients and 54.39% of borrowing HHs took loan for meeting the food expenses and other family consumption purposes; For business purpose, 3.51% of HHs took loan. 28.07% HHs borrowed for buying agricultural inputs/equipment and another 14.4% for other purposes.

**Table 39: Average amount of loans by purposes (All Districts)**

| Loan Purpose                       | Percentage of HHs took loan from any sources (n=57) | %     |
|------------------------------------|-----------------------------------------------------|-------|
| Purchase of Agri. Inputs/Equipment | 16                                                  | 28.07 |
| Business                           | 2                                                   | 3.51  |
| Food/Family Consumption            | 31                                                  | 54.39 |
| Debt Repayment                     |                                                     |       |
| Others                             | 8                                                   | 14.4  |

#### xii) Association with NGOs

As may be seen in Table 40, out of total 112 sampled HHs, 48.21% reportedly associated with any NGOs; Grameen Bank, ASA and BRAC are being the NGOs these HHs are associated with.

**Table 40: Distribution of HHs by NGOs associate**

| Name of NGOs | HHs associated with |              |
|--------------|---------------------|--------------|
|              | No.                 | %            |
| ASA          | 13                  | 7.14         |
| BRAC         | 15                  | 13.39        |
| Grameen Bank | 18                  | 16.07        |
| Other        | 8                   | 7.14         |
| <b>Total</b> | <b>54</b>           | <b>48.21</b> |

#### xiii) Major Local Social Problems

Considered Road improvement to be the number one problem by 100% of respondents; Unemployment is second most common problem reported by 52.68% of respondents. Local conflicts and poverty issues were mentioned by 50.89% HHs.

Among the proposed measures against poverty assistance from Govt. and general demand for industrial establishment; While it is recommended to develop new industries and create employment opportunities to alleviate unemployment and poverty. Those who mentioned unemployment as a problem wanted govt. assistance towards establishing a new factory.

**Table 41: Major problems and recommended solutions**

| Type of problems reported  | HHs reported the problem (n=112) |       | Most common recommended solutions                                                                                                                    |
|----------------------------|----------------------------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------|
|                            | No.                              | %     |                                                                                                                                                      |
| Conflict with Local People | 57                               | 50.89 | <ul style="list-style-type: none"> <li>Assistance from Government</li> </ul>                                                                         |
| Cultural Adjustment        | 14                               | 12.5  | <ul style="list-style-type: none"> <li>Assistance from Government and NGO organization</li> </ul>                                                    |
| Non-comparative            |                                  |       |                                                                                                                                                      |
| Criminal Activity          | 49                               | 43.75 | <ul style="list-style-type: none"> <li>Assistance from Government</li> <li>Need social and Law Enforcement Surveillance</li> </ul>                   |
| Poverty                    | 57                               | 50.89 | <ul style="list-style-type: none"> <li>Assistance from Government</li> <li>Need more industries in this area</li> </ul>                              |
| Unemployment               | 59                               | 52.68 | <ul style="list-style-type: none"> <li>Assistance from Government</li> <li>Need more industries in this area</li> <li>Vocational Training</li> </ul> |
| Transport                  | 112                              | 100   | <ul style="list-style-type: none"> <li>Repair/improve existing Road</li> </ul>                                                                       |
| <b>Total</b>               |                                  |       |                                                                                                                                                      |

### vx) Status of Women in the Project Area

#### a) Education

Even though women constitute half of the population, analysis of survey findings reveal that women in many aspects fall behind men. As Table 42 shows that female literacy rate is still a bit high in the survey areas – about 19.82% female compared to 18.92% of male. Although the male students and recipients of secondary and higher secondary levels education are higher than female, the scenario at graduation levels is just opposite. Male students and recipients of graduate level education is 2.10% as against 0.30% of female, whereas female at graduation/post-graduation level are far behind their male counterparts.

**Table 42: Comparative position of women in terms of education**

| Education Level              | Percentage Distribution of Sampled HH Population Aged above 14years |        |       | Remarks                                                                          |
|------------------------------|---------------------------------------------------------------------|--------|-------|----------------------------------------------------------------------------------|
|                              | Male                                                                | Female | Total |                                                                                  |
| Illiterate                   | 10.51                                                               | 10.51  | 21.02 | Male enrollment at primary and secondary level is relatively higher than female. |
| Primary Level                | 18.92                                                               | 19.82  | 38.74 |                                                                                  |
| Secondary Level              | 18.62                                                               | 14.41  | 33.03 |                                                                                  |
| Higher Secondary Level       | 3.60                                                                | 1.20   | 4.80  |                                                                                  |
| Graduate/Post-graduate Level | 2.10                                                                | 0.30   | 2.40  | Males are little bit higher than female for getting higher education.            |

#### b) Occupation and Employment

As the Table 43 below shows, excluding the absolute housewives and students aged above 14 years, 63.75% of the sampled HH members aged in between 15-65 years reported to be fully employed in any income earning occupation; about 43.03% of male and 39.94% of female are fully employed. Absolute unemployment rate for male is 2.9% and 0.31%; absolute housewives being considered employed.

**Table 43: Men versus women in employment**

| Occupation/Employment                           | Percentage Distribution of Sample HH population aged 15-65 Year |        |       | Remarks                                                                                         |
|-------------------------------------------------|-----------------------------------------------------------------|--------|-------|-------------------------------------------------------------------------------------------------|
|                                                 | Male                                                            | Female | Total |                                                                                                 |
| Fully employed in any income earning occupation | 43.03                                                           | 39.94  | 82.97 | 83.77% of total women within the reference age range are 'Housewives' considered fully employed |

|            |      |      |       |                                                                                                                      |
|------------|------|------|-------|----------------------------------------------------------------------------------------------------------------------|
| Student    | 6.81 | 4.02 | 10.84 | Lower percentage of female student aged above 15 years is discontinuation of education mainly due to early marriage. |
| Unemployed | 2.79 | 0.31 | 3.10  | Considered only those who are willing to work but not finding any opportunity.                                       |

### c) Participation in Social Organizations and NGOs

Whereas 48.21% of total sampled HHs reported to have any family member associated with NGOs like ASA, BRAC, Grameen Bank.

### d) Women's Mobility and Accessibility to Markets

To be taken with caution that 24.11% of sampled HHs heads do not support women working outside home, 91.96% women members of interviewed HHs reported to have visited any place outside home during a year before interview and 38.46% of total women interviewed reported to have visited any marketplace.

**Table 44: Indicators of women's mobility accessibility to markets**

| Indicators                                                                      | Percentage of reporting HHs |
|---------------------------------------------------------------------------------|-----------------------------|
| HH Heads having objection to women working outside home                         | 24.11%                      |
| Interviewed women visited any place outside home (excluding visit to relatives) | 91.96%                      |
| Interviewed women visited any marketplace                                       | 38.46%                      |

### e) Women's Participation in Decision Making

The Table 45 presents the survey findings about women participation in important family matters like children's education, children's marriage, and own health care; wherefrom it appears that women are very good position in regard to deciding about their children's education. About 94.64% of women taking part in deciding about their children's education about 5.36% cannot at all play any role in this regard or was not applicable as they do not have any children yet to go to school.

Only 89.29% of women having children of that age group reported full freedom to participation in any decision about their children's marriage, while 5.36% reported possibility of participation in decision making only on limited issues concerning their children's marriage.

About their own health, 97.32% of women reported to have absolute freedom of taking decision, while about 2.68% cannot take decision.

**Table 45: Women in development and level of empowerment**

| Women by degree of freedom to take part in decision making about: |                    | Percentage of reporting women |
|-------------------------------------------------------------------|--------------------|-------------------------------|
| <b>Children's Education</b>                                       | Cannot take always | 0                             |
|                                                                   | Cannot take at all | 5.36                          |
|                                                                   | Can take always    | 94.64                         |
|                                                                   | Not applicable     | 0                             |
| <b>Children's Marriage</b>                                        | Cannot take always | 0.89                          |
|                                                                   | Cannot take at all | 9.82                          |
|                                                                   | Can take always    | 89.29                         |
|                                                                   | Not applicable     | 0                             |
| <b>Own Health Care</b>                                            | Cannot take always | 0                             |
|                                                                   | Cannot take at all | 2.68                          |
|                                                                   | Can take always    | 97.32                         |
|                                                                   | Not applicable     | 0                             |

### f) Women Awareness of STDs

Although HIV/AIDS infected people in Bangladesh is still at relatively low level, there is, however, a concentrated HIV epidemic among the injecting drug users (IDU), primarily due to sharing of unclean syringes and needles. As a result, the rate of new infections is still on the rise and Bangladesh is the only country in the South Asia Region where new infections are rising<sup>3</sup>. Risk arises mainly from unprotected paid sex, sharing of used needles and syringes

<sup>3</sup>FEATURE STORY; HIV/AIDS in Bangladesh, July 10, 2012, World Bank

by IDU, and unprotected sex between men who have sex with men. There is also a risk of epidemic among female sex workers (FSW) in towns bordering with India.

Having that in view, the study has investigated the knowledge level of the respondents about HIV/AIDS. In response to a question whether they know about Sexually Transmitted Diseases (STD), 23.08% women reported to have heard of HIV/AIDS and about 7.69% claimed to be aware of the reasons for spreading HIV/AIDS.

**Table 46: Women aware of HIV/AIDS and the causes of spreading the diseases.**

| Issues                                                          |                                                                                     | Percentage of reporting women |
|-----------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------|
| Women know of HIV/AIDS                                          |                                                                                     | 23.08                         |
| Women know the reasons for spreading HIV/AIDS                   |                                                                                     | 7.69                          |
| Percentage of women who know the reasons for spreading HIV/AIDS | Copulation with HIV/AIDS infected people                                            | 76.92                         |
|                                                                 | Sexual interaction with multiple partners                                           | 76.92                         |
|                                                                 | Sexual interaction with sex workers                                                 | 76.92                         |
|                                                                 | Blood infusion of HIV/AIDS infected people                                          | 15.38                         |
|                                                                 | Using needle/injection syringe or sharp instrument used by HIV/AIDS infected people | 15.38                         |
|                                                                 | HIV/AIDS infected pregnant mother's baby can get HIV/AIDS in womb                   | 15.38                         |

#### **xv) Potential benefits on People's livelihood for Gas Pipeline Installation**

Establishment of an economic zone will increase the economic benefits of the people within the project's impact zone. It is envisaged that the development of economic zones will enhance the economic growth of the area with the following benefits.

To improve the socio-economic conditions of local settlements.

This gas pipeline network will supply natural gas Industrial Economic Zones of NSEZ. It will speed up industrial development and create employment opportunities not only in Mirsrai, Sitakunda and Sonagazi areas but also in the surrounding areas. Employment opportunities will gradually increase which will increase the demand for skilled, educated, and unskilled people which will increase the quality of education in Bangladesh.

Furthermore, it will facilitate improved access to market centers, educational institutions, healthcare facilities, and offices.

The cumulative positive impacts of the project will result in increased mobility, employment generation, and above all better economic integration of the area with the major market and trade centers within and outside the districts.

More opportunities for the women to educate themselves, train themselves and contribute to improve on the economic conditions of their home and community.

Women empowerment with the onset of training programs involving the awareness among the women population.

Table 47 shows that 69.64% survey people believe new industry will set-up in BEZA industrial area, 64.29% believe investment will be increase, 99.11% said employment opportunity will be increased, 98.21% believe scope of woman employment will be increased, 100% people believe income will be incased.

**Table 47: Benefit for the gas pipeline**

| SL.NO | Issue                          | HHs reported the issue (n=112) | %     |
|-------|--------------------------------|--------------------------------|-------|
|       | Set-up industries              | 78                             | 69.64 |
|       | Increase investment            | 72                             | 64.29 |
|       | Increase employment            | 111                            | 99.11 |
|       | Women employment will increase | 110                            | 98.21 |
|       | Increase income                | 112                            | 100   |
|       | Improve lifestyle              | 99                             | 88.39 |
|       | Improve livelihood facilities  | 109                            | 97.32 |
|       | Improve infrastructure         | 95                             | 84.82 |
|       | Others                         | 8                              | 7.14  |

#### **xvi) Impact on Employment:**

An extensive number of un-skilled and semi-skilled contractual labor may be employed during the construction phase of the project. Most of the labors will be hired from the local community and neighboring district based on availability. The construction phase activities will facilitate intermixing of local workforce (mostly unskilled) with the migrant workforce (mostly skilled). About 83.93% of the HHs are interested in working in NSEZ different stage (Construction period after construction) different factory as skill and un-skill labor. Only 16.17% are not interested

in working at NSEZ.

Woman employment opportunity will be increase in different industry. Now most female are doing their homestead work and maximum time they site daily. About 99.11% female people are interested to work in NSEZ.

Construction of gas pipelines will require many workers. Local workers work here, and the rest of the workers are brought from outside. About 98.21% of the respondents believe that migrant workers will come here for work in BEZA to fill the labor shortage. About 97.32% of people believe that the project will improve livelihood facilities.

**Table 48: People opinion about the project**

| Issue                                                         | HHs reported the issue (n=112) | %     |
|---------------------------------------------------------------|--------------------------------|-------|
| Are you interested to work BEZA                               | Yes=94                         | 83.93 |
|                                                               | NO=18                          | 16.17 |
| Do You think female people are interested to work at BEZA     | Yes=111                        | 99.11 |
|                                                               | NO=1                           | 0.89  |
| Increase employment                                           | 111                            | 99.11 |
| Women employment will increase                                | 110                            | 98.21 |
| Do you think migratory people will come here for work at BEZA | 110                            | 98.21 |
|                                                               | 2                              | 1.79  |
| Impact on Local Business                                      | 107                            | 95.54 |
|                                                               | 5                              | 4.46  |
| Improve livelihood facilities                                 | 109                            | 97.32 |
| Improve infrastructure                                        | 95                             | 84.82 |
| Others                                                        | 8                              | 7.14  |

#### **xvii) Historical, Archeological and Cultural Heritage**

Archaeological heritage and relics are existing at the Mirsarai Upazila jurisdiction like Dhum Shila Pathar (Shantir Hat), Chhuti Khan Mosque, Paragal Khan Dighi, Nai Duari Mosque, Jagannath Dham (Abu Torab), Kali Mandir (Karerhat), Shantiniketan Vihara, Abhay Charan Vihara. All the the archaeological sites are preserved by the Antiquities Act, 1968 (Under Section 12). All sites will not be affected by the project.

#### **xviii) Vulnerable Groups and NGO Activity**

People who will be disproportionately affected by project activities must receive special attention to ensure equal participation and decision-making during project implementation. This type of person or group will thus be classified as vulnerable or deprived for the purposes of the project.

However, it is initially presumed that the possible vulnerable groups will be children (underage employment), women workers, and adolescent girls, physically and mentally challenged persons, Indigenous people, unemployed youths, and directly affected people.

To reduce the risk of vulnerability, engaging stakeholders with identified groups will contribute to successful project implementation and increase interest in project activities, stimulating expertise, networking, and agendas. Furthermore, it provides access to local or indigenous knowledge and experience, allowing them to become actively involved in project implementation.

#### **ixx) Gender Based Violence (GBV) in Study Area**

Gender-based violence (GBV), including sexual harassment and abuse (SHA), may occur at project sites throughout construction and operation due to workforce influx, local recruitment, and other factors. GBV is a widespread worldwide concern, and it is likely to be shown in every context where the World Bank operates. Violence against women, children, and men results in physical and mental harm.

To mitigate risks in project areas, it's important to identify and evaluate potential dangers for vulnerable groups such as women and children. However, tackling GBV remains a difficult and crucial task. GBV risk is determined based on the extent of the labor intake, the scale of local recruitment or job opportunities, and community involvement in project implementation, either directly or indirectly. Because the project area is diverse with industrial operations, business promotion or opportunity, and the involvement of various interested parties, groups, and labor or worker engagement will be a long-term and continuous process, GBV will occur frequently due to the project's operational period. The frequency of GBV will be reduced during the construction phase, necessitating close monitoring of the situation.

## ANNEX 4: ROAD TRAFFIC COUNT SHEET

### ROAD TRAFFIC COUNT TALLY SHEET

Project Name : BSMSN Development Project  
Name of Road : Shekh Hasina Sarak to BSMSN  
Location : CP More

Date : 26/06/2024  
GPS Coordinate : N 22.76449° E 091.50546°

| Time                                 |      | Vehicle Class |              |             |           |          |           |                                           |     |                                               |             |         |          |     |                   |
|--------------------------------------|------|---------------|--------------|-------------|-----------|----------|-----------|-------------------------------------------|-----|-----------------------------------------------|-------------|---------|----------|-----|-------------------|
|                                      |      | Heavy Truck   | Medium Truck | Small Truck | Large Bus | Mini Bus | Micro bus | Utility (4 Wheel Drive/ Jeep/ SUV / NOAH) | Car | Motorized 3 wheel/ CNG/ Mishuk/ Auto Rickshaw | Motor Cycle | Bicycle | Rickshaw | Van | Animal /Push Cart |
| 9:00am to 9:30am                     | Up   | 5             | 1            | 2           | 1         | 1        | 2         | 3                                         | 8   | 47                                            | 11          | 6       | -        | -   | -                 |
|                                      | Down | 7             | 2            | -           | -         | -        | 3         | 1                                         | 3   | 39                                            | 18          | 3       | -        | -   | -                 |
| Total                                |      | 12            | 3            | 2           | 1         | 1        | 5         | 4                                         | 11  | 86                                            | 29          | 9       | 0        | 0   | 0                 |
| 5:00pm to 5:30pm                     | Up   | 7             | 1            | 1           | -         | 1        | 7         | 7                                         | 4   | 32                                            | 14          | 8       | -        | -   | -                 |
|                                      | Down | 11            | 4            | 5           | 3         | 3        | 18        | 16                                        | 12  | 51                                            | 34          | 18      | -        | -   | -                 |
| Total movement of vehicle/30 minute. |      | 18            | 5            | 6           | 3         | 4        | 25        | 23                                        | 16  | 83                                            | 28          | 26      | 0        | 0   | 0                 |

Project Name : BSMSN Development Project  
Name of Road : Shekh Hasina Sarak to BSMSN  
Location : CP More

Date : 27/06/2024  
GPS Coordinate : N 22.76454° E 091.47713°

| Time                                 |      | Vehicle Class |              |             |           |          |           |                                           |     |                                               |             |         |          |     |                   |
|--------------------------------------|------|---------------|--------------|-------------|-----------|----------|-----------|-------------------------------------------|-----|-----------------------------------------------|-------------|---------|----------|-----|-------------------|
|                                      |      | Heavy Truck   | Medium Truck | Small Truck | Large Bus | Mini Bus | Micro bus | Utility (4 Wheel Drive/ Jeep/ SUV / NOAH) | Car | Motorized 3 wheel/ CNG/ Mishuk/ Auto Rickshaw | Motor Cycle | Bicycle | Rickshaw | Van | Animal /Push Cart |
| 9:00am to 9:30am                     | Up   | 5             | 1            | 4           | -         | -        | 6         | 7                                         | 6   | 23                                            | 10          | 2       | -        | -   | -                 |
|                                      | Down | 7             | 2            | -           | -         | -        | 4         | 3                                         | 8   | 17                                            | 18          | -       | -        | -   | -                 |
| Total                                |      | 12            | 3            | 4           | 0         | 0        | 10        | 10                                        | 14  | 40                                            | 28          | 2       | 0        | 0   | 0                 |
| 5:00pm to 5:30pm                     | Up   | 6             | -            | 1           | -         | -        | 1         | 4                                         | 4   | 29                                            | 18          | 1       | -        | -   | -                 |
|                                      | Down | 11            | 4            | 5           | 3         | 3        | 18        | 16                                        | 12  | 51                                            | 34          | 18      | -        | -   | -                 |
| Total movement of vehicle/30 minute. |      | 17            | 4            | 6           | 3         | 3        | 19        | 20                                        | 16  | 80                                            | 52          | 19      | 0        | 0   | 0                 |

Figure 1: Road traffic count sheet

## ANNEX 5: KII, FGD AND STAKEHOLDER'S ENGAGEMENT

### Key Informant Interviews (KIIs)

During the survey conducted by BCL Associates Limited, the following Key Informant Interview (KII) with the different stakeholders taken place to disseminate and disclose information on the project activities. First, briefly discuss the proposed project. This project will install around 30 km of gas pipelines, 2 valve stations, and RMS centers in Zones 2A-2B and its adjacent areas of NSEZ. The objective of the project is to provide gas connections for 1200 industries in NSEZ areas, which will help boost the country's economic growth and create employment opportunities for both locals and outsiders. BEZA will be the executive agency, and KGDCL will be the implementing by the contractor, supervision and monitoring agency.

**Summary of the KII and photographs are given bellow:**

#### **KII with Imam:**

| Md. Rashadul Islam<br>Imam<br>Ichakhali Sluice gate bazar Mosque,<br>Ichakhali Union<br>Mirsharai, Chattogram<br>Mobile:01830-159956<br>Date:9.12.2023 |                                                                                                                       |                                                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sl. No                                                                                                                                                 | Questions                                                                                                             | Answers/Comments                                                                                                                                                                                                                     |
| 1                                                                                                                                                      | Gas line will be installed in the economic zone, do you know it?                                                      | Yes, I know                                                                                                                                                                                                                          |
| 2                                                                                                                                                      | What are the benefits of the local people if the gas line is installed in the economic zone?                          | The people of the area will get some benefits, like: The local people will get employment opportunity. The communication system of the area will be improved. Improve business. Demand for house rent will increase.                 |
| 3                                                                                                                                                      | If the proposed project is implemented, there will be any negative impact on the area or not.                         | Yes, there will be some negative impact on the area, like: Outsiders borrow from locals and leave without repaying. Some outsiders speared addiction among the locals. Some outsiders speared various diseases among the locals.     |
| 4                                                                                                                                                      | Do you have any suggestions or comments that needs to be considered during the implementation of the proposed Project | Since many people will come from outside, they have to be managed well. Local people will be benefited by gas connection outside the Economic Zone. Everyone should be aware so that crime, addiction cannot spear among the locals. |

#### **KII with Teacher**

| Abdur Rab<br>School Teacher<br>Char Sarat Model High School, Char Sarat,<br>Union-Ichakhali<br>Mirsharai, Chattogram<br>Mobile:01836-395661<br>Date:9.12.2023 |                                                                  |                                             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Sl. No                                                                                                                                                        | Questions                                                        | Answers/Comments                                                                                                                |
| 1                                                                                                                                                             | Gas line will be installed in the economic zone, do you know it? | Yes, I know.                                                                                                                    |
| 2                                                                                                                                                             | What about your perception of the project (Positive or Negative) | It is a very good initiative for local and country development and the people of the area will get many benefits in the future. |
| 3                                                                                                                                                             | What is the positive social impact of the proposed project?      | There will be some positive impact on the society, like: increase employment, development of communication system,              |

|   |                                                             |                                                                                                                                                                                                                                                                                           |
|---|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |                                                             | development of business over all the quality of life will be improved and                                                                                                                                                                                                                 |
| 4 | What is the negative social impact of the proposed project? | There will be some negative impact on the society, like: there may be conflict between the local community and the laborers coming from outside. Crime (theft, robbery, rape) may increase. Addiction and various diseases can spread. Cattle rearing will stop within the economic zone. |
| 5 | Do you have any suggestions or comments                     | Local people will be benefited by gas connection outside the Economic Zone. Everyone should be aware so that crime, addiction cannot spear among the locals. Employment of local people should be arranged on priority basis                                                              |

**KII with Upazila Agriculture Officer:**

Protap Chandra Roy  
Upazila Agriculture Officer  
Mirsharai, Chattogram  
Mobile:01718-066684  
Date: 11.12.2023



| Sl. No | Questions                                                                                                             | Answers/Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | What are the general agricultural practices in the study area?                                                        | Generally, Boro, Aman and vegetables are cultivated within the influence area of the gas pipe line                                                                                                                                                                                                                                                                                                                                                                                                           |
| 2      | What are the existing cropping patterns in the area.?                                                                 | At present there are Amon rice and vegetables in the fields                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 3      | Do you think the proposed project will have hampered agricultural production                                          | As the gas pipeline is within the economic zone, it will not any hamper to agricultural production                                                                                                                                                                                                                                                                                                                                                                                                           |
| 4      | Will the people of the influence area get any benefits if the gas pipeline is installed?                              | They will get some benefits such as: employment opportunities will increase, business areas will increase, communication system will be better, etc.                                                                                                                                                                                                                                                                                                                                                         |
| 5      | Will the population of the area be affected by the installation of gas pipeline?                                      | The Gas Pipeline will be installed within the Economic Zone so there is no problem for the local people. However, there are some risks for the communities around the Gas Pipeline from Barotakia to Economic Zone, such as Gas Pipeline Leakage. Local forest drains and irrigation channels may be destroyed. Besides, many cows and buffaloes used to graze in the economic zone which will not be possible anymore and when the boundary wall is put in the economic zone, we will have to travel a lot. |
| 6      | Do you have any suggestions or comments that needs to be considered during the implementation of the proposed Project | Must monitor the activities to mitigate the social impact. No social forest/drainage system/irrigation channels should be disturbed while installing the gas pipeline.                                                                                                                                                                                                                                                                                                                                       |

**KII with Farm Manager:**

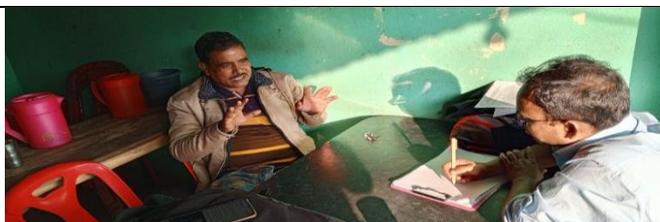
Md. Motasim Bella (Hafiz)  
Farm Manager  
Fish Seed Multiplication Farm  
Mirsharai, Chattogram  
Mobile:01677-515999  
Date:11.12.2023



| Sl. No | Questions                                                                                                             | Answers/Comments                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | How many fishermen families live in Ichakhali and Maghadia Union?                                                     | There are 56 fishermen families live in Osmanpur under Ichakhali union and 100 fishermen families live in Sarkerpara under Maghadia union.                                                                                                                                                                                                                                                                                                     |
| 2      | Do you think the proposed project will have hampered to catching fish                                                 | As the gas pipeline is within the economic zone, it will not any hamper to catching fish                                                                                                                                                                                                                                                                                                                                                       |
| 3      | Whether there will be any benefit on the fishermen families if the gas line will be installed in the economic zone    | The fishermen families will get some benefits, such as: employment opportunities will increase, business areas will increase, communication system will be better etc.                                                                                                                                                                                                                                                                         |
| 4      | Will the population of the area be affected by the installation of gas pipeline?                                      | The Gas Pipeline will be installed within the Economic Zone so there is no problem for the local people. However, there are some risks for the communities around the Gas Pipeline from Barotakia to Economic Zone, such as Gas Pipeline Leakage. Ponds and canals may be destroyed. Besides, there is a possibility of spreading various types of crime, addiction, diseases etc. in the area due to the arrival of many people from outside. |
| 5      | Do you have any suggestions or comments that needs to be considered during the implementation of the proposed Project | If a fisherman's family is harmed due to the gas line, they should be compensated. To ensure security for the population. Care should be taken to ensure that the families of fishermen are not affected.                                                                                                                                                                                                                                      |

**KII with UP Member:**

Md. Yunus Mia  
 UP Member, Ward No-9  
 Maghadia Union,  
 Mirsharai, Chattogram  
 Mobile:01830-140115  
 Date:11.12.2023



| Sl. No | Questions                                                                                                             | Answers/Comments                                                                                                                                                                                                                                                                      |
|--------|-----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | What about your perception of the project (Positive or Negative)                                                      | It is a very good initiative for the development of local and country as well but currently the people of the area are not getting any direct benefits but, in the future, they will get few benefits.                                                                                |
| 2      | Will there be any positive impact on the society as a result of the implementation of the proposed project?           | At the present the people of the area are not getting any benefits but, in the future, they will get few benefits, like: increase employment, development of communication system, development of business over all the quality of life will be improved.                             |
| 3      | Will there be any negative impact on the society as a result of the implementation of the proposed project?           | There may be conflict between the local community and the laborers coming from outside. Crime (theft, robbery, rape) may increase. Addiction and different kinds of diseases can spread.                                                                                              |
| 4      | Do you have any suggestions or comments that needs to be considered during the implementation of the proposed Project | Providing compensation if any family is affected. Employment of local people should be arranged on priority basis. People will be greatly benefited by connecting gas lines outside the economic zone. Workers from outside will actually provide them with the necessary facilities. |

