

Initial Environmental Examination

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**Bangladesh: Narayanganj Green and Resilient Urban
Development Project – Water Supply Project**

**Upgrading of Water Treatment Plant, Deep Tube
Wells, and Distribution Network**

[Package Number NCC/NGRUDP/W-01]

APPENDIXES

CURRENCY EQUIVALENTS

(as of 1 January 2024)

Currency unit	–	Bangladesh Taka (BDT)
BDT1.00	=	\$0.01
\$1.00	=	BDT 108.50

ABBREVIATIONS

ADB	–	Asian Development Bank
AAQ	–	ambient air quality
BDT	–	Bangladesh Taka
BNBC	–	Bangladesh National Building Code
BOD	–	biochemical oxygen demand
BOQ	–	bill of quantities
COD	–	chemical oxygen demand
DMA	–	district metering area
DMZ	–	district metering zone
DO	–	dissolved oxygen
DOE	–	Department of Environment
DTW	–	deep tube well
EA	–	executing agency
EIA	–	environmental impact assessment
ECA	–	Environmental Conservation Act
ECR	–	Environmental Conservation Rules
ECC	–	environmental clearance certificate
EMP	–	environmental management plan
GOB	–	Government of Bangladesh
GRC	–	grievance redress committee
GRM	–	grievance redress mechanism
IEE	–	initial environmental examination
NCC	–	Narayanganj City Corporation
NGO	–	nongovernment organization
NOC	–	no objection certificate
O&M	–	operation and maintenance
PMU	–	project management unit
REA	–	rapid environmental assessment
ROW	–	right of way
SPS	–	safeguard policy statement
TSS	–	total suspended solid

WEIGHTS AND MEASURES

ha	–	hectare
km	–	kilometer
m	–	meter
mg/l	–	milligram per liter
MLD	–	million liters per day
mm	–	millimeter
km/h	–	kilometer per hour

NOTE

In this report, "\$" refers to United States dollars.

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Appendix 1: Rapid Environmental Assessment (REA) Checklist (Water Supply)

Instructions:

- ❑ This checklist is to be prepared to support the environmental classification of a project. It is to be attached to the environmental categorization form that is to be prepared and submitted to the Chief Compliance Officer of the Regional and Sustainable Development Department.
- ❑ This checklist is to be completed with the assistance of an Environment Specialist in a Regional Department.
 - ❑ This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i) involuntary resettlement, (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development.

Answer the questions assuming the “without mitigation” case. The purpose is to identify potential impacts. Use the “remarks” section to discuss any anticipated mitigation measures.

Country/Project Title: Bangladesh/Narayanganj Green and Resilient Urban Development Project

Sector Division: Water and Urban Development Sector Office, Sector Group

Screening Questions	Yes	No	Remarks
Project Siting Is the project area...			
Densely populated?	✓		Narayanganj City is the fourth most populated city in Bangladesh with population density of more than 100,000 per square kilometer.
Heavy with development activities?	✓		Narayanganj City Corporation (NCC) has a combination of commercial and industrial establishments.
Adjacent to or within any environmentally sensitive areas?			
• Cultural heritage site	✓		NCC is one city in Bangladesh that has several cultural heritage sites. In particular, the popular Hajiganj Fort and Sonakanda Fort are in NCC.
• Protected Area		✓	No protected area within or near the subproject sites.
• Wetland		✓	No wetlands within or near the subproject sites.
• Mangrove		✓	No mangroves within or near the subproject sites.
• Estuarine		✓	No estuarines within or near the subproject sites.
• Buffer zone of protected area		✓	No buffer zone of a protected area within or near the subproject sites.
• Special area for protecting biodiversity		✓	No special area for protecting biodiversity within or near the subproject sites.
• Bay		✓	NCC is far from the coastal area.
Potential Environmental Impacts Will the Project cause...			
pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?		✓	The subproject is only limited to construction and rehabilitation of integrated water supply system, and will not have any components that will pollute raw water supply. The rehabilitation of the WTP will be designed such that no discharge of polluted water to Shitalakhya river occurs during the operation phase.

Screening Questions	Yes	No	Remarks
impairment of historical/cultural monuments/areas and loss/damage to these sites?	✓		The alignments of the distribution network may pass through near or adjacent locally important cultural heritage monuments. Damage to these physical cultural resources (PCRs) could happen during construction phase. However, this impact will be avoided with appropriate design measures in the EMP of the subproject.
hazard of land subsidence caused by excessive ground water pumping?	✓		The subproject will involve continuing abstraction of water from underground sources through the rehabilitation of deep tube wells (DTWs). This may cause land subsidence in the area. However, the overall project regards the DTWs as short to medium term source of drinking water and that surface water source will be the ultimate long term plan. The full rehabilitation of the Godenail WTP will bring back the capacity at 45 MLD, and will therefore reduce dependence from DTWs along the way. Also part of the long term plan of NCC is to build a more comprehensive water supply system which will source water from Meghna river. By then, all DTWs are expected to be decommissioned.
social conflicts arising from displacement of communities ?		✓	No physical displacements anticipated. Subproject sites and alignments are in government-owned lands with existing rights of way. Temporary impacts to businesses may occur during pipelaying or rehabilitation works for the distribution network component and are to be addressed through specific measures in the EMP.
conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?	✓		This is a potential impact during operation phase considering that Shitalakhya river, as one source of raw water supply, also has other uses. Sustainability analysis will be undertaken to determine the impact of abstraction to other uses of Shitalakhya river. For example, the sustainability analysis will aim to assess whether the full abstraction of 45 MLD for the WTP will have any significant effect to the discharge flow of the river such that other uses downstream are affected. This will be considered in the final detailed design for the WTP.
unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?	✓		Shitalakhya river is a polluted water body which may have excessive pathogens or mineral constituents. However, the final detailed design of the WTP will consider the quality of this source and ensure that the upgrading works will include a design able to treat the quality of Shitalakhya river to comply with the National Drinking Water Quality Standards (NDWQS). Current conceptual design for the WTP upgrading will include the construction of moving bed biofilm reactor (MBBR). This new design will be finalized during the detailed design phase by the DBO Contractor.
delivery of unsafe water to distribution system?	✓		The subproject will convey treated water through the existing distribution network. However, the subproject includes a component on the rehabilitation of this network to ensure drinking water is delivered safe to end users. An O&M manual will be developed to ensure facilities are kept in working condition, including checking and maintenance of distribution network. Any distributed water must comply with the NDWQS.

Screening Questions	Yes	No	Remarks
inadequate protection of intake works or wells, leading to pollution of water supply?	✓		This is a potential impact during operation phase of the WTP. However, the design will include an intake protection infrastructure to (i) prevent debris from entering the intake pipe, and (ii) ensure no navigational vessels could damage the intake pipe. All details of the rehabilitation works will be finalized by the DBO contractor during the detailed design phase.
over pumping of ground water, leading to salinization and ground subsidence?	✓		<p>The subproject will involve continuing abstraction of water from underground sources through the rehabilitation of deep tube wells (DTWs). This may cause land subsidence in the area. However, the overall project regards the DTWs as short to medium term source of drinking water and that surface water source will be the ultimate long term plan. The full rehabilitation of the Godenail WTP will bring back the capacity at 45 MLD, and will therefore reduce dependence from DTWs along the way. Also part of the long term plan of NCC is to build a more comprehensive water supply system which will source water from Meghna river. By then, all DTWs are expected to be decommissioned. Nevertheless, over the short to medium term, use of the DTWs will not cause land subsidence.</p> <p>Saltwater intrusion leading to salinization may not be possible considering the far distance of the location from the coastal area of Bangladesh. Groundwater monitoring in the Barishal District (southern part of NCC, and closer to the coastal area) reveal that salinity is well below the max limit of chloride concentration.</p>
excessive algal growth in storage reservoir?	✓		The WTP facility will have various storage reservoirs. Algal growth may happen inside these reservoirs. However, an O&M manual will be developed to include effective maintenance works in storage tanks or reservoirs to avoid any algal growth.
increase in production of sewage beyond capabilities of community facilities?	✓		The operation of the WTP will increase the use of water by the residents of NCC. This will, in turn, increase the generation of wastewater that will burden the capacity of the sewerage and sanitation infrastructure of the city. Future projects related to improvement of sanitation and sewerage in NCC will mitigate this impact.
inadequate disposal of sludge from water treatment plants?	✓		A sludge management plan will be prepared, and proper sludge treatment and disposal system will be developed.
inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?	✓		The DTWs and WTP to be rehabilitated are existing ones. Currently, the locations of these components are surrounded by a mix of residential, commercial and industrial establishments. Noise and other nuisance from the sites will be mitigated through proper measures included in the EMP.

Screening Questions	Yes	No	Remarks
impairments associated with transmission lines and access roads?	✓		No impairment associated with transmission lines is expected. However, some portions of the roads (including access to businesses) may be affected during distribution network rehabilitation works. These impacts including road closures will be avoided by implementing a section-wise approach along the alignments during excavation and/or pipe rehabilitation activities. All other specific measures to avoid and/or minimize disruptions and impairments are included in the EMP.
health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.	✓		This is a potential impact at the WTP during operation phase. However, an O&M manual will be developed to ensure facilities are kept in working condition, including checking and maintenance of disinfection facilities and proper storage of chemicals.
health and safety hazards to workers from handling and management of chlorine used for disinfection, other contaminants, and biological and physical hazards during project construction and operation?	✓		This is not applicable during construction phase. This may be possible during operation phase. However, an O&M manual will be developed to include guidelines on proper handling of chlorine and other chemicals during maintenance works at the WTP.
dislocation or involuntary resettlement of people?		✓	No physical displacements anticipated. Subproject sites and alignments are in government-owned lands with existing rights of way. Temporary impacts to businesses may occur during pipelaying or rehabilitation works for the distribution network component and are to be addressed through specific measures in the EMP.
disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		✓	Not anticipated. The subproject is a pro-poor and gender-inclusive undertaking as it aims to provide access to drinking water supply. The subproject provides a positive impact.
noise and dust from construction activities?	✓		Anticipated during construction activities. Temporary increase in noise level and dusts may be caused by excavation equipment, and the transportation of equipment, materials, and people. The impacts are negative but short-term and site-specific within a relatively small area, and reversible through mitigation measures. Good construction practices will mitigate noise and dust, and are specified in the EMP.
increased road traffic due to interference of construction activities?	✓		This is possible during construction activities for the distribution network rehabilitation. The impacts are negative but short-term and site-specific within a relatively small area and reversible through mitigation measures as specified in the EMP.
continuing soil erosion/silt runoff from construction operations?	✓		Due to excavation and run-off from stockpiled materials. The impacts are negative but short-term and site-specific within a relatively small area and reversible through mitigation measures. Good construction practices will mitigate soil erosion and silt runoff and will be specified in the EMP.

Screening Questions	Yes	No	Remarks
delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?	✓		This is a potential impact during operation phase. However, the O&M manual will ensure facilities are kept in working condition, including checking and maintenance of distribution network. Any distributed water must comply with the NDWQS.
delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?	✓		This is a potential impact during operation phase. However, the O&M manual will ensure facilities are kept in working condition, including checking and maintenance of distribution network. Any distributed water must comply with the NDWQS.
accidental leakage of chlorine gas?	✓		This is a potential impact during operation phase. An O&M manual will be developed to include guidelines on the handling of chlorine gas leaks. WTP design will include facilities to deal with accidental leakage of chlorine gas.
excessive abstraction of water affecting downstream water users?	✓		This is a potential impact during operation phase considering that Shitalakhya river, as one source of raw water supply, also has other uses downstream. Sustainability analysis will be undertaken to determine the impact of abstraction to other uses of Shitalakhya river. For example, the sustainability analysis will aim to assess whether the full abstraction of 45 MLD for the WTP will have any significant effect to the discharge flow of the river such that other uses downstream are affected. This will be considered in the final detailed design for the WTP.
competing uses of water?	✓		This is a potential impact during operation phase considering that Shitalakhya river, as one source of raw water supply, also has other uses. Sustainability analysis will be undertaken to determine the impact of abstraction to other uses of Shitalakhya river. For example, the sustainability analysis will aim to assess whether the full abstraction of 45 MLD for the WTP will have any significant effect to the discharge flow of the river such that other uses downstream are affected. This will be considered in the final detailed design for the WTP.
increased sewage flow due to increased water supply	✓		The operation of the WTP will increase the use of water by the residents of NCC. This will, in turn, increase the generation of sewage that will burden the capacity of the sewage handling infrastructure of the city. Future projects related to improvement of sanitation and sewerage in NCC will mitigate this impact.
increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant		✓	The operation of the WTP will increase the use of water by the residents of NCC. This will, in turn, increase the volume of sullage that will burden the capacity of the sanitation and sewerage infrastructure of the city. Future projects related to improvement of sanitation and sewerage in NCC will mitigate this impact. A sludge management plan will also be developed for the WTP to ensure the sludge generated by the plant is properly handled and disposed.

Screening Questions	Yes	No	Remarks
large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	The subproject will not require significant number of people who will move into NCC. Engaging local labor will be a priority under the subproject.
social conflicts if workers from other regions or countries are hired?		✓	The subproject will not require significant number of people who will move into NCC. Engaging local labor will be a priority under the subproject.
risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during operation and construction?	✓		Fuel and other chemicals will be used during construction phase. Potential impact of fuel or chemical spill or mishandling during construction phase will be managed through measures included in the EMP. Similarly, fuel and other chemicals such as chlorine will also be used during the operation phase. An O&M manual will be developed to include guidelines on the handling of all these chemicals.
community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	✓		Anticipated during construction and operation phases. But work areas will be clearly demarcated with signages and safety barriers, and access will be controlled. Only workers and subproject concerned members will be allowed to visit the operational sites, including the DTW and WTP sites.

Appendix 2: Basic Calculation for the MBBR treatment stage

Calculation Sheet-1

TITLE	PROCESS CALCULATION- MOVING BED BIO REACTOR (MBBR) SYSTEM			
<u>1. Influent Characteristics</u>				
Design flow		45,000	m ³ /d	
Design Hourly flow		1,875	m ³ /h	
Number of streams		1	Nos.	
Daily Average flow from each module		45,000	m ³ /d	
Design hourly flow per stream		1,875	m ³ /h	
Total BOD		32.00	mg/l	
BOD soluble		19.20	mg/l	(60% of total BOD is bio available)
NH ₃		12.99	mg/l	(as NH ₃)
NH ₃ -N	(12.99 x 14/17)	10.70	mg/l	(as N) 82.35% Nitrogen as NH ₃
NO ₃		9.30	mg/l	
NO ₃ -N	(9.3 x 14)/(14+3x16)	2.10	mg/l	(as N) 22.58% Nitrogen as NO ₃
NO ₂		1.50	mg/l	
NO ₂ -N	(1.5x (14/(14+2x16)))	0.46	mg/l	(as N) 30.43% Nitrogen as NO ₂
TSS		51	mg/l	
P total		3	mg/l	
Alkalinity		270	mg CaCO ₃ /l	
Water temperature, minimum		15	°C	
Water temperature, maximum		30	°C	
<u>2. Required water Quality After MBBR</u>				
BOD ₅		3.0	mg/l	
NH ₄		2.0	mg/l	
NH ₄ -N		1.6	mg/l	(as N) 82.35% Nitrogen as NH ₃
NO ₃		30.0	mg/l	
NO ₃ -N		6.8	mg/l	(as N) 22.88% Nitrogen as NO ₃
NO ₂		2.0	mg/l	
NO ₂ -N		0.61	mg/l	(as N) 30.43% Nitrogen as NO ₂
Total N		9.03	mg/L	N < 10 mg/L - Condition
<p>Note: All Nitrogenous compounds are reported from this point on as "N"</p> <p>In order to achieve the treating water quality as per tender requirement, four stage treatment for BOD & Nitrogen reduction has been proposed :</p> <p>Stage-1 - Aerobic Reactor : Intense Aeration for oxidation of most of BOD & part of Ammonia.</p> <p>Stage-2 - Aerobic Reactor : Intense Aeration for removal of remaining BOD & Ammonia levels are reduced almost to desired level.</p> <p>Stage-3 - Anoxic Reactor - Intense Denitrification of the nitrate to nitrogen with addition of exogenous carbon source.</p> <p>Stage-4 - Aerobic Reactor : Intense Aeration for removal of any excess carbon remaining from the Denitrification stage, as well as final polishing of ammonia to the required level.</p>				

Calculation Sheet-2

3 Stage 1: Aerobic Reactor -Nitrifying MBBR Reactor (Cell-1)		
NH ₄ to be removed (NH ₄)	9.1 mg/l	(NH ₄ reduced by 91.7 = 1.0 mg/l)
	407.4 kg/d	
NH ₄ removed by assimilation (NH ₄)	18.99 kg/d	(Biomass produced at denitrification stage - ref calculation below)
NH ₄ to be nitrified in entire system (NH ₄)	388.39 kg/d	(NH ₄ - NH ₄)
Nitrification rate at minimal temperature (NR)	1.07 g/m ² /d	
	<small>(Corrected for temp, BOD content, and cell efficient NH₄ concentration)</small>	
NH ₄ to be nitrified in reactor/cell-1 (NH ₄)	171 kg/d	(As per Awwse range 40 to 45 % of total NH ₄ to cell-1)
Required biomass carrier surface area	159,712 m ²	(NH ₄) × 1000 / (NR ₁)
Specific surface area biomass carriers	650 m ² /m ³	(As per Awwse)
Required qty of biomass carriers	246 m ³	
Carrier fill ratio of Reactor volume	50 %	(As per Awwse)
Calculated Reactor Volume	490 m ³	
Hydraulic Retention Time (HRT) of cell-1	16 minutes	
Reactor Dimension :		
Consider side water depth	5.50 m	
Approach velocity	35.00 m ² /m ² /h	
Influent flow	1875.00 m ³ /h	
Total flow through reactor	1875.00 m ³ /h	
Required reactor cross section area	53.57 m ²	
Required reactor width	9.74 m	
Provided reactor width	10.00 m	
Resultant reactor length	8.90 m	
Provided reactor length	9.00 m	
Required freeboard	0.50 m	
Total reactor depth	6.00 m	
Provided volume of reactor/cell-1	495.0 m ³	
4. Stage 2: Aerobic Reactor -Nitrifying MBBR Reactor (Cell-2)		
NH ₄ to be Nitrified in cell 2 only (NH ₄)	156.39 kg/d	(NH ₄) - (NH ₄) - (NH ₄)
Nitrification rate at minimal temperature	1.20 g/m ² /d	
	<small>(Corrected for temp, BOD content, and cell efficient NH₄ concentration)</small>	
Required biomass carrier surface area	130,672 m ²	(NH ₄) × 1000 / (NR ₂)
Specific surface area biomass carriers	650 m ² /m ³	(As per Awwse)
Required qty of biomass carriers	201 m ³	
Carrier fill ratio percent of reactor volume	50 %	(As per Awwse)
Calculated Reactor Volume	403 m ³	
Hydraulic Retention Time (HRT) of Cell-2	13 minutes	
Reactor Dimension :		
Consider side water depth	5.5 m	
Approach velocity	35 m ² /m ² /h	
Influent flow	1875 m ³ /h	
Total flow through reactor	1875 m ³ /h	
Required reactor cross section area	53.6 m ²	
Calculated reactor width	9.7 m	
Provided reactor width	10.0 m	
Calculated reactor length	7.3 m	
Provided reactor length	7.5 m	
Required freeboard	0.5 m	
Total reactor depth	6.0 m	
Provided volume of reactor/cell-2	412.5 m ³	

Calculation Sheet-3

5. Stage 3: Anoxic Reactor- Denitrifying MBBR Reactor (Cell-3)		
Biochemical Parameters		
Influent NO_3^- (Raw Water from River) i/c Nitrite	2.56 mg/l	$(\text{NO}_3^- + \text{NO}_2^-)$
	115.0 kg/d	
NH_4^+ to be Removed (NH_4^+)	9.1 mg/l	$(\text{NH}_4^+ \text{ in influent}) \times 10^7 \div 1.1 \text{ mg/l}$
	407.4 kg/d	
NH_4^+ removed by Assimilation (NH_4^+)	19.0 kg/d	(Biomass produced at denitrification stage- ref calculation below)
NH_4^+ to be nitrified (NH_4^+)	388.4 kg/d	(Eq of NO_3^- created)
Total NO_3^- to be denitrified ($\text{NO}_3^-_{\text{DW}}$)	503 kg/d	(NH_4^+ Nitrification (NH_4^+) + NO_3^- influent)
Amount of Nitrate allowed in effluent ($\text{NO}_3^-_{\text{eff}}$)	305 kg/d	
utilizing exogenous Carbon source ($\text{NO}_3^-_{\text{ex}}$)	199 kg/d	$(\text{NO}_3^-_{\text{DW}} - \text{NO}_3^-_{\text{eff}})$
Denitrification Rate in Cell-3 at mini. Temp (E)	198,596 g/d	
	2.5 g/m ² /d	
Required biomass carrier surface area	80,338 m ²	$(\text{NO}_3^-_{\text{ex}}) / (\text{DR}_{\text{NO}_3^-})$
Specific surface area biomass carriers	650 m ² /m ³	(As per Aoxite)
Required qty of biomass carriers	124 m ³	
Carrier fill ratio percent of reactor volume	25 %	(As per Aoxite)
Calculated Reactor Volume	494 m ³	
Hydraulic Retention Time (HRT) of Cell-3	16 minutes	
Reactor Dimension :		
Consider side water depth	5.5 m	
Approach velocity	35 m ³ /m ² /h	
Influent flow	1,875 m ³ /h	
Required reactor cross section area	54 m ²	
Calculated Reactor width	9.7 m	
Provided reactor width	10.0 m	
Calculated Reactor length	9.0 m	
Provided reactor length	9.0 m	
Required freeboard	0.5 m	
Total reactor depth	6.0 m	
Provided volume of reactor/cell-3	494 m ³	
Exogenous Carbon Dosing (per stream)		
Type	Methanol+Ethanol	(As per mixed reactor to MBR) (Water 22-01-2018)
COD equivalent	2.11 gCOD/g Ethanol	
Required COD stoichiometric equivalent	2.86 gCOD/g NO_3^-	(Stoichiometric equivalent)
Actual dosing design	4.50 gCOD/g NO_3^-	(Actual dosing design)
Total amount of NO_3^- to denitrify	198.60 kg/d	(As calculated above)
	198,596 g/d	
Total amount of COD required	893,684 g/d	(Qty of NO_3^- to denitrify \times actual dosing rate)
Total mass of Ethanol mixture required (EMr)	424 kg/d	(Total COD required/COD reqd)
Ethanol solution content (ETHs)	95 %	
Ethanol specific weight (ETH sw)	800 kg/m ³	
Required dosing	557 l/d	$(\text{EMr} / \text{ETHs}) \div (\text{ETH sw} / 1000)$
	23.2 l/h	
Biomass Production		
Yield	0.25 g VSS/gCOD	(Yield ethanol in denitrification process)
Amount of biomass produced	223.4 kg/d	(Total Qty of COD required \times Yield)
Increase in TSS by biomass	5.0 mg/l	
N-content biomass	8.5 % w/w	
N assimilated in biomass	19.0 kg/d	

Calculation Sheet-4

6. Stage 4: Aerobic Reactor- Post Aeration MBBR (Cell- 4)		
NH ₄ to be Nitrified in cell 4 only (NH ₄)	61 kg/d	(As per Aqviso range 12 to 15% of total NH ₄ in cell-4)
Nitrification Rate in cell 4 at minimum temp	0.98 g/m ² /d	(Corrected for temp, BOD-water, and cell effluent NH ₄ concentrations)
Required biomass carrier surface area	62.674 m ²	$[(N_{f,4}) \times 1000] / (R_{n,4})$
Specific surface area biomass carriers	650 m ² /m ³	(As per Aqviso)
Required amount of biomass carriers	96.4 m ³	
Carrier fill ratio of Reactor Volume	30.0 %	(As per Aqviso)
Calculated Reactor Volume	321.4 m ³	
Hydraulic Retention Time (HRT) of Cell-4	10 minutes	
Reactor Dimension :		
Consider side water depth	5.5 m	
Approach velocity	35 m ³ /m ² /h	
Influent Flow	1,875.0 m ³ /h	
Calculated reactor cross section area	53.6 m ²	
Calculated reactor width	9.74 m	
Provided reactor width	10.00 m	
Calculated reactor length	5.84 m	
Provided reactor Length	6.00 m	
Required freeboard	0.50 m	
Total reactor depth	6.00 m	
Provided volume of reactor/cell-4	330.0 m ³	
7. Perforated Screens and Mixers		
Perforated Screens		
Screen opening	7 mm	Bar Screen
Hydraulic loading through screen	50 m ³ /m ² /h	
Total flow through reactor	1,875 m ³ /h	
Required screen surface area per stage	37.5 m ²	
Consider Screen Width 3.75m	3.75 m	
Consider Screen Length 5m	5.00 m	
Surface area per screen	18.75 m ²	
Calculated Nos of screens per reactor	2.00 units	
Provided nos of screens per reactor	2 no.	
Nos screen in each stream	8 units	
Mixers for Anoxic Reactor (Cell-3)		
Required power input	5.0 w/m ³ reactor volume	
Reactor volume	494 m ³	
Total power input required	2.5 kW	
Number of mixers	2.0 units	Max. W:L=1:3
Required power for each mixer	1.2 kW	
Installed power each mixer	1.5 kW	
Type of Mixer	Vertical Type Hyperbolic Mixer	

Calculation Sheet-5

MBBR System design summary :**(A) Dimension of reactors/cell of each stream**

Stage-1- Aerobic Reactor (Cell-1)	10 mW x9mL x 5.5 mSWD+ 0.5 mFB
Stage-2- Aerobic Reactor (Cell-2)	10 mW x7.5mL x 5.5 mSWD+ 0.5 mFB
Stage-3- Anoxic Reactor (Cell-3)	10 mW x9mL x 5.5 mSWD + 0.5 mFB
Stage-4- Aerobic Reactor (Cell-4)	10 mW x 6mL x 5.5 mSWD + 0.5 mFB

(B) Hydraulic Retention Time (HRT) of Cell :

Stage-1- Aerobic Reactor (Cell-1)	16 minutes
Stage-2- Aerobic Reactor (Cell-2)	13 minutes
Stage-3- Anoxic Reactor (Cell-3)	16 minutes
Stage-4- Aerobic Reactor (Cell-4)	10 minutes
Total HRT of Biological Reactor	55 minutes <small>(as per tender requirement)</small>

(C) Biomass Carriers :

	Carrier Fill Ratio (%)	Carrier Qty (cum)	
		Each Stream	All time stream
Stage-1- Aerobic Reactor (Cell-1)	50	246	737
Stage-2- Aerobic Reactor (Cell-2)	50	201	604
Stage-3- Anoxic Reactor (Cell-3)	25	124	371
Stage-4- Aerobic Reactor (Cell-4)	30	96	289
Grand Total		667	2001

(D) Perforated Screens :

	Nos Perforated	
	Per Stream (Nos)	
Stage-1- Aerobic Reactor (Cell-1)	2	
Stage-2- Aerobic Reactor (Cell-2)	2	
Stage-3- Anoxic Reactor (Cell-3)	2	
Stage-4- Aerobic Reactor (Cell-4)	2	
Grand Total	8	

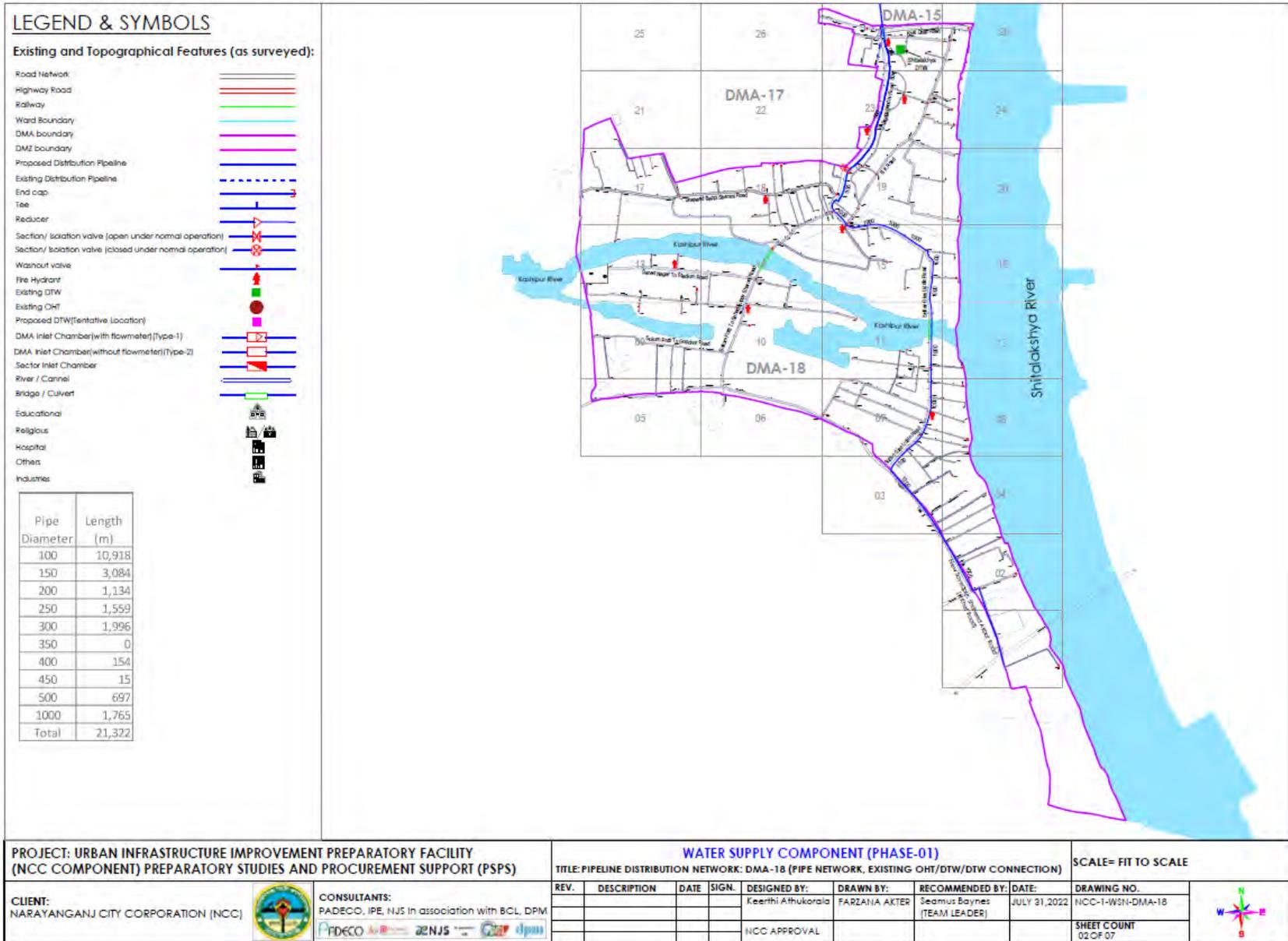
Calculation Sheet-6

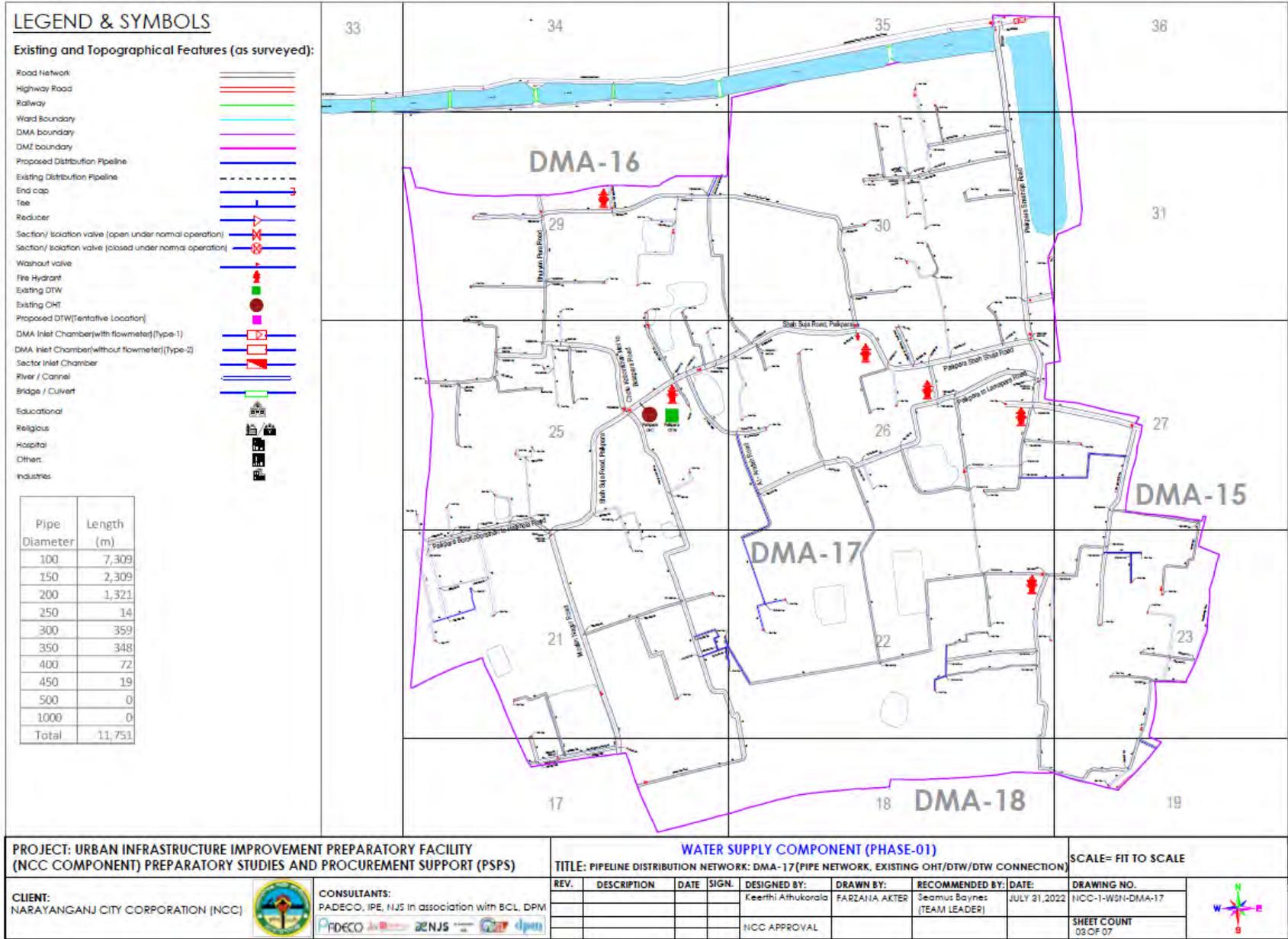
TITLE		DESIGN CALCULATION- AIR REQUIREMENT FOR MOVING BED BIO REACTOR (MBBR) SYSTEM					
Oxygen and Air requirement of Aerobic Reactors :							
<u>(A) Oxygen Requirement for each stream :</u>							
		Cell-1		Cell-2		Cell-4	
NH ₄ to be Nitrified	kg/d	170.9	156.4	61.1			
Required oxygen	g O ₂ /g NH ₄	4.57	4.57	4.57			
	Kg O ₂ /d	781.0	714.7	279.3			
Biodegradable COD in Influent to be oxid	mg/l			10.0			
	kg/d			450.0			
Required oxygen	g O ₂ /g COD			1.0			
	Kg O ₂ /d			450.0			
Total Oxygen requirement	Kg O ₂ /d	781.0	714.7	729.3			
<u>Air Requirement Calculations :</u>							
		Min temp	Max temp	Min temp	Max temp	Min temp	Max temp
Design temperature C	Deg C	15.0	28.0	15.0	26.0	15.0	28.0
Correction factor for field condition							
Elevation in meters	m	6.0	6.0	6.0	6.0	6.0	6.0
Temperature	oC	15.0	28.0	15.0	26.0	15.0	28.0
Actual Oxygen requirement							
$AOR = SCR * C_{sw} / (\alpha * (\beta * F_a * C'_{sw} - C)) * (1.024)^{(T-20)}$							
Where							
α = Alpha factor for diffused aeration (0.4 - 0.8)							
β = Salinity factor 0.7-0.98							
F_a = O ₂ sol. Correc. factor, elevation, $F_a = 1.024^{\Delta}$							
Δ = Temp. factor at site deg C, $T = 1.024^{\Delta}$							
C = Minimum DO in Aeration Tank, mg/l	mg/lit	0.9	1.2	0.9	1.2	0.9	1.2
C _{sw} = O ₂ sol. in tap water at field temp in mg/l	mg/lit	7.0	4.0	7.0	4.0	7.0	4.0
C _{sw} = O ₂ sol. in tap water at 20 deg. mg/l	mg/lit	10.1	7.8	10.1	7.8	10.1	7.8
ACR ₀ at Field conditions	kg/day	9.1	9.1	9.1	9.1	9.1	9.1
SCR/AOR		3705.5	2136.0	3391.1	1956.7	3460.1	1996.5
		0.21	0.37	0.21	0.37	0.21	0.37
Diffuser efficiency per meter of submerse	g O ₂ /m ³ /m submerse	16.5	16.5	16.5	16.5	16.5	16.5
Percentage of oxygen in air (W/W)		23%	23%	23%	23%	23%	23%
Density of air	kg/m ³	1.25	1.25	1.25	1.25	1.25	1.25
Total air required for each cell (@ min & max tan m ³ /day		44915	25891	41104	23694	41941	24176
Air required per hour by each cell (@ min & max tan m ³ /hr		1.871	1.079	1.713	987	1.748	1.007

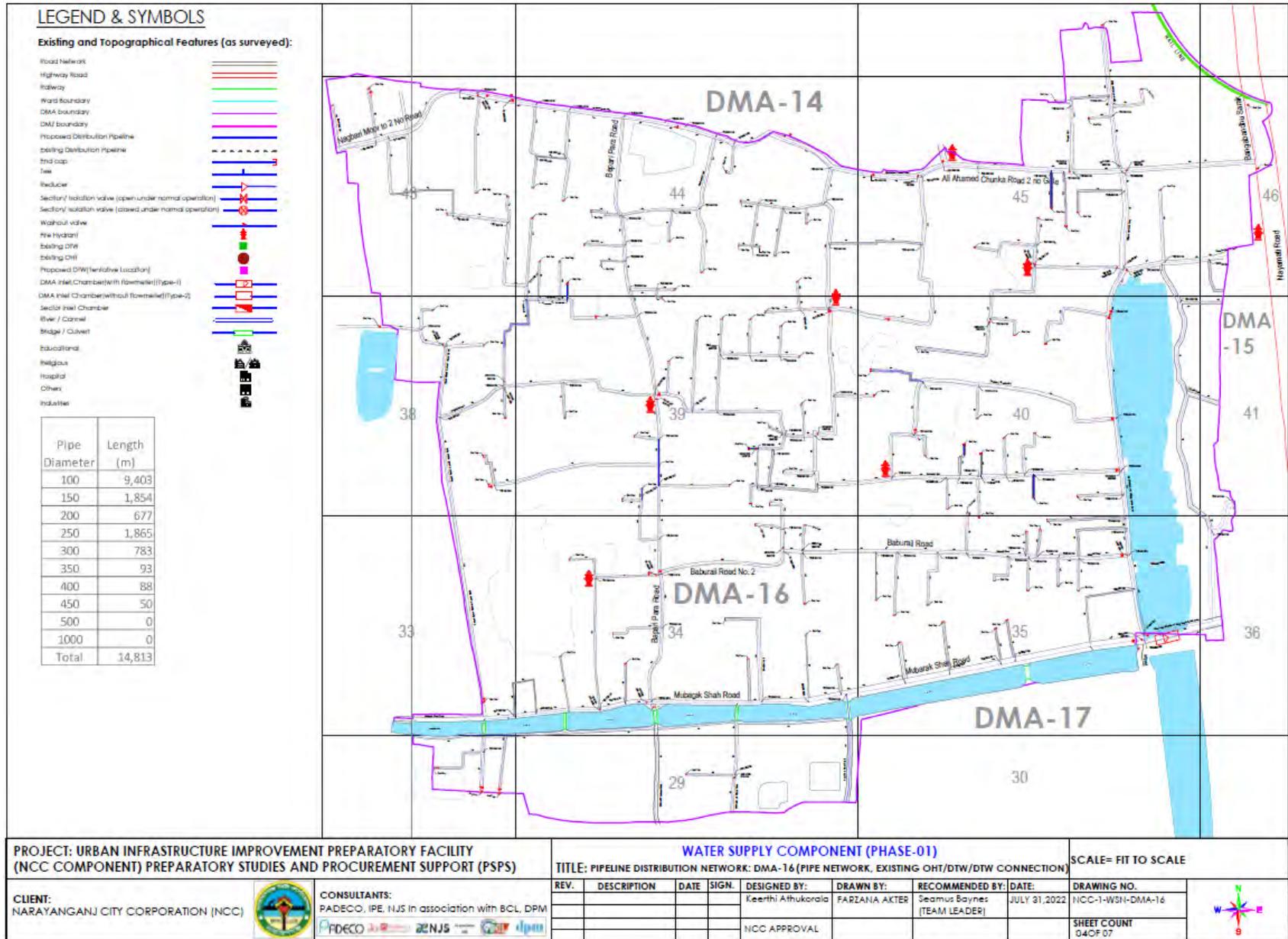
Calculation Sheet-7

Total Air required per hour by each stream at minimum temp (15 deg C)	5,332	m3/hr			
Total Air required per hour by each stream at maximum temp (28 deg C)	3,073	m3/hr			
Consider blower capacity	1,780	m3/hr	Total	5,340	
Head of blower	6.3	mWC			
Nos of blowers required operating at minimum temp	3	nos.			
Nos of blowers required operating at maximum temp	1	no.			
Provide total Nos of blower for each stream	4	nos.	(1 nos working at min temp + 1 no standby)		
Diffuser calculation					
Type of diffusers	Fine bubble		Cell-1	Cell-2	Cell-4
Air flow rate per diffuser considered	m3/hr/m diffuser		7	7	7
Air flow required at minimum temp	m3/hr		1,871	1713	1748
Nos of diffusers required in each cell	Nos.		247	245	250
Provided number of diffuser in each cell	Nos.		293	255	255
Summary Air Blower operation :					
Air Blower capacity	1,780	m3/hr		(29.7	m3/min)
Total Nos of Blowers	4				
Nos of Blower Operating	3				
Nos of Blower standby	1				
Summary of Fine Bubble Diffusers :					
Description	Cell-1	Cell-2	Cell-4	Total	
Nos of diffusers	293	255	255	803	

Appendix 3: Maps Showing Locations of Subproject Components (DTWs, OHTs, Distribution Network)







PROJECT: URBAN INFRASTRUCTURE IMPROVEMENT PREPARATORY FACILITY (NCC COMPONENT) PREPARATORY STUDIES AND PROCUREMENT SUPPORT (PSPS)

WATER SUPPLY COMPONENT (PHASE-01)
TITLE: PIPELINE DISTRIBUTION NETWORK: DMA-16 (PIPE NETWORK, EXISTING OHT/DTW/DTW CONNECTION)

SCALE= FIT TO SCALE

CLIENT:
 NARAYANGANJ CITY CORPORATION (NCC)

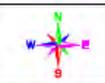


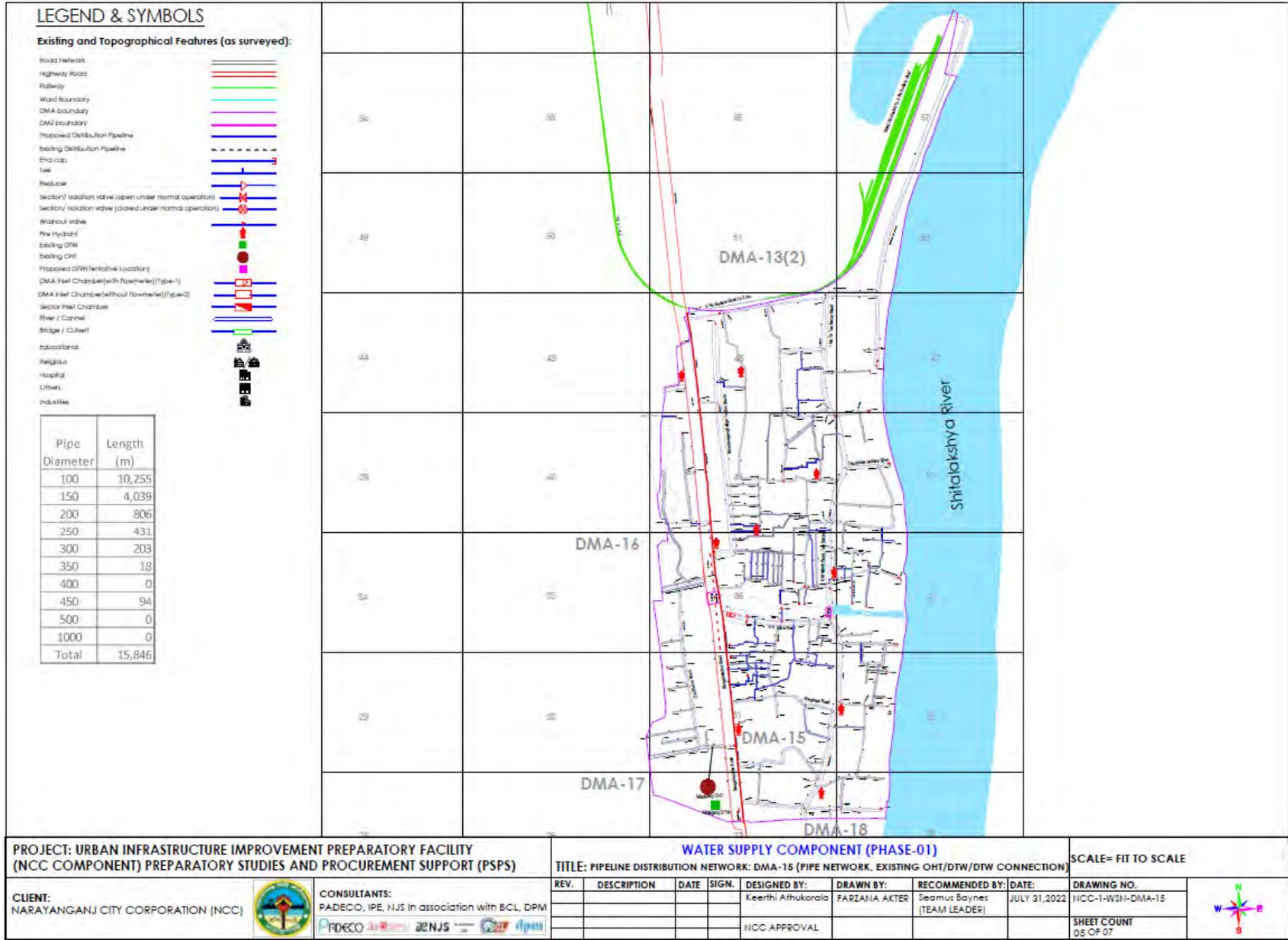
CONSULTANTS:
 PADECO, IPE, NJS in association with BCL, DPM