**KII with BEZA Officials:**

Md. Ferdous Wahid  
 Assistant Engineer (Civil) &  
 Focal Person  
 Bangabandhu Sheikh Mujib Shilpa Nagar  
 (NSEZ)  
 Mirsharai, Chattogram  
 Mibile:01620142860  
 Date:12.12.2023



| Sl. No | Questions                                                                                                             | Answers/Comments                                                                                                                                                                                                                              |
|--------|-----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | If this project is implemented what will be the positive impact on the society?                                       | There will be some positive impact on the society, for example: increase employment, development of communication system, development of business over all the quality of life will be improved.                                              |
| 2      | If this project is implemented what will be the negative impact on the society?                                       | There will be some positive impact on the society, for example: There may be conflict between the local community and the laborers coming from outside. Crime (theft, robbery, rape) may increase. Addiction and various diseases can spread. |
| 2      | Do you have any suggestions or comments that needs to be considered during the implementation of the proposed Project | Health & safety of all those working in the project must be ensured. Gas wastage should be prevented. Training and employment of local people should be arranged on priority basis.                                                           |

### KII with NGO

Md. Shahadat Hossain  
 Manager  
 CODEC Abu Turab Branch  
 Abu Turab Bazar, Moghadia Union  
 Mirsharai, Chattogram  
 Mobile:01708-508164  
 Date:12.12.2023



| Sl. No | Questions                                                                                                             | Answers/Comments                                                                                                                                                                                                                                          |
|--------|-----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | Will there be any impact on NGO activities if the gas pipeline is installed in the economic zone?                     | There will be some impact on NGO activities, like: As the population in the area will increase, the demand for loans will increase on the other hand some people will run away with loans.                                                                |
| 2      | What about your perception of the project (Positive or Negative)                                                      | After the installation of gas lines, many factories will go into production, as a result of which there will be a lot of development in this area and the country.                                                                                        |
| 3      | What is the positive social impact of the proposed project?                                                           | There will be some positive impact on the society indirectly. Like: increase employment, development of communication system, development of business over all the quality of life will be improved and                                                   |
| 4      | What is the negative social impact of the proposed project?                                                           | There will be some negative impact on the society indirectly, like: There may be conflict between the local community and the laborers coming from outside. Crime (theft, robbery, rape) may increase. Addiction can spread. Various diseases can spread. |
| 5      | Do you have any suggestions or comments that needs to be considered during the implementation of the proposed Project | Local people will be benefited by gas connection outside the Economic Zone. Employment of local people should be arranged on priority basis. Health & safety of all those working in the project must be ensured.                                         |

### KII with KGDCL

Name: Md. Nahid Alam  
 Designation: Project Director, Prepaid Meter Installation Project  
 Karnaphuli Gas Distribution Company Limited, Dhaka  
 Mobile:01708-508164  
 Date: 15/05/2024

| Sl. No | Question                                                                       | Response                                                                                                                                                                                          |
|--------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | Tentative manpower during construction period/operation period with breakdown  | - Supervision Consultant: 5 (Approximately)<br>-In total 30-35 skill and non-skill man power will work during gas pipe line setting and they will stay in three camps                             |
| 2      | Source of Utilities (Water, Electricity, Gas, Diesel) for Gas pipeline network | -Electricity: Less electricity requires for the camp and will used from NSEZ project /BEZA's self-source.<br>-Electricity 4-5 KW/day<br>-Electricity for during pipe setting manage by contractor |

|    |                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |                                                                                                      | <ul style="list-style-type: none"> <li>- Gas: Gas will use contractor from their sources, may be used Gas cylinder</li> <li>-Water: Water only for the people of camp will use from project. Per person per day 60 liters water will be used.</li> <li>-Diesel: Managed by contractors</li> </ul>                                                                                                                                        |
| 3  | Tentative work schedule                                                                              | 18 months from contract signing                                                                                                                                                                                                                                                                                                                                                                                                          |
| 4  | Sanitation issue in the labor camp                                                                   | <ul style="list-style-type: none"> <li>-Contractor will properly manage the sanitary and grey water management.</li> <li>-Grey water properly filtered and then discharge or drain out</li> </ul>                                                                                                                                                                                                                                        |
| 5  | Hazardous waste management during construction                                                       | <ul style="list-style-type: none"> <li>-During welding may be incident occur</li> <li>-During construction work Proper PPE will be used and strongly maintain "No PPE no work" and safety is the first</li> <li>-Having no record for major accident but incident /injury may be occurring during pipe loading unloading and setting up</li> <li>- Previous no record on accident</li> <li>-Ensure First AID box in each camp</li> </ul> |
| 6  | Grey water management in the labor camp/construction camp                                            | -Contractor will manage the grey water of the camp and this contractor responsibility                                                                                                                                                                                                                                                                                                                                                    |
| 7  | Technical specification (diameter of pipe, civil work details etc.)                                  | <ul style="list-style-type: none"> <li>- Diameter of Pipe: 24 inches.</li> <li>-Trench: 3 feet</li> <li>-Depth: 1.5 meter</li> <li>-Volume of trench: 300-400 m/day</li> </ul>                                                                                                                                                                                                                                                           |
| 8  | Having any possibilities to pipe leakage? If leakage occur what would be the preventive measure/plan | <ul style="list-style-type: none"> <li>-Accident may be occur but possibilities are very low.</li> <li>-Pipe leakage detection dictator measure will be applied to find out the leakage.</li> </ul>                                                                                                                                                                                                                                      |
| 9  | Having any insurance for involving workers                                                           | -Contractor responsivity                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 10 | Having any Emergency Response Plan? Like firing, gas leakage                                         | <ul style="list-style-type: none"> <li>-KGDCL trained up the technical person of Pipe fitting and welding, even they have taken examination practically-</li> <li>-Bulb isolating ball</li> <li>- Time interval checking the line</li> <li>-Smell come out from leakage side</li> <li>- Gas detector device</li> <li>- having their fire detection device</li> </ul>                                                                     |
| 11 | Is plantation possible on the gas pipeline network?                                                  | -Herbaceous species will be planted after set up gas pipeline in the RoW those are short roots like Binna/Nepiar or Barmudha grass. Which help to protect soil erosion                                                                                                                                                                                                                                                                   |
| 12 | Possibilities of probable accident during construction period                                        | -Probabilities of accident are very low such kind of distribution network project. In addition, project area is isolated from local area so chances of accident are minimal. Proper PPE need to be used to avoid accident.                                                                                                                                                                                                               |
| 13 | Per day amount of Gas requirement from KGDCL to project                                              | -Per day 250 million cubic foot gas will provide to the NSEZ project and KGDCL will collect gas from GTCL and signing with them.                                                                                                                                                                                                                                                                                                         |
| 14 | Having any possibility to check the gas line in interval                                             | -Having plan for upcoming day                                                                                                                                                                                                                                                                                                                                                                                                            |

**KII with Department of Environment (DOE)**

|                                                                                                                                          |                                                                                      |                                                        |
|------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------------------------------------|
| <p>Name: Md. Ashraf Uddin<br/>Designation: Research Officer, DoE, Chattogram District<br/>Cell No.: 01920886635<br/>Date: 26.06.2024</p> |  |                                                        |
| <b>Sl. No</b>                                                                                                                            | <b>Issues</b>                                                                        | <b>Participants' Opinion, Comments and Suggestions</b> |

|   |                                                                                                                                                                   |                                                                                                                 |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| 1 | What do you think regarding this proposed project from the point of view of Department of Environment?                                                            | This project will support positive economic growth in NSEZ as well as the country                               |
| 2 | What environmental issues in this proposed project (gas pipeline networks) should be monitoring during the construction and operation period?                     | Air and soil pollution will be the primary issue; besides sound pollution needs to get attention                |
| 3 | How Department of Environment can help for smooth implementation of this project, particularly for the operation and maintenance period of gas pipeline networks? | By issuing Environmental Clearance Certificate (ECC) according to the ECR,2023                                  |
| 4 | How can this project reduce carbon emissions from the industrial growth, and operation and maintenance period of gas pipeline networks?                           | The project might use high efficiency renewable energy-based machineries and hi-tech for project implementation |
| 5 | Is there any suggestion for betterment of environmental issues during construction and operation of this project?                                                 | Follow the rules of ECR,23 and be aware of environmental pollution                                              |
| 6 | Which department's NoC required for this gas pipeline project?                                                                                                    | Project area is within the NSEZ periphery so NoC from BEZA required for this project.                           |
| 7 | Thanks for your time and valuable suggestions.                                                                                                                    |                                                                                                                 |

#### **KII with Forest Department (DOE)**

Name: Abdul Gofur Mollah  
Designation: Range Officer  
Department of Forest, Chattogram  
Cell. No.: 01866280207  
Date: 26.06.2024



| Sl. No | Issues                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Participants' Opinion, Comments and Suggestions                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | First, briefly discuss the proposed project. This project will install around 32 km of gas pipelines, 2 valve stations, and RMS centers in Zones 2A and 2B of NSEZ. The objective of the project is to provide gas connections for 1200 industries in NSEZ areas, which will help boost the country's economic growth and create employment opportunities for both locals and expats. BEZA will be the executive agency, and KGDCL will be the implementing agency. | Discussed by consultant team                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 2      | The project plans to plant trees in the Green Zone of NSEZ as part of landscape development or scenic beauty. So, are there any suggestions from BFD regarding the selection of tree species, particularly for the coastal area / this proposed project area?                                                                                                                                                                                                       | Tamarix dioica (Jhau tree) is suitable for this type of coastal area but due to lack of proper nutrient of the sandy land we recommend to collect soil from outside of the project for tree plantation. If use outside soil, then local tree species can also be planted.                                                                                                                                                                                                                                        |
| 3      | Activities of the forest department around NSEZ                                                                                                                                                                                                                                                                                                                                                                                                                     | The forest department has an afforestation program at the west part of the super dyke. Under this program they are planting about 4 million trees within 800-acre area. Plantations start from Feni River to Doomkhali sea beach. In every area 30% new trees are planted to adjust for the lost amount. This activity will continue yearly for three years upon monitoring the success of previous plantations. To sustain this afforestation program sand cutting should be stopped adjacent to the sea shore. |

|   |                                                                                                                                         |                                                                                                                                                                                                                        |
|---|-----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4 | How can this project reduce carbon emissions from the industrial growth, and operation and maintenance period of gas pipeline networks? | Tree plantation program needs to be implemented properly to reduce the carbon emission                                                                                                                                 |
| 5 | Is there any suggestion for betterment of natural safeguards during construction and operation of this project?                         | Palm trees should have planted to protect against thunder storm in the project area.<br>Ground water cannot be used for industrial purpose. Desalination can be a good alternative in order to avoid ground water use. |
| 6 | Thanks for your time and valuable suggestions.                                                                                          |                                                                                                                                                                                                                        |

### **KII with Department of Inspection for Factories and Establishment (DIFE)**

| Name: Shipon Chowdhury<br>Designation: Deputy Inspector General,<br>Department of Inspection for Factories and Establishment (DIFE), Chattogram,<br>Cell No.: 01815610717<br>Date: 26.06.2024 |                                                                                                                                                                                             |                                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sl. No                                                                                                                                                                                        | Issues                                                                                                                                                                                      | Participants' Opinion, Comments and Suggestions                                                                                                                                                                                                |
| 1                                                                                                                                                                                             | How can DIFE work with the newly growth industries or BEZA to ensure Good International Industry Practice (GIIP) in NSEZ areas?                                                             | DIFE is a department under Ministry of Labor and Employment. All industries have a to take permission before start their operation. They have to comply Bangladesh Labor Law for the rights of workers. DIFE monitor such issues periodically. |
| 2                                                                                                                                                                                             | What do you think that Gas Pipeline operation will cause danger for workers and industries? If so, what is your suggestions to address these risks during operation and maintenance period? | During operation period of gas pipeline proper safety protocol should be followed according to the approved layout from Inspector General of DIFE                                                                                              |
| 3                                                                                                                                                                                             | Is there any standards set by DIFE for industry operation?                                                                                                                                  | Every industry should follow Labor Law,2006                                                                                                                                                                                                    |
| 4                                                                                                                                                                                             | How can DIFE help BEZA to ensure safety protocols for gas pipeline operation and industrial operation?                                                                                      | DIFE have to take industry layout and machineries layout approval from Inspector General of DIFE on that time industry have to comply safety protocols.                                                                                        |
| 5                                                                                                                                                                                             | How BEZA can make sustainable industrial growth and safely manage the Gas Pipeline operation in the NSEZ areas? Do you have any suggestions in this regard?                                 | Need to take layout approval of the industry from Inspector General of DIFE.<br>Every industry has to take permission from DIFE to run the industry before 15 days of the operation started.                                                   |

### **KII with Power Grid Company of Bangladesh (PGCB)**

| Name: Md. Noor Hosain<br>Designation: Sub-Assistant Engineer,<br>PGCB sub station, NSEZ, Mirsharai,<br>Cell No.: 001885541435<br>Date: 26.06.2024 |                                                                                                                |                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sl. No                                                                                                                                            | Issues                                                                                                         | Participants' Opinion, Comments and Suggestions                                                                                                                                                                                                                                                                                                               |
| 1                                                                                                                                                 | How can PGCB work with the newly growth industries or BEZA to ensure uninterrupted power supply in NSEZ areas? | Actually, PGCB is a transmission company. Inside the NSEZ PGCB have 230KVA transmission line and have plan to add 400 KVA line in future to provide uninterrupted connection to the project including 2A and 2B.<br>PGCB transfer electricity through NLDC to the project. REB is the responsible party to provide/distribute the electricity to the project. |

|   |                                                                                                                                                                                 |                                                                                                                                                                                                                                         |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2 | What do you think that Gas Pipeline operation will be risks for PGCB power lines during operation and maintenance period?                                                       | Gas pipeline construction and operation have no risk for PGCB power line and substation.                                                                                                                                                |
| 3 | What is the good international industry practice (GIIP) for gas pipeline operation and maintenance/ PGCB powerlines management in the NSEZ areas?                               | N/A                                                                                                                                                                                                                                     |
| 4 | What are the major risks for gas pipeline operation relating to PGCB powerlines and what will be corrective measures to address the anticipated risks in NSEZ areas?            | No Idea regarding this issue                                                                                                                                                                                                            |
| 5 | How BEZA can make sustainable industrial growth and safely manage the Gas Pipeline operation and PGCB powerlines in the NSEZ areas? Do you have any suggestions in this regard? | Gas connection will have facilitated the industries inside the NSEZ which boost the economy of the country. During supply the gas to the industries proper safety measures should be followed according to the applicable safety rules. |

### **KII with Bangladesh Electrification Board (BREB)**

Name: Adnan Ahmed  
 Designation: Deputy General Manager (DGM),  
 Bangladesh Rural Electrification Board,  
 Mirsharai  
 Cell No.: 01769400212  
 Date: 27.06.2024



| Sl. No | Issues                                                                                                                                                                         | Opinion, Comments and Suggestions                                                                                                                                                                                                                                                             |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | What is the present status of REB in the NSEZ?                                                                                                                                 | REB already has 4 substations inside the NSEZ. Among them, one is a switching substation which is located inside the PGCB periphery of NSEZ.<br>Currently REB has 33kva and 11kva distribution line inside the project<br>Current demand of electricity inside the NSEZ project area is 10MW. |
| 2      | How can REB work with the newly growing industries or BEZA to ensure uninterrupted power supply in NSEZ areas?                                                                 | REB has 3 substations inside the NSEZ to provide uninterrupted power supply in NSEZ areas.                                                                                                                                                                                                    |
| 3      | Do you think that the Gas Pipeline operation will pose any risk for REB power lines during operation and maintenance period?                                                   | If trenches are dug for gas pipeline near the REB electricity poles, they may fall over. Care should be taken to avoid this. Before start their work to construct the gas pipeline it will better to coordinate with REB so that electric pole not be damaged.                                |
| 4      | What is the best international industry practice (GIIP) for gas pipeline operation and maintenance/ REB power lines management in the NSEZ areas?                              | N/A                                                                                                                                                                                                                                                                                           |
| 5      | How BEZA can make sustainable industrial growth and safely manage the Gas Pipeline operation and REB powerlines in the NSEZ areas? Do you have any suggestions in this regard? | None                                                                                                                                                                                                                                                                                          |

### **KII with Fire Service and Civil Defense**

Name: Imam Hossen Patowary  
 Designation: Station Officer, Mirsharai  
 Cell No.: 01827974148  
 Date: 27.06.2024

| Sl No. | Issues | Participants' Opinion, Comments and Suggestions |
|--------|--------|-------------------------------------------------|
|--------|--------|-------------------------------------------------|

|   |                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2 | What are the major risks for gas pipeline operation in the project areas from the view of fire service and civil defense department?                                                   | Fire hazard is the major risk for the Gas pipeline from the view of fire service and civil defence department                                                                                                                                                                                  |
| 3 | How can project authority minimize these anticipate risks and how the fire service and civil defense department can help BEZA to address these risks and impacts in the Project areas? | All CGS and DRS should control under fire safety protocols. All industries have to take fire safety plan from Bangladesh Fire Service and Civil Defence Authority. Fire safety plan should be complying before start the operation.                                                            |
| 4 | Have any activities in project area                                                                                                                                                    | Adequate amount of fire extinguisher has to be provided. For gas pipeline construction and operation CO2 and DCP fire extinguisher have to be provided. Fire Service and Civil Defence Authority will have established two stations inside the NSEZ to provide continuous support to the NSEZ. |
| 5 | What are the safety protocols for gas pipeline operation? Is there any specific safety codes of Fire Service and Civil Defense Department?                                             | Fire Prevention and Fighting Act of 2003 and Bangladesh National Building Code 2020 should follow to prevent the fire hazard.                                                                                                                                                                  |

### KII with Karnaphuli Gas Distribution Company (KGDCL)

Name: Mahmudul Hossen  
 Designation: Manager (Environment), KGDCL,  
 Chattogram H/Q  
 Cell No.: 01718779635  
 Date:27.06.2024



| Sl. No | Issues                                                                         | Opinion, Comments and Suggestions                                                                                                                                                                                                                                                                                                                                                                                    |
|--------|--------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2      | What is design and demand of gas pipe line in 2A and 2B and its adjacent areas | Gas Safety rules 1991 should be followed<br>Already 1 CGS and 2 DRS have inside the NSEZ. Additional four (4) DRS will be established inside the NSEZ for smooth operations of the industries. Among this four DRS two will be constructed for 2A and 2B.<br>The overall demand for future for the NSEZ is 874mmcf. Other side the gas requirement for 2A and 2B is 100mmcf. BEPZA have also requirement of 120mmcf. |

### KII with Farmer

Nur Hosen  
 Village-Charsarath  
 Union-Ichakhali  
 Mirsharai, Chattogram  
 Mobile\_0187569073  
 Date-28.06.24



| Sl. No | Questions                                                                   | Answers/Comments                                                                                                      |
|--------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| 1      | How many crops are grown in this field annually?                            | Aush, Borro and winter vegetables are cultivated in this field.                                                       |
| 3      | Do you use pesticides on crops?                                             | Yes, I use.                                                                                                           |
| 4      | How is the rice yield per acre?                                             | 6000-8000 kg. per acre                                                                                                |
| 5      | Will there be any impact on you if farming is stopped in the Economic Zone? | Most of our families cultivate other people's land. If this land is taken away, it will be difficult to get new land. |

**KII with Fisherman**

|                                                                                                                                                                      |                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| Md. Jashim Uddin<br>Village-Shariatpara<br>Union-Moghadia<br>Mirsharai, Chattogram<br>Location-Oali Canal Sluice Get (Seaside)<br>Mobile- Not found<br>Date-28.06.24 |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|

| Sl. No | Questions                                       | Answers                                                                                        |
|--------|-------------------------------------------------|------------------------------------------------------------------------------------------------|
| 1      | What is the name of this canal?                 | Oali canal                                                                                     |
| 2      | Is the sluice gate of this canal always closed? | Yes. Sea water cannot enter through this gate but internal water can exit.                     |
| 3      | What is the depth of this canal?                | The depth of this canal is 30-35 feet                                                          |
| 4      | What fish are available in this canal?          | Shrimp, Bata, Guila, Chiring, Telapia, Puti, Tengra, Pangash, Shing, Shoil are available here. |
| 5      | When are the fish available more?               | More fish are available during the low tide                                                    |
| 6      | What do you fish with?                          | Jhaki jal, Thela jal, Moshari, Khappa, Current jal and fishing is done by hand                 |

**KII with Assistant Inspector of Explosives, Department of Explosives (DOEXP), Dhaka**

| Adress                                                                                                                                                             | Comments                                                                                                                                                                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Muhammad Mehdi Islam Khan<br>Assistant Inspector of Explosives,<br>Department of Energy and Mineral Resources, Dhaka,<br>Mobile No.-01717352709<br>Date-08.07.2024 | Mr. Mehedi Islam Khan said regarding the gas line that:<br>Department of Explosives gives permission for Gas Network not NOC<br>According to the Natural Gas Rules 1991 no person or organization can take Gas line without the permission of the Department of Explosives. |

**KII with DOE Official**

| Name: Md. Abul Kalam Azad<br>Designation: Deputy Director (Environmental Clearance)<br>DoE, H/Q, Dhaka.<br>Cell No.: 01718725668<br>Date: Date-08.07.2024 |                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Issue                                                                                                                                                     | Opinion/Suggestions                                                                                                             |
| What is the procedure for ToR approval and taking ECC from DoE for the Gas Pipeline Construction in NSEZ under BEZA?                                      | Since the project inside the economic zone so ToR approval and EIA are not required. EMP have to submit for taking ECC from DoE |

**Focus Group Discussions (FGD)**

During the field survey the following focus group discussion was conducted with seven separate groups of people to disseminate and disclose the information of propose Gas pipe line Sub-project under the NSEZ Development Project and to know their opinions about the project

**FGD with Local Community**

Village: Char Sarat, Upazila: Mirsharai, District: Chittogram

Date: 09.12.2023

Place: Shop of Mosharof Member

The FGD was conducted at the tea stall of former UP member Mosharof Hossain of Charsarat village of Mirsharai Upazila. There was attended a total of ten participants which represent small businessman, student, day labor, farmer and local leader, etc. The FGD discussion minutes and attendance list are as follows



Figure 1: FGD with local community at charsarat of ichakhali union under mirsharai upazila

**Summary of Focus Group Discussion (FGD-1):**

- Mosharraf Hossain said that we are not getting any benefits directly because the gas line is in the economic zone.
- Abdus Salam says many people will come from outside to work on gas line and we may have conflict with them
- Monirul Islam said that people who come from outside can spear various types of crime, such as theft, robbery, intoxication etc.
- Abdul Hai said that we will be greatly benefited if gas connection is provided outside the economic zone.
- Finally, everyone says that if the Economic Zone is established, the area will develop in various ways. For example, our employment opportunities will be created, income will increase, roads will improve, etc.

**Attendance sheet of Focus Group Discussion (FGD-1):**

Bangabandhu Sheikh Mujib Shilpa Nagar (BSMSN) Development Project  
Environmental and Social Consultancy services (Package No. PMC 16-BSMSN-BEZA)  
Bangladesh Economic Zones Authority (BEZA)

Sub: Attendance Sheet of Focus Group Discussion (FGD) for Gas pipeline

Name of District: Chittagong Name of Place: Shop of Mosharof Member  
Name of Upazila: Mirsharai Name of Location:  
Name of Union: Isakhali Date: 9.12.2023  
Name of Village: Charsarat Time: 3.15 Pm  
Name of Group: Local community

| Sl. No | Name of Participants | Designation        | Mobile Number | Signature   |
|--------|----------------------|--------------------|---------------|-------------|
| 1      | Mosharof Hossain     | former member      | 01815408952   | [Signature] |
| 2      | Ismael               | farmer             | 01812728394   | [Signature] |
| 3      | Monirul Afsar        | farmer             |               | [Signature] |
| 4      | Md. Abdus Salam      | small business man | 01815527413   | [Signature] |
| 5      | Obaidul Haque        | farmer             | 01840276004   | [Signature] |
| 6      | Monirul Islam        | student            | 01604764274   | [Signature] |
| 7      | Abdul Subhan         | small business man | 01813540578   | [Signature] |
| 8      | Md. Ziaul Haque      | farmer             | 01897663191   | [Signature] |
| 9      | Abdul Hai            | farmer             | 01873649587   | [Signature] |
| 10     | Md. Abdul Halim      | Labour             | 01869550024   | [Signature] |
|        |                      |                    |               |             |
|        |                      |                    |               |             |
|        |                      |                    |               |             |

**FGD with Project Affected People**

Village: Char Sarat, Upazila: Mirsharai, District: Chittogram

Date: 9.12.2023

Place: Member's Office, Daborkhali Point

This FGD was conducted at Member's Office, Daborkhali Point of Charsarat village of Mirsharai Upazila. There was attended a total of nine (9) participants which represent farmer, auto driver and cook. The FGD discussion minutes and attendance list are as follows



Figure 2: FGD with affected person for economic zone at daborkhali point of ichakhali union

**Summary of Focus Group Discussion (FGD-2):**

- Rabiul Islam said the economic zone has acquired our farming land. As a result, we have suffered. Economic Zone does not give us any work.
- Ajmir said that we are not getting any benefits directly because the gas line is in the economic zone.
- Biplab Kumar Das said that we should give job opportunities on priority basis in the economic zone.
- Jamal said that in the future increase employment, development of communication system, development of business over all the quality of life will be improved.
- Finally, everyone says that if the Economic Zone is established, the area will develop in various ways. For example, our employment opportunities will be created, income will increase, roads will improve, etc.

**Attendance sheet of Focus Group Discussion (FGD-2):**

Bangabandhu Sheikh Mujib Shilpa Nagar (BSMSN) Development Project  
Environmental and Social Consultancy services (Package No. PMC 16-BSMSN-BEZA)  
Bangladesh Economic Zones Authority (BEZA)

Sub: Attendance Sheet of Focus Group Discussion (FGD) for... Gas pipeline

Name of District: Chittagong Name of Place: Daborkhali point  
Name of Upazila: Mirsharai Name of Location: Member's office  
Name of Union: Isakhali Date: 10.12.2023  
Name of Village: Charsarat Time: 5.20 Pm  
Name of Group: Affected Person's

| Sl. No | Name of Participants | Designation | Mobile Number | Signature      |
|--------|----------------------|-------------|---------------|----------------|
| ১      | মো: রবিউল ইসলাম      | কৃষক        | ০২৮৭৪২৭২৫৭৫   | রবিউল          |
| ২      | আবু দাউদ             | আইসিএস      | ০২৮৭৫৭৭৭৪০২   | আবু দাউদ       |
| ৩      | বিল্লাহ কুমার মাসুদ  | কৃষক        | ০২৮০৪২০৬২৪২   | বিল্লাহ        |
| ৪      | সুজন ইসলাম           | আইসিএস      | ০২৮৬৪৭২৬০৫৭   | সুজন ইসলাম     |
| ৫      | মো: জাকিয়া হক       | আইসিএস      | ০২৮৫৭২২৬৫৫০   | জাকিয়া হক     |
| ৬      | মো: মোস্তাফিজ        | কৃষক        | ০২৮৭৬৬৭৫০২২   | মোস্তাফিজ      |
| ৭      | মো: সাজিদ            | কৃষক        | ০২৮৪২৭০০০৩৪   | সাজিদ          |
| ৮      | সুজন কুমার দাস       | কৃষক        | ০১৪৩১৭৬২১৪৫   | সুজন কুমার দাস |
| ৯      | জামাল                | আইসিএস      | ০১৪৪১৫৭৪৫০৩   | জামাল          |

**FGD with Businessmen**

Ichakhali Sluicagate Bazar, Upazila: Mirsharai, District: Chittogram

Date: 10.12.2023

Place: Ichakhali Sluicagate Bazar

On 10.12.2023, FGD was conducted at Infront of Iqbal Hotel & Restaurant, Ichakhali Sluicagate Bazar Ichakhali union of Mirsharai Upazila. There was attended a total of nine (9) participants which represent only businessman. The FGD discussion minutes and attendance list are as follows



Figure 3: FGD with business group at ichakhali sluicagate bazar of ichakhali union.

**Summary of Focus Group Discussion (FGD-3):**

- Mohammad Hossain said that many people from outside will come to this area to work in the gas line so our business will be better.
- Nurul Afser said we want gas connection.
- Abul Kalam said some people may leave the shop without paying money.
- Abul Hossain said the area will improve.
- Md. Tarek Hossain said that people who come from outside can spear various types of crime, such as theft, robbery, intoxication etc
- Finally, everyone says that if the Economic Zone is established, the area will develop in various ways. For example, our employment opportunities will be created, income will increase, roads will improve, etc.