REV.	DESCRIPTION	DATE	SIGN.	DESIGNED BY:	DRAWN BY:	RECOMMENDED BY:	DATE:
				Keerthi Athukorala	FARZANA AKTER	Seamus Baynes (TEAM LEADER)	JULY 31, 2022
NCC APPROVAL							

DRAWING NO.
 NCC-1-WSN-DMA-16

SHEET COUNT
 04 OF 07





PROJECT: URBAN INFRASTRUCTURE IMPROVEMENT PREPARATORY FACILITY (NCC COMPONENT) PREPARATORY STUDIES AND PROCUREMENT SUPPORT (PSPS)

WATER SUPPLY COMPONENT (PHASE-01)

SCALE= FIT TO SCALE

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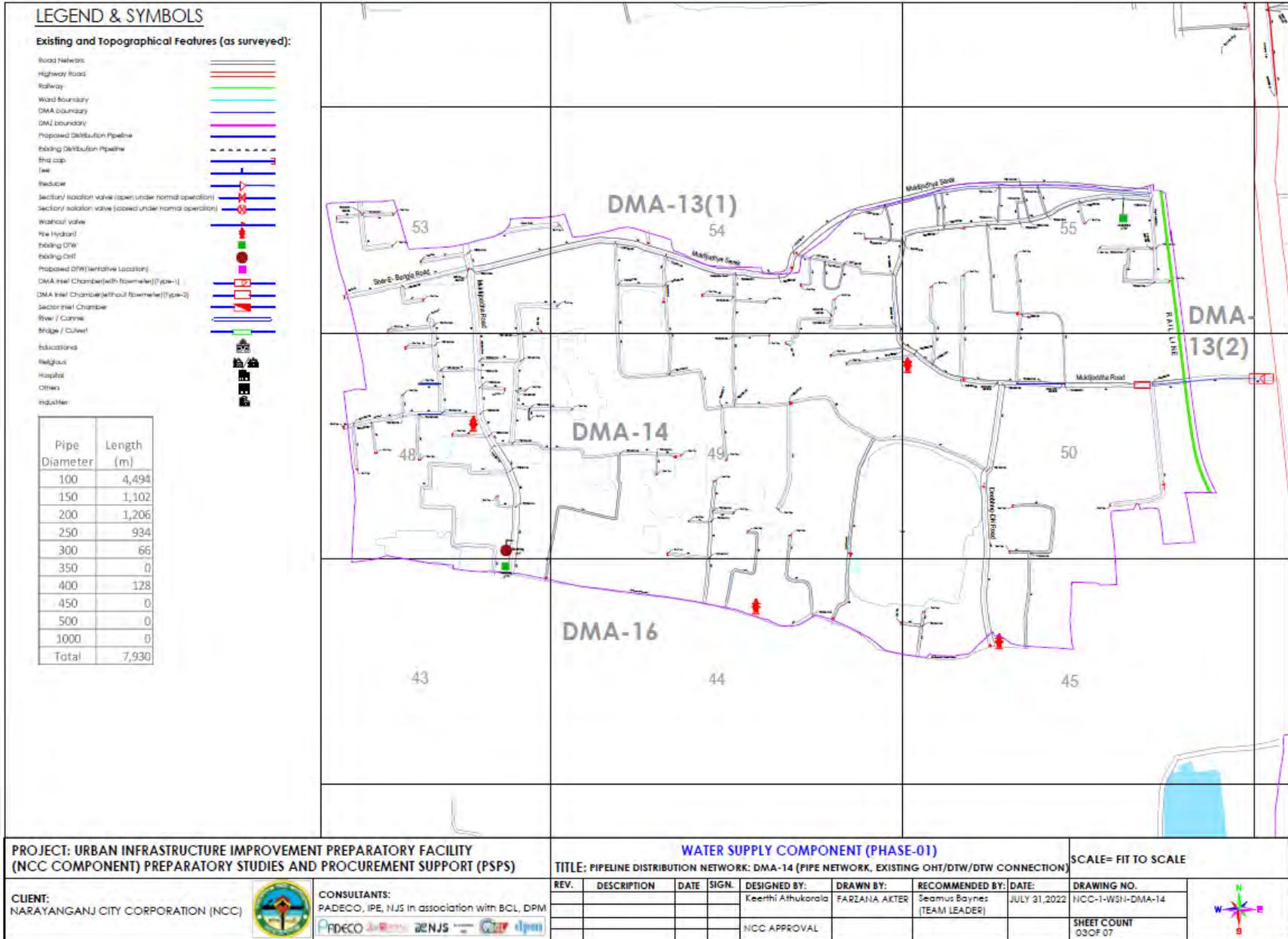
CLIENT:
NARAYANGANJ CITY CORPORATION (NCC)

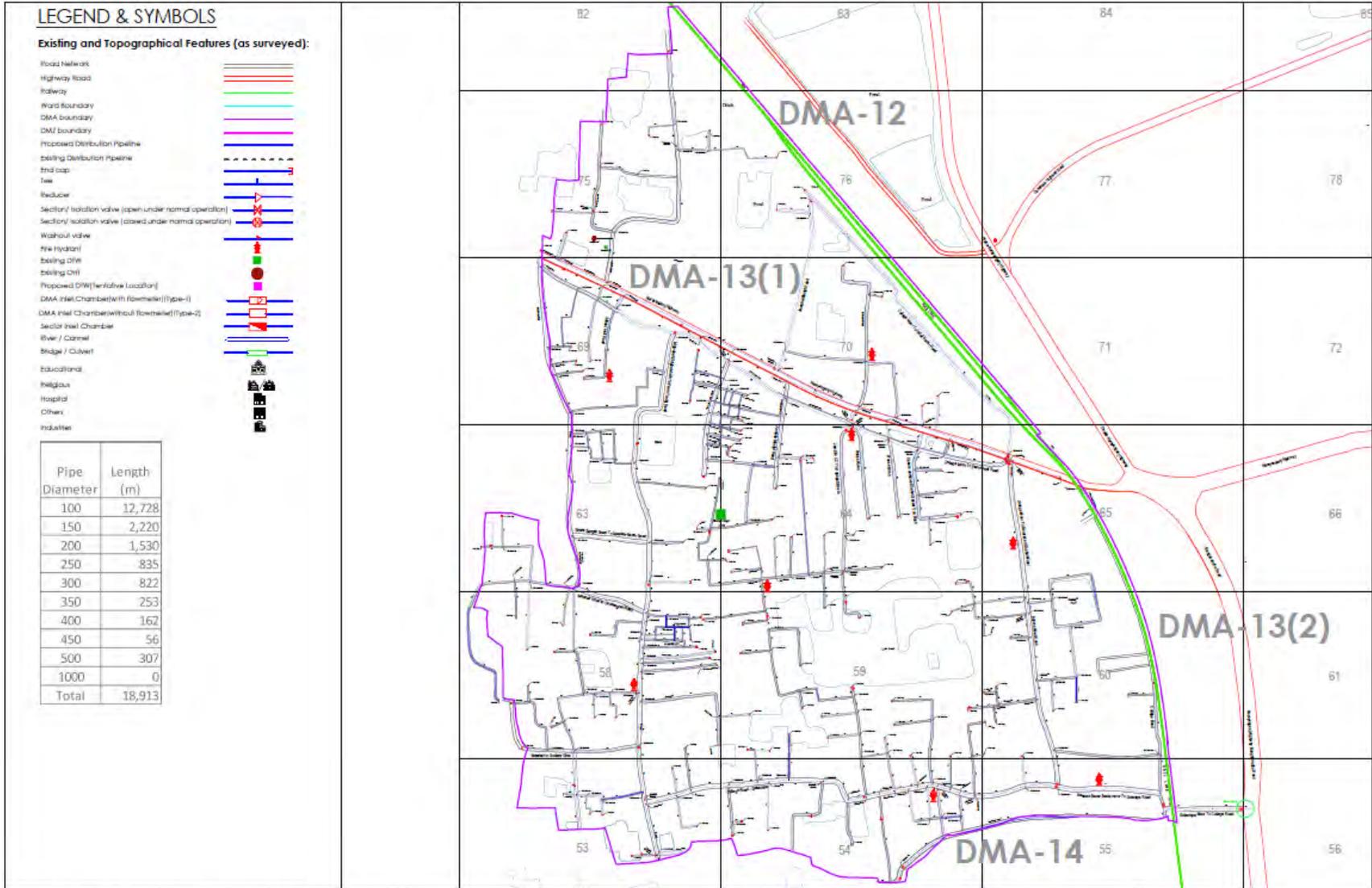


CONSULTANTS:
PADECO, IPE, NJS in association with BCL, DPM

REV.	DESCRIPTION	DATE	SIGN.	DESIGNED BY:	DRAWN BY:	RECOMMENDED BY:	DATE:	DRAWING NO.
				Keerthi Athukorala	FARZANA AKTER	Seamus Baynes (TEAM LEADER)	JULY 31, 2022	NCC-1-WSN-DMA-15
				NCC APPROVAL				SHEET COUNT 05 OF 07

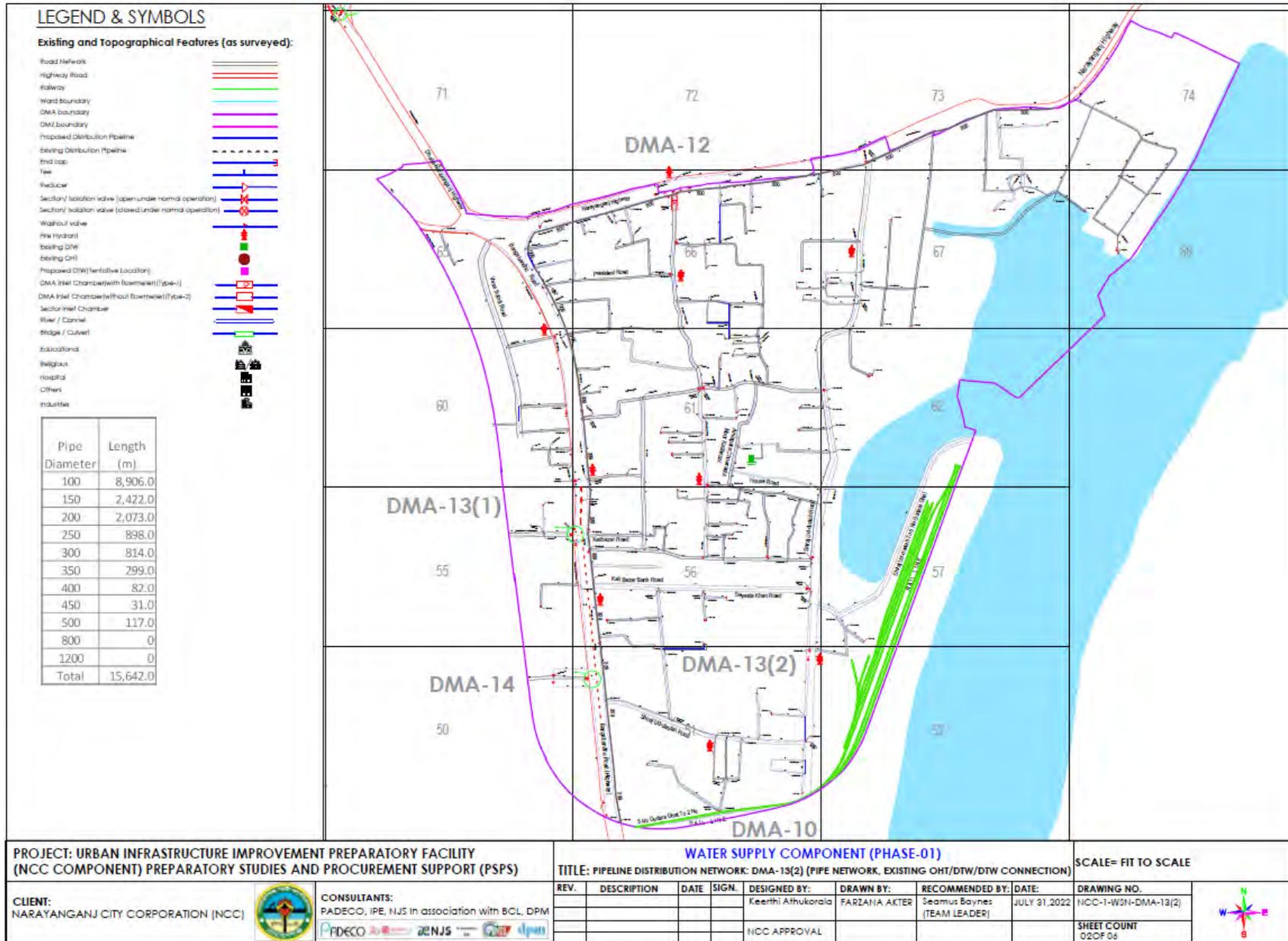


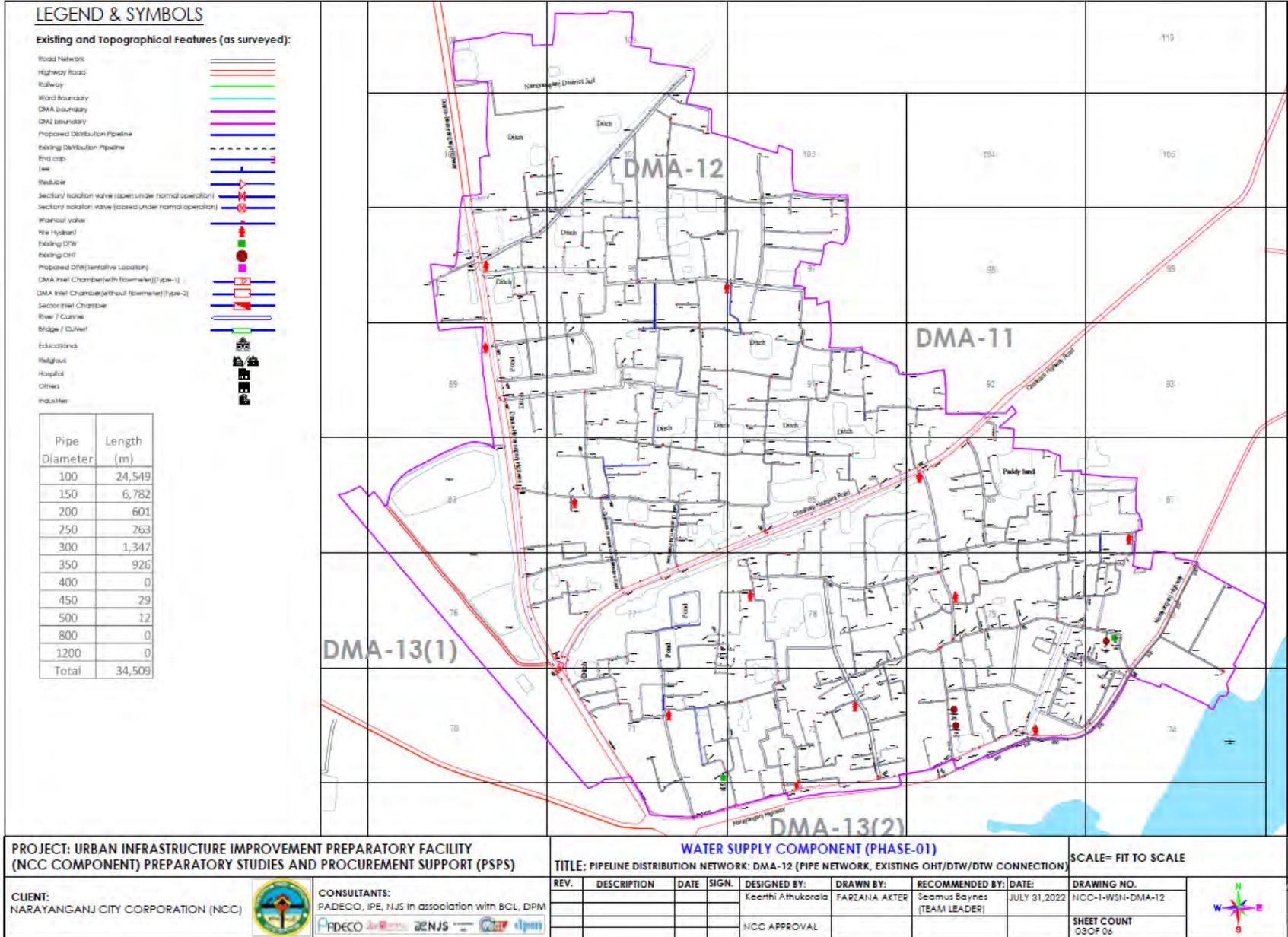




PROJECT: URBAN INFRASTRUCTURE IMPROVEMENT PREPARATORY FACILITY (NCC COMPONENT) PREPARATORY STUDIES AND PROCUREMENT SUPPORT (PSPS)		WATER SUPPLY COMPONENT (PHASE-01)				SCALE= FIT TO SCALE				
TITLE: PIPELINE DISTRIBUTION NETWORK: DMA-13(1) (PIPE NETWORK, EXISTING OHT/DTW/DTW CONNECTION)		REV.	DESCRIPTION	DATE	SIGN.	DESIGNED BY:	DRAWN BY:	RECOMMENDED BY:	DATE:	DRAWING NO.
CLIENT: NARAYANGANJ CITY CORPORATION (NCC)		CONSULTANTS: PADECO, IPE, NJS In association with BCL, DPM				Keerthi Athukorala	FARZANA AKTER	Seamus Baynes (TEAM LEADER)	JULY 31, 2022	NCC-1-WSH-DMA-13(1)
		NCC APPROVAL								SHEET COUNT 02 OF 07







PROJECT: URBAN INFRASTRUCTURE IMPROVEMENT PREPARATORY FACILITY (NCC COMPONENT) PREPARATORY STUDIES AND PROCUREMENT SUPPORT (PSPS)

TITLE: PIPELINE DISTRIBUTION NETWORK: DMA-12 (PIPE NETWORK, EXISTING OHT/DTW/DTW CONNECTION)

SCALE= FIT TO SCALE

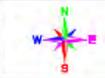
CLIENT:
NARAYANGANJ CITY CORPORATION (NCC)

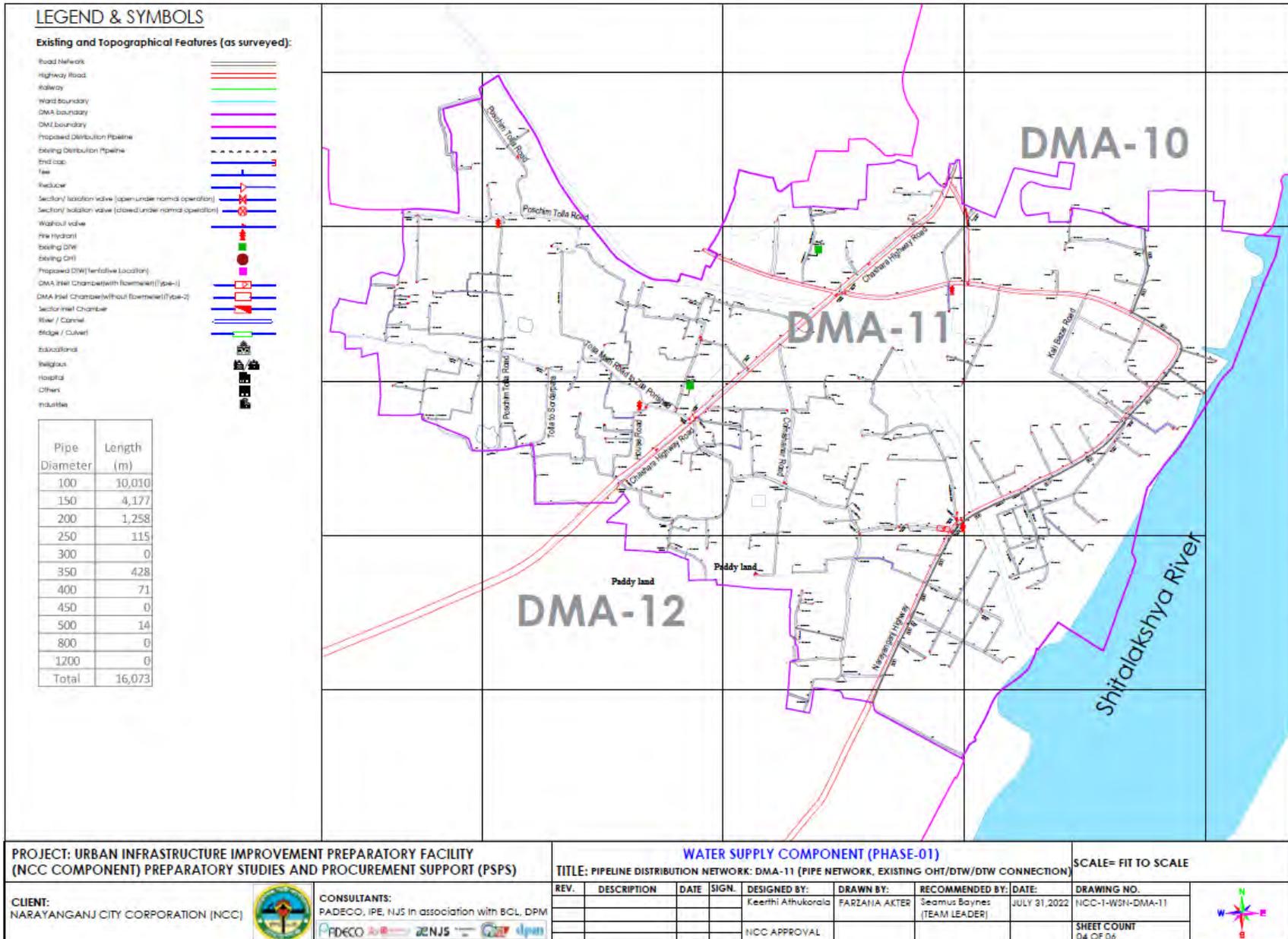


CONSULTANTS:
PADECO, IPE, NJS in association with BCL, DPM



REV.	DESCRIPTION	DATE	SIGN.	DESIGNED BY:	DRAWN BY:	RECOMMENDED BY:	DATE:	DRAWING NO.
				Keerthi Athukoralal	FARJANA AKTER	Seamus Baynes	JULY 21, 2022	NCC-1-WSH-DMA-12
				NCC APPROVAL				SHEET COUNT 03 OF 06