**Attendance sheet of Focus Group Discussion (FGD-3):**

Bangabandhu Sheikh Mujib Shilpa Nagar (BSMSN) Development Project  
Environmental and Social Consultancy services (Package No. PMC 16-BSMSN-BEZA)  
Bangladesh Economic Zones Authority (BEZA)

Sub: Attendance Sheet of Focus Group Discussion (FGD) for...  
Name of District: Chittagong  
Name of Upazila: Mirsharai  
Name of Union: Ichakhali  
Name of Village: Ichakhali Sluicagate Market  
Name of Group: Business Group

Name of Participant: Nurul Afser  
Name of Place: Infront of Iqbal Hotel  
Date: 10.12.2023  
Time: 3.30 Pm

| Sl. No | Name of Participants | Designation         | Mobile Number | Signature   |
|--------|----------------------|---------------------|---------------|-------------|
| ১      | মুহাম্মদ হোসেন       | স্বতন্ত্র ব্যবসায়ী | ০১৬৮২২০০৭৭    | [Signature] |
| ২      | নূরুল আফসর           | "                   | ০১৬২১৭০২০২০   | [Signature] |
| ৩      | আবুল কলাম            | "                   | ০১৬৮২০২০০৬০   | [Signature] |
| ৪      | আবুল হোসেন           | স্বতন্ত্র ব্যবসায়ী | ০১৮২৪৬৩৪৭৭৭   | [Signature] |
| ৫      | আবুল কালাম           | স্বতন্ত্র ব্যবসায়ী | ০১৬০৬০৬০৪০    | [Signature] |
| ৬      | আবুল হোসেন           | স্বতন্ত্র ব্যবসায়ী | ০১৬১৫৩৬৭১২    | [Signature] |
| ৭      | আবুল কালাম           | স্বতন্ত্র ব্যবসায়ী | ০১০২৬৬২৪০৭৭৪  | [Signature] |
| ৮      | আবুল হোসেন           | "                   | ০১৬৮২২০০৭৭    | [Signature] |
| ৯      | আবুল কালাম           | "                   | ০১৬২১৭০২০২০   | [Signature] |

**FGD with Local Community**

Village: Char Sarat, Upazila: Mirsharai, District: Chittogram

Date: 10.12.2023

Place: Shop of Saiful Islam, Daborkhali Point

On 10.12.2023, FGD was conducted at the shop of Saiful Islam, Daborkhali Point, Ichakhali union of Mirsharai Upazila. There was attended a total of seven (7) participants which represent small businessman, day labor, farmer and local leader. The FGD discussion minutes and attendance list are as follows



Figure 4: FGD with local community at daborkhali point of ichakhali union.

**Summary of Focus Group Discussion (FGD-4):**

- Kabir Ahmmed said we want gas connection.
- Shamchul Haque said we have to arrange work in the economic zone.
- Md. Rahat said if the gas line leaks, the surrounding people will be affected.
- Md. Ismail said that if anyone is affected, he should be compensated.
- Abdul Khalek said the area will improve
- Finally, everyone says that if the Economic Zone is established, the area will develop in various ways. For example, our employment opportunities will be created, income will increase, roads will improve, etc.

**Attendance sheet of Focus Group Discussion (FGD-4):**

Bangabandhu Sheikh Mujib Shilpa Nagar (BSMSN) Development Project  
Environmental and Social Consultancy services (Package No. PMC 16-BSMSN-BEZA)  
Bangladesh Economic Zones Authority (BEZA)

Sub: Attendance Sheet of Focus Group Discussion (FGD) for Gas Pipeline.....

Name of District: *Chittagong* Name of Place: *Shop of Saiful Islam*  
Name of Upazila: *Mirsharai* Name of Location: *Daborkhali point*  
Name of Union: *Isakhali* Date: *10.12.2023*  
Name of Village: *Chasarat* Time: *12.40*  
Name of Group: *Local Community*

| Sl. No | Name of Participants | Designation | Mobile Number | Signature          |
|--------|----------------------|-------------|---------------|--------------------|
| ১      | কবির আহম্মদ          | কৃষি        |               | <i>[Signature]</i> |
| ২      | শামসুল হক            | কৃষি        | ০১৭৩২৬১০৭৩০   | <i>[Signature]</i> |
| ৩      | আবু. বাহাদুর         | কৃষি        | ০১৪৫৭২০৪২১৫   | <i>[Signature]</i> |
| ৪      | আবু. হুসেইন          | খিস্তাব     | ০১৪১৬০৬৪৭১০   | <i>[Signature]</i> |
| ৫      | আবু. ইমরান           | গৃহস্থালী   |               | <i>[Signature]</i> |
| ৬      | ইকরামান              | কৃষক        |               | <i>[Signature]</i> |
| ৭      | আবু. আলী             | কৃষক        | ০১৪১৬৩০৭৩০    | <i>[Signature]</i> |

**FGD with Women Group**

Village: Badiullahpara, Union: Maghadia, Upazila: Mirsharai, District: Chittogram

Date: 11.12.2023

Place: House of Mafij Shoudagor

On 11.12.2023, FGD was conducted at the house of Mafij Shoudagor, Badiullahpara (inside of Technology) Maghadia union of Mirsharai Upazila. There was attended a total of ten participants which represent only women. The FGD discussion minutes and attendance list are as follows



Figure 5: FGD with women group at badiullahpara of maghadia union

| Summary of Focus Group Discussion (FGD-5):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Attendance sheet of Focus Group Discussion (FGD-5):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |             |                      |             |               |           |   |               |            |             |        |   |                |          |              |           |   |            |   |            |            |   |              |   |             |         |   |             |   |             |             |   |            |   |             |       |   |              |          |             |       |   |             |   |             |        |   |                 |   |             |          |    |            |          |  |       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------|-------------|---------------|-----------|---|---------------|------------|-------------|--------|---|----------------|----------|--------------|-----------|---|------------|---|------------|------------|---|--------------|---|-------------|---------|---|-------------|---|-------------|-------------|---|------------|---|-------------|-------|---|--------------|----------|-------------|-------|---|-------------|---|-------------|--------|---|-----------------|---|-------------|----------|----|------------|----------|--|-------|
| <ul style="list-style-type: none"> <li>Jesmin Akter said, our house was destroyed when the gas line went from Barotakia to the economic zone. Due to the living in khash land only compensation for house demolition and trees supposed to be paid but still nothing.</li> <li>Bibi Rehena said, we want to gas connection.</li> <li>Laki Akter said, we have to arrange work.</li> <li>Shabana said, compensation should be given to the affected families due to the gas line going from Barotakia to the economic zone</li> <li>Finally, everyone says that if the Economic Zone is established, the area will develop in various ways. For example, our employment opportunities will be created, income will increase, roads will improve, etc.</li> </ul> | <p style="text-align: center;">Bangabandhu Sheikh Mujib Shilpa Nagar (BSMSN) Development Project<br/>Environmental and Social Consultancy services (Package No. PMC 16-BSMSN-BEZA)<br/>Bangladesh Economic Zones Authority (BEZA)</p> <p>Sub: Attendance Sheet of Focus Group Discussion (FGD) for <u>Chittogram</u></p> <p>Name of District: <u>Chittogram</u> Name of Place: <u>House of Mofiz Sawdogan</u><br/>         Name of Upazila: <u>Mirsharai</u> Name of Location: <u>Inside of Technology</u><br/>         Name of Union: <u>Maghadia</u> Date: <u>11.12.23</u><br/>         Name of Village: <u>Bediullah para</u> Time: <u>3:00 PM</u><br/>         Name of Group: <u>Women Group</u></p> <table border="1"> <thead> <tr> <th>Sl. No</th> <th>Name of Participants</th> <th>Designation</th> <th>Mobile Number</th> <th>Signature</th> </tr> </thead> <tbody> <tr> <td>১</td> <td>জেসমিন আক্তার</td> <td>হাউস গার্ড</td> <td>০১৮৬০৪৫৪০২১</td> <td>জেসমিন</td> </tr> <tr> <td>২</td> <td>ছানোয়ারা বেগম</td> <td>স্বার্থী</td> <td>০১৮২৪০০৬৬০০২</td> <td>ছানোয়ারা</td> </tr> <tr> <td>৩</td> <td>বিবি রেহনা</td> <td>"</td> <td>০১৮৬৯৪০৬২২</td> <td>বিবি রেহনা</td> </tr> <tr> <td>৪</td> <td>শ্যামলজ বেগম</td> <td>"</td> <td>০১৮২০১২৪২৭৪</td> <td>শ্যামলজ</td> </tr> <tr> <td>৫</td> <td>লালী আক্তার</td> <td>"</td> <td>০১৮৬৪০৬৬৪৪০</td> <td>লালী আক্তার</td> </tr> <tr> <td>৬</td> <td>সুরমা বেগম</td> <td>"</td> <td>০১৮৬২১৬০৬২৫</td> <td>সুরমা</td> </tr> <tr> <td>৭</td> <td>আবাসী আক্তার</td> <td>স্বার্থী</td> <td>০১৪১২৪১৪৪১৪</td> <td>আবাসী</td> </tr> <tr> <td>৮</td> <td>জারিনা বেগম</td> <td>"</td> <td>০১৮২৪৯২২০২৫</td> <td>জারিনা</td> </tr> <tr> <td>৯</td> <td>জাহান্না আক্তার</td> <td>"</td> <td>০১৮৪০০৬০৬২৭</td> <td>জাহান্না</td> </tr> <tr> <td>১০</td> <td>কামনা বেগম</td> <td>স্বার্থী</td> <td></td> <td>কামনা</td> </tr> </tbody> </table> | Sl. No      | Name of Participants | Designation | Mobile Number | Signature | ১ | জেসমিন আক্তার | হাউস গার্ড | ০১৮৬০৪৫৪০২১ | জেসমিন | ২ | ছানোয়ারা বেগম | স্বার্থী | ০১৮২৪০০৬৬০০২ | ছানোয়ারা | ৩ | বিবি রেহনা | " | ০১৮৬৯৪০৬২২ | বিবি রেহনা | ৪ | শ্যামলজ বেগম | " | ০১৮২০১২৪২৭৪ | শ্যামলজ | ৫ | লালী আক্তার | " | ০১৮৬৪০৬৬৪৪০ | লালী আক্তার | ৬ | সুরমা বেগম | " | ০১৮৬২১৬০৬২৫ | সুরমা | ৭ | আবাসী আক্তার | স্বার্থী | ০১৪১২৪১৪৪১৪ | আবাসী | ৮ | জারিনা বেগম | " | ০১৮২৪৯২২০২৫ | জারিনা | ৯ | জাহান্না আক্তার | " | ০১৮৪০০৬০৬২৭ | জাহান্না | ১০ | কামনা বেগম | স্বার্থী |  | কামনা |
| Sl. No                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Name of Participants                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Designation | Mobile Number        | Signature   |               |           |   |               |            |             |        |   |                |          |              |           |   |            |   |            |            |   |              |   |             |         |   |             |   |             |             |   |            |   |             |       |   |              |          |             |       |   |             |   |             |        |   |                 |   |             |          |    |            |          |  |       |
| ১                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | জেসমিন আক্তার                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | হাউস গার্ড  | ০১৮৬০৪৫৪০২১          | জেসমিন      |               |           |   |               |            |             |        |   |                |          |              |           |   |            |   |            |            |   |              |   |             |         |   |             |   |             |             |   |            |   |             |       |   |              |          |             |       |   |             |   |             |        |   |                 |   |             |          |    |            |          |  |       |
| ২                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ছানোয়ারা বেগম                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | স্বার্থী    | ০১৮২৪০০৬৬০০২         | ছানোয়ারা   |               |           |   |               |            |             |        |   |                |          |              |           |   |            |   |            |            |   |              |   |             |         |   |             |   |             |             |   |            |   |             |       |   |              |          |             |       |   |             |   |             |        |   |                 |   |             |          |    |            |          |  |       |
| ৩                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | বিবি রেহনা                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | "           | ০১৮৬৯৪০৬২২           | বিবি রেহনা  |               |           |   |               |            |             |        |   |                |          |              |           |   |            |   |            |            |   |              |   |             |         |   |             |   |             |             |   |            |   |             |       |   |              |          |             |       |   |             |   |             |        |   |                 |   |             |          |    |            |          |  |       |
| ৪                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | শ্যামলজ বেগম                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | "           | ০১৮২০১২৪২৭৪          | শ্যামলজ     |               |           |   |               |            |             |        |   |                |          |              |           |   |            |   |            |            |   |              |   |             |         |   |             |   |             |             |   |            |   |             |       |   |              |          |             |       |   |             |   |             |        |   |                 |   |             |          |    |            |          |  |       |
| ৫                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | লালী আক্তার                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | "           | ০১৮৬৪০৬৬৪৪০          | লালী আক্তার |               |           |   |               |            |             |        |   |                |          |              |           |   |            |   |            |            |   |              |   |             |         |   |             |   |             |             |   |            |   |             |       |   |              |          |             |       |   |             |   |             |        |   |                 |   |             |          |    |            |          |  |       |
| ৬                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | সুরমা বেগম                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | "           | ০১৮৬২১৬০৬২৫          | সুরমা       |               |           |   |               |            |             |        |   |                |          |              |           |   |            |   |            |            |   |              |   |             |         |   |             |   |             |             |   |            |   |             |       |   |              |          |             |       |   |             |   |             |        |   |                 |   |             |          |    |            |          |  |       |
| ৭                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | আবাসী আক্তার                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | স্বার্থী    | ০১৪১২৪১৪৪১৪          | আবাসী       |               |           |   |               |            |             |        |   |                |          |              |           |   |            |   |            |            |   |              |   |             |         |   |             |   |             |             |   |            |   |             |       |   |              |          |             |       |   |             |   |             |        |   |                 |   |             |          |    |            |          |  |       |
| ৮                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | জারিনা বেগম                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | "           | ০১৮২৪৯২২০২৫          | জারিনা      |               |           |   |               |            |             |        |   |                |          |              |           |   |            |   |            |            |   |              |   |             |         |   |             |   |             |             |   |            |   |             |       |   |              |          |             |       |   |             |   |             |        |   |                 |   |             |          |    |            |          |  |       |
| ৯                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | জাহান্না আক্তার                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | "           | ০১৮৪০০৬০৬২৭          | জাহান্না    |               |           |   |               |            |             |        |   |                |          |              |           |   |            |   |            |            |   |              |   |             |         |   |             |   |             |             |   |            |   |             |       |   |              |          |             |       |   |             |   |             |        |   |                 |   |             |          |    |            |          |  |       |
| ১০                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | কামনা বেগম                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | স্বার্থী    |                      | কামনা       |               |           |   |               |            |             |        |   |                |          |              |           |   |            |   |            |            |   |              |   |             |         |   |             |   |             |             |   |            |   |             |       |   |              |          |             |       |   |             |   |             |        |   |                 |   |             |          |    |            |          |  |       |

**FGD with Fishermen**

Village: Sarkerpara, Union: Maghadia, Upazila: Mirsharai, District: Chittogram

Date: 12.12.2023

Place: House of Shishuram Das

On 12.12.2023, FGD was conducted at the house of Shishuram Das, Sarkerpara (inside of Abu Turab bazar) Maghadia union of Mirsharai Upazila. There was attended a total of eleven participants which represent only fishermen. The FGD discussion minutes and attendance list are as follows



**Figure 6: FGD with fishermen at sarkerpara of maghadia union**

**Summary of Focus Group Discussion (FGD-6):**

- Shishuram Das said fishing within the zone is closed.
- Badol Das said we can't repay the loan from different organizations.
- Ratan Das said let us provide employment
- Porimol Das said areas will be developed
- Arjun Das said communication system will be developed
- Finally, everyone says that if the Economic Zone is established, the area will develop in various ways. For example, our employment opportunities will be created, income will increase, roads will improve, etc.

**Attendance sheet of Focus Group Discussion (FGD-6):**

Bangabandhu Sheikh Mujib Shilpa Nagar (BSMSN) Development Project  
Environmental and Social Consultancy services (Package No. PNC 16-BSMSN-BEZA)  
Bangladesh Economic Zones Authority (BEZA)

Sub: Attendance Sheet of Focus Group Discussion (FGD) for Gas Pipeline

Name of District: Chittagong Name of Place: Shishuram Das House  
Name of Upazila: Mirsharai Name of Location: Inside of Abdonal Das  
Name of Union: Maghadia Date: 12.12.2023  
Name of Village: Sarkertola Time: 11:00 AM  
Name of Group: Fishery group

| Sl. No | Name of Participants | Designation | Mobile Number | Signature  |
|--------|----------------------|-------------|---------------|------------|
| ১      | শিশুরাম দাস          | ফার্মার     | ০১৪৩৪৬৪১৭০৭   | শিশুরাম    |
| ২      | দিপন দাস             | "           | ০১৩০৭৪৭১২৩৩   | দিপন দাস   |
| ৩      | বাদল দাস             | "           | ০১৪১৪৪৩৬০১৬   | বাদল দাস   |
| ৪      | শৌর্য চান            | "           | ০১৪৩৩৫০৭৭৭৭   | শৌর্য চান  |
| ৫      | রতন দাস              | "           | ০১৪১১৪৪৪৩০২   | রতন        |
| ৬      | দিপন দাস             | "           | ০১৪১০২৯৫৪৭১   | দিপন       |
| ৭      | পরিমল দাস            | "           | ০১৪২৬৩৫৪০০২   | পরিমল      |
| ৮      | অর্জুন দাস           | "           | ০১৪৫২৪২০৯৬৭   | অর্জুন     |
| ৯      | ফকির চান             | "           | ০১৪২৭২৭০৭২    | ফকির চান   |
| ১০     | প্রশান্ত দাস         | "           | ০১৪৩০৭০৬২৩১   | প্রশান্ত   |
| ১১     | চিত্তরঞ্জন ভূঁইয়া   | "           | ০১৪২১৭৭৭৩৬    | চিত্তরঞ্জন |

**FGD with farmer Group**

Village: Sariatpara, Union: Maghadia, Upazila: Mirsharai, District: Chittogram

Date: 11.12.2023

Place: Shop of Belal Hossen

On 11.12.2023, FGD was conducted at the shop of Belal Hossen, Sariatpara (inside of UP Member house) Maghadia union of Mirsharai Upazila. There was attended a total of eight (8) participants which represent only farmers. The FGD discussion minutes and attendance list are as follows



Figure 7: FGD with fishermen at sarkerpara of maghadia union

**Summary of Focus Group Discussion (FGD-7):**

- Ekramul Haq said that our crop land has been acquired as a result we have lost our cultivation land.
- Md Moksed said, fishing is closed in the economic zone.
- Md. Tareq said that we are not being used in the economic zone.
- Md. Imam Hossen said we want job opportunity in the economic zone on priority basis.
- Md. Didarul Alom said we want gas connection
- Finally, everyone says that if the Economic Zone is established, the area will develop in various ways. For example, our employment opportunities will be created, income will increase, roads will improve, etc.

**Attendance sheet of Focus Group Discussion (FGD-7):**

Bangabandhu Sheikh Mujib Shilpa Nagar (BSMSN) Development Project  
Environmental and Social Consultancy services (Package No. PMC 16-BSMSN-BEZA)  
Bangladesh Economic Zones Authority (BEZA)

Sub: Attendance Sheet of Focus Group Discussion (FGD) for Gas Pipeline

Name of District: Chittagong Name of Place: Shop of Babul Hossen  
Name of Upazila: Mirshera Name of Location: Inside of member home  
Name of Union: Maghadia Date: 11.12.23  
Name of Village: Shariatpura Time: 4:30 PM  
Name of Group: Agriculture group

| Sl. No | Name of Participants | Designation       | Mobile Number | Signature         |
|--------|----------------------|-------------------|---------------|-------------------|
| ১      | শ্রী: আব্দুল হক      | কৃষি              | ০২৬৭৬২৬০২৬    | শ্রী: আব্দুল হক   |
| ২      | শ্রী: মকসেদ          | কৃষি              |               | শ্রী: মকসেদ       |
| ৩      | শ্রী: তারেক          | কৃষি              | ০২৬৭০৬০২৭০    | শ্রী: তারেক       |
| ৪      | শ্রী: জাকার হোসেন    | শ্রী: জাকার হোসেন |               | শ্রী: জাকার হোসেন |
| ৫      | শ্রী: ইমাম হোসেন     |                   |               | শ্রী: ইমাম হোসেন  |
| ৬      | শ্রী: সাদাত হোসেন    | কৃষি              |               | শ্রী: সাদাত হোসেন |
| ৭      | শ্রী: দিদারুল আলম    | কৃষি              | ০২৬৬২৬০০০০৮   | শ্রী: দিদারুল আলম |
| ৮      | শ্রী: আব্দুল হক      |                   | ০১৮৫৬২২৪/১১   | শ্রী: আব্দুল হক   |

## Stakeholders' Consultation Meeting

**Place: Moghadia Union Parishad Hall Room, Mirsharai, Chattogram**

**Date: 16 January 2024**

On 16/1/24 Moghadiya Union Parishad chairman Mr. Md. Jahangir Hossin presided over a public consultation meeting in the Moghadiya Union Parishad Hall room with the presentation of Dr. Tajul Islam as part of environmental and social impact assessment of gas line network under Bangabandhu Sheikh Mujib Shilpa Nagar (NSEZ) Development Project. Also present were Upazila Agriculture Extension Officer, Senior Fisheries Officer, Assistant Engineer (DPHE), UP members, political personalities and people from various professions of the area.

**Table 1: The topics discussed in the meeting are described below:**

| Sl. No | Name, designation and mobile number                                                                                        | Topics and discussions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------|----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | Md. Jahangir Hossin<br>Chairman, Moghadia UP,<br>Mirsharai, Chattogram<br>Mobile No-01829807721                            | Md. Jahangir Hossain, the Honorable President of today's public consultation meeting, inaugurated the meeting by greeting everyone and wished the meeting success.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 2      | Abu Sufian<br>Farmer,<br>Mobile-01831414402                                                                                | <ul style="list-style-type: none"> <li>Beza has acquired our three crop lands.</li> <li>Some people did not get proper land money, those who used to live on government land have become homeless,</li> <li>Beza is not giving us jobs, fishing has stopped, and wood harvesting has stopped in the forest.</li> <li>Our source of income has become very narrow.</li> <li>What should we do now?</li> </ul> <p><b>In reply, social expert Mr. Mamun Ar Rashid said-</b></p> <ul style="list-style-type: none"> <li>As far as I know, Beja has made a list of victims.</li> <li>Beja will give priority to the family in this list if he has any support (e.g., house, job).</li> <li>He also said that everyone should try alternative livelihood.</li> <li>He also said that he would request Beza to arrange accommodation for those who have become homeless.</li> </ul> |
| 3      | Md. Nurul Haque<br>Farmer<br>Mobile-01885221931                                                                            | <ul style="list-style-type: none"> <li>Compensation was supposed to be given to the victims while taking the gas line from Barotakia to the economic zone but no compensation has been given so far.</li> <li>Will we get gas connection outside the zone?</li> </ul> <p><b>In reply, Mamun Ar Rashid said -</b></p> <ul style="list-style-type: none"> <li>The decision to provide gas connection outside the economic zone has not been made yet.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                               |
| 4      | Arif Ullah Chodhuri<br>UP Member<br>Mobile-01828400200                                                                     | <p><b>Arif Ullah Chowdhury's speech is described below-</b></p> <ul style="list-style-type: none"> <li>A large number of fish was produced in Mirsharai Upazila Due to economic zone; fish production has suffered greatly.</li> <li>There were many plants and many animals and birds in the Economic Zone. Wildlife habitats have been destroyed due to deforestation. Mr. Arif Ullah Chowdhury suggested forestry</li> <li>In the case of land acquisition, there are some mistakes which must be resolved by all.</li> <li>Advise those who have lost their residence to arrange home loans.</li> <li>Pipe lines and road areas should be marked and advised not to allow anyone to use them.</li> <li>In terms of employment, he suggested setting quotas for the people of the area.</li> </ul>                                                                        |
| 5      | Md. Zobaidur Rahman<br>Vashani<br>Upazila Agriculture<br>Extension Officer,<br>Mirsharai, Chattogram<br>Mobile-01737126532 | <p><b>Mr. Zobaidur Rahman Vashani said:</b></p> <ul style="list-style-type: none"> <li>Without development of industry, the country will not progress</li> <li>Bangabandhu Sheikh Mujib Shilpa Nagar (NSEZ) Development Project will be established in coastal areas of three Upazila. The Upazila are Mirsharai, Sitakunda under Chattogram district and Sonagazi Upazila under Feni district.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Sl. No | Name, designation and mobile number                                                                         | Topics and discussions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------|-------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |                                                                                                             | <ul style="list-style-type: none"> <li>To increase the production of agricultural products.</li> <li>After land acquisition, if 1-1.5 decimal of land is left then vegetable garden can be done there.</li> <li>In this regard, the most cooperation will be given to the affected areas due to the economic zone.</li> <li>Mr. Zobaidur Rahman Vashani also said, since the gas line will pass under the ground, there will be no damage to agriculture</li> </ul>                                                                                                                                                                                                                                                                                                                                                             |
| 6      | Nasim Al Mahmud<br>Upazila Senior Upazila Fisheries Officer,<br>Mirsharai, Chattogram<br>Mobile-01723834974 | <p><b>Mr. Nasim Al Mahmud said</b></p> <ul style="list-style-type: none"> <li>The fisheries sector is and will be severely affected</li> <li>I can't claim anything on their behalf as the places are govt/khash. Yet when they leave this place, they will suffer.</li> <li>Those who are successful here may not be successful elsewhere</li> <li>Those who fish in the sea are not interested in alternative work</li> <li>Those who fish in the sea are weak and helpless, so they should be compensated.</li> <li>However, fishermen are unlikely to be harmed by the gas line unless water bodies are affected</li> </ul>                                                                                                                                                                                                 |
| 7      | K.M Sayed Mahmud<br>Assistant Engineer –DPHE,<br>Mirsharai, Chattogram<br>Mobile-01712914453                | <p><b>Mr.K.M Sayed Mahmud said</b></p> <ul style="list-style-type: none"> <li>50 deep tube wells have been provided from DPHE to provide water to the economic zone</li> <li>Without the industries in the economic zone, the remaining areas will be green</li> <li>Must have waste disposal plan</li> <li>Water will come from Chandpur and Muhuri projects to run industries in the economic zone. Deep tube wells will be used during emergencies so there will be no water problem here</li> <li>Care should be taken to ensure that the garbage does not fall into the sea.</li> </ul>                                                                                                                                                                                                                                    |
| 8      | Sanjib Barua<br>Social Counsitor, BEZA<br>Mobile-01819884061                                                | <p><b>Mr. Sanjib Barua said</b></p> <ul style="list-style-type: none"> <li>No development of economic zone is possible without gas</li> <li>I will hear good and bad from you</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 9      | Mahfuja Khatun<br>Social Counsitor, BEZA<br>Mobile-01747164914                                              | <p><b>Mrs. Mahfuja Khatun said-</b></p> <ul style="list-style-type: none"> <li>Due to the Economic Zone the communication system has improved</li> <li>Outsiders will come and stay here</li> <li>Six factories have been started</li> <li>If the garments are launched, priority will be given to the people of the area.</li> <li>Mrs. Mahfuja also said “if you come to us for jobs in Economic Zone, we will try to recommend you”</li> </ul>                                                                                                                                                                                                                                                                                                                                                                               |
| 10     | Joynal Abedin<br>Local Elite<br>Mobile-01818949731                                                          | Prime minister Sheikh Hasina said that there will be a university here, you will recommend that it be implemented.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 11     | Md. Jahangir Hossin<br>Chairman, Moghadia UP,<br>Mirsharai, Chattogram<br>Mobile No-01829807721             | <p><b>Mr. Jahangir Hossin said-</b></p> <ul style="list-style-type: none"> <li>Due to the economic zone, especially the residents of Moghadiya Union are affected from all sides</li> <li>The size of the land has been reduced due to the acquisition of land in the Economic Zone</li> <li>After acquiring the road side land, Beja is preventing the construction of houses/shops on the remaining land. The rest of the land should be allowed to be used. That's why people are angry</li> <li>The Anser prevented them from fishing</li> <li>Many people are getting involved in illegal activities due to reduced sources of income</li> <li>Factories are hiring outsiders for the sake of qualifications, cheating the local people</li> <li>The homeless of this area should be rehabilitated in this area</li> </ul> |

At the end, the president announced the end of the public consultation meeting by wishing all those present.



Figur 8: Photos of the stakeholders' consultation meetin

**Attendance sheet of Public Consultation Meeting-(1)**

Bangabandhu Sheikh Mujib Shilpa Nagar (BSMSN) Development Project  
 Environmental and Social Consultancy Services (Package No. PMC 16-BSMSN-BEZA)  
 Mirsharai, Chattogram

Subject: Attendance sheet of Public Consultation Meeting of ESIA for Gas Pipeline Network in BSMSN  
 Moghadia Union: Moghadia Upazila: Mirsharai, District: Chattogram  
 Place: Moghadia Union Parishad Date: 16.01.2024

| Sl. No | Name of Participants | Designation                       | Village            | Mobile Number | Signature   |
|--------|----------------------|-----------------------------------|--------------------|---------------|-------------|
| ১      | JAHANNABIR Hossain   | CHAIRMAN                          | SEKER TALUK        | 01829-807721  | [Signature] |
| ২      | কবি: মাহবুব হোসেন    | সংস্কৃতি বিষয়ক কর্মসূচী          | -                  | 01826191153   | [Signature] |
| ৬      | SANJIB BARUA         | Social Counsellor                 | BEZA               | 01819489061   | [Signature] |
| ৪      | Mahfuz Khan          | Social Counsellor                 | BEZA               | 01767164914   | [Signature] |
| ৩      | Masum Ar Rana        | Social Exp                        | BCL                | 01711125020   | M Rana      |
| ৬      | সুজিতা               | সি.সি.সি. সিস্টেম                 | সুজিতা             | 0181720640    | [Signature] |
| ৭      | ম. মাহবুব            | সংস্কৃতি বিষয়ক কর্মসূচী          | মহাশূন্য           | 019254134     | [Signature] |
| ৫      | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী          | মহাশূন্য           | 02658-268220  | [Signature] |
| ৯      | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী          | মহাশূন্য           | 0266282880    | [Signature] |
| ১০     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী          | 11                 | 02668223210   | [Signature] |
| ১১     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী          | 11                 | 02668223210   | [Signature] |
| ১২     | Dr. RAJUL            | সংস্কৃতি বিষয়ক কর্মসূচী          | BCL                | 0173245142    | [Signature] |
| ১৩     | Nasim A Mahmud       | Senior Officer Dept. of Fisheries | Dept. of Fisheries | 01723834974   | [Signature] |
| ১৪     | K.M Sayed mahmud     | Assttng Eng                       | DPHE               | 01712-91953   | [Signature] |
| ১৫     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী          | মহাশূন্য           | 01757126532   | [Signature] |
| ১৬     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী          | মহাশূন্য           | 02726922-806  | [Signature] |

| Sl. No | Name of Participants | Designation              | Village  | Mobile Number | Signature   |
|--------|----------------------|--------------------------|----------|---------------|-------------|
| ১৭     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 02622696620   | [Signature] |
| ১৮     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 02620892796   | [Signature] |
| ১৯     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 018127997     | [Signature] |
| ২০     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 01828100200   | [Signature] |
| ২১     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 01777600058   | [Signature] |
| ২২     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 01817772013   | [Signature] |
| ২৩     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 01854320622   | [Signature] |
| ২৪     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 026226279     | [Signature] |
| ২৫     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 026226279     | [Signature] |
| ২৬     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 01817772013   | [Signature] |
| ২৭     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 026226279     | [Signature] |
| ২৮     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 01817772013   | [Signature] |
| ২৯     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 026226279     | [Signature] |
| ৩০     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 026226279     | [Signature] |
| ৩১     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 026226279     | [Signature] |
| ৩২     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 026226279     | [Signature] |
| ৩৩     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 01819490582   | [Signature] |
| ৩৪     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 0174092551    | [Signature] |
| ৩৫     | Md. Nazmul Hossain   | Data Collector           | BCL      | 01788932547   | [Signature] |
| ৩৬     | Md. Musfiruz Zaman   | Social Researcher        | BCL      | 01716498950   | [Signature] |

| Sl. No | Name of Participants | Designation              | Village  | Mobile Number | Signature   |
|--------|----------------------|--------------------------|----------|---------------|-------------|
| ৩৭     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 026226279     | [Signature] |
| ৩৮     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 01836490582   | [Signature] |
| ৩৯     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | -             | [Signature] |
| ৪০     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 0269260822    | [Signature] |
| ৪১     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 02620722008   | [Signature] |
| ৪২     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 026226279     | [Signature] |
| ৪৩     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 026226279     | [Signature] |
| ৪৪     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 026226279     | [Signature] |
| ৪৫     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 026226279     | [Signature] |
| ৪৬     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 026226279     | [Signature] |
| ৪৭     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 026226279     | [Signature] |
| ৪৮     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 026226279     | [Signature] |
| ৪৯     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 0181111206    | [Signature] |
| ৫০     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 02628000000   | [Signature] |
| ৫১     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 026226279     | [Signature] |
| ৫২     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 026226279     | [Signature] |
| ৫৩     | আব্দুল হান্নান       | সংস্কৃতি বিষয়ক কর্মসূচী | মহাশূন্য | 026226279     | [Signature] |

## ANNEX 6: OCCUPATIONAL HEALTH AND SAFETY PLAN (OHSP)

### 1. Introduction

This Occupational Health and Safety (OHS) Plan actually develop to provide a guideline to the owner and contractor(s) for managing health and safety related issues of the workforce during **establishment** of gas pipeline network towards the NSEZ specially the 2A & 2B zone, and its adjacent area. This OHS plan has been prepared in according to the National Labor Law of Bangladesh, The Natural Gas Safety Rules and ESS2: Labor and Working Condition of WBG following Good International Industry Practice (**GIIP**).

### 2. Objectives

The purpose of occupational health and safety plan is to reduce or lessen the workplace health hazards during working at the sites. The objective of OHS plan is as follows:

- To prevent accidents during mobilization, construction and after construction periods of the proposed sites of gas pipeline network project.
- Prevention of workplace accidents using the approved work plan/instructions by supervisors.
- Implementing the recommendations of the Safety plan properly without causing harm to the natural environment.
- Achieve work towards “INCIDENT FREE” – ZERO accident, ZERO loss, NO harm to people, and NO damage to the environment.
- Implementing the Emergency Assembly points, evacuation and rescue plant contacts by immediate in-charge of project.
- Establishing the accident reporting procedures and process which shall be maintained at the sites.
- Capacity building on OHS issues where staff shall be informed that accidents/incidents investigation are “fact finding” and not “fault finding” exercises and are particularly useful as lessons in preventing re-occurrence.
- Compliance with relevant rules and regulations National Labor Law of Bangladesh, The Natural Gas Safety Rules and ESS2: Labor and Working Condition of WB ESS.

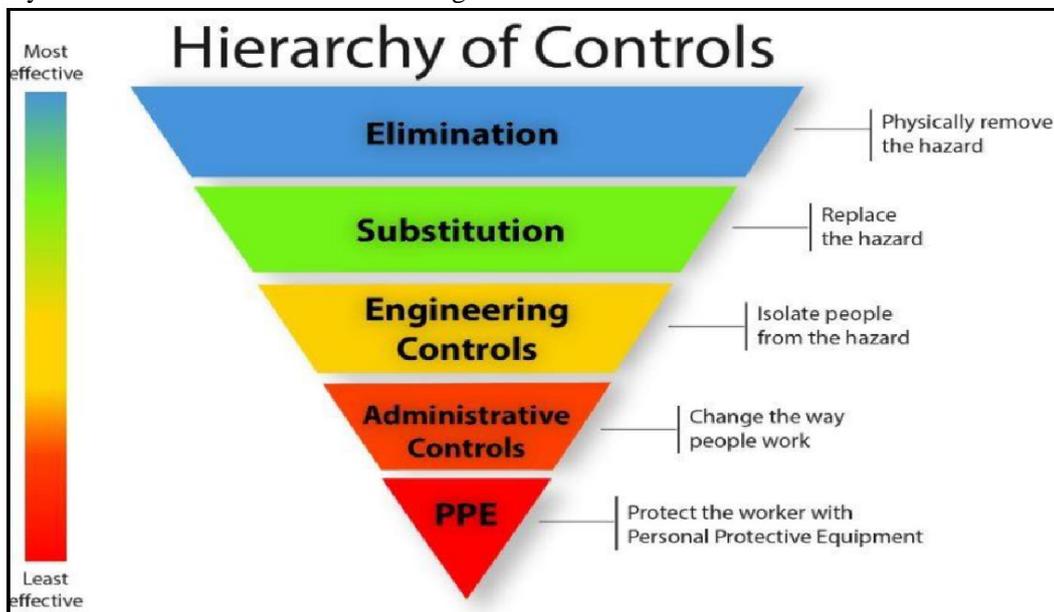


Figure 1: Hierarchy of controls

## ROLES AND RESPONSIBILITIES

**Table 1: The roles and responsibilities of the responsible parties is as follows:**

| Sl.  | Position/ Name of responsible person                              | Duties                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. 1 | <ul style="list-style-type: none"> <li>Project Manager</li> </ul> | <ul style="list-style-type: none"> <li>Will be responsible (to be appointed by the contractor) for the organization, planning and execution of assigned tasks at the working sites.</li> <li>Taking controls to complete the works following the national rules and regulations and WB's E&amp;S standards Guideline.</li> <li>Ensure zero harm or no accident or incident at the sites.</li> <li>Executing the works with quality and deadlines.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 2. 2 | <ul style="list-style-type: none"> <li>Site Supervisor</li> </ul> | <ul style="list-style-type: none"> <li>Employed by the Contractor to manage health and safety protocols at the construction sites and will monitor the quality of works with no harm or zero accident/incident under the project activities.</li> <li>Regularly hold health and safety training preferably toolbox talk (TBT) before commencing the works at the site.</li> <li>Record of accident/incident events and inform the relevant agency or authority immediately if any accident/incident occurs at the site.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 3. 3 | <ul style="list-style-type: none"> <li>OHS coordinator</li> </ul> | <ul style="list-style-type: none"> <li>To adapt the OHS Plan at working sites.</li> <li>To communicate/disseminate the OHS Plan to all all-responsible parties at the working sites.</li> <li>To foster coordination with the team timely.</li> <li>To assess the applicability of the OHS plan at the site, if it's not suitable then revise or adjust the plan immediately based on the field-based requirements.</li> <li>To arrange formal training sessions quarterly or biyearly.</li> <li>To check or verify the OHS accident or incident record book at the field sites.</li> <li>If requires, make necessary corrective action plan (CAP) to lessen the impacts.</li> <li>To take the necessary procedures to make sure that only the authorized persons will have access on the site or access to be limited for only unauthorized people to avoid community health and safety risks.</li> <li>Frequently visit the sites and checking the status of OHS issues on the spot etc.</li> </ul> |
| 4. 4 | <ul style="list-style-type: none"> <li>Workers</li> </ul>         | <ul style="list-style-type: none"> <li>To comply with the requirements of occupational safety and health plan.</li> <li>To use the personal protective equipment</li> <li>To announce the management in the event of danger, accidents, incidents, deficiencies etc.</li> <li>Everybody should know or personal contact with each other for her/his own safety and the safety of others on the construction site.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

### 3. Risks Screening, Evaluation, and Impacts Identification

#### 3.1. Risks Screening/ Identification

The contractor(s) will assess the potential OHS risks at the working sites both construction sites, relevant to gas pipeline carrying to the site, digging trench to place the pipe for gas transmission delivery of pipeline, to Zone 2A-2B and its adjacent landfilled areas sites following the hierarchy of initial hazard identification as follows:

- HIP (Hazard identification plan): Initial hazard identification process will be carried out based on project specific/ activities.
- HAZID (Hazard identification) study. A competent team will be formed consisting of project manager, site supervisor, OHS officer/specialist, and engineers to conduct Hazard Identification study at the sites.
- HAZCON (Control of construction hazards): The process of assessing construction hazards via staged risk assessments shall be done following the OHS requirements of Labor Rules 2006, and ESS-2 standards of World Bank.

- Risk assessment: Conducting risk assessment on the jobsites using subsequent method statements. The designated person assigned by the contractor(s) will conduct the HAZID and HAZCON evaluations to identify potential risks associated with the construction activities. Whereas the site supervisor will ensure the quality of risks assessment and procedural statements in terms of workplace health and safety issues and quality of works. The Project Manager ultimately will review the materials to confirm the health and safety of female workers and ensuring gender integration when completing the risk assessment.

**Table-2: Degree of risk significance**

| Step 1:<br>SIGNIFICANCES-<br>How severely could it hurt someone? or How illness could it make someone? | Step 2: POSSIBILITY- How likely is it for an injury to occur? |                                   |                                   |                                                  |
|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|-----------------------------------|-----------------------------------|--------------------------------------------------|
| Kill or cause permanent disability or ill health.                                                      | Very likely, could happen frequently.                         | Likely, could happen Occasionally | Unlikely, could happen, but rare. | Very unlikely, could happen, probably never will |
| Long term illness or serious injury                                                                    | Very high risk (Score 1)                                      | Very high risk (Score 1)          | High risk (Score 2)               | Substantial Risk (Score 3)                       |
| Medical attention and several days off work.                                                           | Very high risk (Score 1)                                      | High risk (Score 2)               | Moderate risk (4)                 | Substantial Risk (Score 3)                       |
| Medical attention and Several days off work                                                            | High Risk (Score 2)                                           | Substantial Risk (Score 3)        | Moderate Risk (Score 4)           | Acceptable Risk (Score 5)                        |
| First Aid needed                                                                                       | Substantial Risk (Score 3)                                    | Moderate Risk (Score 4)           | Acceptable Risk (Score 5)         | Low risk (Score 6)                               |

*Note: This risk matrix is prepared based on project activities following the IFC EHS Guideline.*

**Table-3: Risk priority score and its response**

| Sl.No | Risks priority scores | Required Actions                                                                                                                                                                                                         |
|-------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | Very High Risks       | <ul style="list-style-type: none"> <li>• Stop the activity—immediate action is required to guarantee safety—before any activity resumes, the Project Manager must approve any safety measures implemented.</li> </ul>    |
| 2     | High Risks            | <ul style="list-style-type: none"> <li>• Proceed with caution—immediate reporting of emerging or ongoing risk exposure at this level to the Project Manager for decision is mandatory</li> </ul>                         |
| 3     | Substantial Risks     | <ul style="list-style-type: none"> <li>• Be aware—immediate action is required to avoid or lessen harm or sickness.</li> </ul>                                                                                           |
| 4     | Moderate Risks        | <ul style="list-style-type: none"> <li>• Reporting to Project Manager or other competent authority is essential</li> </ul>                                                                                               |
| 5     | Acceptable Risks      | <ul style="list-style-type: none"> <li>• Precaution is important or necessary actions should be undertaken at the site to avoid this risk.</li> <li>• Routine monitoring is required to tackle the situation.</li> </ul> |
| 6     | Low Risks             | <ul style="list-style-type: none"> <li>• The responsible/designated person will record the incident/accident, monitoring, and control to prevent the risks.</li> </ul>                                                   |

#### 4. Risks Evaluation Procedures

A simple format will be used to evaluate the occupational health and safety risks at the sites as follows:

**Table 4: Risks evaluation format**

| Locations:                     |                                          |                                                                   |                                                               |                                                           |                                                  |                        |       |                                                                                           |                                         |
|--------------------------------|------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------|------------------------|-------|-------------------------------------------------------------------------------------------|-----------------------------------------|
| Risks assessment conducted by: |                                          |                                                                   |                                                               |                                                           |                                                  |                        |       |                                                                                           |                                         |
| Date of risk assessment:       |                                          |                                                                   |                                                               |                                                           |                                                  |                        |       |                                                                                           |                                         |
| SI #                           | Hazard Identification                    |                                                                   | Risks Assessment                                              |                                                           | Risks Control                                    |                        |       | Review                                                                                    |                                         |
| 1.                             | What types of hazards to be anticipated? | What injury, illness, or significance could be possibly occurred? | Make a list of any control measures that was applied earlier? | Risk level (Severe, High, Moderate, Low, non-significant) | What steps should be taken to lessen the impact? | With whom responsible? | When? | Are the control measures effective? If not, pls. mention the corrective action plan (CAP) | Date of finalization of risk evaluation |

#### 5. Sources of Risks

**Table 5: The potential source of risks associated with the construction activities is as follows:**

| Anticipated risks zone                                                       | Associated risks                                                                                                         |
|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Excavation/trenching sites</li> </ul> | Slips, Trips and Falls, Machineries operation, and oil spillage and Equipment handling etc.                              |
| <ul style="list-style-type: none"> <li>Working sites</li> </ul>              | Slips, Trips and Falls etc.                                                                                              |
| <ul style="list-style-type: none"> <li>Material storage sites</li> </ul>     | Materials handling, slips, trips, and falls etc.                                                                         |
| <ul style="list-style-type: none"> <li>Labor Campsites</li> </ul>            | Health hazards due to improper drinking water, unhygienic sanitary facilities, lack of sunlight and air circulation etc. |
| <ul style="list-style-type: none"> <li>Access roads</li> </ul>               | Road accident, materials handling                                                                                        |

#### 6. Risks Mitigation Measures

The possible mitigation measures to reduce, avoid and or lessen the impacts on occupational health and safety is given below:

The demarcation of the site and the movement within the site:

- The working areas must be contained by warning tapes and signal panels at the access points of the working sites.
- It is mandatory to wear the project specific (Gas pipeline construction) personal protective equipment while working at the sites. Eye protective goggles and leather hand glove must be worn during cutting the gas pipe.
- The rules and regulations of Government of Bangladesh and World Bank E&S standards (ESS-2) on safety and health at work must be complied with in the premises of the site.
- Danger sign should be posted at the sites, and
- Flag man should be deployed to limit the access of local people to the sites.

#### **The Emergency Routes and Exits:**

- There will be an alternative route to reduce the traffic load on the roadways and reduce the impact on community health and safety.
- Emergency exist plan should be developed to escape from the site during emergency situations.
- Assembling points should be fixed on the working sites and drills should be carried out occasionally to train the workers to response during emergency periods.

#### **Emergency Contact:**

- Ensure emergency contact numbers are readily available at the location and maintain close communication with local government offices and emergency responders such as fire stations, red cross society, local police station, and blood donation organizations.

#### **Storage site management:**

- Material storage will take place in purpose-built facilities. The location must be on the site, taking into account the risks associated with material handling and storage, as specified in the accompanying

documentation for producers, as well as the environmental impact (e.g., contamination of soil, air, and water).

- Cover materials with hard polythene or tarpaulin to prevent surface runoff and potential risks for workers at site.
- Chemical substances will be stored separately, especially if they are incompatible with other components.
- Materials posing a risk of explosion or fire, such as fuel like diesel, kerosene, gas cylinder etc., will be stored separately in specially designed premises with proper markings and protection from uncontrolled movements, sunlight, and humidity.

#### **Exposure to risks:**

- Workers should not be exposed to excessive noise or dangerous external factors like fumes, vapors, or dust.
- Workers should wear earplugs to prevent noise exposure.

#### **Fire detection and firefighting:**

- Fire extinguishers or fire balls should be supplied at dredgers and labor campsites.
- Workers should be educated to use them in case of fire mishaps.

#### **Working Environment**

- Ensure a healthy and sanitary work environment, including access to clean drinking water and bathroom facilities.
- During hot days, workers should drink oral saline to prevent dehydration and others necessary preventive measures should be undertaken to avoid health risks at the site, and
- Maintain a clean and healthy environment in work areas and labor campgrounds.

#### **Communication and Cooperation**

- Contractors and their subcontractors will have their own safety and health plans, as well as working sites specific requirements.
- The contractors will receive site rules and must follow them.
- Special dangers are addressed with appropriate guidelines.
- Visitors to the site will receive safety equipment, be accompanied, trained, and registered.
- The contractors, project authority and others will cooperate and communicate about safety and health at work and follow the OHS coordinator's instructions.

#### **Reporting Incidents and Accident**

- The project manager is responsible for reporting and preventing accidents and mishaps.
- In the event of death, significant injury, or a dangerous scenario, contractors and project authority shall be promptly notified, and written confirmation should be provided.
- The site manager will provide information from time to time to the project authority and it will be included in the OHS Plan prior to construction activities.
- All essential addresses and phone numbers will be displayed at the site's office and on safety and health posters.

#### **Capacity Building of Workers**

- Contractors must train their employees on OHS on a regular basis.
- Contractors must check their employees' health and safety sheets on site to ensure they are fit for the task.
- Subcontractors must comply with legal standards for first aid training.
- The project manager validates the number of qualified first aiders in the monthly safety and health report. If necessary, he can request extra training.
- If conditions impacting OHS require revisions to the Occupational Health and Safety Plan, training will be provided. These changes will be handled as initial information in accordance with OHS coordination standards.
- Increased OHS awareness: In addition to training, OHS signage and warning letters will be posted on the landfill sites to alert workers to potential hazards.
- The project manager and supervisors will periodically discuss site-specific safety and health measures.
- The Environmental Management Plan contains instructions on safety and health requirements at work etc.

#### **Monitoring Mechanism**

- Weekly safety and health meetings will provide information on unique issues, directions for specific situations, training, and extensive communication about labor protection in daily work.

- Suggestions/topics for discussion from staff are welcome.
- The results will be tracked regularly and discussed in the meeting.
- Participants include the project manager, OHS coordinator, and others as needed.
- In addition to frequent coordination meetings, monthly health and safety meetings will be held with mandatory attendance.
- These sessions aim to amend the OHS Plan and analyze workplace safety and health performance.

## ANNEX 7: WASTE MANAGEMENT PLAN (WMP)

### 1. Objectives of Waste Management

This WMP plan has been prepared in compliance to the World Bank ESS-2 Labor and Working Condition and ESS-3 Resource Efficiency and Pollution Prevention and Management and following WBG-Good International Industry Practice (GIIP) and as well as GOB's ECR 2023. The main objective of Waste Management Plan (WMP) is to organize the disposal of all wastes generated during the construction activities in an environmentally friendly manner especially considering the following points and principles of SWMP as summarized in below table.

**Table-1: Summary of waste management principles**

| Principles | Application in the project                                                                                                                                                                                                                                                       |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Prevent    | The products and services to be employed for this project will be assessed for their potential to generate waste. Those with a lower potential will be favored.                                                                                                                  |
| Minimize   | If a product or service produces more waste than the desirable limit, it must be used for reasons, then the use of that product or service will be minimized.                                                                                                                    |
| Reuse      | No project materials with the potential to be reused will be disposed of after only single use.                                                                                                                                                                                  |
| Recycle    | Where facilities are available, all recyclable domestic and kitchen waste generated by this project will be recycled.                                                                                                                                                            |
| Recover    | The generation of facilities for energy recovery from waste products including that for waste gas now being flared must be encouraged. All other items that may be reused for energy or other purposes will be employed wherever possible. It's not applicable for this project. |
| Dispose    | As a final resort, waste will be disposed of. All waste disposed of will be done responsibly in approved landfills / due treatment and disposal sinks/sumps.                                                                                                                     |

Source: National 3R strategy for Waste Management, Bangladesh

### 2. Types of Wastes

In addition to bulk materials and debris, based on the Solid Waste Management Rules, 2021, the potential construction wastes generated during construction period can be summarized below:

**Table-2: Different types of waste and possible to reusable/recyclable**

| Waste category | Waste description                              | Reusable/Recyclable |
|----------------|------------------------------------------------|---------------------|
| Solid waste    | Air freshener, Aerosol cane                    | No                  |
|                | Mobile battery and other batteries             | Yes                 |
|                | Oil filter, motor parts                        | Yes                 |
|                | Light, bulb                                    | Yes                 |
|                | Paints, lubricants                             | No                  |
|                | Metals, glass, plastic                         | Yes                 |
|                | Hand gloves, mask, goggles, face shield        | No                  |
|                | Toothpaste, saving cream, antiseptic container | No                  |
|                | Torch light, syringe, needle etc.              | No                  |
|                | Clean wood and stumps                          | Yes                 |
|                | Organic waste/kitchen waste                    | No                  |
|                | Use tires                                      | Yes                 |

Source: Solid Waste Management Rule 2021, Article 7(2), 10(4)

### 3. Hazardous Waste

Hazardous waste management is outlined below in accordance with relevant waste legislation and the Bangladesh E-waste Management Guidelines (2012).

### 4. Source of wastes including hazardous wastes

The probable sources of various types of waste throughout the construction and operation phase will be as follows: Wastage from the cutting of gas pipelines and related debris, and labor camps will generate a variety of trash, including food waste, lubricating oil, waste oil, and others.

## **5. General Procedures for Collection, Storage and Handling Procedures**

All waste generated during and after construction works is processed and disposed of by the contractor(s) in line with Bangladeshi laws and regulations, such as the Solid Wastes Management Rules 2021 and World Bank's ESS standards like ESS-4. The contractor(s) will be responsible for collecting, sorting, and disposing of waste generated by construction activities at the site as follows:

### **Waste Collection:**

- Waste generated during construction activities must be stored and disposed of in approved areas selected by BEZA.
- Waste bins should be freely accessible at the working sites for workers, vendors, and other parties involved in construction activities, such as suppliers and subcontractors.
- Use color-coded containers at construction sites, storage areas, and campsites to distinguish waste kinds, such as food, light, bulbs, needles, dry batteries, health-care waste from labor camps, lubricant oil, and oil wastes.

### **Waste Storage:**

- To conserve soil, garbage should be stored on-site using color-coated waste bins.
- If discharged at disposal sites, the storage space should be paved and covered with soil. No open areas should be left without vegetation.

### **Waste Segregation and Handling:**

- At the source, waste will be separated into hazardous and non-hazardous categories, considering recyclable and non-recyclable materials.
- Recyclable hazardous trash, such as dry batteries, should be given to authorized vendors for recycling. Non-recyclable hazardous garbage, such as healthcare waste, food waste, will be disposed of at specified sites.
- The vendor (either selected by the contractor(s) or by BEZA) will take overall responsibility for collecting, storing, and handling hazardous waste to remove from the sites and dispose of them in a safe disposal point (the location of the disposal site will be decided by BEZA with the collaboration of local government agencies, e.g., Union Parishad).
- Contractors and vendors must maintain appropriate Personal Protective Equipment (PPE) when collecting and handling hazardous waste from working sites to ultimate disposal points.

**Table-3: Draft monitoring form on waste during construction and operation phases**

| <b>Locations</b>           | <b>Kinds of waste</b> | <b>Quantity (kg)</b> | <b>Disposal method</b> |
|----------------------------|-----------------------|----------------------|------------------------|
| Trenching sites            |                       |                      |                        |
| River/Canal crossing sites |                       |                      |                        |
| Labor campsites            |                       |                      |                        |
| Storage sites              |                       |                      |                        |

## ANNEX 8: DRAINAGE MANAGEMENT PLAN (DMP)

### 1. Introduction

The proposed gas distribution pipeline will be constructed along the utility corridor of the approach and internal roads connecting within 2A and 2B zones of NSEZ Project. The project is situated in Mirsharai Upazila of Chattogram district near Abu Torab and Charsarat Village. It is located on the west side of the BWDB embankment, approximately 12 km west of the national highway (Dhaka-Chattogram Highway), with Chattogram City located 60 km south.

This DMP plan is prepared in compliance to the World Bank ESS-3 Resource Efficiency and Pollution Prevention and Management.

### 2. Objectives

The primary objective of the drainage management plan is to spill runoff from the work sites (excavation/digging) and divert them into adjacent canals or surface water sources at the locations near Zone 2A and 2B. As part of the data collecting process for the ESIA study, community interviews, secondary data sources, and primary or baseline data were used to prepare this drainage management plan.

### 3. Existing Drainage Conditions

There is no man-made drainage system at the project site, all the drainage is naturally occurring such as Bamonsundor, Daborkhali, Ichakhali canal and Shaherkhali khal. The water in Ichakhali canal is controlled by a sluice gate, located at the entry point of the channel on SW side of the project site. The upstream area of Ichakhali Canal is crisscrossed by natural drains. Existing surface water sources in the project area are shown in Figure 1. The flow direction is towards the Ichakhali channel and the water from the Ichakhali channel eventually flows into the sea.

According to Physical Infrastructure survey, Mirsharai Upazila Development Plan (MUDP), 2018, In Mirsarai Paurashava, the drainage system showcases a noteworthy distribution, with 75% of the drains covered and the remaining 25% left uncovered. Notably, 82% of the drains are Pucca<sup>4</sup> while 18% are Katcha<sup>5</sup>.

**Table 1: Major surface water sources in the project areas**

| Sl. No. | Sampling Location | Geographical Location       |
|---------|-------------------|-----------------------------|
| 1.      | Bamonsundor Canal | 22°43'36.06"N 91°29'14.67"E |
| 2.      | Daborkhali Canal  | 22°44'30.96"N 91°28'9.60"E  |
| 3.      | Ichakhali Canal   | 22°44'41.63"N 91°27'11.03"E |
| 4.      | Shaherkhali Khal  | 22°71'55.11"N 91°51'40.32"E |

Source: Baseline survey, BCL, 2023.