PROJECT: URBAN INFRASTRUCTURE IMPROVEMENT PREPARATORY FACILITY (NCC COMPONENT) PREPARATORY STUDIES AND PROCUREMENT SUPPORT (PSPS)

WATER SUPPLY COMPONENT (PHASE-01)
TITLE: PIPELINE DISTRIBUTION NETWORK: DMA-11 (PIPE NETWORK, EXISTING OHT/DTW/DTW CONNECTION)

SCALE= FIT TO SCALE

CLIENT:
 NARAYANGANJ CITY CORPORATION (NCC)

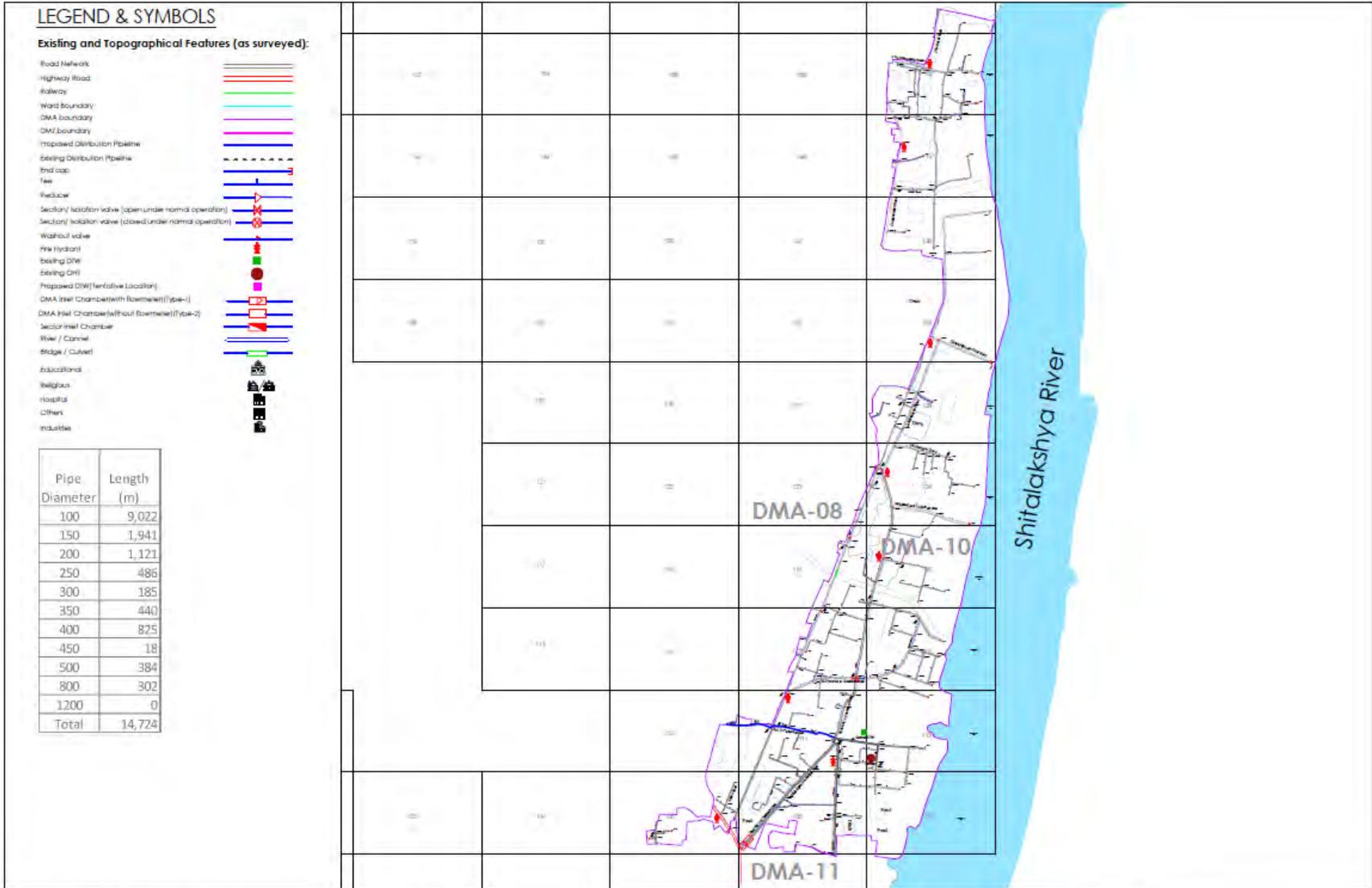


CONSULTANTS:
 PADECO, IPE, NJS in association with BCL, DPM

REV.	DESCRIPTION	DATE	SIGN.	DESIGNED BY:	DRAWN BY:	RECOMMENDED BY:	DATE:
				Keerthi Athukorala	FARZANA AKTER	Seamus Baynes (TEAM LEADER)	JULY 31, 2022
				NCC APPROVAL			

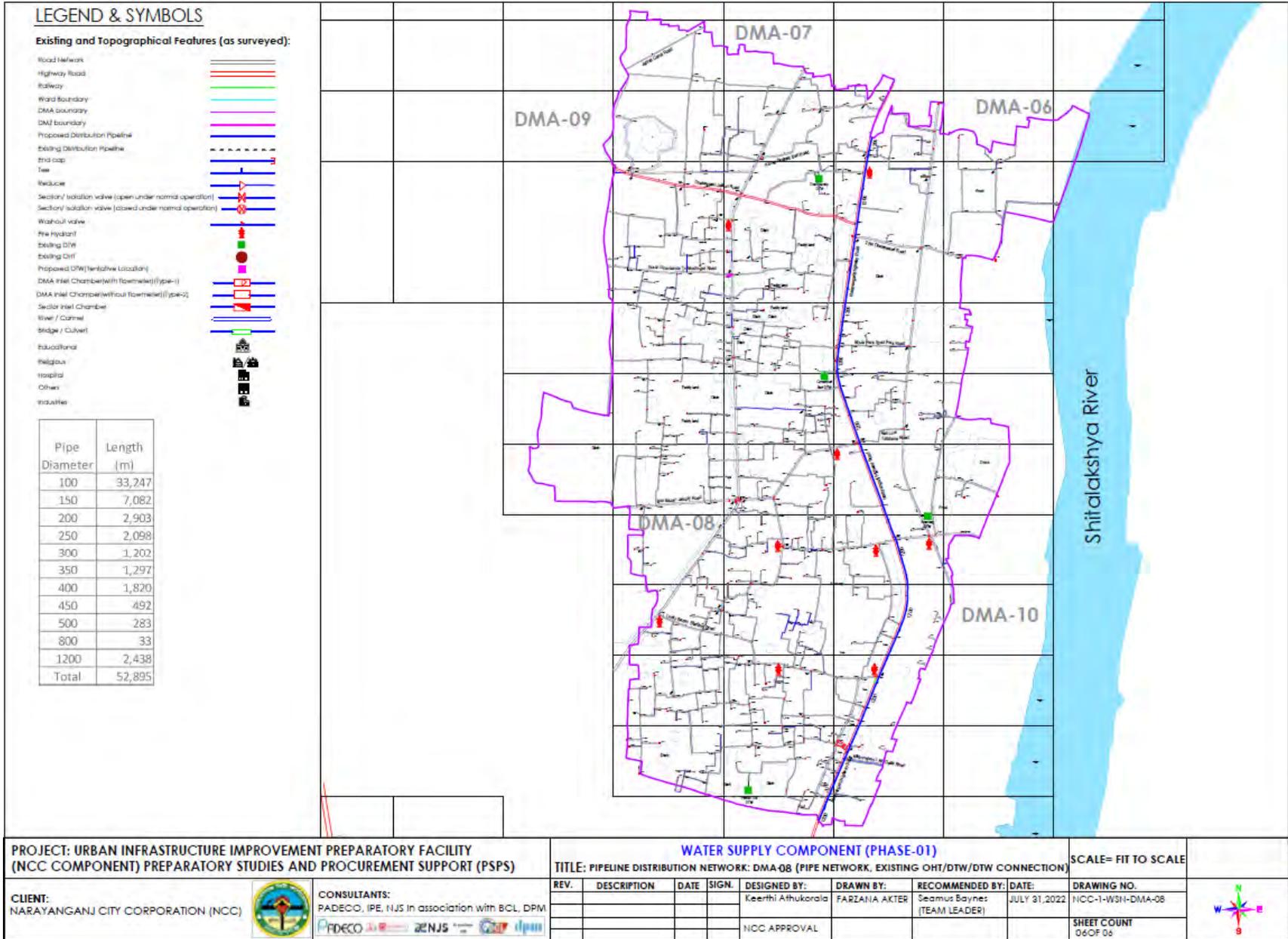
DRAWING NO.
 NCC-1-W21-DMA-11

SHEET COUNT
 04 OF 06

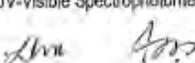
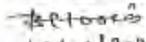


PROJECT: URBAN INFRASTRUCTURE IMPROVEMENT PREPARATORY FACILITY (NCC COMPONENT) PREPARATORY STUDIES AND PROCUREMENT SUPPORT (PSPS)		WATER SUPPLY COMPONENT (PHASE-01)				SCALE= FIT TO SCALE				
TITLE: PIPELINE DISTRIBUTION NETWORK: DMA-10 (PIPE NETWORK, EXISTING OHT/DTW CONNECTION)		REV.	DESCRIPTION	DATE	SIGN.	DESIGNED BY:	DRAWN BY:	RECOMMENDED BY:	DATE:	DRAWING NO.
CLIENT: NARAYANGANJ CITY CORPORATION (NCC)						Keerthi Athukorala	FARZANA AKTER	Seamus Baynes (TEAM LEADER)	JULY 31, 2022	NCC-1-W2N-DMA-10
CONSULTANTS: PADECO, IPE, NJS in association with BCL, DPM 						NCC APPROVAL				SHEET COUNT 05OF 06





Appendix 4: Copy of Laboratory Results of Groundwater Sampling

	Government of the People's Republic of Bangladesh Office of the Chief Chemist Department of Public Health Engineering Central Lab, 38-39, Mohakhali C/A, Dhaka-1212 Phone: 88-02-9881927, Fax: 88-02-9882003, Email: wqmsc_central_lab@yahoo.com					
Lab Memo: 670/ CC, DPHE, CL, Dhaka		Date: 16-01-2023				
Physical /Chemical/ Bacteriological Analysis of Water Sample						
Sample ID: CEN2023010101	Sample Receiving date: 21-12-2022					
Ref. Memo No: PSPS/2022/Nilil & Dated: 21-12-2022	Sample Source: Production Tube Well					
Sent by: Mohammad Mofazzal Hoque, Deputy Team Leader, PSPS, UIIPF-NCC, Narayanganj.	Dist: Narayanganj, Upa: Narayanganj City Corporation					
Care Taker: Narayanganj City Corporation (Sample : 01)	Union: Vill. Bag E Jannat PTW, Ward-12					
Sample Collection date:	Date of Testing: 21/12/2022-15/01/2023					
LABORATORY TEST RESULTS:						
Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Ammonia	0.5	0.12	mg/L	UVS	0.10
2	Biochemical Oxygen Demand (BOD)	0.2	2	mg/L	5 days Incubation	0.1
3	Chemical Oxygen Demand (COD)	4.0	12	mg/L	CRM	-
4	Coliform (Faecal)	0	0	N/100ml	MFM	-
5	Colour	15	0.90	Hazen	UVS	-
6	Cr (Total)	0.05	0.009	mg/L	AAS	0.0003
7	EC	-	420	µS/cm	Multimeter	-
8	Hardness	200-500	185	mg/L	Titrimetic	-
9	Iron (Fe)	0.3-1	0.80	mg/L	AAS	0.05
10	Manganese (Mn)	0.1	0.03	mg/L	AAS	0.03
11	Nitrogen (Nitrate)	10.0	0.8	mg/L	UVS	0.10
12	pH	6.5-8.5	7.4	-	pH Meter	-
13	Phosphate	6.0	0.80	mg/L	UVS	0.10
14	Salinity	-	0.21	‰	Multimeter	-
15	Total Dissolved Solid (TDS)	1000	210	mg/L	Multimeter	-
16	Turbidity	10	0.79	NTU	Turbidity Meter	-
Comments: Sample was collected & supplied by client. N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, MFM-Membrane Filtration Method, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.						
					 16/01/2023 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka	

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
<u>Test Performed by:</u> 1.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer Signature: <i>ASAM</i> 16.01.2023 2.) Name: Taslima Akhter Designation: Sample Analyzer Signature: <i>Taslima</i> 16.01.2023		<u>Countersigned/Approved by:</u> 1.) Name: Mita Sarker Designation: Senior Chemist Signature: <i>Mita Sarker</i> 16/01/2023 2.) Name: Md. Biplab Hossain Designation: Chief Chemist Signature: <i>Biplab Hossain</i> 16/01/2023 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka				

	Government of the People's Republic of Bangladesh Office of the Chief Chemist Department of Public Health Engineering Central Lab, 38-39, Mohakhali C/A, Dhaka-1212 Phone: 88-02-9881927, Fax: 88-02-9882003, Email: wqmsc_central_lab@yahoo.com	
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Lab Memo: 670/CC, DPHE, CL, Dhaka

Date: 16-01-2023

Physical /Chemical/ Bacteriological Analysis of Water Sample

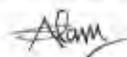
Sample ID: CEN2023010102	Sample Receiving date: 21-12-2022
Ref. Memo No: PSPS/2022/Nilil & Dated: 21-12-2022	Sample Source: Production Tube Well
Sent by: Mohammad Mofazzal Hoque, Deputy Team Leader, PSPS, UIIPF-NCC, Narayanganj.	Dist: Narayanganj, Upa: Narayanganj City Corporation
Care Taker: Narayanganj City Corporation (Sample : 02)	Union: Vill.: Bhuiyer Bagh PTW, Ward-13
Sample Collection date:	Date of Testing: 21/12/2022-15/01/2023

LABORATORY TEST RESULTS:

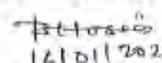
Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Ammonia	0.5	0.10	mg/L	UVS	0.10
2	Biochemical Oxygen Demand (BOD)	0.2	11	mg/L	5 days Incubation	0.1
3	Chemical Oxygen Demand (COD)	4.0	48	mg/L	CRM	-
4	Coliform (Faecal)	0	45	N/100ml	MFM	-
5	Colour	15	0.85	Hazen	UVS	-
6	Cr (Total)	0.05	0.009	mg/L	AAS	0.0003
7	EC	-	325	µS/cm	Multimeter	-
8	Hardness	200-500	120	mg/L	Titrimetic	-
9	Iron (Fe)	0.3-1	0.44	mg/L	AAS	0.05
10	Manganese (Mn)	0.1	0.03	mg/L	AAS	0.03
11	Nitrogen (Nitrate)	10.0	0.20	mg/L	UVS	0.10
12	pH	6.5-8.5	7.4	-	pH Meter	-
13	Phosphate	6.0	0.94	mg/L	UVS	0.10
14	Salinity	-	0.16	‰	Multimeter	-
15	Total Dissolved Solid (TDS)	1000	162	mg/L	Multimeter	-
16	Turbidity	10	0.82	NTU	Turbidity Meter	-

Comments: Sample was collected & supplied by client.

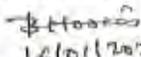
N.B. AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, MFM-Membrane Filtration Method, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.

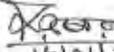
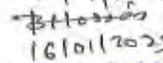


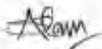



 16/01/2023
Md. Biplab Hossain
 Chief Chemist
 Department of Public Health Engineering
 Central Laboratory Mohakhali, Dhaka

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LCC
<u>Test Performed by:</u> 1.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer Signature: <i>Saiful Alam</i> 16.01.2023 2.) Name: Taslima Akhter Designation: Sample Analyzer Signature: <i>Taslima</i> 16.01.2023		<u>Countersigned/Approved by:</u> 1.) Name: Mita Sarker Designation: Senior Chemist Signature: <i>Mita Sarker</i> 16/01/2023 2.) Name: Md. Biplab Hossain Designation: Chief Chemist Signature: <i>Md. Biplab Hossain</i> 16/01/2023 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory, Mohakhali, Dhaka				

	Government of the People's Republic of Bangladesh Office of the Chief Chemist Department of Public Health Engineering Central Lab, 38-39, Mohakhali C/A, Dhaka-1212 Phone: 88-02-9881927, Fax: 88-02-9882003, Email: wqmsc_central_lab@yahoo.com					
Lab Memo: 670/ CC, DPHE, CL., Dhaka		Date: 16-01-2023				
Physical /Chemical/ Bacteriological Analysis of Water Sample						
Sample ID: CEN2023010103	Sample Receiving date: 21-12-2022					
Ref. Memo No: PSPS/2022/NIII & Dated: 21-12-2022	Sample Source: Production Tube Well					
Sent by: Mohammed Mofazzal Hoque ,Deputy Team Leader , PSPS, UIIPF-NCC, Narayanganj.	Dist:Narayanganj, Ups:Narayanganj City Corporation					
Care Taker: Narayanganj City Corporation (Sample : 03)	Union:, Vill.:Dewbough PTW, Ward-14					
Sample Collection date:	Date of Testing: 21/12/2022-15/01/2023					
LABORATORY TEST RESULTS:						
Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Ammonia	0.5	0.14	mg/L	UVS	0.10
2	Biochemical Oxygen Demand (BOD)	0.2	3	mg/L	5 days Incubation	0.1
3	Chemical Oxygen Demand (COD)	4.0	12	mg/L	CRM	-
4	Coliform (Faecal)	0	0	N/100ml	MFM	-
5	Colour	15	0.91	Hazen	UVS	-
6	Cr (Total)	0.05	0.007	mg/L	AAS	0.0003
7	EC	-	370	µS/cm	Multimeter	-
8	Hardness	200-500	130	mg/L	Titrimetic	-
9	Iron (Fe)	0.3-1	0.80	mg/L	AAS	0.05
10	Manganese (Mn)	0.1	0.06	mg/L	AAS	0.03
11	Nitrogen (Nitrate)	10.0	1.2	mg/L	UVS	0.10
12	pH	6.5-8.5	7.3	-	pH Meter	-
13	Phosphate	6.0	0.37	mg/L	UVS	0.10
14	Salinity	-	0.18	‰	Multimeter	-
15	Total Dissolved Solid (TDS)	1000	185	mg/L	Multimeter	-
16	Turbidity	10	1.4	NTU	Turbidity Meter	-
Comments: Sample was collected & supplied by client. N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, MFM-Membrane Filtration Method, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.						
					 16/01/2023 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka	
Page 1 of 2						

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
<u>Test Performed by:</u>		<u>Signature</u>		<u>Countersigned/Approved by:</u>		
1.)	Name: Md. Saijul Alam Khosru Designation: Sample Analyzer	 16.01.2023		1.)	Name: Mita Sarker Designation: Senior Chemist	 16/01/2023
2.)	Name: Taslima Akhter Designation: Sample Analyzer	 16.01.2023		2.)	Name: Md. Biplab Hossain Designation: Chief Chemist	 16/01/2023 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka

	Government of the People's Republic of Bangladesh Office of the Chief Chemist Department of Public Health Engineering Central Lab, 38-39, Mohakhali C/A, Dhaka-1212 Phone: 88-02-9881927, Fax: 88-02-9882003, Email: wqmsc_central_lab@yahoo.com					
Lab Memo: 670/ CC, DPHE, CL, Dhaka		Date: 16-01-2023				
Physical /Chemical/ Bacteriological Analysis of Water Sample						
Sample ID: CEN2023010104	Sample Receiving date: 21-12-2022					
Ref. Memo No: PSPS/2022/NIII & Dated: 21-12-2022	Sample Source: Production Tube Well					
Sent by: Mohammad Mofazzal Hoque, Deputy Team Leader, PSPS, UIIPF-NCC, Narayanganj.	Dist: Narayanganj, Upa: Narayanganj City Corporation					
Care Taker: Narayanganj City Corporation (Sample : 04)	Union: Vill.: Killerpui Mazar PTW, Ward-11					
Sample Collection date:	Date of Testing: 21/12/2022-15/01/2023					
LABORATORY TEST RESULTS:						
Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Ammonia	0.5	0.14	mg/L	UVS	0.10
2	Biochemical Oxygen Demand (BOD)	0.2	1	mg/L	5 days Incubation	0.1
3	Chemical Oxygen Demand (COD)	4.0	4	mg/L	CRM	-
4	Coliform (Faecal)	0	2	N/100ml	MFM	-
5	Colour	15	1.0	Hazen	UVS	-
6	Cr (Total)	0.05	0.010	mg/L	AAS	0.0003
7	EC	-	471	µS/cm	Mullimeter	-
8	Hardness	200-500	225	mg/L	Titrimetic	-
9	Iron (Fe)	0.3-1	1.40	mg/L	AAS	0.05
10	Manganese (Mn)	0.1	0.53	mg/L	AAS	0.03
11	Nitrogen (Nitrate)	10.0	1.3	mg/L	UVS	0.10
12	pH	6.5-8.5	7.2	-	pH Meter	-
13	Phosphate	6.0	1.1	mg/L	UVS	0.10
14	Salinity	-	0.21	‰	Multimeter	-
15	Total Dissolved Solid (TDS)	1000	208	mg/L	Multimeter	-
16	Turbidity	10	9.2	NTU	Turbidity Meter	-
Comments: Sample was collected & supplied by client. N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, MFM-Membrane Filtration Method, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.						
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Page 1 of 2						

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
<u>Test Performed by:</u> 1.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer Signature: <i>Alam</i> 16.01.2023 2.) Name: Taslima Akhter Designation: Sample Analyzer Signature: <i>Taslima</i> 16.01.2023		<u>Countersigned/Approved by:</u> 1.) Name: Mita Sarker Designation: Senior Chemist Signature: <i>Mita Sarker</i> 16/01/2023 2.) Name: Md. Biplab Hossain Designation: Chief Chemist Signature: <i>Biplab Hossain</i> 16/01/2023 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory, Mohakhali, Dhaka				

	Government of the People's Republic of Bangladesh Office of the Chief Chemist Department of Public Health Engineering Central Lab, 38-39, Mohakhali C/A, Dhaka-1212 Phone: 88-02-9881927, Fax: 88-02-9882003, Email: wqmsc_central_lab@yahoo.com	
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Lab Memo: 670/ CC, DPHE, CL, Dhaka

Date: 16-01-2023

Physical /Chemical/ Bacteriological Analysis of Water Sample

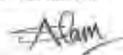
Sample ID: CEN2023010105	Sample Receiving date: 21-12-2022
Ref. Memo No: PSPS/2022/N/11 & Dated: 21-12-2022	Sample Source: Production Tube Well
Sent by: Mohammad Mofazzal Hoque, Deputy Team Leader, PSPS, UIIPF-NCC, Narayanganj.	Dist: Narayanganj, Upa: Narayanganj City Corporation
Care Taker: Narayanganj City Corporation (Sample : 05)	Union:, Vill.: Pashim Tallah PTW, Ward-11
Sample Collection date:	Data of Testing: 21/12/2022-15/01/2023

LABORATORY TEST RESULTS:

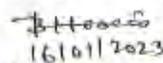
Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Ammonia	0.5	0.10	mg/L	UVS	0.10
2	Biochemical Oxygen Demand (BOD)	0.2	11	mg/L	5 days incubation	0.1
3	Chemical Oxygen Demand (COD)	4.0	40	mg/L	CRM	-
4	Coliform (Faecal)	0	0	N/100ml	MFM	-
5	Colour	15	1.2	Hazen	UVS	-
6	Cr (Total)	0.05	0.008	mg/L	AAS	0.0003
7	EC	-	366	µS/cm	Multimeter	-
8	Hardness	200-500	140	mg/L	Titrimetic	-
9	Iron (Fe)	0.3-1	0.37	mg/L	AAS	0.05
10	Manganese (Mn)	0.1	0.48	mg/L	AAS	0.03
11	Nitrogen (Nitrate)	10.0	1.9	mg/L	UVS	0.10
12	pH	6.5-8.5	7.2	-	pH Meter	-
13	Phosphate	6.0	0.20	mg/L	UVS	0.10
14	Salinity	-	0.18	‰	Multimeter	-
15	Total Dissolved Solid (TDS)	1000	183	mg/L	Multimeter	-
16	Turbidity	10	2.0	NTU	Turbidity Meter	-

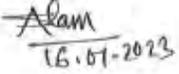
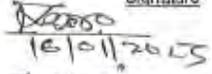
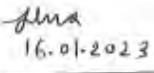
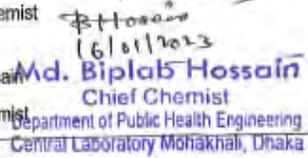
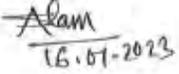
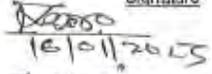
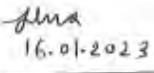
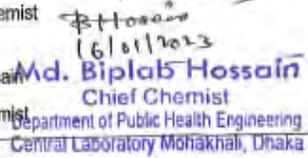
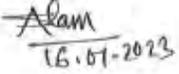
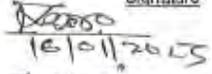
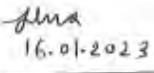
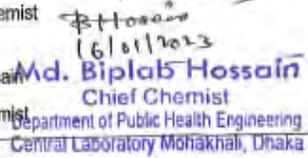
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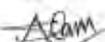
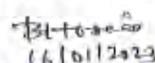
N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, MFM-Membrane Filtration Method, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.

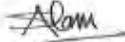
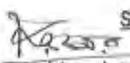
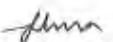
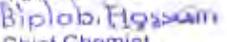
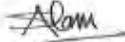
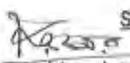
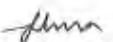
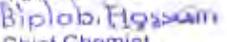
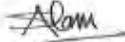
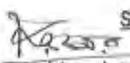
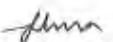
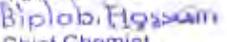





 16/01/2023
Md. Biplab Hossain
 Chief Chemist
 Department of Public Health Engineering
 Central Laboratory Mohakhali, Dhaka

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ																
<table border="1"> <thead> <tr> <th colspan="2">Test Performed by:</th> <th colspan="2">Countersigned/Approved by:</th> </tr> <tr> <th>Name</th> <th>Signature</th> <th>Name</th> <th>Signature</th> </tr> </thead> <tbody> <tr> <td>1.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer</td> <td> 16.01.2023</td> <td>1.) Name: Mita Sarker Designation: Senior Chemist</td> <td> 16/01/2023</td> </tr> <tr> <td>2.) Name: Taslima Akhter Designation: Sample Analyzer</td> <td> 16.01.2023</td> <td>2.) Name: Md. Biplab Hossain Designation: Chief Chemist</td> <td> 16/01/2023 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka</td> </tr> </tbody> </table>							Test Performed by:		Countersigned/Approved by:		Name	Signature	Name	Signature	1.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer	 16.01.2023	1.) Name: Mita Sarker Designation: Senior Chemist	 16/01/2023	2.) Name: Taslima Akhter Designation: Sample Analyzer	 16.01.2023	2.) Name: Md. Biplab Hossain Designation: Chief Chemist	 16/01/2023 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka
Test Performed by:		Countersigned/Approved by:																				
Name	Signature	Name	Signature																			
1.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer	 16.01.2023	1.) Name: Mita Sarker Designation: Senior Chemist	 16/01/2023																			
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Lab Memo: 670/ CC, DPHE, CL, Dhaka		Date: 16-01-2023				
Physical /Chemical/ Bacteriological Analysis of Water Sample						
Sample ID: CEN2023010106	Sample Receiving date: 21-12-2022					
Ref. Memo No: PSPS/2022/Nilil & Dated: 21-12-2022	Sample Source: Production Tube Well					
Sent by: Mohammad Mofazzal Hoque, Deputy Team Leader, PSPS, UIIPF-NCC, Narayanganj.	Dist: Narayanganj, Upa: Narayanganj City Corporation					
Care Taker: Narayanganj City Corporation (Sample : 06)	Union: Vill.: Tat Khana Chowduribari PTW, Ward-08					
Sample Collection date:	Date of Testing: 21/12/2022-15/01/2023					
LABORATORY TEST RESULTS:						
Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Ammonia	0.5	0.12	mg/L	UVS	0.10
2	Biochemical Oxygen Demand (BOD)	0.2	5	mg/L	5 days Incubation	0.1
3	Chemical Oxygen Demand (COD)	4.0	24	mg/L	CRM	-
4	Coliform (Faecal)	0	0	N/100ml	MFM	-
5	Colour	15	0.96	Hazen	UVS	-
6	Cr (Total)	0.05	0.010	mg/L	AAS	0.0003
7	EC	-	1550	μS/cm	Multimeter	-
8	Hardness	200-500	2100	mg/L	Titrimetic	-
9	Iron (Fe)	0.3-1	0.20	mg/L	AAS	0.05
10	Manganese (Mn)	0.1	2.04	mg/L	AAS	0.03
11	Nitrogen (Nitrate)	10.0	0.10	mg/L	UVS	0.10
12	pH	6.5-8.5	6.3	-	pH Meter	-
13	Phosphate	6.0	0.26	mg/L	UVS	0.10
14	Salinity	-	0.78	‰	Multimeter	-
15	Total Dissolved Solid (TDS)	1000	776	mg/L	Multimeter	-
16	Turbidity	10	1.1	NTU	Turbidity Meter	-
Comments: Sample was collected & supplied by client. N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, MFM-Membrane Filtration Method, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.						
  			 16/01/2023 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka			
Page 1 of 2						

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ																
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Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka																						

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Lab Memo: 670/ CC, DPHE, CL, Dhaka

Date: 16-01-2023

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2023010107	Sample Receiving date: 21-12-2022.
Ref. Memo No: PSPS/2022/Nil & Dated: 21-12-2022	Sample Source: Production Tube Well
Sent by: Mohammad Mofazzal Hoque, Deputy Team Leader, PSPS, UIIPF-NCC, Narayanganj.	Dist: Narayanganj, Upa: Narayanganj City Corporation
Care Taker: Narayanganj City Corporation (Sample : 07)	Union:, Vill.: Patantuli PTW, Ward-08
Sample Collection date:	Date of Testing: 21/12/2022-15/01/2023

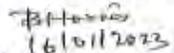
LABORATORY TEST RESULTS:

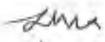
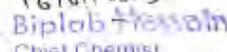
Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Ammonia	0.5	0.11	mg/L	UVS	0.10
2	Biochemical Oxygen Demand (BOD)	0.2	2	mg/L	5 days Incubation	0.1
3	Chemical Oxygen Demand (COD)	4.0	8	mg/L	CRM	-
4	Coliform (Faecal)	0	0	N/100ml	MFM	-
5	Colour	15	0.90	Hazen	UVS	-
6	Cr (Total)	0.05	0.009	mg/L	AAS	0.0003
7	EC	-	415	µS/cm	Multimeter	-
8	Hardness	200-500	160	mg/L	Titrimetic	-
9	Iron (Fe)	0.3-1	0.26	mg/L	AAS	0.05
10	Manganese (Mn)	0.1	0.08	mg/L	AAS	0.03
11	Nitrogen (Nitrate)	10.0	0.10	mg/L	UVS	0.10
12	pH	6.5-8.5	7.1	-	pH Meter	-
13	Phosphate	6.0	0.27	mg/L	UVS	0.10
14	Salinity	-	0.21	‰	Multimeter	-
15	Total Dissolved Solid (TDS)	1000	207	mg/L	Multimeter	-
16	Turbidity	10	0.80	NTU	Turbidity Meter	-

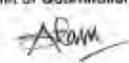
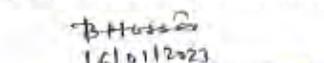
Comments: Sample was collected & supplied by client.

N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, MFM-Membrane Filtration Method, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.

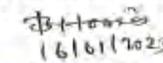
*Atam**Alma**Jam*


 16/01/2023
Md. Biplab Hossain
 Chief Chemist
 Department of Public Health Engineering
 Central Laboratory Mohakhali, Dhaka

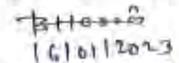
Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
<u>Test Performed by:</u> 1.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer Signature:  16.01.2023		<u>Countersigned/Approved by:</u> 1.) Name: Mita Sarker Designation: Senior Chemist Signature:  16/01/2023				
2.) Name: Taslima Akhter Designation: Sample Analyzer Signature:  16.01.2023		2.) Name: Md. Biplab Hossain Designation: Chief Chemist Signature:  16/01/2023 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka				

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Lab Memo: 870/ CC, DPHE, CL, Dhaka		Date: 16-01-2023				
Physical /Chemical/ Bacteriological Analysis of Water Sample						
Sample ID: CEN2023010108	Sample Receiving date: 21-12-2022					
Ref. Memo No: PSPS/2022/Nilf & Dated: 21-12-2022	Sample Source: Production Tube Well					
Sent by: Mohammad Mofazzal Hoque, Deputy Team Leader, PSPS, UIIPF-NCC, Narayanganj.	Dist: Narayanganj, Upa: Narayanganj City Corporation					
Care Taker: Narayanganj City Corporation (Sample : 08)	Union:, Vill.: Niltaigonj PTW, Ward-15					
Sample Collection date:	Date of Testing: 21/12/2022-15/01/2023					
LABORATORY TEST RESULTS:						
Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Ammonia	0.5	0.12	mg/L	UVS	0.10
2	Biochemical Oxygen Demand (BOD)	0.2	1	mg/L	5 days Incubation	0.1
3	Chemical Oxygen Demand (COD)	4.0	4	mg/L	CRM	-
4	Coliform (Faecal)	0	0	N/100ml	MFM	-
5	Colour	15	0.97	Hazen	UVS	-
6	Cr (Total)	0.05	0.011	mg/L	AAS	0.0003
7	EC	-	410	µS/cm	Multimeter	-
8	Hardness	200-500	205	mg/L	Titrimetic	-
9	Iron (Fe)	0.3-1	0.64	mg/L	AAS	0.05
10	Manganese (Mn)	0.1	0.24	mg/L	AAS	0.03
11	Nitrogen (Nitrate)	10.0	0.70	mg/L	UVS	0.10
12	pH	6.5-8.5	7.1	-	pH Meter	-
13	Phosphate	6.0	0.38	mg/L	UVS	0.10
14	Salinity	-	0.21	‰	Multimeter	-
15	Total Dissolved Solid (TDS)	1000	205	mg/L	Multimeter	-
16	Turbidity	10	1.1	NTU	Turbidity Meter	-
Comments: Sample was collected & supplied by client. N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, MFM-Membrane Filtration Method, CRM-Closed Reflex. Methods, LOQ - Limit of Quantitation.						
				 16/01/2023 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka		
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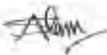
Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
<u>Test Performed by:</u> 1.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer Signature: <i>Alam</i> 16.01.2023 2.) Name: Taslima Akhter Designation: Sample Analyzer Signature: <i>Taslima</i> 16.01.2023		<u>Countersigned/Approved by:</u> 1.) Name: Mita Sarker Designation: Senior Chemist Signature: <i>Mita Sarker</i> 16/01/2023 2.) Name: Md. Biplab Hossain Designation: Chief Chemist Signature: <i>Md. Biplab Hossain</i> 16/01/2023 Department of Public Health Engineering Central Laboratory, Mirsharai, Dhaka				

	Government of the People's Republic of Bangladesh Office of the Chief Chemist Department of Public Health Engineering Central Lab, 38-39, Mohakhali C/A, Dhaka-1212 Phone: 88-02-9881927, Fax: 88-02-9882003, Email: wqmsc_central_lab@yahoo.com					
Lab Memo: 670/ CC, DPHE, CL, Dhaka		Date: 18-01-2023				
Physical /Chemical/ Bacteriological Analysis of Water Sample						
Sample ID: CEN2023010109	Sample Receiving date: 21-12-2022					
Ref. Memo No: PSPS/2022/Nil & Dated: 21-12-2022	Sample Source: Production Tube Well					
Sent by: Mohammad Mofazzal Hoque, Deputy Team Leader, PSPS, UIIPF-NCC, Narayanganj.	Dist: Narayanganj, Upa: Narayanganj City Corporation					
Caro Taker: Narayanganj City Corporation (Sample : 09)	Union:, Vill.: Masdalr PTW, Ward-12					
Sample Collection date:	Date of Testing: 21/12/2022-15/01/2023					
LABORATORY TEST RESULTS:						
Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Ammonia	0.5	0.10	mg/L	UVS	0.10
2	Biochemical Oxygen Demand (BOD)	0.2	2	mg/L	5 days Incubation	0.1
3	Chemical Oxygen Demand (COD)	4.0	8	mg/L	CRM	-
4	Coliform (Faecal)	0	20	N/100ml	MFM	-
5	Colour	15	0.92	Hazen	UVS	-
6	Cr (Total)	0.05	0.008	mg/L	AAS	0.0003
7	EC	-	510	µS/cm	Multimeter	-
8	Hardness	200-500	140	mg/L	Titrimetic	-
9	Iron (Fe)	0.3-1	0.31	mg/L	AAS	0.05
10	Manganese (Mn)	0.1	0.17	mg/L	AAS	0.03
11	Nitrogen (Nitrate)	10.0	1.5	mg/L	UVS	0.10
12	pH	6.5-8.5	7.0	-	pH Meter	-
13	Phosphate	6.0	0.46	mg/L	UVS	0.10
14	Salinity	-	0.26	‰	Multimeter	-
15	Total Dissolved Solid (TDS)	1000	255	mg/L	Multimeter	-
16	Turbidity	10	0.8	NTU	Turbidity Meter	-
Comments: Sample was collected & supplied by client. N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, MFM-Membrane Filtration Method, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.						
  		 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka				
Page 1 of 2						

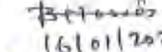
Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
<u>Test Performed by:</u> 1.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer Signature: <i>Alam</i> 16.01.2023 2.) Name: Taslima Akhter Designation: Sample Analyzer Signature: <i>Taslima</i> 16.01.2023		<u>Countersigned/Approved by:</u> 1.) Name: Mita Sarker Designation: Senior Chemist Signature: <i>Mita Sarker</i> 16/01/2023 2.) Name: Md. Biplab Hossain Designation: Chief Chemist Signature: <i>Md. Biplab Hossain</i> 16/01/2023 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka				

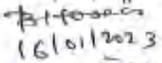
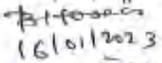
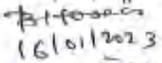
	Government of the People's Republic of Bangladesh Office of the Chief Chemist Department of Public Health Engineering Central Lab, 38-39, Mohakhali C/A, Dhaka-1212 Phone: 88-02-9881927, Fax: 88-02-9882003, Email: wqmsc_central_lab@yahoo.com					
Lab Memo: 670/ CC, DPHE, CL, Dhaka		Date: 16-01-2023				
Physical /Chemical/ Bacteriological Analysis of Water Sample						
Sample ID: CEN2023010110	Sample Receiving date: 21-12-2022					
Ref. Memo No: PSPS/2022/Nil & Dated: 21-12-2022	Sample Source: Production Tube Well					
Sent by: Mohammed Mofazzal Hoque, Deputy Team Leader, PSPS, UIIPF-NCC, Narayanganj.	Dist: Narayanganj, Upa: Narayanganj City Corporation					
Care Taker: Narayanganj City Corporation (Sample :10)	Union:, Vill.: Arambagh PTW, Ward-10					
Sample Collection date:	Date of Testing: 21/12/2022-15/01/2023					
LABORATORY TEST RESULTS:						
Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Ammonia	0.5	0.10	mg/L	UVS	0.10
2	Biochemical Oxygen Demand (BOD)	0.2	1	mg/L	5 days incubation	0.1
3	Chemical Oxygen Demand (COD)	4.0	4	mg/L	CRM	-
4	Coliform (Faecal)	0	2	N/100ml	UVS	0
5	Colour	15	0.90	Hazen	UVS	-
6	Cr (Total)	0.05	0.016	mg/L	AAS	0.0003
7	EC	-	1840	µS/cm	Multimeter	-
8	Hardness	200-500	2350	mg/L	Titrimetic	-
9	Iron (Fe)	0.3-1	0.23	mg/L	AAS	0.05
10	Manganese (Mn)	0.1	1.97	mg/L	AAS	0.03
11	Nitrogen (Nitrate)	10.0	0.80	mg/L	UVS	0.10
12	pH	6.5-8.5	6.5	-	pH Meter	-
13	Phosphate	6.0	0.40	mg/L	UVS	0.10
14	Salinity	-	0.92	‰	Multimeter	-
15	Total Dissolved Solid (TDS)	1000	920	mg/L	Multimeter	-
16	Turbidity	10	1.3	NTU	Turbidity Meter	-
Comments: Sample was collected & supplied by client. N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, MFM-Membrane Filtration Method, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.						
			 16/01/2023 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka			
Page 1 of 2						

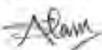
Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
<u>Test Performed by:</u> 1.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer Signature: <i>[Signature]</i> 16.07.2023		<u>Countersigned/Approved by:</u> 1.) Name: Mita Sarker Designation: Senior Chemist Signature: <i>[Signature]</i> 16/07/2023 2.) Name: Md. Biplab Hossain Designation: Chief Chemist Signature: <i>[Signature]</i> 16/07/2023 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka				

	Government of the People's Republic of Bangladesh Office of the Chief Chemist Department of Public Health Engineering Central Lab, 38-39, Mohakhali C/A, Dhaka-1212 Phone: 88-02-9881927, Fax: 88-02-9882003, Email: wpmcsc_central_lab@yahoo.com					
Lab Memo: 670/ CC, DPHE, CL, Dhaka		Date: 16-01-2023				
Physical /Chemical/ Bacteriological Analysis of Water Sample						
Sample ID: CEN2023010111	Sample Receiving date: 21-12-2022					
Ref. Memo No: PSPS/2022/Nill & Dated: 21-12-2022	Sample Source: Production Tube Well					
Sent by: Mohammad Mofazzal Hoque, Deputy Team Leader, PSPS, UIIPF-NCC, Narayanganj.	Dist: Narayanganj, Upa: Narayanganj City Corporation					
Care Taker: Narayanganj City Corporation (Sample :11)	Union:, Vill.: Dhonkunda PTW, Ward-8					
Sample Collection date:	Date of Testing: 21/12/2022-15/01/2023					
LABORATORY TEST RESULTS:						
Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Ammonia	0.5	0.10	mg/L	UVS	0.10
2	Biochemical Oxygen Demand (BOD)	0.2	2	mg/L	5 days incubation	0.1
3	Chemical Oxygen Demand (COD)	4.0	8	mg/L	CRM	-
4	Coliform (Faecal)	0	0	N/100ml	MFM	-
5	Colour	15	0.98	Hazen	UVS	-
6	Cr (Total)	0.05	0.008	mg/L	AAS	0.0003
7	EC	-	1245	µS/cm	Multimeter	-
8	Hardness	200-500	1300	mg/L	Titrimetic	-
9	Iron (Fe)	0.3-1	0.42	mg/L	AAS	0.05
10	Manganese (Mn)	0.1	2.06	mg/L	AAS	0.03
11	Nitrogen (Nitrate)	10.0	0.70	mg/L	UVS	0.10
12	pH	6.5-8.5	7.1	-	pH Meter	-
13	Phosphate	6.0	0.17	mg/L	UVS	0.10
14	Salinity	-	0.62	‰	Multimeter	-
15	Total Dissolved Solid (TDS)	1000	622	mg/L	Multimeter	-
16	Turbidity	10	1.0	NTU	Turbidity Meter	-
Comments: Sample was collected & supplied by client. N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, MFM-Membrane Filtration Method, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.						
			 16/01/2023 Md. Biplob Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka			
Page 1 of 2						

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
Test Performed by: 1.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer Signature: <i>Alam</i> 16.01.2023		Countersigned/Approved by: 1.) Name: Mita Sarker Designation: Senior Chemist Signature: <i>Mita Sarker</i> 16/01/2023				
2.) Name: Taslima Akhter Designation: Sample Analyzer Signature: <i>Taslima</i> 16.01.2023		2.) Name: Md. Biplab Hossain Designation: Chief Chemist Signature: <i>Md. Biplab Hossain</i> 16/01/2023 Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka				

	Government of the People's Republic of Bangladesh Office of the Chief Chemist Department of Public Health Engineering Central Lab, 38-39, Mohakhali C/A, Dhaka-1212 Phone: 88-02-9881927, Fax: 88-02-9882003, Email: wqmsc_central_lab@yahoo.com					
Lab Memo: 670/ CC, DPHE, CL, Dhaka		Date: 16-01-2023				
Physical /Chemical/ Bacteriological Analysis of Water Sample						
Sample ID: CEN2023010112	Sample Receiving date: 21-12-2022					
Ref. Memo No: PSPS/2022/NIH & Dated: 21-12-2022	Sample Source: Production Tube Well					
Sent by: Mohammad Mofazzal Hoque, Deputy Team Leader, PSPS, UIIPF-NCC, Narayanganj.	Dist: Narayanganj, Upa: Narayanganj City Corporation					
Care Taker: Narayanganj City Corporation (Sample :12)	Union:, Vill.: Khanpur Bank Colony PTW, Ward-12					
Sample Collection date:	Date of Testing: 21/12/2022-15/01/2023					
LABORATORY TEST RESULTS:						
Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Ammonia	0.5	0.12	mg/L	UVS	0.10
2	Biochemical Oxygen Demand (BOD)	0.2	7	mg/L	5 days Incubation	0.1
3	Chemical Oxygen Demand (COD)	4.0	24	mg/L	CRM	-
4	Coliform (Faecal)	0	0	N/100ml	MFM	-
5	Colour	15	0.97	Hazen	UVS	-
6	Cr (Total)	0.05	0.012	mg/L	AAS	0.0003
7	EC	-	320	µS/cm	Multimeter	-
8	Hardness	200-500	195	mg/L	Titrimetic	-
9	Iron (Fe)	0.3-1	0.46	mg/L	AAS	0.05
10	Manganese (Mn)	0.1	0.06	mg/L	AAS	0.03
11	Nitrogen (Nitrate)	10.0	2.3	mg/L	UVS	0.10
12	pH	6.5-8.5	7.1	-	pH Meter	-
13	Phosphate	6.0	0.13	mg/L	UVS	0.10
14	Salinity	-	0.16	‰	Multimeter	-
15	Total Dissolved Solid (TDS)	1000	160	mg/L	Multimeter	-
16	Turbidity	10	1.0	NTU	Turbidity Meter	-
Comments: Sample was collected & supplied by client.						
N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, MFM-Membrane Filtration Method, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.						
				 16/01/2023 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka		
Page 1 of 2						