<sup>4</sup>

<sup>5</sup> i

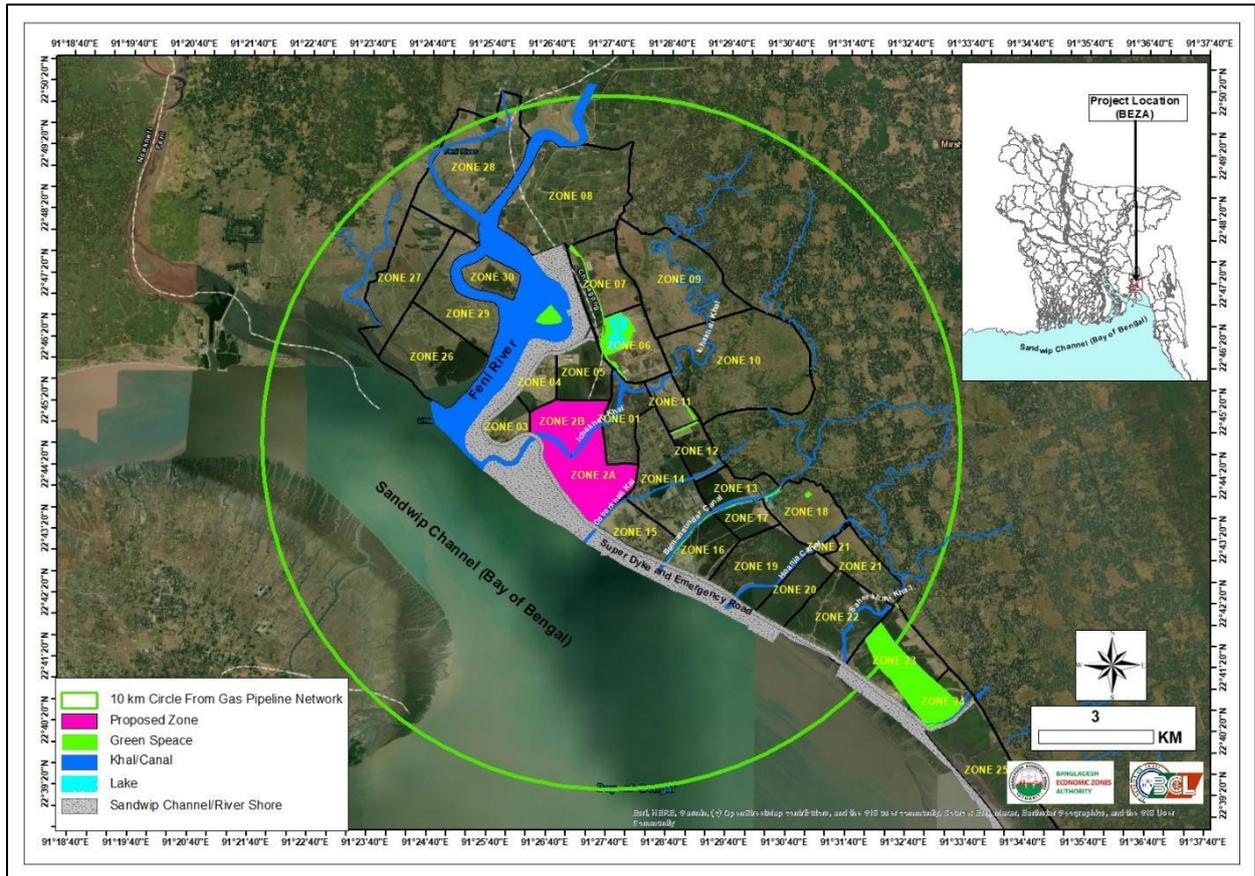


Figure 1: Drainage system with ZOI (10 km) of the project areas.

#### 4. Drainage Management System

The sustainable drainage management is required to the project areas to release rainwaters and the spoil runoff from the construction camps, sites and excavated trench to the surface water sources in terms of managing erosion, soakage, settle down of silt before discharging to the natural water courses, sensitivity of aquatic ecosystems, and other engineering controls etc. However, to catch the silt before release, temporary settling ponds are needed.

To provide sufficient silt removal during the excavation or digging phase, temporary settling ponds could be required to reduce the amount of contaminated water left over during landfilling. It must be considered for spoil outflow from both permanent and transient spoil deposits. Cover may be taken into consideration to stop fine particles from washing off. Preventing the placement of either temporary or permanent spoil stacks near drains or watercourses is imperative. Before beginning the excavation activities, a temporary drainage system should be ensured.

#### 5. Proposed Drainage System under the Project

To manage the spoil runoff, and as well as huge rainwaters is mainly considered the two options such as Cross-drainage structures, and Side drains etc.

#### 6. Construction of Side Drains

Side drains construction may possibly be one of the other options to discharge excess runoff and heavy rainwater from the sites to the nearby surface water sources. It is generally a structure of drains, discharge spoil runoff immediately to the desired destinations of surface water sources, it' can be RCC Pre-cast or cast in situ type structure commonly used in different parts of the country. If U-drains can be constructed in Zone 2A and 2B, it can easily discharge or drain out the rainwater and spoil runoff from the excavation sites. Normally U drains are made by cast-in-situ Concrete and Pipe Drain made by Precast Concrete. A typical cross-section of drains has been presented in the following Figures 2 and 3.

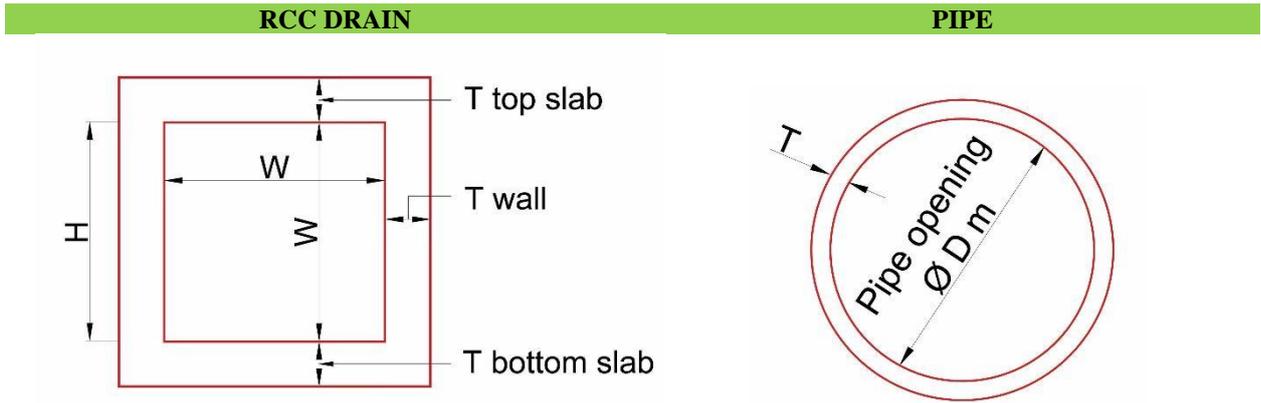


Figure 2: Typical Section of Drain

### 7. Cross-Drainage

If Cross-drainage structure can be made adjacent to the project areas (Zone 2A and 2B) that could easily drain out the spoil runoff and rainwater from the construction sites to the nearby surface water sources, it generally a structure of culverts, or regulators etc. The typical section of Culvert is given below:

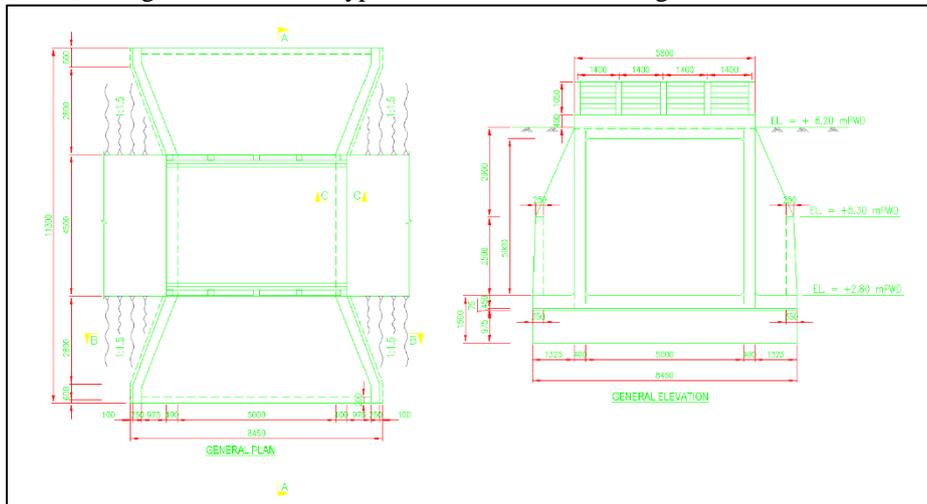


Figure 3: Typical plan and section of culvert

Table 2: Drainage management plan for excavation/digging sites of gas network in zone 2a and zone 2b

| Project activity/<br>Impact source | Environmental Impact                                                                                                                                                                                                                                                      | Mitigation Measures/ Management Guidelines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Excavation                         | Excavation can alter the natural landscape, affecting soil stability, erosion, and coastal features.<br>Excavation disrupts the natural soil structure, affecting drainage patterns. Soil compaction during excavation can reduce permeability, leading to poor drainage. | <ul style="list-style-type: none"> <li>Develop a temporary stormwater drainage system on-site to direct water away from excavation, filling areas, debris storage, and raw material storage zones.</li> <li>Install cross-drainage structures (such as balancing ponds) to maintain drainage patterns and prevent waterlogging and soil erosion.</li> <li>Choose between open or closed temporary drains based on flow magnitude, duration, and design requirements.</li> <li>Ensure stormwater drains do not obstruct traffic, embankments, roads, or structures.</li> <li>Provide covered access to adjacent plots or properties.</li> <li>Regularly clear cross-drainage structures and natural channels before the monsoon season to prevent blockages.</li> <li>Monitor ground and surface water quality during excavation, taking necessary mitigation measures if adverse impacts are detected.</li> <li>Retain the Ichakhali canal on-site and avoid waste disposal in it. Temporary storm water drains will be</li> </ul> |

| Project activity/<br>Impact source | Environmental Impact | Mitigation Measures/ Management Guidelines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                    |                      | <p>provided for whole site. These drains will be connected to Ichakhali canal. These drains have been provided with stilt trap to arrest sediments from run-off before discharging into canal.</p> <ul style="list-style-type: none"> <li>• Usage of silt or air bubble screens/curtains should be explored to minimize the sediment release during excavation operations; Ensuring that silts are removed periodically from these stilt traps to avoid choking and overflowing.</li> <li>• Contractor should prepare and follow the contingency plans and emergency response procedures in accordance with the approved ESMP to address any unexpected releases or spills of contaminants that may occur during the filling process and after filling process.</li> </ul> |

**ANNEX 9: SPILL MANAGEMENT PLAN (SMP)**

**1. Introduction**

BEZA will adopt all possible contingency plans for effective management of spillage, with equipment for appropriate management for immediate response and post incident actions as soon as possible and upgraded with time. The spill management plan shall be implemented to comply ESS-3: Resource Efficiency and Pollution Prevention and Management.

The following procedures will be adopted in response to oil spillage (reduce, recover, and minimize of spreading oil spillage)

Mechanical Recovery will include Skimmers for recovery of oil/chemicals, Oil/water/chemical separators, and storage etc.

Mechanical Remove technique will include Manual removal of oiled/chemical entangled materials (hand, shovel, rakes, etc.), manual cutting of vegetations, manual removal of contaminated soil, and warm water and low pressure washing if contamination occurs at the river crossing or canal crossing sections.

Bioremediation: Bioremediation is the application of nutrients (fertilizers containing nitrogen and phosphorous) to accelerate the natural biodegradation of the oil. Oil/chemical biodegradation is the natural process by which microorganisms oxidize hydrocarbons, ultimately, converting to carbon dioxide and water. Bioremediation will be considered as the final treatment step after completing conventional treatment or in areas where other methods are not possible to use or recommended for use.

**2. Spillage After-Effects and Damage Mitigation**

Resources will be made available to assess oil/chemical exposure effects, possible contamination, and diseases and special medical assistance will be made available at the site.

Ensuring the health and safety protocols of the manpower who will make mitigating efforts.

If the greater extent is such that the environment and ecosystem will be affected in the long-term, restorative actions to be taken considering the challenges that existed in the affected areas.

**3. Record keeping and accounting**

**Table 1: Sample reporting format can be developed to keep the record of oil/chemical spillage at the sites:**

| Types spillages | Damages areas | Date of occurrence | Place of occurrence | Corrective Action Plan (CAP) |
|-----------------|---------------|--------------------|---------------------|------------------------------|
|                 |               |                    |                     |                              |
|                 |               |                    |                     |                              |
|                 |               |                    |                     |                              |
|                 |               |                    |                     |                              |
|                 |               |                    |                     |                              |
|                 |               |                    |                     |                              |

If there is any chance of economic damage, the loss and damage records should be prepared that shows how the loss was calculated using the area's demarcation, the level of pollution, and the identification of severely contaminated areas. A description of the work completed in the impacted regions and the methodologies used will be emphasized in light of the evidence in the incident with the chemical and/or oil pollution.

## **ANNEX 10: EMERGENCY RESPONSE AND DISASTER MANAGEMENT PLAN**

### **1. Pre-Emergency Planning**

During the pre-emergency planning stage, identifying anticipated disaster risks, and how to respond to this odd situation, that could help project people, resources, materials, and as well as nearby communities to respond quickly. The following issues should be addressed or considered during pre-planning stage:

- Hazard Identification or assessment.
- Identifying the emergency resources available at the sites.
- Develop communication strategies during disaster period.
- Administering the plan
- Collecting and available the emergency nos of local fire departments, local police station, and local hospitals at the construction sites.
- Preparing the emergency response procedures
- Communication of the procedures
- Conducting or assessing the capacity needs and development.
- Set up assembly points where everybody gathers during emergency periods.
- Finalizing the debriefing and post-emergency procedures.

#### **Emergency Classification**

Basically, any emergency can be classified at three stages:

- **Minor Emergency:** It is easy to control by persons who'll be engaged in the Project operation and facilities which are to be used at the project sites.
- **Major or Serious Emergency:** This kind of emergency may force the project operation to be suspended or even disrupted entirely, depending on the circumstances.
- **Disaster Emergency:** During this disaster emergency, the project operation will have to stop right away because the danger of vulnerability is greater. This will result in unsafe working conditions, major injuries, fatalities among employees, contractors, or members of the community, excessive damage to property or equipment, and serious environmental destruction.

### **2. Level of Priority**

The level of priority means to take the steps or initiatives to respond to any odd situation that may cause emergency conditions/situation during gas pipeline network construction and post-construction periods. To get the priority, three types of level are identified during the project implementation period which are as follows:

**Level-1 (Minor Emergency):** It is easy to tackle or control if some sorts of preventative measures are maintained properly at the sites. To avoid or reduce this situation, any kind of emergency object should be identified and properly mitigated at the early stages of the project implementation. Because a small or minor accident/incident may become a major accident/ incident if proper mitigation is not undertaken at the sites. LEVEL-1 Emergencies may result from equipment or property damage at small scale which are not causing disruptions for operations and do not pose at risk to project personnel or property or the community people in the project areas.

**Level-2 (Major or serious Emergency):** Under this level of circumstance, emergencies are defined as mishaps or incidents that jeopardize or violate the safety protocol of project workers, staff, or the general public outside of the project areas, or that have the potential to jeopardize the safety of personnel involved in the gas pipeline construction activities, and which necessitate notification to the relevant authority for the necessary support services.

**Level-3 (Disaster Emergency):** This will result in unsafe working conditions, major injuries, fatalities among employees, contractors, or members of the community, excessive damage to property or equipment, and serious environmental destruction. So, during this emergency, Gas pipe line construction work and post-construction or in operation should be shut down immediately without notification and alternative arrangement should be there as a contingency plan.

### **3. Emergency Notification & Evacuation Process**

Emergency notification and evacuation process is an important process to reduce the risk and less the degree of impacts that will follow some sorts of steps:

- a) Emergency Notification &
- b) Evacuation Process

❖ **Notification**

- The notification will be issued first, notification served to the project sites and its surrounding areas to inform the local people about emergency situations.
- The site manager should be notified immediately, and he will inform BEZA immediately without delay.
- The Maintenance Supervisor and Operations Supervisor should also be notified.
- Use the emergency contact list to notify the relevant parties.

❖ **Evacuation**

In case of an emergency that requires evacuation, the following procedures should be followed:

- Activate the alarm and alert all employees and visitors.
- Ensure that all employees and visitors are accounted for.
- Assemble at the designated assembly point.
- Wait for further instructions.
- Respond to emergencies using an effective communication network and organized procedures.
- Resume normal activities after emergency situations.

Personnel involved in dealing with emergencies shall follow these priorities while making decisions and developing strategies. Contractor's employees should also be instructed in the Emergency Procedures before commencing work on this site. They will report to the emergency assembly point on this site. Construction Manager /EHS expert will guide them in case a major decision like evacuation from the project site is taken. High Disaster or Catastrophic condition, all employees should be evacuated immediately.

❖ **Head Count**

Head count is important to identify the injured, wounded, missing, in field, present and absent persons from the site during emergency situations. The simple format/checklist can be maintained at the assembly point to operate the head count system.

**Table 1: Head count format at assembly Point during emergency period**

| Name of the sites:  |         | Assembly point: |          |         |         |                               |         |
|---------------------|---------|-----------------|----------|---------|---------|-------------------------------|---------|
| Date and Time:      |         |                 |          |         |         |                               |         |
| Employees / Visitor | Present | Absent          | In Field | Injured | Missing | Required Emergency Assistance | Remarks |
|                     |         |                 |          |         |         |                               |         |
|                     |         |                 |          |         |         |                               |         |
|                     |         |                 |          |         |         |                               |         |
|                     |         |                 |          |         |         |                               |         |

**RE-ENTRY**

❖ **Re-entry Planning:**

Without proper re-entry process, or control over the re-entry issues, new emergencies will occur when workers or residents return to their works or home. This process will cover the following issues:

- Identified the workers or employees of the evacuated areas.
  - Transport them to the evacuated areas.
  - Maintaining order during re-entry etc.
1. The Re-Entry Plan and operation must minimize the danger and properly warn those who may be entering potentially unsafe areas.
  2. After the damage information is collected and the decision is made to activate the Re-Entry Plan, construction managers and other community officials will determine what resources are needed and available to devote to the re-entry operation.
  3. Some cleanup and repairs may have to be made before it is even possible to get to their property.
  4. Traffic control may require substantial manpower resources if transportation routes are damaged and/or detoured.
  5. Ongoing security of the evacuated area will require additional law enforcement resources.
  6. A successful Re-Entry Plan must be flexible enough to consider post-disaster conditions, size and population of the evacuated area, and availability of resources.
  7. Contractors and other repair service providers will be allowed access at this time.
  8. If full-scale re-entry is impossible, schedule additional phases of re-entry so that residents or workers in particular areas are allowed in at specified times for a fixed number of hours.

9. Have emergency response personnel and equipment in the re-entered area ready and able to respond even when utilities may not be available.

❖ **Public Communication During Emergency**

A reliable communication system is an important key to make an effective emergency response for disseminating the information on time. To make it successful, reliable communication with procedural development, and personnel training is required.

- Notify the relevant authorities, such as Emergency Services, the Fire Bigrade, the Police Stations or other regulatory agencies, as required.
- Develop a media communication plan to keep the public and stakeholders informed.
- Collect the cell phone numbers of nearest medical centers or hospital services.
- Collect the cell phone numbers of the nearest Police stations for emergency help.
- Collect the cell phone numbers of local fire service station locally name as Fire Bigrade stations.

❖ **Assembly Points**

The Evacuation Assembly Point (EAP) should be an open area away from the building and out of the way of responding emergency personnel. Establish primary and secondary EAPs in case the primary cannot be occupied during or after an evacuation. A separate EAP may be necessary for earthquake evacuation.

Occupants meet after evacuation so that they may be accounted for or lend assistance as needed. There may be more than one assembly point depending on the size of the employees, workers, contractors, and the location of the exits. Some EAPs may be unsuitable for assembly following an earthquake event. However, EAP both primary and secondary locations should be familiar with the project personnel including workers, employees and contractors’ representatives during the construction and post-construction periods.

To activate the assembly point, everyday morning before commencing work, Toolbox talk (TBT) and mock drills for emergency evacuation process should be carried out in these places occasionally. The primary and secondary Evacuation Assembly Points (EAPs):

|                                  |                          |
|----------------------------------|--------------------------|
| <b>Primary Assembly Point:</b>   | <b>Name of the place</b> |
| <b>Secondary Assembly Point:</b> | <b>Name of the place</b> |

**4. Emergency Response for Typical Emergencies**

Typical emergency situations at the sites will follow 5 steps such as prevention, mitigation, preparedness, response, and recovery<sup>6</sup> etc.

- **Prevention:** Preventive measures will prioritize identifying potential dangers at project sites to limit the risk of emergencies. Fire accidents, electrical shocks, slips, and other connected risks, among others, should be inspected before beginning work, and if any possibility is discovered, it should be removed first, followed by the work.
- **Mitigations:** Refers to efforts taken to either avert an emergency, reduce the risk of an emergency occurring, or ameliorate the harmful effects of unavoidable disasters. To safeguard worker safety, create hard barriers, safety signage, flag man deployment, warning signs, alternate routes for vehicle movement, and ensure the quality of gas pipeline construction works. However, wearing PPE is critical for maintaining workplace health and safety. Adopting construction standards and adhering to the World Bank Guidelines for Environmental and Social Protection (ESS standards) are typical mitigation techniques.
- **Preparedness:** Activities improve a worker's ability to respond when a crisis strikes. Typical preparedness tactics include increasing understanding, educating both response staff and concerned public, holding catastrophe drills to reinforce training and test capabilities, and presenting all-hazards education campaigns.
- **Response:** Actions taken promptly before, during, and after a hazard impact to save lives, reduce economic losses, and alleviate suffering. Response actions may include activating the emergency operations center, evacuating threatened workers, opening alternate shelters, and providing onsite medical treatment facilities, performing emergency rescue and, battling fires, and conducting search and rescue.

<sup>6</sup> <https://www.stlouis-mo.gov/government/departments/public-safety/emergency-management/about/Steps-of-Emergency-Management.cfm>

- **Recovery:** Actions should be taken to restore workers and staff to normal or near-normal conditions. Providing financial assistance for self-recovery, essential medical care, clearing debris or other objects from the sites, and reconstructing roads, pipelines, and other structures.



Figure 1: Steps of typical emergency management.

❖ **Fuel and Chemicals Spillage**

Contractors will ensure proper fueling and lubrication of machinery, motors, and vehicles to prevent spillage and evaporation. To protect against spills, gasoline storage locations should be isolated and contained. Access to the storage areas should be restricted, and security personnel should always be present. Different colors should be used to identify different types of fuel, such as diesel, gasoline, and octane. Because petrol and octane have the highest rate of evaporation, they must be used and handled with attention, and special precautions should be taken when receiving and changing oil. Create supplementary containment for oil transfer, as indicated below:

Table 2: Oil storage facilities at working sites

| Description                                    | Secondary containment           | Type                       | Location              | Purpose of using                                            |
|------------------------------------------------|---------------------------------|----------------------------|-----------------------|-------------------------------------------------------------|
| Equipment Diesel Fuel and Gasoline (Temporary) | Double-walled and/or lined berm | Stationary Refueling Tanks | At construction yard  | Refueling equipment/vehicle during construction activities. |
| Contractor Diesel Fuel (Temporary)             | Single-Walled                   | Mobile Refueler            | Construction Facility | Refueling equipment/vehicle during construction activities. |

Source: Construction spill prevention, control, and countermeasures (SPCC) plan, Gravel Pit Solar, East Windsor, CT March 18, 2021.

- **Contractor’s responsibility:** The contractor will notify the site manager / project manager as soon as the spillage is released or occurs on the site, regardless of the amount of oil or chemical leakage that happened. If there is an oil spill, an oil kit (such as a skimmer or sucker) should be utilized to clean up the materials on the construction site.

❖ **Medical Emergency**

- **First Aid Kit-** Every workplace should have a first aid kit with one person in charge and placed in easily accessible locations for everyone to use.
- **Emergency vehicles:** An emergency vehicle should be present on-site to transport the wounded or injured person to a hospital or medical facility as soon as possible.
- **Emergency number and information:** Emergency numbers for local hospitals, medical facilities, police stations, fire stations, and local volunteer associations/groups should be available at the sites and easily accessible to everybody for emergency response.
- **Takeaway:** Gas network construction activities sites are generally safe places to work, although accidents do occur from time to time. To reduce the danger of an accident, workplace safety laws must be followed. If an accident occurs, the repercussions may be lessened by providing workers with first aid kits, mobile medical units, and adequate information or training.

### COVID-19 Situations

The Government of Bangladesh (GOB) currently has left the COVID-19 restrictions because to the low frequency of cases and the completion of three rounds of vaccines. However, if a COVID-19 emergency occurs, the following responses will be implemented at the sites to prevent or mitigate the effects.

**Table 3: COVID-19 Situations-**

| Action to be done | Requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Eliminate</b>  | <ul style="list-style-type: none"> <li>Workers who don't feel well should not stay or continue their work on the site.</li> <li>Avoid physical meeting and maintaining 2 meters social distancing while working on the sites.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Reduce</b>     | <ul style="list-style-type: none"> <li>When social distancing measures (2 meters) are not practical, it is necessary to wear a minimum surgical mask, safety eyewear, and hand gloves.</li> <li>Temperature screening tests must be performed.</li> <li>Limit worker proximity to 2 meters and reduce the number of workers involved in tasks.</li> <li>Encourage workers to work side-by-side or away from each other.</li> <li>Maintain cleanliness of common touch areas, such as doors, buttons, handles, vehicle cabs, tools, and equipment.</li> <li>Increase ventilation in enclosed areas.</li> <li>Employees should wash their hands before and after using any equipment.</li> </ul> |
| <b>Isolate</b>    | <ul style="list-style-type: none"> <li>Keep groups of workers who need to work within 2 meters.</li> <li>Work in teams (do not swap workers within teams)</li> <li>Keep teams small as much as possible.</li> <li>Work away from other workers as much as feasible.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Control</b>    | <p>When working within 2 meters, face-to-face interaction is required to complete a task.</p> <ul style="list-style-type: none"> <li>Limit these activities to 15 minutes or less.</li> <li>Implement an upgraded authorization process.</li> <li>Increase supervision to ensure compliance.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>PPE</b>        | <ul style="list-style-type: none"> <li>Workers at project sites are required to wear the necessary PPE and maintain a 2-meter social distance.</li> <li>The necessary PPE will be ensured at the site for each employee, workers, and others.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Behaviors</b>  | <ul style="list-style-type: none"> <li>The contractor(s) should take the required precautions to reduce the risk of infection transmission and rely on all construction workers to follow their actions and behaviors.</li> <li>Encourage an open and collaborative approach between workers and employers on-site, so any difficulties can be openly acknowledged and addressed.</li> </ul>                                                                                                                                                                                                                                                                                                   |

Source: Novel Coronavirus (COVID-19) Guidelines, Government of Bangladesh.

<https://old.dghs.gov.bd/index.php/en/home/5376-novel-coronavirus-covid-19-guidelines>.

#### ❖ Emergency Response Equipment

Fire extinguishers- Fire extinguishers or fire balls should be placed in strategic positions around the project area to respond to any fire incidents that may arise. Staff and personnel shall be adequately taught to use firefighting equipment during fire emergencies.

#### ❖ Emergency Response Training

- A necessary training program should be designed to provide 'need to know' knowledge to emergency responders, including information on how to avert a pipeline incident.
- It should focus on the shared aim of workers and public safety. Emergency responders are trained to safeguard the public from a variety of potential emergencies.
- The contractor will prepare a detailed 'Emergency Training Plan' in the Construction Environmental and Social Management Plan (CESMP) where frequency of training, no of participants, and trainers' information should be detailed.
- Every day before work begins, the project manager/HSE officer should conduct a toolbox talk on occupational health and safety and emergency response plans. This should be documented and reported to the project authority in the progress report.

#### ❖ Emergency Drills/Exercises

- Necessary emergency drills or exercise will be carried out at the sites during the construction (trench excavation) /fixing the pipeline. It will help enhance the capacity of workers to response to the emergency with the way of interactive, realism and handling the emergency conditions at the site.