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ																
<table border="1"> <thead> <tr> <th colspan="2">Test Performed by:</th> <th colspan="2">Countersigned/Approved by:</th> </tr> <tr> <th>Name</th> <th>Signature</th> <th>Name</th> <th>Signature</th> </tr> </thead> <tbody> <tr> <td>1.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer</td> <td> 16.01.2023</td> <td>1.) Name: Mita Sarker Designation: Senior Chemist</td> <td> 16/01/2023</td> </tr> <tr> <td>2.) Name: Taslima Akhter Designation: Sample Analyzer</td> <td> 16.01.2023</td> <td>2.) Name: Md. Biplab Hossain Designation: Chief Chemist</td> <td> Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka</td> </tr> </tbody> </table>							Test Performed by:		Countersigned/Approved by:		Name	Signature	Name	Signature	1.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer	 16.01.2023	1.) Name: Mita Sarker Designation: Senior Chemist	 16/01/2023	2.) Name: Taslima Akhter Designation: Sample Analyzer	 16.01.2023	2.) Name: Md. Biplab Hossain Designation: Chief Chemist	 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka
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	Government of the People's Republic of Bangladesh Office of the Chief Chemist Department of Public Health Engineering Central Lab, 38-39, Mohakhali C/A, Dhaka-1212 Phone: 88-02-8881927, Fax: 88-02-8882003, Email: wqmsc_central_lab@yahoo.com																																																																																																																								
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Sample ID: CEN2023010115	Sample Receiving date: 21-12-2022																																																																																																																								
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Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LCQ
<u>Test Performed by:</u> 1.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer Signature: <i>[Signature]</i> 16.01.2023		<u>Countersigned/Approved by:</u> 1.) Name: Mita Sarker Designation: Senior Chemist Signature: <i>[Signature]</i> 16/01/2023 2.) Name: Md. Biplab Hossain Designation: Chief Chemist Signature: <i>[Signature]</i> 16/01/2023 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka				

	Government of the People's Republic of Bangladesh Office of the Chief Chemist Department of Public Health Engineering Central Lab, 38-39, Mohakhali C/A, Dhaka-1212 Phone: 88-02-9681927, Fax: 88-02-9682003, Email: wqmsc_central_lab@yahoo.com	
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Lab Memo: 670/ CC, DPHE, CL, Dhaka

Date: 16-01-2023

Physical /Chemical/ Bacteriological Analysis of Water Sample

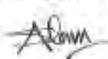
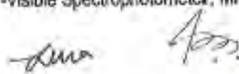
Sample ID: CEN2023010114	Sample Receiving date: 21-12-2022
Ref. Memo No: PSPS/2022/N/II & Dated: 21-12-2022	Sample Source: Production Tube Well
Sent by: Mohammad Mofazzal Hoque, Deputy Team Leader, PSPS, UIIPF-NCC, Narayanganj.	Dist: Narayanganj, Upa: Narayanganj City Corporation
Care Taker: Narayanganj City Corporation (Sample :14)	Union:, Vill.: Godnail WW PTW, Ward-10
Sample Collection date:	Date of Testing: 21/12/2022-15/01/2023

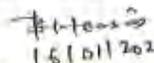
LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Ammonia	0.5	0.10	mg/L	UVS	0.10
2	Biochemical Oxygen Demand (BOD)	0.2	2	mg/L	5 days incubation	0.1
3	Chemical Oxygen Demand (COD)	4.0	8	mg/L	CRM	-
4	Coliform (Faecal)	0	2	N/100ml	MFM	-
5	Colour	15	0.96	Hazen	UVS	-
6	Cr (Total)	0.05	0.007	mg/L	AAS	0.0003
7	EC	-	760	µS/cm	Multimeter	-
8	Hardness	200-500	230	mg/L	Titrimetic	-
9	Iron (Fe)	0.3-1	0.60	mg/L	AAS	0.05
10	Manganese (Mn)	0.1	1.31	mg/L	AAS	0.03
11	Nitrogen (Nitrate)	10.0	1.1	mg/L	UVS	0.10
12	pH	6.5-8.5	6.8	-	pH Meter	-
13	Phosphate	6.0	0.25	mg/L	UVS	0.10
14	Salinity	-	0.38	‰	Multimeter	-
15	Total Dissolved Solid (TDS)	1000	380	mg/L	Multimeter	-
16	Turbidity	10	1.7	NTU	Turbidity Meter	-

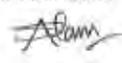
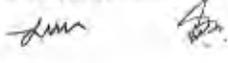
Comments: Sample was collected & supplied by client.

N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, MFM-Membrane Filtration Method, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.

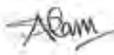
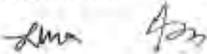




 16/01/2023
Md. Biplab Hossain
 Chief Chemist
 Department of Public Health Engineering
 Central Laboratory Mohakhali, Dhaka

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LCQ
Test Performed by: 1.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer Signature: <i>Alam</i> 16.07.2023 2.) Name: Taslima Akhter Designation: Sample Analyzer Signature: <i>Taslima</i> 16.07.2023		Countersigned/Approved by: 1.) Name: Mita Sarker Designation: Senior Chemist Signature: <i>Mita Sarker</i> 16/07/2023 2.) Name: Md. Biplab Hossain Designation: Chief Chemist Signature: <i>Md. Biplab Hossain</i> 16/07/2023 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka				

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Lab Memo: 670/ CC, DPHE, CL, Dhaka		Date: 16-01-2023				
Physical /Chemical/ Bacteriological Analysis of Water Sample						
Sample ID: CEN2023010115	Sample Receiving date: 21-12-2022					
Ref. Memo No: PSPS/2022/Nill & Dated: 21-12-2022	Sample Source: Production Tube Well					
Sent by: Mohammad Mofazzal Hoque, Deputy Team Leader, PSPS, UIIPF-NCC, Narayanganj.	Dist: Narayanganj, Upa: Narayanganj City Corporation					
Care Taker: Narayanganj City Corporation (Sample :15)	Union:, Vill.: Dhonkunda New PTW, Ward-8					
Sample Collection date:	Date of Testing: 21/12/2022-15/01/2023					
LABORATORY TEST RESULTS:						
Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Ammonia	0.5	0.14	mg/L	UVS	0.10
2	Biochemical Oxygen Demand (BOD)	0.2	1	mg/L	5 days Incubation	0.1
3	Chemical Oxygen Demand (COD)	4.0	4	mg/L	CRM	-
4	Coliform (Faecal)	0	0	N/100ml	MFM	-
5	Colour	15	1.1	Hazen	UVS	-
6	Cr (Total)	0.05	0.009	mg/L	AAS	0.0003
7	EC	-	980	µS/cm	Multimeter	-
8	Hardness	200-500	307	mg/L	Titrimetic	-
9	Iron (Fe)	0.3-1	0.76	mg/L	AAS	0.05
10	Manganese (Mn)	0.1	1.35	mg/L	AAS	0.03
11	Nitrogen (Nitrate)	10.0	0.40	mg/L	UVS	0.10
12	pH	6.5-8.5	6.7	-	pH Meter	-
13	Phosphate	6.0	0.13	mg/L	UVS	0.10
14	Salinity	-	0.49	‰	Multimeter	-
15	Total Dissolved Solid (TDS)	1000	490	mg/L	Multimeter	-
16	Turbidity	10	6.5	NTU	Turbidity Meter	-
Comments: Sample was collected & supplied by client. N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, MFM-Membrane Filtration Method, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.						
			 Md. Biplob Hossain 16/01/2023 Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka			
Page 1 of 2						

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
<u>Test Performed by:</u> 1.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer Signature: <i>Alam</i> 16.07.2023 2.) Name: Taslima Akhter Designation: Sample Analyzer Signature: <i>Taslima</i> 16.07.2023		<u>Countersigned/Approved by:</u> 1.) Name: Mita Sarker Designation: Senior Chemist Signature: <i>Mita Sarker</i> 16/07/2023 2.) Name: Md. Biplab Hossain Designation: Chief Chemist Signature: <i>Biplab Hossain</i> 16/07/2023 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory, Mohakhali, Dhaka				

	Government of the People's Republic of Bangladesh Office of the Chief Chemist Department of Public Health Engineering Central Lab, 38-39, Mohakhali C/A, Dhaka-1212 Phone: 88-02-9581927, Fax: 88-02-9382003, Email: wqmsc_central_lab@yahoo.com					
Lab Memo: 670/ CC, DPHE, CL, Dhaka		Date: 16-01-2023				
Physical /Chemical/ Bacteriological Analysis of Water Sample						
Sample ID: CEN2023010116	Sample Receiving date: 21-12-2022					
Ref. Memo No: PSPS/2022/Nil & Dated: 21-12-2022	Sample Source: Production Tube Well					
Sent by: Mohammad Mofazzal Hoque ,Deputy Team Leader , PSPS, UIIPF-NCC, Narayanganj.	Dist:Narayanganj, Upa:Narayanganj City Corporation					
Care Taker: Narayanganj City Corporation (Sample :16)	Union: Vill.:Talia Boro Mosque PTW,Ward-11					
Sample Collection date:	Date of Testing: 21/12/2022-15/01/2023					
LABORATORY TEST RESULTS:						
Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Ammonia	0.5	0.12	mg/L	UVS	0.10
2	Biochemical Oxygen Demand (BOD)	0.2	1	mg/L	5 days incubation	0.1
3	Chemical Oxygen Demand (COD)	4.0	4	mg/L	CRM	-
4	Coliform (Faecal)	0	0	N/100ml	MFM	-
5	Colour	15	0.98	Hazen	UVS	-
6	Cr (Total)	0.05	0.006	mg/L	AAS	0.0003
7	EC	-	350	µS/cm	Multimeter	-
8	Hardness	200-500	180	mg/L	Titrimetic	-
9	Iron (Fe)	0.3-1	0.55	mg/L	AAS	0.05
10	Manganese (Mn)	0.1	0.50	mg/L	AAS	0.03
11	Nitrogen (Nitrate)	10.0	0.70	mg/L	UVS	0.10
12	pH	6.5-8.5	7.1	-	pH Meter	-
13	Phosphate	6.0	0.19	mg/L	UVS	0.10
14	Salinity	-	0.18	‰	Multimeter	-
15	Total Dissolved Solid (TDS)	1000	175	mg/L	Multimeter	-
16	Turbidity	10	2.1	NTU	Turbidity Meter	-
Comments: Sample was collected & supplied by client. N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, MFM-Membrane Filtration Method, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.						
			 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka			
Page 1 of 2						

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
Test Performed by: 1.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer Signature: <i>[Signature]</i> 16.01.2023		Countersigned/Approved by: 1.) Name: Mita Sarker Designation: Senior Chemist Signature: <i>[Signature]</i> 16/01/2023 2.) Name: Md. Biplab Hossain Designation: Chief Chemist Signature: <i>[Signature]</i> 16/01/2023 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory, Mohakhali, Dhaka				

	Government of the People's Republic of Bangladesh Office of the Chief Chemist Department of Public Health Engineering Central Lab, 38-39, Mohakhali C/A, Dhaka-1212 Phone: 88-02-9881927, Fax: 88-02-9882003, Email: wqmsc_central_lab@yahoo.com	
---	--	---

Lab Memo: 670/ CC, DPHE, CL, Dhaka

Date: 16-01-2023

Physical /Chemical/ Bacteriological Analysis of Water Sample

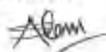
Sample ID: GEN2023010117	Sample Receiving date: 21-12-2022
Ref. Memo No: PSPS/2022/NIII & Dated: 21-12-2022	Sample Source: Production Tube Well
Sent by: Mohammad Mofazzal Hoque, Deputy Team Leader, PSPS, UIIPF-NCC, Narayanganj.	Dist: Narayanganj, Upa: Narayanganj City Corporation
Care Taker: Narayanganj City Corporation (Sample :17)	Union:, Vill.: Baghpara, Ward-10
Sample Collection date:	Date of Testing: 21/12/2022-15/01/2023

LABORATORY TEST RESULTS:

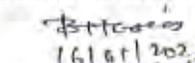
Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Ammonia	0.5	0.19	mg/L	UVS	0.10
2	Biochemical Oxygen Demand (BOD)	0.2	7	mg/L	5 days Incubation	0.1
3	Chemical Oxygen Demand (COD)	4.0	32	mg/L	CRM	-
4	Coliform (Faecal)	0	0	N/100ml	MFM	-
5	Colour	15	2.3	Hazen	UVS	-
6	Cr (Total)	0.05	0.014	mg/L	AAS	0.0003
7	EC	-	2750	μS/cm	Multimeter	-
8	Hardness	200-500	2600	mg/L	Titrimetic	-
9	Iron (Fe)	0.3-1	3.60	mg/L	AAS	0.05
10	Manganese (Mn)	0.1	5.21	mg/L	AAS	0.03
11	Nitrogen (Nitrate)	10.0	0.10	mg/L	UVS	0.10
12	pH	6.5-8.5	6.5	-	pH Meter	-
13	Phosphate	6.0	0.44	mg/L	UVS	0.10
14	Salinity	-	1.38	‰	Multimeter	-
15	Total Dissolved Solid (TDS)	1000	1375	mg/L	Multimeter	-
16	Turbidity	10	35.2	NTU	Turbidity Meter	-

Comments: Sample was collected & supplied by client.

N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, MFM-Membrane Filtration Method, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.






 16/01/2023
Md. Biplab Hossain
 Chief Chemist
 Department of Public Health Engineering
 Central Laboratory Mohakhali, Dhaka

Appendix 5: Copies of Laboratory Analysis Results on Ambient Air Quality

EQMS

Ref: EQMS/Air Quality/ 20230205227

EQMS ENVIRONMENTAL LABORATORY
Monitoring Results of Ambient Air Quality

Project Name : Urban Infrastructure Improvement Preparatory Facility (UIIPF)
 Monitoring Activity : Ambient Air Quality (Working Day)
 Monitoring Personnel : EQMS Inspection Team
 Monitoring Location :

SL No	GPS Coordinate	Location Name
1	23°36'5.48"N 90°29'50.01"E	Ranada Prasad Saha University, 12 Sahed Bappi Sharoni, Narayanganj
2	23°36'41.67"N 90°29'44.81"E	Bara Dewbhog, 1 Mobarak Shah Rd, Narayanganj
3	23°37'55.85"N 90°30'11.56"E	Shirin Seina Home, Narayanganj
4	-	-
5	23°40'59.39"N 90°29'58.41"E	Chairman Bari, Siddhirganj
6	23°40'40.09"N 90°31'25.46"E	Adamjee EPZ Road, Siddhirganj
7	23°34'42.2"N 90°30'41.3"E	Crown Cement Factory Ltd. Road, Muktarpur, Narayanganj
8	23°37'24.88"N 90°30'46.23"E	AKU Flour Mills Limited, Nabiganj, Narayanganj

Monitoring Date : 25.01.2022 - 04.02.2023
 Reporting Date : 14.02.2023



 P.T.O





Head Office: H # 33, R # 04, B # C, Sarani, Dhaka -1213, Bangladesh
 Lab Office: Bar # F1, House # 3a-134A, Babupatti (Sarai), Gulshan-Badda (1st Road), Dhaka - 1202
 Toronto Office: 7 Annet Street, Scarborough, Ontario, M1H4B5 Canada









Ref: EQMS/Air Quality/ 20230205227

Description of Analysis:

Location	Sampling Date	Ambient Air Pollutants' Concentration in $\mu\text{g}/\text{m}^3$							CO mg/m^3
		PM ₁₀	PM _{2.5}	SO ₂	NO ₂	Pb	NH ₃	O ₃	
AQ1	25.01.2023	353.87	177.43	30.25	61.79	0.031	2.48	41.39	2.33
AQ2	25.01.2023	133.28	101.35	30.19	33.98	BDL	0.00	21.71	0.15
AQ3	26.01.2023	182.85	122.97	27.68	52.24	0.070	0.00	13.02	0.20
AQ4	-	-	-	-	-	-	-	-	-
AQ5	01.02.2023	108.18	68.33	14.49	22.18	0.068	0.00	42.90	0.31
AQ6	01.02.2023	190.75	98.89	105.67	75.63	0.059	6.04	29.11	1.80
AQ7	02.02.2023	205.97	94.61	43.24	47.88	0.034	6.04	29.12	1.80
AQ8	02.02.2023	93.78	59.89	16.07	19.66	BDL	0.00	18.44	0.14
Durations		24	24	24	24	24	24	8	8
Air Pollution (Control) Rules, 2022		150	65	80	80	0.50	400	100	05
Method of Analysis		Light Scattering Nephelometer	Light Scattering Nephelometer	High Sensitivity Electrochemical	High Sensitivity Electrochemical	High Sensitivity Electrochemical	High Sensitivity Electrochemical	Mixed Metal Oxide	High Sensitivity Electrochemical

Note: * Air Pollution (Control) Rules, 2022. Legend: PM₁₀-Particulate Matter of a diameter of 10 microns or less, PM_{2.5}-Particulate Matter of a diameter of 2.5 microns or less, SO₂-Sulphur Dioxide; NO₂-Nitrogen Dioxide; NH₃ (ammonia); O₃-Ozone; CO-Carbon Monoxide, BDL - Below detection limit

Weather Condition:

Code	Wind Speed (km/h)	Wind Direction	Relative Humidity (%)	Remarks/Comments
AQ1	1.06	215.44 (South South West)	50	Sunny Day
AQ2	3.1	253.56 (West South West)	53	Sunny Day
AQ3	4.25	136.50 (South East)	60	Sunny Day
AQ4	-	-	-	-
AQ5	6.59	218.31 (South South West)	63	Sunny Day
AQ6	4.14	140.51 (South East)	57	Sunny Day
AQ7	4.57	140.68 (South East)	49	Sunny Day
AQ8	8.32	176.45 (South South West)	43	Sunny Day



Head Office: H # 33, E # 04, G # C, Sarani, Dhaka - 1213, Bangladesh
 Lab Office: Flat # 11, House # 1a-13a/A, Boshakti Sarani, Gulshan-Badda Link Road, Dhaka - 1212
 Toronto Office: 7 Avon Street, Scarborough Ontario, M1S 4B5 Canada



Ref: EQMS/Air Quality/ 20230205227

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Technical Manager
EQMS Consulting Limited

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Md. Jahidul Islam
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Toronto Office: 7 Amal Street, Scarborough, Ontario, M1K 4K5 Canada



Ref: EQMS/Air Quality/ 20230205226

EQMS

EQMS ENVIRONMENTAL LABORATORY**Monitoring Results of Ambient Air Quality**

Project Name : Urban Infrastructure Improvement Preparatory Facility (UIPF)
Monitoring Activity : Ambient Air Quality (Non-Working Day)
Monitoring Personnel : EQMS Inspection Team
Monitoring Location :

SL No	GPS Coordinate	Location Name
1	23°36'5.48"N 90°29'50.01"E	Ranada Prasad Saha University, 12 Sahed Bappi Sharoni, Narayanganj
2	23°36'41.67"N 90°29'44.81"E	Bara Dewbhog, 1 Mobarak Shah Rd, Narayanganj
3	23°37'55.85"N 90°30'11.56"E	Shirin Selina Home, Narayanganj
4	-	-
5	23°40'59.39"N 90°29'58.41"E	Chairman Bari, Siddhirganj
6	23°40'40.09"N 90°31'25.46"E	Adamjee EPZ Road, Siddhirganj
7	23°34'42.21"N 90°30'41.3"E	Crown Cement Factory Ltd. Road, Multarpur, Narayanganj
8	23°37'24.88"N 90°30'46.23"E	AKIJ Flour Mills Limited, Nabiganj, Narayanganj

Monitoring Date : 25.01.2022 - 04.02.2023

Reporting Date : 14.02.2023



P.T.O



Head Office: H # 53, B # 04, B # C, Barani Dhaka-1213, Bangladesh
 Lab Office: H # 8, F1, House # 10, Dhaka, Bangladesh
 Telenor Office: 7, Amari Street, Scarborough, Ontario, M1S 4B5, Canada



Ref: EQMS/Air Quality/ 20230205228

Description of Analysis:

Location	Sampling Date	Ambient Air Pollutants' Concentration in µg/m ³							CO mg/m ³
		PM ₁₀	PM _{2.5}	SO ₂	NO ₂	Pb	NH ₃	O ₃	
AQ1	25.01.2023	256.59	159.58	66.24	39.65	0.032	4.39	38.93	1.19
AQ2	25.01.2023	128.72	96.72	27.20	45.67	BDL	0.00	14.36	0.20
AQ3	26.01.2023	147.53	106.85	20.81	24.15	0.021	0.00	51.97	0.17
AQ4	-	-	-	-	-	-	-	-	-
AQ5	01.02.2023	113.99	82.42	26.67	13.21	0.065	0.00	37.78	0.18
AQ6	01.02.2023	226.16	133.19	89.03	73.79	0.060	5.27	33.06	2.03
AQ7	02.02.2023	335.70	131.59	59.84	66.04	0.052	4.85	42.28	1.61
AQ8	02.02.2023	116.76	84.29	37.99	26.67	BDL	0.00	9.15	0.21
Durations		24	24	24	24	24	24	8	8
Air Pollution (Control) Rules, 2022		150	65	80	80	0.50	400	100	05
Method of Analysis		Light Scattering Nephelometer	Light Scattering Nephelometer	High Sensitivity Electrochemical	High Sensitivity Electrochemical	High Sensitivity Electrochemical	High Sensitivity Electrochemical	Passive Media Oxide	High Sensitivity Electrochemical

Note: * Air Pollution (Control) Rules, 2022. Legend: PM₁₀-Particulate Matter of a diameter of 10 microns or less, PM_{2.5}-Particulate Matter of a diameter of 2.5 microns or less, SO₂-Sulphur Dioxide; NO₂-Nitrogen Dioxide; NH₃ (ammonia); O₃-Ozone; CO -Carbon Monoxide, BDL - Below detection limit

Weather Condition:

Code	Wind Speed (km/h)	Wind Direction	Relative Humidity (%)	Remarks/ Comments
AQ1	5.33	127.69(East South East)	53	Sunny Day
AQ2	10.73	262.50(West South West)	65	Sunny Day
AQ3	8.03	166.83 (South)	61	Sunny Day
AQ4	-	-	-	-
AQ5	7.78	196.88(South)	60	Sunny Day
AQ6	4.39	177.08(South South East)	47	Sunny Day
AQ7	3.10	120.21(East South East)	49	Sunny Day
AQ8	8.50	121.50 (East South East)	54	Sunny Day



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 Lab Office: Plot A FT, House # 5a-15/A, Boshakkhi Sarani, Gulshan-Badda Link Road, Dhaka - 1215
 Toronto Office: 7 Avond Street, Scarborough, Ontario, M1R 4R5, Canada



Ref: EQMS/Air Quality/ 20230205228

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Shihabuddin Ahmed
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Quality Manager
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Job Office: Plot # F1, House # To-13/A, Boshakti Sagar, Gulshan-Badda Link Road, Dhaka -1212
Toronto Office: 7 Anni Street, Scarborough Ontario, M1E 4B5 Canada



Appendix 6: Copies of Laboratory Analysis Results on Noise Level Measurements

Ref: EQMS/Noise Level/ 20230205229

EQMS

EQMS Environmental Laboratory
Test Results of Noise Level

Project Name : Urban Infrastructure Improvement Preparatory Facility (UIPF)

Description of Sample : Noise Level Measurement

Sample Collector : EQMS Inspection Team

Sampling Location : NLT to NLB

Sampling Date : 25.01.2022-28.01.2022 & 01.02.2023-04.02.2023

Reporting Date : 13.02.2023

Monitoring Locations:

SL No	GPS Coordinate	Location Name
1	23°36'5.48"N 90°29'50.01"E	Ranada Prasad Saha University, 12 Sahed Bappi Sharoni, Narayanganj
2	23°36'41.67"N 90°29'44.81"E	Bara Dewbhog, 1 Mobarak Shah Rd, Narayanganj
3	23°37'55.85"N 90°30'11.56"E	Shirin Selina Home, Narayanganj
4	-	-
5	23°40'59.39"N 90°29'56.41"E	Chairman Bari, Siddhirganj
6	23°40'40.09"N 90°31'25.46"E	Adamjee EPZ Road, Siddhirganj
7	23°34'42.2"N 90°30'41.3"E	Crown Cement Factory Ltd. Road, Muktarpur, Narayanganj
8	23°37'24.88"N 90°30'46.23"E	AKU Flour Mills Limited, Nabiganj, Narayanganj





P.T.O


 Head Office: H-4 SS, P-04 B & C, Barani, Dhaka-1213, Bangladesh
 Lab Office: Plot # 71, House # 2-13/A, Ashrafji Sarani, Gulshan-3, Sadar Line Road, Dhaka-1213
 Faranta Office: 7, Anwar Street, Savar, Dhaka-1342, Bangladesh







Ref: EQMS/Noise Level/ 20230205229



EQMS

Description of Analysis:

SL No	Leq _{day}	Leq _{night}	L _{max}	L	Standard	
					Day(dB)	Night(dB)
NL1-WD	67.74	60.41	92.5	45.6	50	40
NL1-NWD	66.41	59.96	89.6	32.1		
NL2-WD	59.29	56.95	80.0	30.8	60	50
NL2-NWD	63.56	55.21	90.8	37.8		
NL3-WD	64.68	58.76	85.1	30.8	55	45
NL3-NWD	63.28	57.87	90.2	41.0		
NL4-WD	-	-	-	-	75	70
NL4-NWD	-	-	-	-		
NL5-WD	62.89	56.89	90.0	30.8	55	45
NL5-NWD	62.97	55.22	86.4	32.1		
NL6-WD	78.99	68.88	108.2	42.3	75	70
NL6-NWD	74.99	68.70	93.6	32.1		
NL7-WD	73.39	57.16	97.9	40.8	75	70
NL7-NWD	77.78	68.93	95.9	40.8		
NL8-WD	74.42	66.99	97.3	40.6	75	70
NL8-NWD	70.62	59.97	92.5	44.3		
Standard (ECR'1997) & Noise Pollution (Control) Rules 2006						
Silent area					50	40
Residential area					55	45
Mixed area					60	50
Commercial Area					70	60
Industrial area					75	70
World Bank/IFC Standard						
Residential; Institutional; Educational					55	45
Industrial					70	70

[Signature]

[Signature]

[Signature]



Head Office: H-433, F-4, G.P.O. Bursari, Dhaka-1013, Bangladesh
 Lab Office: Flat # 7/1, House # 12-13/A, Police Officer's Quarters, Gulshan-3 Road, New Entral, Dhaka-1212
 Toronto Office: 7 Ann Street, Scarborough Ontario, M1S 4B5, Canada



Ref: EQMS/Noise Level/ 20230205229

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EQMS Consulting Limited

Checked by:

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Job Office: Flat A TL House # 34-13/A, Boshary/Sorani, Gulshan-6/10a Dhaka -1212
Toronto Office: 7 And Street, Scarborough Ontario, M1K 4R5 Canada



Appendix 7: IBAT Screening Results



Integrated Biodiversity Assessment Tool

World Bank Group Biodiversity Risk Screen

BAN-NGRUDP

- Country: Bangladesh
- Location: [23.6, 90.5]
- IUCN Red List Biomes: Marine, Freshwater, Terrestrial
- Created by: ██████████

Overlaps with:

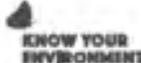
Protected Areas	1 km: 0	10 km: 0	50 km: 2	2
World Heritage (WHI)	1 km: 0	10 km: 0	50 km: 0	0
Key Biodiversity Areas	1 km: 0	10 km: 0	50 km: 0	0
Alliance for Zero Extinction (AZE)	1 km: 0	10 km: 0	50 km: 0	0
IUCN Red List				43
Critical Habitat				Unclassified



Displaying project location and buffers: 1 km, 10 km, 50 km



This report is based on IFC Performance Standard 6 (PS6) but applies to World Bank Environmental and Social Standard 6 (E6)




BANNGRUDP (Water Supply - Package 1) | Page 1 of 13



About this report

The recommendations stated alongside any Protected Areas and Key Biodiversity Areas identified in this report are determined by the following:

Protected Areas:

- 'Highest risk. Seek expert help' is stated if the report identifies a designation that includes either 'natural' or 'mixed world heritage site'.
- 'Assess for Critical Habitat' is stated if the report identifies a Strict Nature Reserve, Wilderness Area or National Park as coded by IUCN protected area categories Ia, Ib and II.
- 'Assess for biodiversity risk' is stated if the report identifies any other type of protected area.

Key Biodiversity Areas:

- 'Highest risk. Seek expert help' is stated if the report identifies an Alliance for Zero Extinction site.
- 'Assess for Critical Habitat' is stated if the report identifies Critically Endangered or Endangered species OR species with restricted ranges OR congregatory species as coded in the IUCN Red List of Threatened Species.
- 'Assess for biodiversity risk' is stated if the report identifies any other type of Key Biodiversity Area.

IBAT provides initial screening for Critical Habitat values. Performance Standard 6 (PS6) defines these values for Critical Habitat (PS6: para. 16) and legally protected and internationally recognized areas (PS6: para. 20). PS6 will be triggered when IFC client activities are located in modified habitats containing "significant biodiversity value," natural habitats, Critical Habitats, legally protected areas, or areas that are internationally recognized for biodiversity. References to PS6 and Guidance Note 6 (GN6) are provided to guide further assessment and detailed definitions where necessary. Please see <https://www.ifc.org/ps6> for full details on PS6 and GN6.

This report identifies restricted range species according to the KBA Standard definition (hyperlink KBA Standard <https://portals.iucn.org/library/sites/library/files/documents/2016-048.pdf>):

Species having a global range size less than or equal to the 25th percentile of range-size distribution in a taxonomic group within which all species have been mapped globally, up to a maximum of 50,000 km². If all species in a taxonomic group have not been mapped globally, or if the 25th percentile of range-size distribution for a taxonomic group falls below 10,000 km², restricted range should be defined as having a global range size less than or equal to 10,000 km². For coastal, riverine and other species with linear distributions that do not exceed 200 km width at any point, restricted range is defined as having a global range less than or equal to 500 km linear geographic span (i.e. the distance between occupied locations furthest apart).

Note, sites supporting restricted range species can qualify as KBAs under criterion B2. These are sites that hold a significant proportion of the global population size of multiple restricted-range species, and so contribute significantly to the global persistence of biodiversity at the genetic and species level.

The report screens for known risks within a standard 50km buffer of the coordinates used for analysis. This buffer is not intended to indicate the area of impact. The report can be used to:

- Scope risks to include within an assessment of risks and impacts





- Identify gaps within an existing assessment of risks and impacts
- Prioritize between sites in a portfolio for further assessment of risks and impacts
- Inform a preliminary determination of Critical Habitat
- Assess the need for engaging a biodiversity specialist
- Identify additional conservation experts or organizations to inform further assessment or planning

WARNING: IBAT aims to provide the most up-to-date and accurate information available at the time of analysis. There is however a possibility of incomplete, incorrect or out-of-date information. All findings in this report must be supported by further desktop review, consultation with experts and/or on-the-ground field assessment as described in PS6 and GN6. Please consult IBAT for any additional disclaimers or recommendations applicable to the information used to generate this report.

Please note, sensitive species data are currently not included in IBAT reports in line with the [Sensitive Data Access Restrictions Policy for the IUCN Red List](#). This relates to sensitive Threatened species and KBAs triggered by sensitive species.

Legal disclaimer

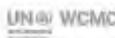
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Priority Species

Habitat of significant importance to priority species will trigger Critical Habitat status (See PS6: para 16). IBAT provides a preliminary list of priority species that could occur within the 50km buffer. This list is drawn from the IUCN Red List of Threatened Species (IUCN RL). This list should be used to guide any further assessment, with the aim of confirming known or likely occurrence of these species within the project area. It is also possible that further assessment may confirm occurrence of additional priority species not listed here. It is strongly encouraged that any new species information collected by the project be shared with species experts and/or IUCN wherever possible in order to improve IUCN datasets.

IUCN Red List of Threatened Species - CR & EN

The following species are potentially found within 50km of the area of interest.
For the full IUCN Red List please refer to the associated csv in the report folder.

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Batagur dhongoka	Three-striped Roofed Turtle	REPTILIA	CR	Decreasing	Terrestrial, Freshwater
Sphyrna lewini	Scalloped Hammerhead	CHONDRICTHYES	CR	Decreasing	Marine
Sphyrna mokarran	Great Hammerhead	CHONDRICTHYES	CR	Decreasing	Marine
Sonneratia griffithii		MAGNOLIOPSIDA	CR	Decreasing	Terrestrial, Marine
Aythya baeri	Baer's Pochard	AVES	CR	Decreasing	Freshwater
Houbaropsis bengalensis	Bengal Florican	AVES	CR	Decreasing	Terrestrial
Batagur baska	Northern River Terrapin	REPTILIA	CR	Decreasing	Terrestrial, Marine, Freshwater
Pelochelys cantorii	Asian Giant Softshell Turtle	REPTILIA	CR	Decreasing	Terrestrial, Marine, Freshwater



Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
<i>Geoclemys hamiltonii</i>	Spotted Pond Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
<i>Hardella thurjii</i>	Crowned River Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
<i>Morenia petersi</i>	Indian Eyed Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
<i>Orcaella brevirostris</i>	Irrawaddy Dolphin	MAMMALIA	EN	Decreasing	Marine, Freshwater
<i>Panthera tigris</i>	Tiger	MAMMALIA	EN	Decreasing	Terrestrial
<i>Rhincodon typus</i>	Whale Shark	CHONDRICHTHYES	EN	Decreasing	Marine
<i>Varanus flavescens</i>	Yellow Monitor	REPTILIA	EN	Decreasing	Terrestrial
<i>Nilssonina gangetica</i>	Indian Softshell Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
<i>Nilssonina hurum</i>	Indian Peacock Softshell Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
<i>Nycticebus bengalensis</i>	Bengal Slow Loris	MAMMALIA	EN	Decreasing	Terrestrial
<i>Hoolock hoolock</i>	Western Hoolock Gibbon	MAMMALIA	EN	Decreasing	Terrestrial
<i>Platanista gangetica</i>	Ganges River Dolphin	MAMMALIA	EN	Decreasing	Freshwater
<i>Eusphyra blochii</i>	Winghead Shark	CHONDRICHTHYES	EN	Decreasing	Marine



Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
<i>Mobula eregoodoo</i>	Longhorned Pygmy Devil Ray	CHONDRICHTHYES	EN	Decreasing	Marine
<i>Stegostoma tigrinum</i>	Zebra Shark	CHONDRICHTHYES	EN	Decreasing	Marine
<i>Mobula tarapacana</i>	Sicklefin Devil Ray	CHONDRICHTHYES	EN	Decreasing	Marine
<i>Mobula thurstoni</i>	Bentfin Devil Ray	CHONDRICHTHYES	EN	Decreasing	Marine
<i>Acropora rudis</i>		ANTHOZOA	EN	Decreasing	Marine
<i>Trachypithecus phayrei</i> ssp. <i>phayrei</i>		MAMMALIA	EN	Decreasing	Terrestrial
<i>Alopias pelagicus</i>	Pelagic Thresher	CHONDRICHTHYES	EN	Decreasing	Marine
<i>Heritiera fomes</i>		MAGNOLIOPSIDA	EN	Decreasing	Terrestrial, Marine, Freshwater
<i>Holothuria scabra</i>	Golden Sandfish	HOLOTHUROIDEA	EN	Decreasing	Marine
<i>Holothuria lessoni</i>	Golden Sandfish	HOLOTHUROIDEA	EN	Decreasing	Marine
<i>Thelenota ananas</i>	Prickly Redfish	HOLOTHUROIDEA	EN	Decreasing	Marine
<i>Urogymnus polylepis</i>	Giant Freshwater Whipray	CHONDRICHTHYES	EN	Decreasing	Marine, Freshwater



Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
<i>Mobula birostris</i>	Oceanic Manta Ray	CHONDRICHTHYES	EN	Decreasing	Marine
<i>Rynchops albicollis</i>	Indian Skimmer	AVES	EN	Decreasing	Terrestrial, Freshwater
<i>Sterna acuticauda</i>	Black-bellied Tern	AVES	EN	Decreasing	Terrestrial, Freshwater
<i>Haliaeetus leucoryphus</i>	Pallas's Fish-eagle	AVES	EN	Decreasing	Terrestrial, Freshwater
<i>Aquila nipalensis</i>	Steppe Eagle	AVES	EN	Decreasing	Terrestrial
<i>Leptoptilos dubius</i>	Greater Adjutant	AVES	EN	Decreasing	Terrestrial, Freshwater
<i>Laticilla cinerascens</i>	Swamp Grass-babbler	AVES	EN	Decreasing	Terrestrial, Freshwater
<i>Mobula mobular</i>	Spinetail Devil Ray	CHONDRICHTHYES	EN	Decreasing	Marine
<i>Trachypithecus phayrei</i>	Phayre's Leaf-monkey	MAMMALIA	EN	Decreasing	Terrestrial
<i>Trachypithecus pileatus</i> ssp. <i>pileatus</i>	Blond-bellied Langur	MAMMALIA	EN	Decreasing	Terrestrial

Restricted Range Species

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
<i>Ophistemon bengalense</i>	Bengal Mud Eel	ACTINOPTERYGII	LC OR LR/LC	Stable	Marine, Freshwater



Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Bengala elanga	Bengala Barb	ACTINOPTERYGII	LC OR LR/LC	Unknown	Freshwater
Xenentodon cancila		ACTINOPTERYGII	LC OR LR/LC	Unknown	Freshwater
Batasio batasio		ACTINOPTERYGII	LC OR LR/LC	Unknown	Freshwater
Oreochthys cosuatis		ACTINOPTERYGII	LC OR LR/LC	Unknown	Freshwater
Oryzias dancena	Indian Ricefish	ACTINOPTERYGII	LC OR LR/LC	Stable	Marine, Freshwater
Pseudosphromenus cupanus	Spiketail Paradise Fish	ACTINOPTERYGII	LC OR LR/LC	Stable	Freshwater
Oryzias carmaticus	Spotted Ricefish	ACTINOPTERYGII	LC OR LR/LC	Unknown	Marine, Freshwater
Macrobrachium scabriculum		MALACOSTRACA	LC OR LR/LC	Unknown	Freshwater
Macrobrachium rude		MALACOSTRACA	LC OR LR/LC	Unknown	Freshwater
Macrobrachium rosenbergii	Giant River Prawn	MALACOSTRACA	LC OR LR/LC	Unknown	Freshwater
Fregatta tropica	Black-bellied Storm-petrel	AVES	LC OR LR/LC	Decreasing	Terrestrial, Marine
Nangra bucculenta		ACTINOPTERYGII	DD	Unknown	Freshwater



Biodiversity features which are likely to trigger Critical Habitat

Protected Areas

The following protected areas are found within 1 km and 10 km and 50 km of the area of interest. For further details please refer to the associated csv file in the report folder.

Area name	Distance	IUCN Category	Status	Designation	Recommendation
Bhawal	50 km	IV	Designated	National Park	Assess for biodiversity risk
Mirpur Botanic Garden	50 km	Not Reported	Proposed	National Botanic Garden	Assess for biodiversity risk

Key Biodiversity Areas

There are no key biodiversity areas to show for this report.

Species with potential to occur

Area Taxonomic group	Total assessed species	Total (CR, EN & VU)	CR	EN	VU	NT	LC	DD
REPTILIA	100	18	3	6	9	3	77	2
CHONDRICHTHYES	25	19	2	10	7	2	3	1
MAGNOLIOPSIDA	88	4	1	1	2	3	76	5
AVES	330	17	2	6	9	21	292	0
MAMMALIA	69	19	0	8	11	4	46	0
ANTHOZOA	8	2	0	1	1	2	3	1



Area Taxonomic group	Total assessed species	Total (CR, EN & VU)	CR	EN	VU	NT	LC	DD
HOLOTHUROIDEA	30	5	0	3	2	0	14	11
ACTINOPTERYGII	516	8	0	0	8	9	461	38
INSECTA	103	1	0	0	1	0	100	2
LILIOPSIDA	57	1	0	0	1	1	53	2
MALACOSTRACA	27	0	0	0	0	1	19	7
AMPHIBIA	17	0	0	0	0	0	17	0
HYDROZOA	2	0	0	0	0	0	2	0
GASTROPODA	114	0	0	0	0	0	109	5
POLYPODIOPSIDA	4	0	0	0	0	0	4	0
BIVALVIA	35	0	0	0	0	0	32	3
ARACHNIDA	3	0	0	0	0	0	3	0



Recommended citation

IBAT PS6 & ESS6 Report. Generated under licence 159-36648 from the Integrated Biodiversity Assessment Tool on 21 November 2022 (GMT). www.ibat-alliance.org

Recommended Experts and Organizations

For projects located in Critical Habitat, clients must ensure that external experts with regional expertise are involved in further assessment (GN6: GN22). Clients are encouraged to develop partnerships with recognized and credible conservation organizations and/or academic institutes, especially with respect to potential developments in natural or Critical Habitat (GN6: GN23). Where Critical Habitats are triggered by priority species, species specialists must be involved. IBAT provides data originally collected by a large network of national partners, while species information is sourced via the IUCN Red List and affiliated Species Specialist Groups. These experts and organizations are listed below. **Please note that this is not intended as a comprehensive list of organizations and experts. These organizations and experts are under no obligation to support any further assessment and do so entirely at their discretion and under their terms. Any views expressed or recommendations made by these stakeholders should not be attributed to the IFC or IBAT for IFC partners.**

Birdlife Partners

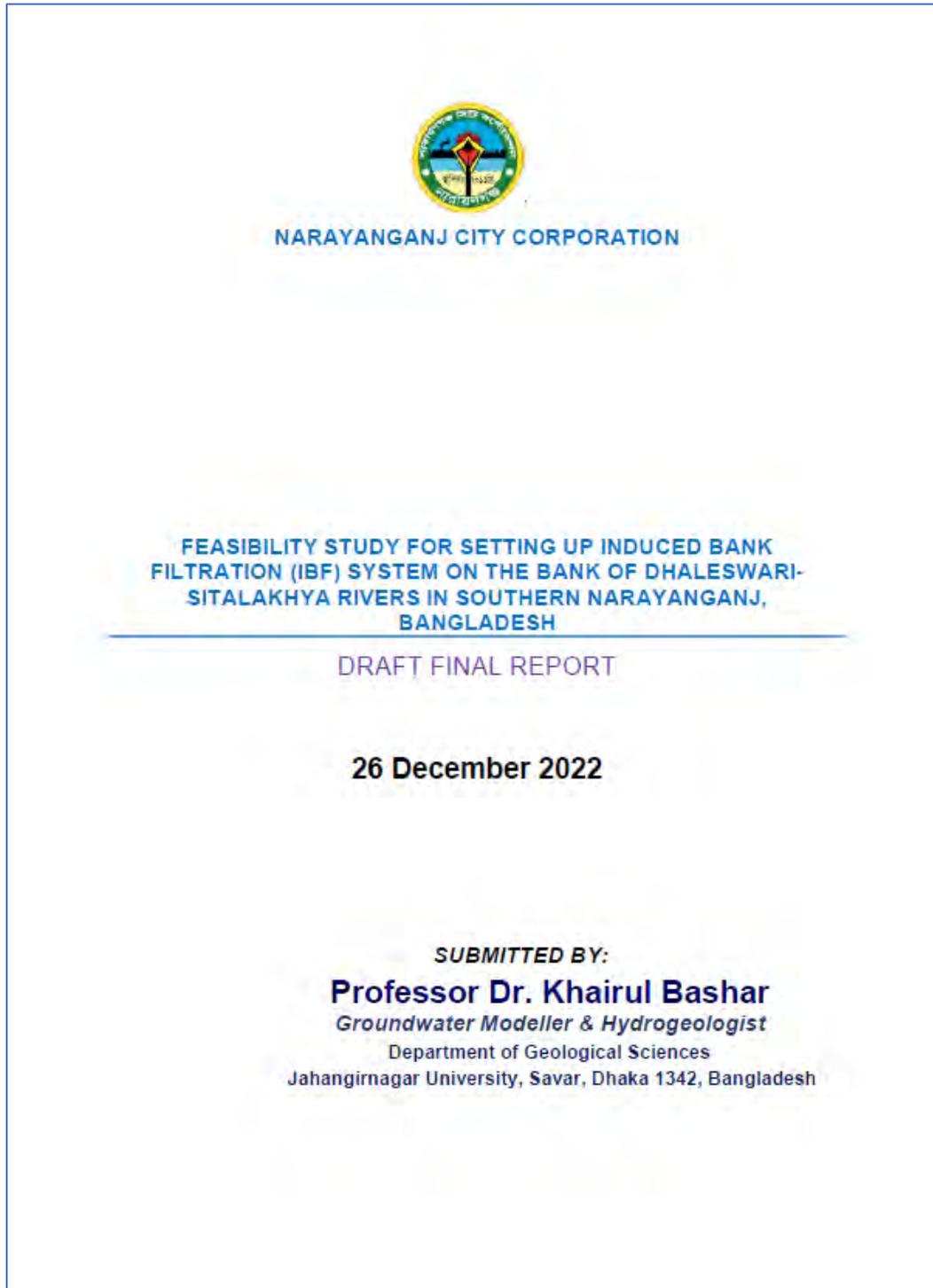
URL: <https://www.birdlife.org/worldwide/partnership/birdlife-partners>

Directory for Species Survival Commission (SSC) Specialist Groups and Red List Authorities

URL: <https://www.iucn.org/commissions/ssc-groups>

Appendix 8A: Feasibility Study for Setting Up Induced Bank Filtration (IBF) System on the bank of Dhaleshwari-Sitalakhya Rivers in Southern Narayanganj, Bangladesh

(This is a voluminous document with annexes, and copy can be requested from NCC or ADB Project Officer. Cover page below is for reference only. Analysis of the expert on the issue of subsidence is in the succeeding pages of this Appendix)



Ans to the questions of the reviewers

Prof. Khalid Bashir

- (i) In the proposed vicinity of the IBF, the modeling shows lowering of the dry season GWL to around 35m bgl in 2030. The current/2020 dry season GWL is at about 10m bgl. Does this mean that the GWL will go down by around 25m in the next 10 years?