- In emergency drills, workers, staff, and other personnel are directly or indirectly involved in the project activities. Emergency drills should be conducted every quarter.
- It is critical to communicate with stakeholders before, during, and after the drill or exercise to ensure that they understand the purpose, expectations, and outcomes. It is also critical to seek their opinion, advice, and suggestions to ensure that the drill or exercise is relevant, practical, and courteous.

❖ **Emergency Communication**

A list of emergency communications will be posted in the emergency drill sites and construction areas to respond emergency quickly which is given below:

**Table 4: Emergency drill sites and construction areas**

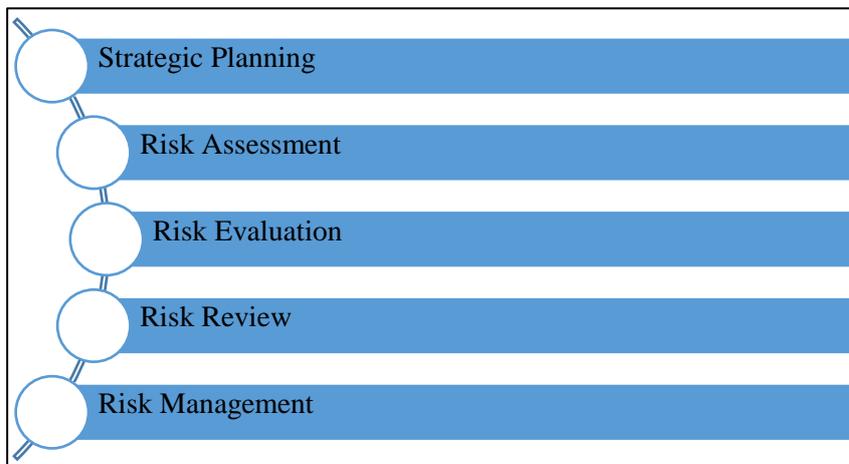
| Sl | Name                                                      | Emergency no. |
|----|-----------------------------------------------------------|---------------|
| 1  | National emergency cell                                   | 999           |
| 2  | Local police station (Officer in Charge, Mirsharai Thana) | 01713373644   |
| 3  | Mirsharai Fire station                                    | 01901021577   |
| 4  | Local Hospital                                            | 01851333111   |

**5. Risk Assessment and Emergency Response**

The fundamental risk assessment will be conducted based on the likelihood of major accidents occurring at the working sites and the possible damage to the local community, workers, employees, and others, as well as the destruction of the surrounding natural environment. However, damage assessment clearly identifies the different connected aspects such as chemical leakage, oil spills, confinement of oil storage locations, dispersion distances from oil/chemical substances, noxious materials, and site population, among others.

❖ **Introduction Hazard Assessment Process**

Oil leaks can occur from dredgers, vehicles and other motor engines which will lead to fires and explosions. This type of accident, however, has a negative impact on a country's economic growth and development image around the world, causing property loss, serious health complications, site workers and other lives being jeopardized, and causing serious environmental damage.



**Figure 2: Flow chart of risks management**

❖ **Identification of Hazards and Cause Analysis**

- Risks/ hazards evaluation criteria will be based on various causes of emergency during gas pipeline installation and post installation periods due to inappropriate handling, use, transportation, storage, and disposal of equipment, wastes including hazardous materials, However, the hazardous materials are considered as of:
- Explosives, toxic and flammable gases, flammable solids, oxidizing substances, toxic and infectious materials, and corrosive substances etc.

❖ **Causes of hazards mainly occurs from:**

Source: Environmental Assessment for Fouzderhat-Sitakunda-Mirsharai Gas Distribution Network Upgradation Project, Chattogram of Karnaphuli Gas Distribution Company Limited (KGDCL), March 2023.

## ANNEX 11: TRAFFIC MANAGEMENT PLAN (TMP)

### 1. Introduction

Before work begins, the EPC Contractor will create and carry out a traffic management plan to control construction-related traffic. This will be necessary to stop local traffic jams, avoid rush hour traffic, and stop accidents. The contractor will prepare traffic management plan following Master Plan of NSEZ.

### 2. An indication of traffic management plan

#### 2.1 Road Networks of NSEZ

The roadways that will transport and transmit passenger and goods traffic into and out of the NSEZ are the local and regional road networks, which are of utmost importance. Given the functional attributes of the NSEZ and the projected passenger and freight movement pattern, the Dhaka – Chattogram Highway (N1) and Feni – Sonagazi Road are expected to be of utmost importance, particularly for north-south main travel. Most of the connected roads originate from Dhaka Chattogram Road.

- Muhuri Project Road (Zorarganj to Muhuri Project)
- Bamonsundor Road
- Sheikh Hasina Sarani
- Mohan Nagar Barodarogarhat Road
- On-Site Road Network within NSEZ:

#### 2.2 Hierarchy of Roads and Cross Sections in NSEZ

Table 1: Hierarchy of roads and cross sections in NSEZ

| Type of Roads                             | Description                                                                                                                                                     |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| An Emergency Road: Super Dyke (100m ROW). | Road is a high embankment road next to the sea that provides restricted access and, in case of emergency, serves as an escape from NSEZ.                        |
| Arterial Roads- Type A (100m ROW).        | For vehicles traveling throughout the NSEZ to reach Precincts more quickly.                                                                                     |
| Arterial Roads – Type B (60m ROW)         | For through traffic on an uninterrupted path inside the NSEZ.                                                                                                   |
| Sub Arterial Roads – Type A (40m ROW)     | for collecting and distributing traffic in order to link with the network of arterial roads, while providing a worse quality of service than an arterial route. |
| Sub Arterial Roads – Type B (30m ROW)     | for gathering and distributing traffic in order to link with the network of arterial roads, while providing a worse quality of service than an arterial route.  |
| Collector Street – (20m ROW)              | for the purpose of gathering and allocating local traffic as well as granting access to major and minor thoroughfares.                                          |

Source: Master Plan of NSEZ, BEZA.

#### 2.3 Intersection and Interchanges

The following intersections and interchanges should be considered during preparation of traffic management plan.

- Intersection of Sheikh Hasina Avenue with Dhaka Chittagong Road (3 arm)
- Intersection of Port connector with Dhaka Chittagong Road (3 arm)
- Intersection of Sheikh Hasina Avenue at CP More (4 arm)

### 3. General Responsibility of Contractors

- Whenever possible, heavy vehicle movement should be avoided during peak hours.
- Consistent car maintenance helps prevent malfunctions that cause traffic jams.
- Raising driver awareness and providing training to promote safe parking practices, observing traffic laws, avoiding needless stops, and overtaking.
- Employees will be tasked with upholding traffic laws, facilitating traffic flow, and preventing collisions.
- To protect the safety of the local population, a program of awareness will be held for the staff participating in construction activity connected to the movement of heavy equipment.
- To guide people and vehicles, clear and visible traffic signs should be installed.
- Determining rights-of-way, speed restrictions (max. 30 km/hr.) for the site, requirements for vehicle inspections, operating guidelines and managing traffic patterns or directions.
- The adjacent Ring Roads should be free from project vehicles movement that will help neighborhoods experience low traffic congestion and improved traffic flows.

- No child driver or child helper would be employed at the project sites for transportation of materials and goods to the sites.
- Drivers must have a valid driving license to carry goods and materials to the sites.
- To produce low noise, good engines should be ensured for the vehicles.
- To help lower the number of traffic accidents at the project sites, one-way traffic should be implemented as much as practicable.

**4. Reporting and Monitoring**

A regularly monitoring should be carried out during the construction and operation of gas pipelines and findings should be included in the Quarterly Environmental and Social Monitoring Report. A sample format will be used to keep the record of traffic flow, accident or incident related to project’s vehicle movement and necessary corrective action plan (CAP) will be implemented accordingly.

**Table 2: Types of traffic flow with specific locations:**

| <b>Types of traffic flow with specific locations:</b> | <b>Accident/Incident types</b> | <b>Date of occurrence</b> | <b>Place of occurrence</b> | <b>Corrective Action Plan (CAP)</b> |
|-------------------------------------------------------|--------------------------------|---------------------------|----------------------------|-------------------------------------|
|                                                       |                                |                           |                            |                                     |
|                                                       |                                |                           |                            |                                     |
|                                                       |                                |                           |                            |                                     |
|                                                       |                                |                           |                            |                                     |
|                                                       |                                |                           |                            |                                     |
|                                                       |                                |                           |                            |                                     |

**Conclusion:**

The traffic management plan shall be prepared by the Contractor as site specific, should be approved by BEZA, and shared with the NSEZ to advice for the movement, routes, and schedules of project vehicles.

## ANNEX 12: AIR MODELLING

### 1. Air Quality Monitoring

#### 1.1. Background

Modern technological man's craze for more and more material wealth and physical comforts has unknowingly pushed him into the world of unsustainable trade, commerce, and industry, for the carrying of which, a number of developmental activities like hazardous and non-hazardous involving excessive use of science and technology necessarily take place. In this regard, environmental degradation like air pollution has been observed in each industrial development. Therefore, it is necessary to decrease such environmental pollution and degradation through environmental management procedure. In Bangladesh, Environment Conservation Act 1995 (Amended 2010) is currently the main act governing environmental protection in Bangladesh, which replaced the earlier environment pollution control ordinance of 1992 and provides the legal basis for Air Pollution Control rule 2022 aiming to protect environmental health, the government has published a new rule based on section 20 of The Bangladesh Environment Conservation Act, 1995.

An issue that is becoming ever more important is identifying and mitigating potential environmental and social impacts related to the development. Therefore, a baseline study is essential in order to be able to determine the level of impact expected and to enable the monitoring of impacts after the development has occurred. To facilitate further preparation of Environment Clearance Report cognizant to the need to mitigate the negative environmental impacts of projects in its portfolio and has developed systems to safeguard the environmental concerns. To comply with the environmental safeguard requirement a baseline environmental status of project sites has to be established before activity initiates in the field. It will be done through primary monitoring and surveys for relevant parameters and secondary data collection to provide a database against which short- or long-term environmental impacts of the project can be determined, the existing baseline environmental data are to be collected.

To predict pollution level and its management through very sound and scientific modeling technique such as air dispersion model and noise model are used widely in the present scenario. For this this region, baseline environmental monitoring of certain environmental attributes viz. Meteorology, Ambient Air Quality, Ambient Noise Quality need to be studied surrounding projected area. Similarly, regulatory agencies rely on dispersion models as part of environment management plan and their approval processes

Therefore, USEPA recommended different air dispersion model and noise prediction model to assess the emission and magnitude of the contaminants to the adjacent areas of the Project site. The model AERMOD 8.9 has been used to predict and simulate the effects of criteria pollutants from major emission sources in the Project area and analyzed the effect on ambient air quality for NO<sub>2</sub>, SO<sub>2</sub>, PM<sub>2.5</sub> and PM<sub>10</sub>.

The major objective of AQM was the prediction of dispersion of air emission from project side. The Gaussian Dispersion Modeling framework was used for the computation of GLC up to a distance of 10 Km from source. The AERMOD 9.5.0 software platform was used for the modeling exercise. The period GLC's of the air pollutant, namely PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>x</sub>, NO<sub>x</sub> from the source operations have been computed. AERMET view has been used to create the SURFACE file (.SFC) and PROFILE file (.PFL).

The baseline study was done in January to March 2024 for a period of 3 months. Meteorological file has been prepared by wind direction, wind speed, temperature (in K), mixing height, stability class (urban and rural) and cloud cover etc.

#### 1.2. Impact on Air Quality

The impacts on air quality from the proposed project depends on various factors like flue gas emission, design capacity of the boiler and DG set, configuration, process technology, raw materials, combusting elements, air pollution control measures, operation & maintenance and monitoring system. Air pollutant disperse to the ambient air of the study area depending on the environmental conditions like atmospheric stability, topographic features, land use land cover etc. in the study area. Emission of flue gas to the ambient environment, it will be subjected to following physical and chemical processes for discharging, dispersion and dissipating to the ambient airshed. Spatial and temporal distribution of air pollutants depends on the following -

- An initial vertical rise, called plume rise, due to initial buoyancy and momentum of discharge from the stacks
- Transport by wind in its direction due to wind speed, land cover friction and atmospheric parameters like precipitation
- Diffusion by turbulence, and stability class of the atmospheric condition
- Gravitational settling, chemical transformations, dry or wet deposition, topographical features, and other complex interactions.

The emitted flue gas from the stacks will disperse into the atmosphere and transported through wind flow into the down wind direction. Finally, the ground level concentration of pollution will diverges depending on the atmospheric process, existing pollution level, distance from the sources, land status etc. This study will estimate the resultant maximum ground level concentration of the particular pollutants are being estimated and checked with respect to the national and international compliance standard values.

During operation of the Boiler & DG mainly emits the criteria pollutants like Particulate Matters (PM), Oxides of Nitrogen (NOx), Oxides of Sulfur (SOx), Carbon Monoxide (CO) etc. Along with the criteria pollutants, it will also emit persistent organic pollutants (e.g., dioxins), volatile organic compounds (non-methane VOCs), ammonia (NH3) and some heavy metals (e.g., Pb, Cu, Cd, Cr, Ni, Hg), at some time. Those pollutants are usually emitted minimally to the ambient environment maintaining the international standard. However, this study is focusing on the criteria pollutants with are being mathematically modeled in this study for addressing the ground level concentration during operation stage with respect to compliance standard.

The emissions of total particulate matter can be comprised with PM2.5 and PM10 (Particles  $\leq 2.5\mu\text{m}$  and  $\text{PM}\leq 10\mu\text{m}$  in size) which will be released in the flue gas during combustion process. Emission of SO<sub>2</sub> in the flue gas depends on the percentage of sulfur present in the HSD which oxidized in the boiler and produce SO<sub>2</sub>. Nitrogen oxides are products of all fuel/air combustion processes. Nitric oxide (NO) is the primary component of NOx; however, nitrogen dioxide (NO<sub>2</sub>) and nitrous oxide (N<sub>2</sub>O) are also formed in smaller amounts. The rate of emission of the pollutants in the flue gas have been presented in **Table-1** in compliance with the Air Pollution Control rule 2022.

**Table 1: Emission rate from the stack**

| 1  | Coal based Emission Features       |     | Project Target Value   | APCR 2022              |
|----|------------------------------------|-----|------------------------|------------------------|
|    | Particulate Matter (PM)            | New | 30 mg/Nm <sup>3</sup>  | 50 mg/Nm <sup>3</sup>  |
|    |                                    | Old |                        | 100 mg/Nm <sup>3</sup> |
|    | Sulfur Dioxide (SO <sub>2</sub> )  | New | 40 mg/Nm <sup>3</sup>  | 200 mg/Nm <sup>3</sup> |
|    |                                    | Old |                        | 400 mg/Nm <sup>3</sup> |
|    | Oxides of Nitrogen (NOx)           | New | 180 mg/Nm <sup>3</sup> | 200 mg/Nm <sup>3</sup> |
|    |                                    | Old |                        | 400 mg/Nm <sup>3</sup> |
| 2. | <b>Oil Based Emission Features</b> |     |                        |                        |
|    | Particulate Matter (PM)            | Old | 30 mg/Nm <sup>3</sup>  | 50 mg/Nm <sup>3</sup>  |
|    |                                    | New |                        | 80 mg/Nm <sup>3</sup>  |
|    | Sulfur Dioxide (SO <sub>2</sub> )  | Old | 40 mg/Nm <sup>3</sup>  | 200 mg/Nm <sup>3</sup> |
|    |                                    | New |                        | 400 mg/Nm <sup>3</sup> |
|    | Oxides of Nitrogen (NOx)           | Old | 180 mg/Nm <sup>3</sup> | 200 mg/Nm <sup>3</sup> |
|    |                                    | New |                        | 400 mg/Nm <sup>3</sup> |

Source: Air Pollution Control rule 2022

### 1.3. Research Methodology

Regulatory agencies rely on dispersion models as part of their approval processes. The Department of Environment (DoE) in Bangladesh does not recommend any specific models for the impact assessment study. Therefore, this study has maintained the USEPA recommended air dispersion model has been used for this project to assess the ambient maximum air pollution. The latest version of the USEPA regulatory model AERMOD 9.1 has been used to predict the pollutant dispersion through the simulation of criteria pollutants from major emission sources from the factory.

#### 1.3.1. Model Setup

The Gaussian Dispersion Modeling (GDM) is used for prediction of dispersion of air emission and the computation of Ground Level Concentration (GLC) up to a specified distance from source. The fundamental model is given below:

$$c(x, y, z) = \frac{Q}{2\pi\sigma_y\sigma_z u} \exp\left(\frac{-y^2}{2\sigma_y^2}\right) \left( \exp\left(\frac{-(z-h)^2}{2\sigma_z^2}\right) + \exp\left(\frac{-(z+h)^2}{2\sigma_z^2}\right) \right)$$

Where c is a concentration at a given position, Q is the source term, x is the downwind, y is the crosswind and z is the vertical direction and u is the wind speed at the h height of the release. The deviations describe the crosswind and vertical mixing of the pollutant. The above equation describes a mixing process that results in a Gaussian concentration distribution both in crosswind and in vertical direction, centered at the line downwind from the source. Gravitational settling and chemical or radioactive decays are neglected.

The mathematical simulation model used for predictions on air quality dispersion in the airshed of study area in ISC-AERMOD View. It is the next generation air dispersion model, which incorporates planetary boundary layer concepts. The AERMOD is actually a modeling system with three separate components: AERMOD

(AERMIC Dispersion Model), AERMAP (AERMOD Terrain Preprocessor), and AERMET (AERMOD Meteorological Preprocessor). Moreover, it has the ability to treat the vertical in homogeneity of the planetary boundary layer special treatment of surface releases, irregularly shaped area sources, a plume model for the convective boundary layer, limitation of vertical mixing in the stable boundary layer, and fixing the reflecting surface at the stack base. The AERMAP is a terrain preprocessor designed to simplify and standardize the input of terrain data for the AERMOD.

To ensure compliance with the air emission criteria the following model setup has been taken into consideration in this study with integration of monitored baseline data of the project **Table-2**.

**Table 2: General layout of the model**

| Parameter                   | Details                                          |
|-----------------------------|--------------------------------------------------|
| Model name                  | AERMOD 9.5.0                                     |
| Model type                  | Steady state Gaussian plume air dispersion model |
| Averaging time              | 24 Hour                                          |
| Source type                 | Point source                                     |
| Surface meteorological data | Site specific data processed by AERMET           |

The output of the modeling process includes, for each receptor, location, distance and elevations used for the computation of airflow around hills. However, the following options have been considered to predict the ground level concentrations due to emissions from the proposed activity.

- Defining the area of interest especially 10 km around the stack
- Hourly micrometeorological data has been included
- The modeling has been done only for criteria pollutants (SO<sub>2</sub>, NO<sub>x</sub>, PM<sub>2.5</sub> and PM<sub>10</sub>)
- Land use and all terrain dispersion parameters are considered
- Selection discrete and grid receptors based on the sensitivity
- Determination of the emission rates from the sources
- The predicted GLC concentration of the criteria pollutants have been added with the ambient measured pollutant concentration
- Checking the resultant maximum ambient air quality with respect to standard in the airsheds and determining the project contribution

Monitoring period has been considered for January to March 2024. Meteorological file has been prepared by taking the hourly data for one month and consist of wind direction, wind speed, temperature (in K), mixing height, stability class (urban and rural) and cloud cover. AERMET View version 9.5.0 has been used to create the SURFACE file (.SFC) and PROFILE file (.PFL).

### 1.3.2. Data Inputs

There are two input data processors that are regulatory components of the AERMOD modeling system: AERMET, a meteorological data preprocessor that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, and AERMAP, a terrain data preprocessor that incorporates complex terrain using USGS Digital Elevation Data. There are following considerations for this project

1. Emission during the operation phase is mainly from the Boiler & DG sets in which DG Set which are operational during the power failure only.
2. DG Stacks are proposed to be installed above the terrace level of the building as per DoE, APCR, 2022 norms.
3. Reference point has been taken as the center of the project site.
4. Only surface air data has been considered for the running the model for upper air, upper air estimator has been used.
5. Model is run through the whole period and 24 Hours. Results have been prepared accordingly

### A. Background Pollution Concentration

An area of 10 km by 10 km centering the stack has been selected for the air quality dispersion modeling. The project area and its nearby area which might be affected by the worst air quality during operation of the plant. The background air quality of the criteria pollutants has been measured during baseline study. Background ambient air quality of the criterion pollutants is comprised from multiple sources. Continuous vehicular movement over the road, locomotive movement, existing industries, construction activities, road dust etc. are responsible for increasing the concentration of air pollutants in the study area. To understand the baseline situation, 10 locations in the airshed have been monitored continuously for 24 hrs. The real-time ambient air quality monitoring sites have been shown in the Table- 3 and its result is tabulated in the Table 4.

**Table 3: Ambient Air Quality monitoring locations**

| Sampling Code | Sampling Locations                                                                   | Geographical Coordinates        |
|---------------|--------------------------------------------------------------------------------------|---------------------------------|
| AAQ-1         | Near BADC sluice gate, Char Chandia, Sonagazi, Feni                                  | 22°47'36.148"N & 91°23'34.199"E |
| AAQ-2         | Near 7 no. Sonagazi Union parishad, Sonagazi, Feni                                   | 22°51'2.332"N & 91°24'14.888"E  |
| AAQ-3         | East side of the road, Bishumiyarhat, Zorarganj, Mirsharai                           | 22°51'35.38"N & 91°30'31.534"E  |
| AAQ-4         | Near BEZA Administrative Building, NSEZ                                              | 22°45'37.566"N & 91°28'5.761"E  |
| AAQ-5         | South Mogadia, Mirsharai                                                             | 22°42'49.566"N & 91°31'34.458"E |
| AAQ-6         | Beribadh Road, Infront of Unigas Plant, Barabkunda, Sitakunda                        | 22°33'57.532"N & 91°39'12.96"E  |
| AAQ-7         | Goll Chatter of Komor Ali Bazar, Mirsharai                                           | 22°41'11.543"N & 91°38'8.382"E  |
| AAQ-8         | Middle Abu Turab Bazar, Mirsharai, Chattogram                                        | 22°44'52.103"N & 91°33'26.088"E |
| AAQ-9         | In front of the Government Technical School & College, Sitakunda                     | 22°37'39.974"N & 91°38'46.504"E |
| AAQ-10        | In front of the Kazi company market, CNG station, Bamonsundor, Bariyarhat, Mirsharai | 22°47'51.09"N & 91°30'47.515"E  |

**Table 4: Ambient Air Quality data**

| Sampling Code | Parameters                             |                                       |                                      |                                      |                         |                         |                                     |                                      |
|---------------|----------------------------------------|---------------------------------------|--------------------------------------|--------------------------------------|-------------------------|-------------------------|-------------------------------------|--------------------------------------|
|               | PM <sub>2.5</sub><br>µg/m <sup>3</sup> | PM <sub>10</sub><br>µg/m <sup>3</sup> | SO <sub>2</sub><br>µg/m <sup>3</sup> | NO <sub>2</sub><br>µg/m <sup>3</sup> | CO<br>mg/m <sup>3</sup> | Pb<br>µg/m <sup>3</sup> | O <sub>3</sub><br>µg/m <sup>3</sup> | NH <sub>3</sub><br>µg/m <sup>3</sup> |
| AAQ-1         | 46.38                                  | 79.51                                 | 11.63                                | 21.18                                | 0.08                    | <0.05                   | 27.04                               | 0                                    |
| AAQ-2         | 33.41                                  | 55.75                                 | 25.45                                | 29.24                                | 0.07                    | <0.05                   | 31.77                               | 0                                    |
| AAQ-3         | 20.15                                  | 33.90                                 | 24.38                                | 31.06                                | 0.12                    | <0.05                   | 36.19                               | 0                                    |
| AAQ-4         | 35.80                                  | 59.48                                 | 21.55                                | 27.14                                | 0.11                    | <0.05                   | 29.01                               | 0                                    |
| AAQ-5         | 33.19                                  | 54.32                                 | 15.40                                | 17.91                                | 0.06                    | <0.05                   | 25.89                               | 0                                    |
| AAQ-6         | 10.84                                  | 19.49                                 | 26.44                                | 19.47                                | 0.10                    | <0.05                   | 24.83                               | 0                                    |
| AAQ-7         | 17.29                                  | 31.67                                 | 31.52                                | 15.98                                | 0.14                    | <0.05                   | 21.59                               | 0                                    |
| AAQ-8         | 34.89                                  | 58.16                                 | 22.21                                | 18.59                                | 0.17                    | <0.05                   | 23.13                               | 0                                    |
| AAQ-9         | 15.97                                  | 25.65                                 | 39.90                                | 33.06                                | 0.22                    | <0.05                   | 35.42                               | 0                                    |
| AAQ-10        | 40.05                                  | 71.22                                 | 18.62                                | 15.17                                | 0.11                    | <0.05                   | 20.02                               | 0                                    |

### B. Emission Estimation from the Sources

In the plant, air pollutant releases mainly form the stacks. Combustion in a furnace, producing flue hot gases and a bottom ash residue for disposal. It will generate flue gas that contains pollutants such as dust, sulfur oxides, nitrogen oxides, acid gases, heavy metal, dioxin, water vapor and carbon dioxide. The pollutants can be removed through a series of air pollution control technologies if it exceeds the compliance standard. However, the rate of emission from the stack has been presented in the **Table-5**

**Table 5: Stack emission features**

| S/L | Name of Investors/Industry     | Industry Type | NSEZ Zone | Fuel Type | No. of Stack | Stack Height (m) | Stack Inside Diameter (m) | Gas exit temperature (°C) | Gas exit velocity (m/s) | Emission Concentration (mg/Nm <sup>3</sup> ) |                  |                 |                 |     |      |
|-----|--------------------------------|---------------|-----------|-----------|--------------|------------------|---------------------------|---------------------------|-------------------------|----------------------------------------------|------------------|-----------------|-----------------|-----|------|
|     |                                |               |           |           |              |                  |                           |                           |                         | PM <sub>2.5</sub>                            | PM <sub>10</sub> | SO <sub>2</sub> | NO <sub>2</sub> | CO  | SPM  |
| 1   | Jinyuan Chemical Industry Ltd. | Red           | 6         | Gas       | 1            | 12.2             | 1.29                      | 120                       | 312.2                   | 5.8                                          | 9.7              | 8.2             | 151             | 212 | 16.4 |
| 2   | Asian Paints Ltd (Boiler- 1)   | Red           | 6         | Diesel    | 1            | 19.5             | 0.203                     | 223.1                     | 5.1                     | 6.3                                          | 9.2              | 11.4            | 67.3            | 231 | 15.3 |
| 3   | Asian Paints Ltd (Boiler- 2)   | Red           | 6         | Diesel    | 1            | 19.5             | 0.203                     | 214                       | 5.2                     | 5.1                                          | 7.8              | 8.9             | 47.1            | 220 | 21.1 |
| 4   | Asian Paints Ltd (DG- 1)       | Red           | 6         | Diesel    | 1            | 15.5             | 0.36                      | 456.3                     | 4.4                     | 7.3                                          | 10.1             | 12.5            | 65.7            | 234 | 17.8 |
| 5   | Asian Paints Ltd (DG- 12)      | Red           | 6         | Diesel    | 1            | 15.5             | 0.203                     | 441.9                     | 4.9                     | 8.4                                          | 11.3             | 11.9            | 59.3            | 241 | 19.3 |
| 6   | BR Powered Limited, Mirsharai  | Red           | 2B        | HFO/Gas   | 9            | 50               | 1.62                      | 280                       | NA                      | NA                                           | NA               | 8.6             | 13.8            | NA  | 178  |

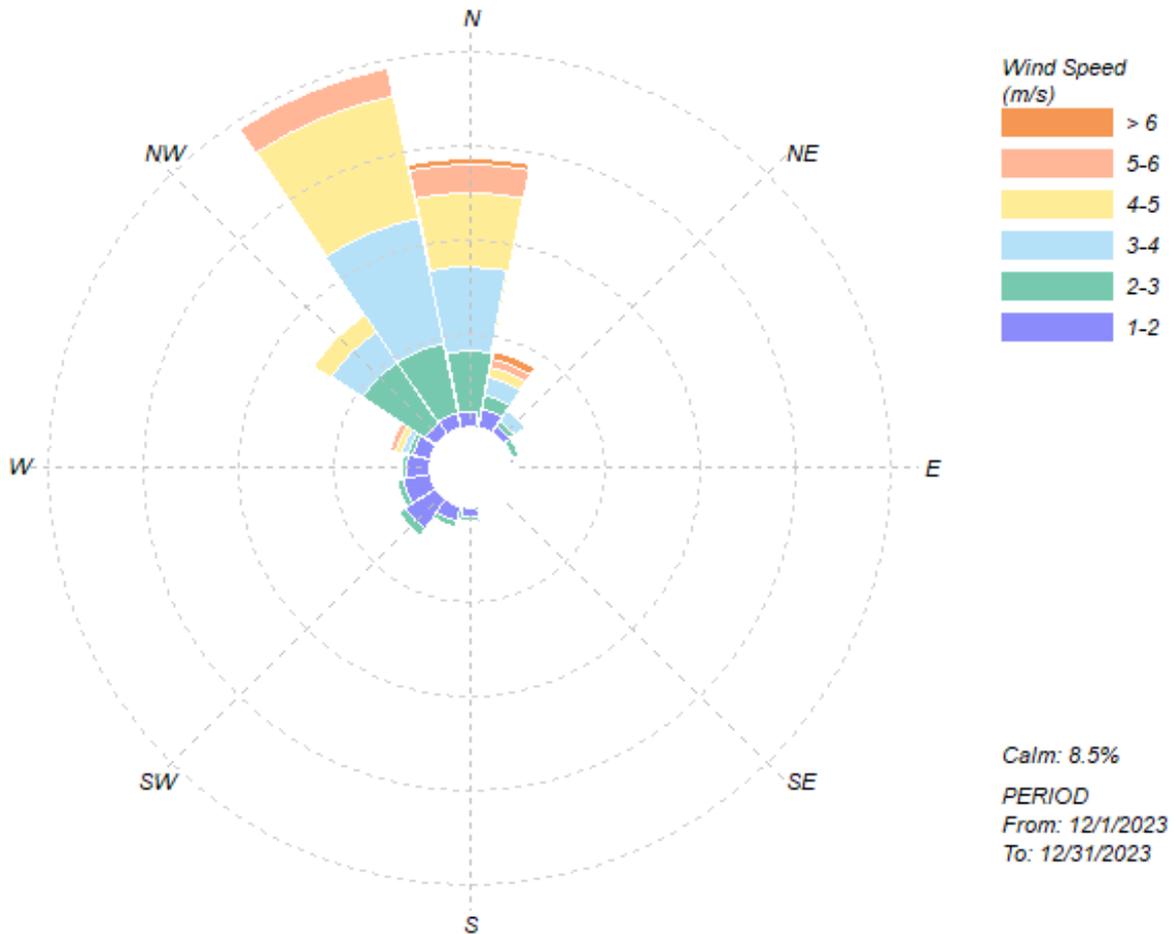
The rate of emission of the pollutants have been calculated based on the technical specification for using it for dispersion modeling study in AERMOD. However, all the estimation has been made to determine the maximum emission for addressing the worst-case situation. However, the emission of CO, SO<sub>2</sub>, NO<sub>x</sub> and PM<sub>10</sub>, PM<sub>2.5</sub> is considered with updated modern technology has been assumed in the plant during the modeling study.

## 1.4. Result and Discussion

### 1.4.1. Meteorological Condition

The Windrose was plotted with the aid of software WRPLOT which is shown in **Fig 1** and following results have been obtained.

- Predominant wind direction is NW and N.
- Second & third predominant wind direction are NWW and NE respectively.
- Calm conditions were recorded as 8.5 %



**Figure. 1: Wind-rose of the study area**

### 1.4.2. Predicted GLC

The modeling has been run for predicting the maximum ground level concentration of ambient air pollution like SO<sub>2</sub>, NO<sub>x</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> during operation phase of the incineration project. The maximum ground level concentration of the criteria pollutants has been estimated for different averaging time period in order to comply the national (ECR, 2005) and international standard (WHO, 2021).

The average air quality monitoring data has been assumed to be similar in different time scale. The sampling data are also considered as the background data for different hours. Therefore, the baseline air quality data has been used both long term and short-term perspective to prepare the resultant pollution level in future. Therefore, this baseline concentration of pollutants is added with the predicted pollutants concentration for assessing the resulting or collective concentration of the pollutants during operation. Table-6 shows the maximum level of ground concentration in the airshed with respect to changing averaging time period. Point sources at location of proposed Boiler and DG stack were fixed. Receptors were fixed at baseline monitoring stations as well as in uniform polar grid up to 30 km radius Centre of project site.

The model was run assuming for 24-hour activities. The predicted maximum incremental GLC (24-hour average) of PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>x</sub> and SO<sub>2</sub> was found as 15.40 µg/m<sup>3</sup>, 10.12 µg/m<sup>3</sup>, 6.16 µg/m<sup>3</sup>, and 2.98 µg/m<sup>3</sup> respectively. The predicted maximum incremental GLC (24-hour average) and predicted cumulative GLC at baseline air quality monitoring locations are presented in **Table-6**.

Table-6: Maximum GLC of the pollutants

| Location Code | Baseline Conc. ( $\mu\text{g}/\text{m}^3$ ) |                   |                 |                 | Predicted GLC ( $\mu\text{g}/\text{m}^3$ ) |                   |                 |                 | Total GLC ( $\mu\text{g}/\text{m}^3$ ) (Existing + Proposed Scenario) |                   |                 |                 |
|---------------|---------------------------------------------|-------------------|-----------------|-----------------|--------------------------------------------|-------------------|-----------------|-----------------|-----------------------------------------------------------------------|-------------------|-----------------|-----------------|
|               | PM <sub>10</sub>                            | PM <sub>2.5</sub> | SO <sub>2</sub> | NO <sub>2</sub> | PM <sub>10</sub>                           | PM <sub>2.5</sub> | SO <sub>2</sub> | NO <sub>2</sub> | PM <sub>10</sub>                                                      | PM <sub>2.5</sub> | SO <sub>2</sub> | NO <sub>2</sub> |
| AQ1           | 79.5                                        | 46.4              | 11.6            | 21.2            | 0.02                                       | 0.01              | 0               | 0               | 79.52                                                                 | 46.41             | 11.6            | 21.2            |
| AQ2           | 55.8                                        | 33.4              | 25.5            | 29.2            | 0.01                                       | 0.01              | 0               | 0               | 55.81                                                                 | 33.41             | 25.5            | 29.2            |
| AQ3           | 33.9                                        | 20.2              | 24.4            | 31.1            | 0.12                                       | 0.08              | 0.03            | 0.05            | 34.02                                                                 | 20.28             | 24.43           | 31.15           |
| AQ4           | 59.5                                        | 35.8              | 21.6            | 27.1            | 0.66                                       | 0.44              | 0.08            | 0.27            | 60.16                                                                 | 36.24             | 21.68           | 27.37           |
| AQ5           | 54.3                                        | 33.2              | 15.4            | 17.9            | 0.45                                       | 0.3               | 0.06            | 0.18            | 54.75                                                                 | 33.5              | 15.46           | 18.08           |
| AQ6           | 19.5                                        | 10.8              | 26.4            | 19.5            | 0.15                                       | 0.1               | 0.02            | 0.06            | 19.65                                                                 | 10.9              | 26.42           | 19.56           |
| AQ7           | 31.7                                        | 17.3              | 31.5            | 16              | 0.24                                       | 0.16              | 0.05            | 0.1             | 31.94                                                                 | 17.46             | 31.55           | 16.1            |
| AQ8           | 58.2                                        | 34.9              | 22.2            | 18.6            | 0.26                                       | 0.18              | 0.05            | 0.11            | 58.46                                                                 | 35.08             | 22.25           | 18.71           |
| AQ9           | 25.7                                        | 16                | 39.9            | 33.1            | 0.15                                       | 0.1               | 0.03            | 0.06            | 25.85                                                                 | 16.1              | 39.93           | 33.16           |
| AQ10          | 71.2                                        | 40.1              | 18.6            | 15.2            | 0.62                                       | 0.41              | 0.03            | 0.25            | 71.82                                                                 | 40.51             | 18.63           | 15.45           |

**A. The spatial distribution of PM10, PM2.5**

The incinerator will contribute negligible amount of particulate matter both PM10 and PM2.5 for both the average duration of short term (24hr) and long-term period. But the baseline concentration of particulate matter still high which collectively raise the resultant concentration of particulate matter. Some time, the maximum ground level concentration exceeds the compliance limit both for national and international standard. Actually, the background concentration is responsible for breaching the compliance standard limit of PM10 and PM2.5. From the above table, it can be concluded that the predicted GLC of the criteria pollutants are significantly lower than the existing ambient situation. Figure 2 ad 3 shows the resultant maximum ground level concentration of PM10 and PM2,5 at the ambient air quality monitoring locations where the remaining status has been presented in the

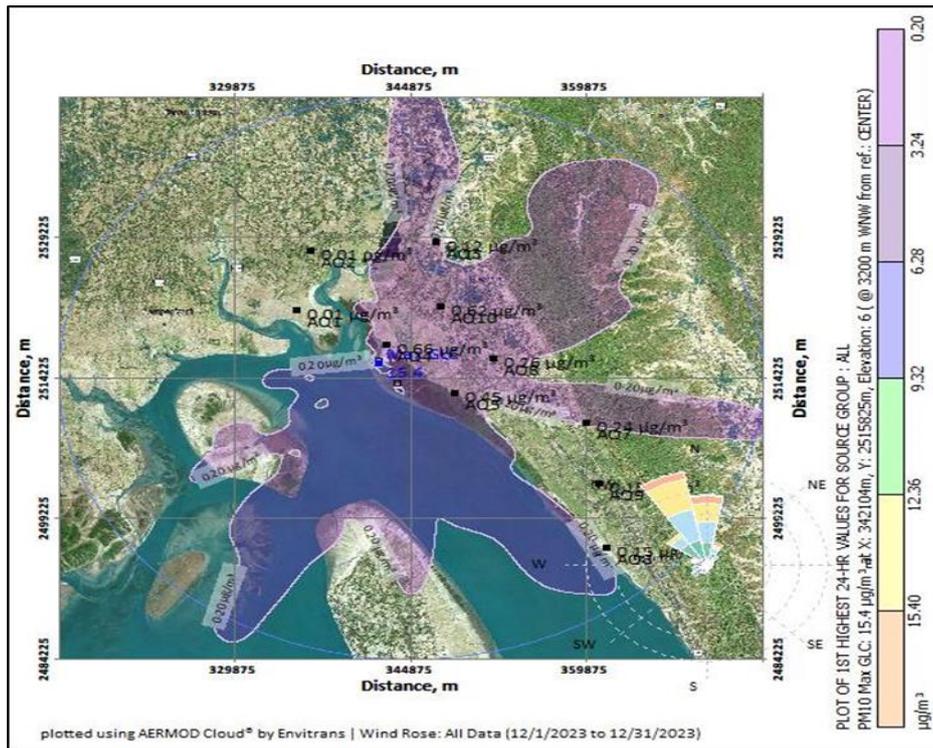


Figure. 2: Isopleths of 24-hourly average maximum pm10 ground level concentrations

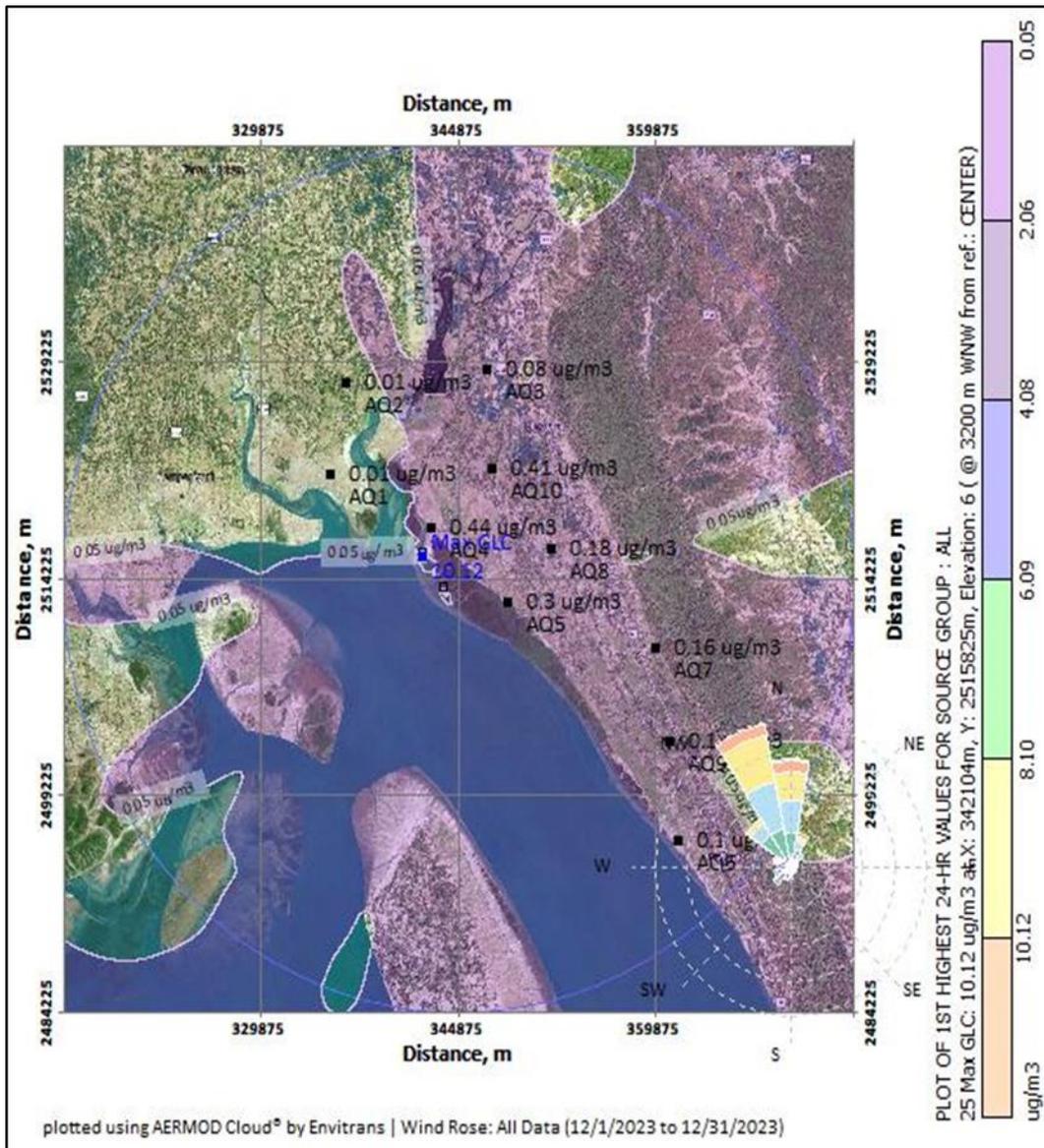


Figure. 3: Spatial distribution one-month maximum incremental glc of the pm<sub>2.5</sub>

**B. The spatial distribution of SO<sub>2</sub>**

The airshed is insignificantly pollute with SO<sub>2</sub> in terms of DOE standard but noticeable in terms of WHO compliance standard for 24hr. Therefore, this project will elevate SO<sub>2</sub> concentration moderately for short term period especially international perspective but insignificant for long term basis. However, the incremental effects of SO<sub>2</sub> would not be any problem in the study area as it will be well below from the standard values of ECR, 2005 and WHO 2021. Figure 4 shows the resultant maximum ground level concentration of SO<sub>2</sub> at the ambient air quality monitoring locations.





- All the trucks/dumpers shall be covered while entering and going out from the site.
- All the buildings shall be covered with suitable envelope to prevent dust emission due to cutting of bricks and tiles during plumbing and other works.
- NOx emission control technology should be adopted like low NOx burner or SCR/SNCR to reduce the NOx emission rate to the ambient environment
- The vehicles used in transportation will comply norms as per the motor vehicle act.
- They should take policy level intervention to reduce the particulate matter over the air shed with the assistance of other authorities and stakeholders.
- Water spraying will be practiced frequently and regular maintenance of valves, pipes etc.
- Providing protective gear, such as shoes, face masks, and gloves to the employees during the working hours
- Restrict access to disposal sites such that only safety trained personnel with protective gear are permitted to high-risk areas;
- Regular periodic monitoring of work area to check the emission level.
- Three tire green belt development surrounding the periphery of the project site

Today, more comprehensive abatement techniques have become common as many countries must now apply with to maintain the ambient air pollution in the study areas.

## **ANNEX 13: TREE PLANTATION FOR GREENERY PLAN**

### **1. Tree Plantation Plan for Gas Pipeline Network**

Government of Bangladesh encourages tree plantation to improve the environment. For making the development of the project sustainable a tradeoff approach has been adopted by planting saplings. Tree plantation is not only the most economical and effective, and useful mitigation measure to control the pollution but also provide shadow to the user especially during summer. Since it is unavoidable to safeguard these trees, it is suggested that local, fast-growing trees will be planted. Roadside trees intercept the dust on their leaves and keep the ambient air dust free. In general, plantation of trees has advantages with respect to environment and economy. Therefore, environmental enhancement will be done through plantation on the side slopes of the road, embankments of canal and elsewhere where free spaces are available.

The species for the proposed tree plantation has been selected in consultations with the concerned officials of the Forest Department (FD) of Chittagong. Priority to be given on existing species including rare species. Native plant species to be planted for functional reasons, not only aesthetic, because they are durable, long-lived perennials, ecologically suitable, best adapted to Bangladesh climate and growing conditions and able to survive the stresses of road right-of-ways. It is necessary to select species, which have air-filtering properties. The species will also be evergreen, having dense branching, thick leaves and rough surface, which have capacity to absorb air contaminating dust particles. In addition, dense mangrove tree plantation at both sides of the road embankment, super dyke embankment has special positive impact like protection of the coastal area from natural calamities like cyclonic storm and tidal surges.

### **2. Positive Impact of plantation**

- To create new habitat for both flora and fauna
- To augment in maintaining biodiversity with restore birds, and other animal habitat on trees
- To reduce the impact of ever-increasing noise pollution caused due to increase in number of vehicles
- To reduce the impacts of air pollution and dust as trees and shrubs are known to be natural sink for air pollutants;
- To provide much needed shade on glaring hot roads during summer
- To arrest soil erosion at the embankment slopes;
- To prevent of glare from the headlight of incoming vehicles;
- To moderating the effect of wind and incoming radiation;
- To mitigate climate change scenarios of the region.
- To generate of employment opportunity to local people;
- Providing eco-friendly walking paths as well as creating aesthetic and scenic beauty within NSEZ.
- Creating a balance between environment, human life and livelihood

### **Principles of Plantation**

- Large seedlings should be planted, i.e., man height or above 1 m height seedlings should be planted.
- Seedlings will be planted at road embankment slopes and in vacant land within RoW in plan way.
- Ornamental and flower plants will be planted in front areas for enhancing beauty at the median of road.
- Timber and fruit trees should be planted on embankment of Road and Rest areas
- Variety of species may be planted for light and fresh air circulation.

### **Methods of Plantation**

- May – June is the best season for plantation. The tree seedlings are planted in row with a spacing of 2.5 m x 2.5 m. Only one row, saplings to be planted and per km will be 400 saplings.
- No trees will be planted in the inner curve of the road.
- It should not be planted large and deep – rooted plants at the edge of road.
- Only one row of saplings tree to be planted in the toe of embankment at one side of road and species should be water and salt tolerant. In case of slope of embankment in both sides to be planted, the other side can be planted by herbaceous species with short bunch roots like Vetivar /Nepiar/ Barmuda grasses for soil erosion protection (Fig. Showing typical tree plantation).

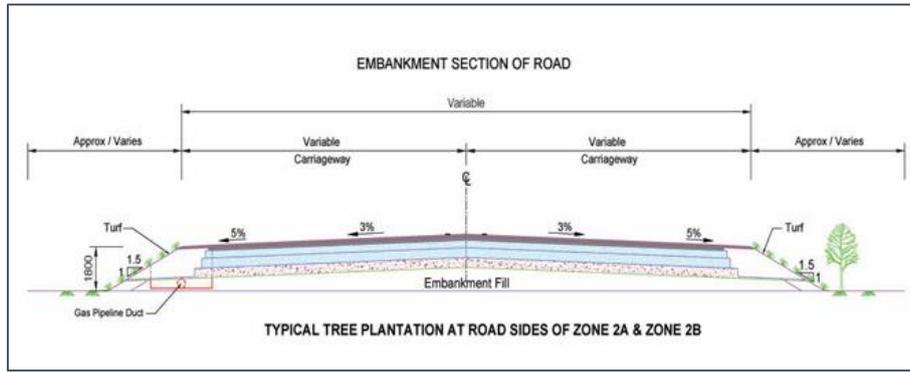


Figure 1: Tree plantation plan at road sides of zone 2a and zone 2b

### 3. Street Plantation

Street trees can be planted in hard or soft landscape conditions within all roads Gas pipeline network. Street trees help to improve the overall living/working environment and can assist in improving air quality and reducing the urban heat. Preferences should be given for large canopy native species for street tree planting, which are low maintenance. Some fruit trees grow fruit, create sticky substances or drop leaves which creates hazardous situations.

### 4. Selection of Species

The project involves movement of vehicle for transportation of material, causing emissions of particulate matter, and SO<sub>2</sub>, NO<sub>x</sub> & CO will be generated at site. Also, there is potential of generation of dust while unloading the materials at stockpiles. Hence the plant species chosen for along the roadside should be tolerant to these pollutants and be moderately able to mitigate these from air.

Native plant species to be planted for functional reasons, not only aesthetic, because they are durable, long-lived perennials, ecologically suitable, best adapted to Bangladesh climate and growing conditions and able to survive the stresses of road right-of-ways. It is necessary to select species, which have air-filtering properties. The species will also be evergreen, having dense branching, thick leaves and rough surface, which have capacity to absorb air contaminating dust particles. The composition of tree species under the social forestry will be selected after the consultation with the local communities.

- Timber tree species will cover 30% of the total area
- Fruit tree species will cover 30% of the total area;
- Medicinal tree species will cover 15% of the total area
- Fuel tree species will cover the rest 20% of the total area.
- Ornamental and Beatification flower trees 5% on road median and available spaces.

### 5. Species selecting criteria is given below

- Native species including herbs, shrubs, and trees of different
- Tolerant to expected pollutants at project site
- Longer duration of foliage
- Freely exposed foliage (adequate height of crown, openness of foliage, small stomata apertures, stomata well exposed)
- Broad leaf plants should be taken in consideration as these kind of plant helps to reduce different air pollutants by absorbing through stomata.
- Leaves supported on firm petioles
- The proposed following trees for plantation plan include different categories of trees with distance to each other are given in **Table 1**

Table 1: Based on Types plants with distance following tree species are recommended for plantation:

| S/N | Local Name | English name          | Species Name          | Family   | Type | Uses   | Distance (m) between each saplings |
|-----|------------|-----------------------|-----------------------|----------|------|--------|------------------------------------|
| 1.  | Mangiam    | Austrilian Teak Plant | <i>Acacia mangium</i> | Fabaceae | Tree | Timber | 2.5m                               |

|     |              |                      |                                 |               |       |                          |      |
|-----|--------------|----------------------|---------------------------------|---------------|-------|--------------------------|------|
| 2.  | Akashmoni    | Akashmoni            | <i>Acacia moniliformes</i>      | Fabaceae      | Tree  | Timber                   | 2.5m |
| 3.  | Siris        | Raintree             | <i>Albizia lebbek</i>           | Fabaceae      | Tree  | Timber                   | 2.5m |
| 4.  | Kathal       | Jack fruit           | <i>Artocarpus heterophyllus</i> | Moraceae      | Tree  | Fruit Bearing/<br>Timber | 3.5m |
| 5.  | Neem         | Neem                 | <i>Azadirachta indica</i>       | Meliaceae     | Tree  | Medicinal                | 2.5m |
| 6.  | Shimul       | Red silk cotton tree | <i>Bombax ceiba</i>             | Malvaceae     | Tree  | Flower                   | 2.5m |
| 7.  | Tal          | Palm                 | <i>Borassus flabellifer</i>     | Arecaceae     | Tree  | Fruit Bearing            | 2.5m |
| 8.  | Radachura    | Peacock              | <i>Caesalpinia pulcherrima</i>  | Fabaceae      | Tree  | Ornamental flower        | 2.5m |
| 9.  | Jhao Ghas    | Beach She-oak        | <i>Casuarina equisetifolia</i>  | Casuarinaceae | Tree  | Timber                   | 2.5m |
| 10. | Jambura      | Jambura              | <i>Citrus grandis</i>           | Rutaceae      | Tree  | Fruit Bearing            | 3.5m |
| 11. | Narikel      | Narikel              | <i>Cocos nucifera</i>           | Palmae        | Tree  | Fruit Bearing            | 3.5m |
| 12. | Krichnachura | Royal poinciana      | <i>Delonix regia</i>            | Fabaceae      | Tree  | Ornamental               | 2.5m |
| 13. | Aam          | Mango                | <i>Mangifera indica</i>         | Anacardiaceae | Tree  | Fruit Bearing            | 3.5m |
| 14. | Safeda       | Safeda               | <i>Manilkara zapota</i>         | Zapotaceae    | Tree  | Fruit Bearing            | 3.5m |
| 15. | Kadam        | Burflower            | <i>Neolamarckia cadamba</i>     | Rubiaceae     | Tree  | Ornamental flower/Fuel   | 2.5m |
| 16. | Olives       | Olives               | <i>Olea europaea</i>            | Oleaceae      | Tree  | Fruit Bearing            | 3.5m |
| 17. | Debdaru      | Pseudo Ashoka        | <i>Polyalthia longifolia</i>    | Annonaceae    | Tree  | Timber                   | 2.5m |
| 18. | Ashoka       | Ashoka tree          | <i>Saraca asoca</i>             | Fabaceae      | Tree  | Ornamental flower        | 2.5m |
| 19. | Amra         | Hog Plum             | <i>Spondius pinnata</i>         | Anacardiaceae | Tree  | Fruit Bearing            | 3.5m |
| 20. | Mahagony     | Mahagony             | <i>Swietenia mahagony</i>       | Meliaceae     | Tree  | Timber                   | 3.5m |
| 21. | Jaam         | Black Berry          | <i>Syzygium cumini</i>          | Myrtaceae     | Tree  | Fruit Bearing            | 3.5m |
| 22. | Jamrul       | Jamrul               | <i>Syzygium samarengense</i>    | Myrtaceae     | Shrub | Fruit bearing            | 3.5m |
| 23. | Tentul       | Tentul               | <i>Tamarindus indica</i>        | Leguminosae   | Tree  | Fruit Bearing            | 2.5m |
| 24. | Segun        | Teak                 | <i>Tectonia grandis</i>         | Lamiaceae     | Tree  | Timber                   | 2.5m |
| 25. | Arjun        | Arjun tree           | <i>Terminalia arjuna</i>        | Combretaceae  | Tree  | Medicinal                | 2.5m |
| 26. | Bohera       | Bohera               | <i>Terminalia bellirica</i>     | Combretaceae  | Tree  | Medicinal                | 2.5m |
| 27. | Kathbadam    | Kathbadam            | <i>Terminalia catapa</i>        | Combrataceae  | Tree  | Timber/Shed              | 2.5m |
| 28. | Horitoki     | Horitoki             | <i>Terminalia chebula</i>       | Combretaceae  | Tree  | Medicinal                | 2.5m |

## 5. Budget

Greenery plan for Gas pipeline network in the NSEZ. Greenery plan budget include no. of saplings, per saplings estimated cost, mulching, watering, cages, stick etc. are given below **Table 2**

**Table 2: Tentative budget for tree planation**

| Sl/No.       | Length (Km/m)                                  | Distance between two saplings | No. of saplings to be planted | Each sapling Cost, planting, mulching, watering, cage and maintenance, replantation etc. | Total cost BDT |
|--------------|------------------------------------------------|-------------------------------|-------------------------------|------------------------------------------------------------------------------------------|----------------|
| 1            | 30km or 30,000m                                | 2.5m                          | 12,000                        | BDT. 700                                                                                 | 84,00,000      |
| 2            | Plantation of Vetivar /Nepiar/ Barmuda grasses |                               |                               | LS                                                                                       | 12,00,000      |
| <b>Total</b> |                                                |                               |                               |                                                                                          | 100,00,000     |

## 6. Protection of Tree saplings

Circular tree guard should be placed after the plantation of the saplings for the protection of these young plants from the ravages. If tree saplings die or damages occur after placing the circular tree guard, timely replacements of damaged plants and after-care is important. Saplings require support throughout the first few months to avoid drooping or bending. Support sticks should be inserted into the soil near the plant's roots without hurting the plant's roots. For plants shorter than 1 meter, 1-metre-long bamboo sticks and for taller plants, slightly thicker 2-2.5-metre-long bamboo sticks should be used. The sticks should be tied to the plant stems using thin jute strings. Support sticks will be needed for at least every alternate plant.

## 7. Maintenance

The plantation should be monitored once in 1-2 months, to check if the targets have been achieved and if any changes should be made to improve results. This should be done the first 8-12 months. Count the number of saplings that have survived, and record the data. Growth of selected species should also be monitored. Mulching should be maintained for at least one year. The soil should be re-mulched with time, since dry soil is detrimental to plant health. As the tree grows taller, longer support sticks may be needed so that the tree shoot does not bend and become weak. Water the forest with hose pipe once a day. Keep the forest weed-free for the first 2-3 years. Once the forest starts growing, weed growth will stop. Mortality rate of plants is usually 2-5 percent. Mortality is to be checked after 3-4 months of planting; minimum 70% survival rate shall be achieved. Keep the forest clean, and free of plastic, paper etc. Re-plantation after one year and pruning and thinning after 4 years later.

## ANNEX 14: GRIEVANCE REDRESS MECHANISM

Considering the overall need for the total project period, BEZA will establish a GRM to address complaints and grievances throughout the lifecycle of the project. To receive complaints, grievances, and remedies over the concerned issues, a grievance redress mechanism (GRM) shall be established likely adhering to the World Bank's Environmental and Social Standards, particularly, ESS-10 focuses on information disclosure and stakeholder engagement, which aligns with the need for a GRM. The establishment of a Grievance Redress Mechanism (GRM) is crucial in ensuring accountability and addressing concerns raised by stakeholders. The PMU is likely responsible for project implementation, and collaboration between project management and grievance redress activities.

The GRM is intended to address issues and complaints in an efficient, timely, and cost-effective manner. The mechanism will, however, not bar an aggrieved person from going to the courts of law. A separate mechanism will be available for labor related issues under contractors and sub-contractors. Project-affected-people in the PRIDE project and any other stakeholder may submit comments or complaints at any time by using the project's Grievance Redress Mechanism (GRM).

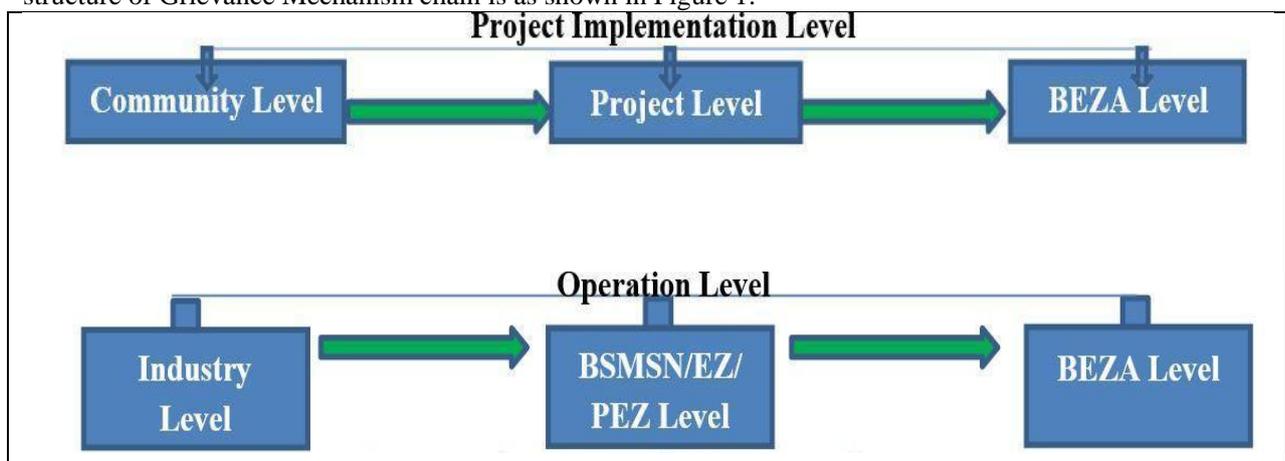
Grievances in the project may range from disputes over ownership and inheritance of the acquired lands to affected persons and assets missed by the censuses; less valuation of the affected assets; delay in compensation payment; adverse effect on the squatters and their livelihood, effect on the society and the local community due to construction related activities leading to noise, light and dust pollution, conduct of the migrant workers, local workers and the contractor, GBV and spread of STD, and during the operational stage grievances of the workforce against factory management, water pollution, mismanagement in treatment of effluent discharged by the factory and the like.

### A) THE OBJECTIVES OF THE GRM

- Provide a transparent process for timely identification and resolution of issues affecting the project and people, including issues related to the environmental impact, resettlement and compensation program.
- Strengthen accountability to the beneficiaries, including project affected people.

### B) GRIEVANCE MECHANISM STRUCTURE/ARCHITECTURE

The purpose of the GRM is to record and address any issue that may arise during the life cycle of the project period effectively and efficiently. The GRM is designed to address concerns and complaints promptly and transparently with no impacts (cost, discrimination) for any reports made by project affected people (PAPs) and the complainants. The GRM works within existing social and resettlement management frameworks, providing an additional opportunity to resolve grievances at the local, project and NSEZ/EZ level. Necessary sign posting/billboard would be placed at the central places/places where people gather for sharing detailed information of the GRCs at every level. A bottom up GRC system will be established in this Project and the structure of Grievance Mechanism chain is as shown in Figure 1.



**Figure 1: The structure of grievance mechanism**  
Source: Stakeholder engagement plan –BEZA-SEP

**i) Community level**

The objective of the community level GRM is to resolve issues at the first instance. However, issues that are not resolved at community level will be referred to the industry/project level GRC. The community level GRC shall carry out the following as regard to redressing grievances:

- a) Hear the grievances and provide an early and mutually satisfactory solution to those.
- b) Immediately bring to the notice of the Project unit or Social Standards Officer/Industry Leadership any serious matter that may have arisen/complaint received.
- c) Inform the aggrieved parties about the progress of actions of their grievances and decisions. The community level Grievance Redress Committee (GRC) shall have the following members:
  - Assistant Manager-NSEZ (Convener), BEZA
  - An Elected Member of the Union Parishad or Upazila Parishad
  - A Female Member of the Union or Upazila Parishad
  - A Representative of the PAPs in the EZ/subproject
  - An Elected-UP chairman
  - A member of the NGO working in the locality on Social Development/Gender/GBV issues
  - Social development officer (Member Secretary)

The Community level GRC shall resolve or reach a decision fifteen (15) days from the date the complaint is received. The chairperson of the GRC shall communicate the committee's decision to the aggrieved PAPs in writing and maintain a record of all decisions related to each case. In addition, local communities have existing traditional and cultural grievance redress mechanisms. It is expected that some disputes at the community level may be resolved using these mechanisms, without the involvement of the contractor(s), and or Government representatives at the local, NSEZ/EZ/ and BEZA level.

**ii) Project/Industry (During Operation) Level Grievance Redress Mechanism**

The objective of the project/Industry level GRM is to bring the GRM closer to PAPs/workers of an industry, when operational. Issues that are not resolved at community level or industry level issues would be handled at this level. All effort shall be made to resolve issues at the first instance. The Project Director/ Social Specialist at the project level / appropriate representative of the industry along with HR Manager at the operational level shall carry out the following as regard to redressing grievances:

- Hear the grievances of the PAPs/staff and workers and provide an early and mutually satisfactory solution to those.
- Immediately bring to the notice of the Project unit or Social Standards Officer/Industry Leadership any serious matter that may have arisen/complaint received.
- Inform the aggrieved parties about the progress of actions of their grievances and decisions of the Project unit/Industry level.
- The project level GRM shall have the following Grievance Redress Committee (GRC) members: -
- Project Director (Convener) / Director Administration of the Industry (during Operation Level)
- Assistant Manager-NSEZ
- An Elected Member of the Union Parishad or Upazila Parishad (Project Level Only)
- A Female Member of the Union or Upazila Parishad (Project Level Only).
- A Representative of the PAPs in the EZ/subproject/staff or workers representative of the industry (operational level)
- An Area Representative of an NGO working in the area on Social Development /Gender/GBV and labor issues.
- Social/ Resettlement Specialist/ HR Manager (Member Secretary)

The project level GRC shall resolve or reach a decision fifteen (15) days from the date the complaint is received. The Convener of the GRC shall communicate the committee's decision to the aggrieved PAPs in writing and maintain a record of all decisions related to each case.

**iii) NSEZ/EZ Level Grievance Redress Mechanism (Operational Stage)**

The objective of NSEZ/EZ level GRM is to oversee the GRM of the Industries at the operational stage and assist the Industries/Entrepreneurs in addressing the grievances immediately upon receipt of a complaint. When a grievance could not be effectively addressed and mitigated at the Industry/Entrepreneur level, it would be forwarded to the NSEZ/EZ level for necessary action. All effort shall be made to resolve issues at the earliest. The NSEZ/EZ level GRM shall have the following Grievance Redress Committee (GRC) members:

- General Manager of NSEZ/his Deputy as Convener
- Director Administration of the Industry
- Representative of the staff or workers of the industry including a female staff/worker
- An Area Representative of an NGO working in the area particularly in the fields of Labor, Gender and GBV
- Manager Administration of NSEZ/EZ (Member Secretary)

The NSEZ/EZ level GRC shall reach a decision fifteen (15) days from the date the complaint is received. The chairperson of the GRC shall communicate the committee's decision to the aggrieved ones in writing and maintain a record of all decisions related to each case.

#### **iv) BEZA Level Grievance Redress Mechanism**

A committee of knowledgeable persons, experience in the subject area, shall be constituted at the BEZA to handle complaints that have not been addressed or resolved at the Project implementation and operational level in the impact area or the project influence. The BEZA level GRM shall be comprised of the following members:

- General Manager (Convener)
- Legal Specialist, Member
- Social Specialist, Member
- Environmental Specialist-Member
- UP Chairman (on behalf of PAPs in Project Implementation stage)/Director Administration of the during the Operational Lev-I - Member
- Chief Law Officer of BEZA – Member
- NSEZ/EZ Manager Administration (operational level)
- Director Administration of the Industry (operational level)
- GBV Specialist of the Local NGO assigned by BEZA to manage and respond to GBV cases.
- Manager Administration-BE-A - Member Secretary

The BEZA level Grievance redress committee shall do everything possible to hear and determine the issues within 15 (fifteen) days from the date the case has been transferred to it from the NSEZ/EZ GRC. To ensure impartiality and transparency, hearings on complaints will remain open to the public. The GRCs will record the details of the complaints, the reasons that led to acceptance or rejection of the particular cases, and the decision agreed with the complainants. BEZA will keep records of all resolved and unresolved complaints and grievances and make them available for review as and when asked for by the World Bank and other interested persons/entities.

The chairperson of the GRC shall communicate the outcome to the aggrieved PAP(s)/staff in writing. The GRC shall maintain a record of all outcomes related to each case. Should measures taken by the BEZA fails to satisfy the complainant, the aggrieved party is free to take his/her grievance to the court, and the court's decision will be final.

Grievance Mechanism Intake Channels: Information about the GRM will be publicized as part of the initial disclosure consultations in the participating Upazila, union and villages. Brochures will be distributed during consultations and public meetings, and posters will be displayed in public places such as in government offices, project offices, village notice boards, community centers, etc. Information about the GRM will also be posted online on the BEZA website (<http://www.beza.gov.bd>). The overall process for the GRM will include six steps and described below:

**Step 1:** Uptake. Project stakeholders will be able to provide feedback and report complaints through several channels: in person at offices (village/mahalla, Union, project, and Upazila offices) and at project sites, and by mail, telephone, and email.

**Step 2:** Sorting and processing. Complaints and feedback will be compiled by the Assistant Manager/Social Development Officer and recorded in a register. Submissions related to the resettlement and compensation program will be referred to the planning department for processing and resolution.

**Step 3:** Acknowledgement and follow-up. Within seven (7) days of the date a complaint is submitted, the responsible person will communicate with the complainant and provide information on the likely course of action and the anticipated timeframe for resolution of the complaint.

**Step 4:** Verification, investigation and action. This step involves gathering information about the grievance to determine the facts surrounding the issue and verifying the complaint's validity, and then developing a proposed resolution, which could include changes of decisions concerning eligibility for compensation, additional compensation or assistance, changes in the program itself, other actions, or no actions. Depending on the nature of the complaint, the process can include site visits, document reviews, a meeting with the complainant (if known and willing to engage), and meetings with others (both those associated with the project and outside)

who may have knowledge or can otherwise help resolve the issue. It is expected that many or most grievances would be resolved at this stage. All activities taken during this and the other steps will be fully documented, and any resolution logged in the register.

**Step 5:** Monitoring and evaluation. Monitoring refers to the process of tracking grievances and assessing the progress that has been toward resolution. The Planning Department will be responsible for consolidating, monitoring, and reporting on complaints, enquiries and other feedback that have been received, resolved, or pending. This will be accomplished by maintaining the grievance register and records of all steps taken to resolve grievances or otherwise respond to feedback and questions. Typical grievance resolution process is shown on

**Step 6:** Providing Feedback. This step involves informing those to submit complaints, feedback, and questions about how issues were resolved, or providing answers to questions. Whenever possible, complainants should be informed of the proposed resolution in person. If the complainant is not satisfied with the resolution, he or she will be informed of further options, which would include pursuing remedies through the World Bank, as described below, or through avenues afforded by the Bangladesh legal system. On a monthly basis, the Planning Department will report to the Executive Chairman on grievances resolved since the previous report and on grievances that remain unresolved, with an explanation as to steps to be taken to resolve grievances that have not been resolved within 30 days.

Grievance Registry, Referral, Resolution and Appeals Process: As per existing practice BEZA would adopt the following procedures:

The GRC at the Community level will establish a simple computerized system to record the complaints; information on the complainants and perpetrators with names of the enterprises they are employed in; acceptance/rejection of the complaints by CGRC and the reasons thereof. If the decision made at this level is not acceptable to the aggrieved person, GRC will refer to the project level during implementation level/to NSEZ/EZ level during operational level. If they too fail to solve the problem, it would be referred to the BEZA Headquarters with details of the complaint and minutes of the hearings at the NSEZ/EZ level. BEZA will review the case and send its decision within fifteen days from the receipt of the complaint or earlier. However, if an aggrieved person is dissatisfied with the GRM, he/she may lodge a complaint following the law of the land. An example of a grievance registration form and Grievance Mechanism for PRIDE project is given in Appendix-13 under the Stakeholder Engagement Plan, BEZA.

Any GBV related complaints will be handled in a survivor-centric manner in line with the World Bank guidelines provided in the WB good practice note on gender-based violence<sup>4</sup>. GBV-related complaints will be dealt with strict confidentiality, based on the wishes of the GBV-survivor. Any GBV-survivor will be referred to an NGO assigned for the project by the Borrower to manage and respond to GBV cases. This NGO will support GBV survivors in accessing service providers and guiding them through options of lodging a complaint. Process of grievance resolution is presented in Figure 2

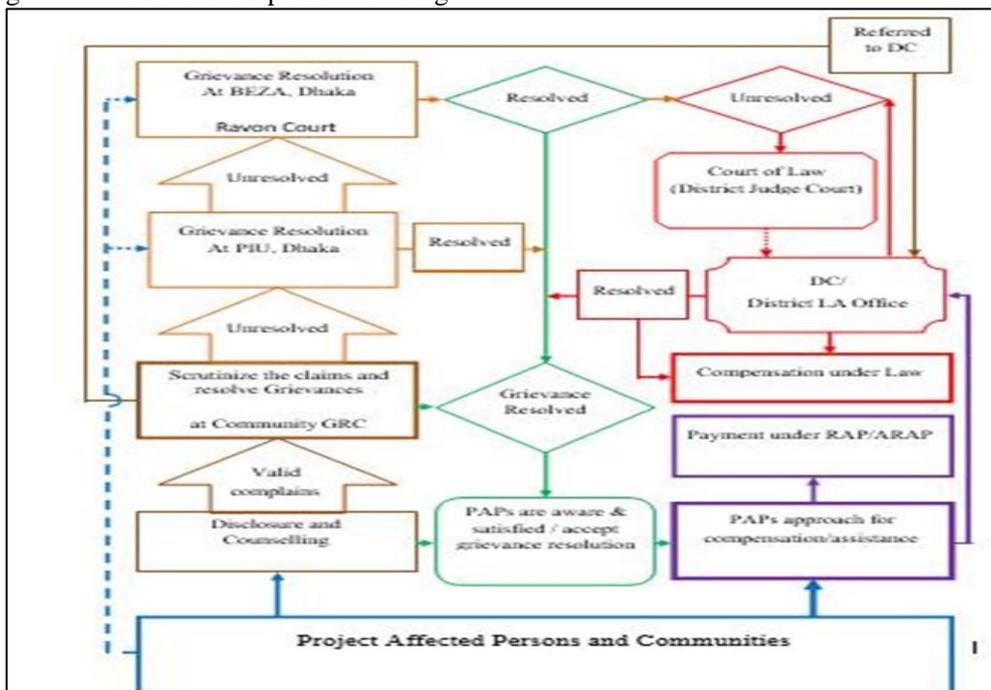


Figure 2: Grievance resolution process

GRM Monitoring and Reporting: Day-to-day implementation of the GRM and reporting to the World Bank will be the responsibility of the Project Director of PRIDE project. To ensure management oversight of grievance handling, the Internal team will be responsible for monitoring the overall process, including verification that agreed resolutions are actually implemented Any GBV related complaints will be handled in a survivor-centric manner in line with the World Bank guidelines provided in the WB good practice note on gender-based violence<sup>5</sup>. GBV-related complaints will be dealt with strict confidentiality, based on the wishes of the GBV-survivor. Any GBV-survivor will be referred to an NGO assigned for the project by NSEZ/BEZA to manage and respond to GBV cases. This NGO will support GBV survivors in accessing service providers and guiding them through options of lodging a complaint.

GRM contact information BEZA: Information on the project and future stakeholder engagement programs will be available on the project's website and will be posted on information boards in the project office, villages, Union Parishad office, Upazila Office crossed by the line. Information can also be obtained from BEZA offices in Mirsharai and Dhaka. The point of contact regarding the stakeholder engagement program at BEZA is given below:

**Table 1: Stakeholder Engagement Program at BEZA**

| Description   | Contact details                     |
|---------------|-------------------------------------|
| Organization: | Bangladesh Economic Zones Authority |

| Description                                                                                                                                          | Contact details                                                                                                                                                     |                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Company:                                                                                                                                             | Bangladesh Economic Zones Authority                                                                                                                                 |                                                                                                                                              |
| To:                                                                                                                                                  | Project Director                                                                                                                                                    |                                                                                                                                              |
| Address:                                                                                                                                             | 111 CR Datta Road (level 12), Dhaka                                                                                                                                 |                                                                                                                                              |
| E-mail: <a href="mailto:mahmud.faruk@gmail.com">mahmud.faruk@gmail.com</a> ,<br><a href="mailto:social.stcb@beza.gov.bd">social.stcb@beza.gov.bd</a> | mahmud.faruk@gm"<br>l: <a href="mailto:mahmud.faruk@gmail.com">mahmud.faruk@gmail.com</a> ,<br><a href="mailto:social.stcb@beza.gov.bd">social.stcb@beza.gov.bd</a> | <a href="mailto:mahmud.faruk@gmail.com">mahmud.faruk@gmail.com</a> ,<br><a href="mailto:social.stcb@beza.gov.bd">social.stcb@beza.gov.bd</a> |
| Website: <a href="http://www.beza.gov.bd">www.beza.gov.bd</a> Telephone:                                                                             | www.b"<br>e: <a href="http://www.beza.gov.bd">www.beza.gov.bd</a> Telephone: 02-<br>9632459                                                                         | <a href="http://www.beza.gov.bd">www.beza.gov.bd</a><br>bd                                                                                   |
| Telephone:                                                                                                                                           | 02-9632459                                                                                                                                                          |                                                                                                                                              |

**Table 2: Sample Grievance Registration Form**

|                                                                                                                                                                              |                                           |                                       |                                      |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|---------------------------------------|--------------------------------------|--|
| Grievance Form: Bangladesh Economic Zones Authority                                                                                                                          |                                           |                                       |                                      |  |
| Grievance reference number (to be completed by Project):                                                                                                                     |                                           |                                       |                                      |  |
| Contact details (May be submitted anonymously)                                                                                                                               | Name (s):                                 |                                       |                                      |  |
|                                                                                                                                                                              | Address:                                  |                                       |                                      |  |
|                                                                                                                                                                              | Telephone:                                |                                       |                                      |  |
|                                                                                                                                                                              | Email:                                    |                                       |                                      |  |
| How would you prefer to be contacted (check one)                                                                                                                             | By mail/post:<br><input type="checkbox"/> | By phone:<br><input type="checkbox"/> | By email<br><input type="checkbox"/> |  |
| Preferred language                                                                                                                                                           | <input type="checkbox"/> Bangla           | <input type="checkbox"/> English      |                                      |  |
| Provide details of your grievance. Please describe the problem, who it happened to, when and where it happened, how many times, etc. Describe in as much detail as possible. |                                           |                                       |                                      |  |
| What is your suggested resolution for the grievance, if you have one? Is there something you would like BEZA or another party/person to do to solve the problem?             |                                           |                                       |                                      |  |
|                                                                                                                                                                              | Website                                   | Email                                 | By hand                              |  |

|                                                           |                                       |                                          |                                             |  |
|-----------------------------------------------------------|---------------------------------------|------------------------------------------|---------------------------------------------|--|
| How have you submitted this form to the project?          | <input type="checkbox"/>              | <input type="checkbox"/>                 | <input type="checkbox"/>                    |  |
|                                                           | In person<br><input type="checkbox"/> | By telephone<br><input type="checkbox"/> | Other (specify)<br><input type="checkbox"/> |  |
| Who filled out this form (If not the person named above)? | Name and contact details:             |                                          |                                             |  |
| Signature                                                 |                                       |                                          |                                             |  |
| Name of BEZA official assigned responsibility             |                                       |                                          |                                             |  |
| Resolved or referred to GRC1?                             | <input type="checkbox"/> Resolved     | <input type="checkbox"/> Referred        | If referred, date:                          |  |
| Resolved or referred to GRC2?                             | <input type="checkbox"/> Resolved     | <input type="checkbox"/> Referred        | If referred, date:                          |  |
| Completion                                                |                                       |                                          |                                             |  |
| Final resolution (briefly describe)                       |                                       |                                          |                                             |  |
|                                                           | Short description                     | Accepted? (Y/N)                          | Acknowledgement signature                   |  |
| 1st proposed solution                                     |                                       |                                          |                                             |  |
| 2nd proposed solution                                     |                                       |                                          |                                             |  |
| 3rd proposed solution                                     |                                       |                                          |                                             |  |

## **ANNEX 15: ENVIRONMENTAL AND SOCIAL CODE OF PRACTICES (ESCOPS)**

### **Code of Conduct for Contractor's Personnel**

#### **1. Introduction**

The Code of Conduct forms part of efforts aimed at managing environmental, health, safety, and social risks associated with Installation Services.

Environmental and Social Code of Practices (ESCoPs) Of the Gas Pipeline Network in Zone 2A- B and its adjacent areas of the NSEZ in Mirsharai are follows

All individuals engaged in executing the Contract, whether they are staff, laborers, subcontractors, or any other personnel aiding in Contract execution, collectively referred to as Contractor's Personnel, are subject to this Code of Conduct.

This document outlines the expected conduct for Contractor's Personnel involved in executing Installation Services at the Site (or other locations within the country where the Site is situated).

The workplace is intended to be a safe environment where any form of unsafe, offensive, abusive, or violent behavior is not acceptable. Additionally, it should encourage all individuals to voice concerns or raise issues without the fear of facing retaliation.

#### **Required Conduct**

- Contractor's Personnel engaged in executing Installation Services at the Site (or other locations within the country where the Site is situated) must:
- Perform their duties with competence and diligence.
- Adhere to this Code of Conduct and all relevant laws, regulations, and other standards, including those aimed at ensuring the health, safety, and welfare of fellow Contractor's Personnel and others. Maintain a safe working environment including by:
- Ensure that workplaces, machinery, equipment, and processes under their control are safe and free from health risks.
- Wear necessary personal protective equipment.
- Utilize appropriate measures concerning chemical, physical, and biological substances and agents.
- Adhere to applicable emergency operating procedures.
- Report any work situations they believe are unsafe or unhealthy and remove themselves from any work situation they reasonably believe poses an imminent and serious danger to their life or health.
- Treat all individuals with respect and refrain from discriminating against specific groups such as women, people with disabilities, migrant workers, or children.
- Refrain from engaging in any form of sexual harassment, including unwelcome sexual advances, requests for sexual favors, or any other verbal or physical conduct of a sexual nature with other Contractor's or Employer's Personnel.
- Refrain from engaging in Sexual Exploitation, which involves any actual or attempted abuse of a position of vulnerability, differential power, or trust for sexual purposes, such as profiting monetarily, socially, or politically from the sexual exploitation of another.
- Refrain from engaging in Sexual Abuse, defined as the actual or threatened physical intrusion of a sexual nature, whether by force or under unequal or coercive conditions.
- Refrain from engaging in any sexual activity with individuals under the age of 18, except in cases of pre-existing marriage.
- Complete relevant training courses provided on the environmental and social aspects of the Contract, including health and safety matters, Sexual Exploitation and Abuse, and Sexual Harassment (SH).
- Report violations of this Code of Conduct.
- Not retaliate against any person who reports violations of this Code of Conduct, whether to the Contractor or the Employer, or who uses the project's Grievance Redress Mechanism for Contractor's Personnel.
- These requirements are essential to ensuring a safe, respectful, and compliant work environment for all involved in the execution of Installation Services

#### **2. Raising concerns**

If any individual observes behavior, they believe may breach this Code of Conduct or otherwise concerns them, they should promptly raise the issue. This can be accomplished through either of the following methods:

Contact [enter name of the Contractor's Social Expert with relevant experience in handling sexual exploitation, sexual abuse and sexual harassment cases, or if such person is not required under the Contract, another individual designated by the Contractor to handle these matters] in writing at this address [ ] or by telephone at [ ] or in person at [ ]; or

Call [ ] to reach the Contractor's hotline (**if any**) and leave a message.

The confidentiality of the person reporting will be maintained, except where required by country law to disclose allegations. Anonymous complaints or allegations will also be accepted and given due consideration. We treat all reports of potential misconduct seriously and will conduct thorough investigations, taking appropriate action as necessary. We will also offer referrals to supportive service providers for individuals who have experienced alleged incidents, as deemed appropriate.

No retaliation will be tolerated against anyone who raises concerns in good faith about behaviors prohibited by this Code of Conduct. Any form of retaliation would constitute a violation of this Code of Conduct.

### **3. Consequences of Violating the Code of Conduct**

Any breach of this Code of Conduct by Contractor's Personnel may lead to severe consequences, which could include termination of employment and potential referral to legal authorities.

#### **For Contractor's Personnel:**

I have received a copy of this Code of Conduct written in a language that I comprehend. I understand that if I have any questions about this Code of Conduct, I can contact [enter name of Contractor's contact person(s) with relevant experience] requesting an explanation.

Name of Contractor's Personnel:

Signature:

Date (Day/Month/Year):

Countersignature of authorized representative of the Contractor:

Signature:

Date (Day/Month/Year):

## **The Code of Conduct Form**

### **For**

### **Behaviors Constituting Sexual Exploitation and Abuse (Sea) and Behaviors Constituting Sexual Harassment (Sh)**

The following non-exhaustive list is intended to illustrate types of prohibited behaviors.

**(1) Examples of sexual exploitation and abuse** include, but are not limited to:

A Contractor's Personnel offers a member of the community jobs related to the work site (such as cooking and cleaning) in exchange for sex.

A Contractor's Personnel, responsible for connecting electricity input to households, suggests that he can prioritize women-headed households for grid connection in exchange for sex.

A Contractor's Personnel commits rape or another form of sexual assault against a member of the community.

A Contractor's Personnel denies a person access to the Site unless they perform a sexual favor.

A Contractor's Personnel informs a job applicant under the Contract that they will only be hired if they engage in a sexual relationship with them

**(2) Examples of sexual harassment in a work context**

A Contractor's Personnel makes comments about the appearance and sexual desirability of another Installation Services Personnel, whether positive or negative.

When a Contractor's Personnel complains about comments made by another Contractor's Personnel regarding their appearance, the other Contractor's Personnel responds by suggesting that the complainant is "asking for it" due to their attire.

Unwelcome touching of a Contractor's Personnel or Employer's Personnel by another Contractor's Personnel.

A Contractor's Personnel tells another Contractor's Personnel that they will secure a salary raise or promotion for them if they send naked photographs of themselves

---