Ans: The model predicted that the elongated cone of depression will attain a *new equilibrium condition* for the proposed increase in abstraction in the study area of by 2030 and there will be no further decline of GWL in 2040 or 2050. It should be mentioned here that the model input parameters (such as river level, evapotranspiration, river geometry, subsurface aquifer geometry and aquifer properties) have not been changed at all for future prediction. Figures 1 and 2 give the give the model predicted groundwater table contour maps for 2040 for both dry and wet seasons.

Figure 1: Model predicted groundwater table contour map for 2040 (Dry season)

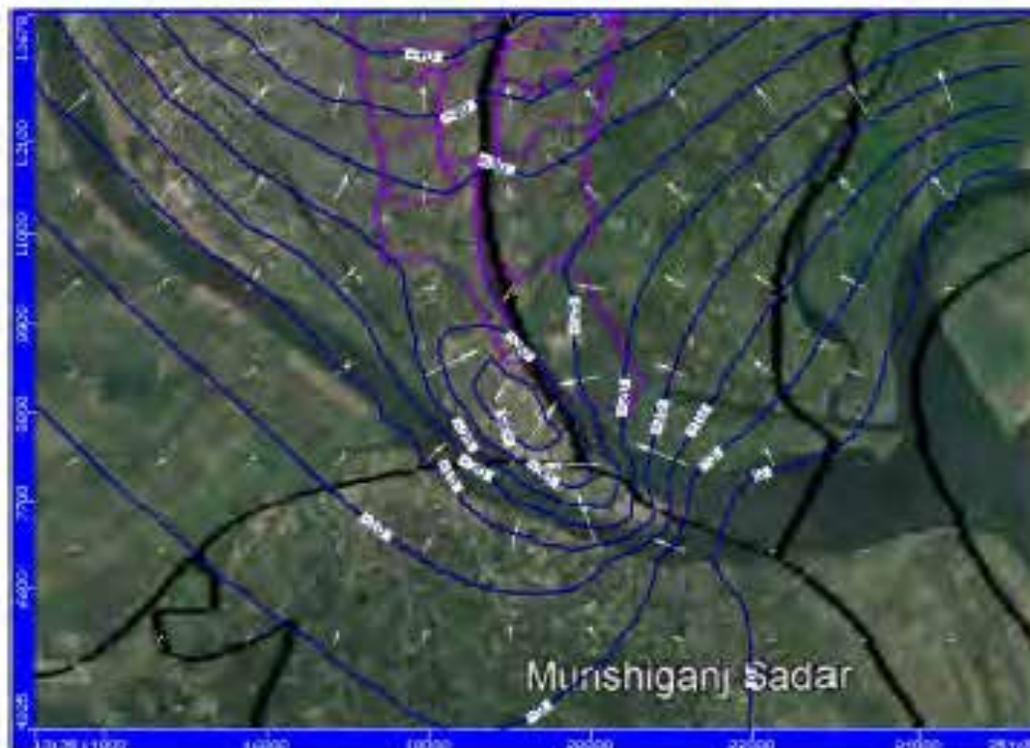


Figure 2: Model predicted groundwater table contour map for 2040 (wet season)



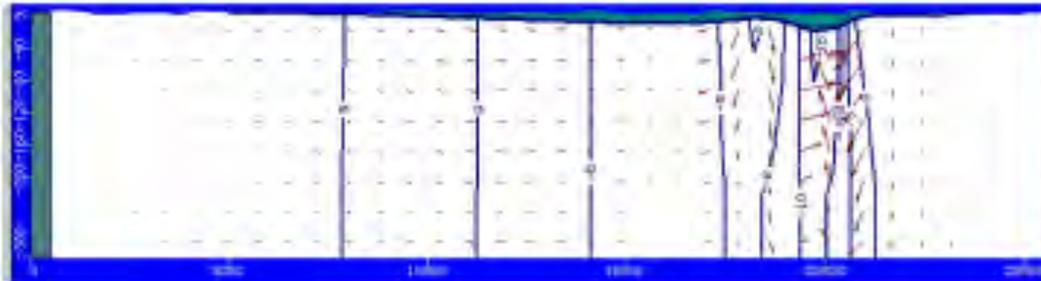
- (ii) The model shows prediction of GWL for 2030. How about the GWLs for other years in the timeline, e.g., 2025, 2035, and so on. Providing this set of info/data will give the idea of the long term GWL profile in the area as a result of all natural processes and anthropogenic activities including abstraction of 50 MLD or more by the project.

Ans: Under equilibrium (steady-state) conditions, the rate of pumping (Q) is equal to the rate that the aquifer transmits water to the wells.

The reality is that a thick (>250m) sand aquifer with reasonable transmissivity and storativity underlies the study area. The sandy aquifer is hydraulically well connected to the river over a large surface area and the hydraulic head of water on the river bed is high (i.e., 10 to 30m meters). This high hydraulic head will cause fast flow of water towards the well field from the rivers through the thick aquifer and an equilibrium condition is reached.

The model predicted A-A' sectional view of groundwater table contour map for 2040 (wet season) shows that flow of water from the east and directions towards the cone of depression.

Figure 3: A-A' sectional view of model predicted groundwater table contour map for 2040 (wet season).



- (iii) Please elaborate more on the prediction that "an elongated cone of depression would be developed in the study area". Does falling GWL or the cone of depression induce or lead to any land subsidence-related issues? Will these phenomena have any impact on water quality?

Ans: As the pumping wells will be set on the bank of the river Dhaleswari along a line and the shape of the cone of depression will not be circular, rather it will be oval shaped with one long axis and one short axis as shown in Figure 1.

Land subsidence Issue

Higgins et al. (2014)¹ concluded that:

- Many of the world's largest river deltas are sinking due to sediment loading, compaction, and tectonics but also recently because of groundwater extraction, hydrocarbon extraction, and reduced aggradation.
- Land subsidence of 0 to >10mm/yr is seen in Dhaka, with variability likely related to local variations in shallow subsurface sediment properties. Outside of the city, rates vary from 0 to >18mm/yr, with the lowest rates appearing primarily in Pleistocene Madhupur Clay and the **highest rates in Holocene organic-rich muds**.
- Results demonstrate that subsidence in this delta is primarily controlled by local stratigraphy, with rates varying by more than an order of magnitude depending on lithology.

¹ Higgins, Stephanie & Overeem, Inna & Steckler, Michael & Syvitski, Jala & Seiber, Leonardo & Akhter, Syed. (2014). InSAR Measurements of Compaction and Subsidence in the Ganges-Brahmaputra Delta, Bangladesh. *Journal of Geophysical Research: Earth Surface*. 119. 10.1002/2014JF003117.

In the area of the proposed well field, the bore log data showed that the whole vertical sequence of the sediments does not contain any significant organic rich mud at all.

Dewatering of sediments will take place only in the uppermost 10 to 35m thick predominantly sandy sediments. Therefore, the possibility of land subsidence due to the impact of IBF system is expected to be very low or insignificant.

In different parts of Dhaka and Narayanganj cities GWL has already declined to 50 to 100m below ground level. However, land subsidence is very much within tolerable limit till today in both Dhaka and Narayanganj cities.

Impact on water quality

There are large number of pumping wells in Bangladesh which were set on the bank of rivers or other surface water bodies in different parts of Bangladesh including large cities like Dhaka, Narayanganj, Rajshahi, Chittagong, Mymensingh, Cumilla, Rangamati etc. In some cases, the river/ lake is hydraulically well connected to aquifers and IBF system is being in action.

In most cases the water quality is monitored before pumping the water for domestic uses. However, no water quality problem is reported in most cases in Bangladesh.

The fact is that the strainers of the Production Tube Wells (PTWs) are generally set several hundred feet below the bottom of the water bodies and water is filtered. Most of the heavy metals are sorbed by fine sediments like silt and clay. Different organic materials and arsenic are decomposed or sorbed in the sediments. Only chemically conservative ions like chloride and nitrate can flow to a long distance. Due to dilution, filtration and sorption, the water is ultimately decontaminated after traveling several hundred feet.

In the proposed IBF system on the Dhaleswari River, the strainer of the PTWs will be set at about 600 feet below ground level to ensure proper filtering and natural decontamination of surface water. In extreme cases we may use treatment facilities if needed.

Appendix 8B: Hydrogeological Investigation Report for the IBF System



Adobe Acrobat
Document

(please double click the PDF icon to see the document)

Appendix 9: Sample Asbestos-Containing Materials Management Plan



Adobe Acrobat
Document

(please double click the PDF icon to see the document)

Appendix 10: Sample Outline of Traffic Management Plan

Introduction

This Traffic Management Plan (TMP) provides the traffic management procedures to be followed by the vehicle users of Contractors' while implementing the construction/reconstruction works of the project (or subproject). The vehicle operators should be careful that, road users are not limited to motorists. There are also the pedestrians, such as school children, people with disabilities, cyclists and animals using or traversing these roads.

Traffic Management Objectives and Strategies

The objectives of the TMP are to:

- i. Provide for a safe environment for all road users;
- ii. Provide protection to Contractors' operators and the general public from traffic hazards that may arise as a result of the driving of vehicles;
- iii. Minimize the disruption, congestion and delays to all road users;
- iv. Ensure access to adjacent private/commercial premises is maintained at all times.

To achieve the above objectives, the Traffic Management Plan will:

- i. Ensure whenever possible, that a sufficient number of traffic lanes to accommodate vehicle traffic volumes are provided.
- ii. Ensure that delays and traffic congestion are kept to a minimum and within acceptable levels.
- iii. Ensure that appropriate/sufficient warning and information signs are installed and that adequate guidance is provided to delineate the travel paths to bypass or cross the construction site.
- iv. Ensure that the roads are free of hazards and that all road users are adequately protected from activities of road users.
- v. Ensure that all needs of road users, motorists, pedestrians, cyclists, public transport passengers and people with disabilities are accommodated around the construction site.

A Traffic Management Plan is a key workplace document that has legal standing. As such it is critical that the structure and content of the Plan is sufficient to explain the potential hazards, the assessed risks and the proposed treatments for the proposed work activities and work site. The TMP should include all of the following. Where any of the following sections are not applicable, the TMP should indicate this accordingly.

Introduction

- i. Purpose and Scope,
- ii. Objectives and Strategies.

Project Overview

- i. Project Location,
- ii. Project Details and Site Constraints/Impacts

Project Representatives (Principal for the Works; Principal Contractor)

Safety Plan

- i. Occupational Safety and Health;
- ii. Competencies;
- iii. Responsibilities- Role, responsibility and authority of key personnel, management hierarchy including site representatives and contact details of the responsible personnel;
- iv. Communicating TMP requirements;
- v. Prior approvals (if any) granted by the governing local government agencies with relevant reference number.

Trip Hazards & Environmental Conditions

- i. Weather;
- ii. Vegetation;
- iii. Existing signage;
- iv. Structures.

Worksite Access

- i. Pedestrians;
- ii. Cyclists;
- iii. Works vehicles;
- iv. Emergency vehicles;
- v. Public Transport;
- vi. Property Access;
- vii. School crossings;
- viii. Impact on adjoining Road Network;
- ix. Heavy and Oversized Vehicles and Loads;
- x. Legal and Other Requirements.

Emergency Arrangements and Contingencies

- i. Emergency Services;

- ii. Dangerous Goods;
- iii. Damage/Failure to Services (Traffic signals, street lighting, power, gas);
- iv. Contingency Planning (Road crash or vehicle breakdown, serious injury or fatality);
- v. Emergency Contacts.

Appendix 11: Sample Outline of Spoil Management Plan

Purpose and Application: Spoil Management Plan (SMP) is to describe how the project will manage the spoil generated and reuse related to design and construction works. This is an integral part of EMP. The objective of SMP is to reuse of spoil from works in accordance with the spoil management hierarchy outlined in this document.

Objectives of Spoil Management Plan: The objectives of SMP are:

- (i) To minimize spoil generation where possible;
- (ii) Maximize beneficial reuse of spoil from construction works in accordance with spoil management hierarchy;
- (iii) Manage onsite spoil handling to minimize environmental impacts on resident and other receivers;
- (iv) Minimize any further site contamination of land, water, soil; and
- (v) Manage the transportation of spoil with consideration of traffic impacts and transport related emissions.

Structure of Spoil Management Plan:

Section 1: Introduction of SMP

Section 2: Legal and other requirements

Section 3: Roles and responsibilities

Section 4: Identification and assessment of spoil aspects and impacts

Section 5: Spoil volumes, characteristics and minimization

Section 6: Spoil reuses opportunities, identification and assessment

Section 7: On site spoil management approach

Section 8: Spoil transportation methodology

Section 9: Monitoring, Reporting, Review, and Improvements

Aspects and potential impacts

The key aspects of potential impacts in relation to SMP are listed in table below:

Aspects	Potential Impacts
Air Quality	Potential for high winds generating airborne dust from the stock piles
Sedimentation	Potential for sediment laden site runoff from spoil stockpiles and potential for spillage of spoil from truck on roads
Surface and groundwater	Contamination of surface and ground water
Noise	Associated with spoil handling and haulage and storage
Traffic	Impacts associated with spoil haulage
Land Use	Potential for spoil to be transported to a that does not have permission for storage/disposal
Design specifications	Limitations on opportunities to minimize spoil generation
Sustainability	Limited sites for storage, reuse opportunities

Spoil volumes, Characteristics and Minimization

Spoil volume calculations: Estimate the volumes of spoils produced from each of the construction sites.

Characterization of spoil: Based on the type of spoil; characterization is done (sand stone, mud mix materials, reusable materials)

Adopt Spoil Reduce, Reuse Opportunities: An overview of the assessment methodology to be used is mentioned below.

- Consideration of likely spoil characteristics
- Identification of possible reuse sites
- Screening of possible reuse opportunities

Identification of possible safe disposal sites for spoil: Those spoils which cannot be reuse shall be properly disposed in designated areas, such disposal areas should be identified in project locations. Such disposal areas should be safe from environmental aspects and there should be any legal and resettlement related issues. Such areas need to be identified and prior client approval should be obtained to use it as spoil disposal area. The local administration must be consulted and if required permission should be obtained from them.

Storage and stock piling Transportation and haulage route

Based on the above, the contractor will prepare a SMP as an integral part of EMP and submit it to the MDSC for their review and approval.

Summary of Key Issues and Remedial Actions

Summary of follow up time-bound actions to be taken within a set timeframe

Appendix 12: Sample Outline of Waste Management Plan

Sample Waste Management Plan Outline	
<p><i>(Note: This was lifted from and patterned after the "Suggested Pre-incident All-hazards Waste Management Plan Outline of US Environmental Protection Agency". Minor edits were made for consistency with specific country setting.)</i></p>	
Recommended Plan Contents:	Considerations:
<p>I. Plan Overview</p> <ol style="list-style-type: none"> 1. Scope <i>Description of scenario, entity, and geographical area covered</i> 2. Planning assumptions 3. List of officials who should be notified in the case of an incident and contact information 4. Roles and responsibilities for waste management activities <i>Include specialized resources (e.g., subject matter experts for consultation, emergency response teams)</i> 5. Regulatory requirements List necessary permits as they are obtained 6. Documentation of plan development process <i>Include all internal departments and external entities</i> 7. Record of plan approvals, reviews, and updates to include any changes made 	<p>This section should be updated as needed during an incident with the situational overview.</p> <p>Scenarios may be based on site- and community-specific threats, hazards, and vulnerabilities.³</p> <p>Describe general terrain types, land use, and accessibility for the areas that would most likely be impacted by the incident and how these characteristics may affect waste management activities. Also, identify critical infrastructure and areas that may impact response priorities or present cleanup challenges.</p> <p>Include relevant national, local, tribal, and territorial (including neighboring countries, as appropriate) environmental/public health regulatory and legal requirements that impact waste management and material reuse. Also, include the impact that a government emergency or major disaster declaration might have on the implementation of applicable laws. Keep in mind that local government requirements may be more stringent than national government requirements and may include additional waste streams not covered under national laws.</p> <p>Establish roles and responsibilities for all waste management activities, including who will monitor contractors and waste management sites.</p>
<p>II. Materials and Waste Streams</p> <ul style="list-style-type: none"> List of anticipated waste streams Description of each waste stream <i>Include regulatory status (national and local), associated hazards, if any, agent-specific (e.g., chemical, biological) information, fact sheets, if any, contact information for waste-specific subject matter experts, and packaging, labeling, handling, and transportation requirements, as well as identify decontamination and reuse, recycling, treatment, and disposal</i> 	<p>This section should be updated as needed during an incident with the actual waste streams generated by the incident.</p> <p>Consider these and other potential waste streams:</p> <ul style="list-style-type: none"> • Aqueous Waste (e.g., water from decontamination activities) • Asbestos-containing Material • Ash • Asphalt • Building Contents • Chemically-contaminated Waste • Commingled Debris • Construction and Demolition Debris

<p><i>options appropriate to that waste stream</i></p>	<ul style="list-style-type: none"> • Cylinders and Tanks • Electronics Waste • Food Waste • Hazardous Waste • Lead-based Paint • Metals • Mixed Waste • Municipal Solid Waste (MSW) • Scrap Tires • Soils, Sediments, and Sandbags • Solid Waste from Response Activities (e.g., personal protective equipment (PPE), waste from law enforcement activities) • Used Oil and Oil-contaminated Waste • Vegetative Debris <p>Consider all other potential sources of wastes from construction activities.</p>
<p>III. Waste Quantities</p> <ol style="list-style-type: none"> 1. Forecast quantity of each type of anticipated waste 2. Method for estimating actual waste quantities during/after an incident <i>(e.g., GIS, windshield assessment, manned and unmanned aerial surveillance)</i> 	<p>This section should be updated as needed during an incident with waste estimates based on the specifics of the incident.</p> <p>Recommended Tools: Incident Waste Decision Support Tool (I-WASTE DST) (registration is required to use this tool) http://www2.ergweb.com/bdrtool/login.asp</p> <p>FEMA's Hazards U.S.-Multi-Hazard (Hazu-MH) (for estimating potential losses from earthquakes, floods, and hurricanes) http://www.fema.gov/hazus (ArcGIS software is required to use Hazus-MH)</p> <p>EPA's Waste Estimation Support Tool (WEST) (for estimating the type and amount of waste generated from cleanup after a radiological incident) https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=288802</p>
<p>IV. Waste Characterization Sampling and Analysis <i>(for each waste stream)</i></p> <ol style="list-style-type: none"> 1. Sampling <i>Estimate number of samples, identify type of analysis needed for each waste/material type, potential approaches to combine/composite samples, and address Health and Safety issues, such as appropriate PPE for sampling activities</i> 	<p>Two different types of sampling may be needed to meet waste acceptance criteria at waste management facilities and to allay community concerns:</p> <ol style="list-style-type: none"> 1) sampling to classify and determine compliance with national, local, or tribal regulatory criteria, and 2) sampling to ensure that waste/materials have been effectively decontaminated.

<p><i>AND</i> <i>Identify any requirements for transporting the samples to laboratories for testing</i></p> <p>2. Analysis <i>Identify data quality objectives, labs which can conduct the analyses, as well as methodologies for the analyses, what items are needed for sampling (e.g., swabs, sample bottles), sampling methodologies (e.g., composite sampling procedures), and the required techniques</i></p> <p>3. Quality assurance <i>Identify methods to ensure the quality of the data, analysis, and results</i></p>	
<p>V. Waste Management Strategies/ Options</p> <p>1. Procedures and approaches <i>By activity</i></p> <p>a. Minimization <i>Actions to minimize waste generation, toxicity, and physical size</i></p> <p>b. Collection <i>Methods; health and safety requirements</i></p> <p>c. Segregation</p> <p>d. Decontamination (equipment, people, waste/ materials) <i>Health and safety requirements</i></p> <p>e. Accumulation/Storage <i>Site location selection criteria; documentation; health and safety requirements</i></p> <p>f. Monitoring of Waste Management Activities</p> <p>2. Pre-selected waste management sites <i>Site-specific information</i></p>	<p>This section should be updated as needed during an incident (e.g., with sites that are used or may be used to manage waste during the incident).</p> <p>Relevant legal and regulatory requirements should be considered, including whether waste management activities may trigger compliance with environmental and historic preservation laws, rules, and regulations. Describe how compliance will be attained.</p> <p>Required permits may include waste processing and recycling operations permits, temporary land-use permits, land-use variances, traffic circulation strategies, air quality permits, water quality permits, coastal commission land-use permits, HHW permits, fire department permits, and burn permits.</p> <p>Reuse, recycling, and composting are generally preferred options, where appropriate. Consider adding a list of possible materials that can be reused, recycled, or composted. Having advance information on the local and regional markets, capacity, and local and regional recyclers can be important.</p> <p>Consider the impact of potential decontamination approaches on quantities and characteristics of waste and the impact of waste management constraints on potential decontamination approaches.</p>

<p>a. Waste staging and storage (short-term and long term) locations</p> <p>b. Equipment staging and storage (short-term and long-term) locations</p> <p>c. Decontamination and treatment stations</p>	<p>Define the priorities during both the response and recovery phase operations, including for facilities that may be impacted.</p> <p>Describe the coordination process with other entities responsible for managing waste.</p> <p>Consider difficulties and issues regarding removing waste from waterways and sensitive habitats (e.g., shorelines, wetlands, marshes) and their impacts on collection and removal activities.</p> <p>Describe the circumstances under which waste will be removed from private property. Identify the laws that allow government to intercede in private property matters, the process to obtain permissions to enter onto private property, and the process for recouping costs (such as insurance proceeds).</p> <p>Account for impacts from adverse weather, such as flooding and wind damage.</p> <p>Identify multiple sites/locations to choose from during an incident, if possible. However, designating specific sites/locations in advance of an incident may not be possible. In this case, develop guidelines that could be used to designate sites during an incident.</p> <p>Whether specifying sites/locations or developing guidelines, consider:</p> <ul style="list-style-type: none"> • Benefits of on-site vs. off-site management • Potential impact of having to transport the waste • Speed with which waste needs to be managed • Facility requirements and capacity • Permitting and land-use variance requirements • Cost of various options • Community concerns • Site security • Resources needed, including private sources of equipment • Proximity to anticipated waste generation points • Ease of access • Ease of containment of wastes/materials • Ownership of sites • Need for buffers and setbacks • Proximity to environmentally sensitive/protected areas (e.g., wetlands, floodplains, critical habitats, surface water, storm drains and sanitary sewer drains)
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	<p>that may lead to waterways, drinking water wells, septic tanks with leach fields)</p> <ul style="list-style-type: none"> • Proximity to historically significant areas like historic districts and archeologically sensitive areas • Environmental and human health concerns of specific waste streams • Ability to sort waste streams by category to facilitate recycling • Ability to properly contain radioactive or other highly hazardous waste streams <p>Consider the possible need for long-term groundwater, air, and other environmental monitoring at on-site burial sites and other waste management facilities or sites.</p> <p>Consider the nature of the waste or material being managed. In some cases, long-term storage may be required.</p>
<p>VI. Waste Management Facilities</p> <p>1. Anticipated types of waste management facilities needed <i>Identify all facility types needed to manage anticipated waste streams and quantities</i></p> <p>2. Specific facilities identified <i>Provide detailed information on each potential site to aid in selection at time of the incident, including some or all of the following: facility name, type, contact information for site manager and support staff, location information (including latitude/longitude), permit status and compliance history, types of waste accepted, pre-negotiated contracts, if any, waste capacity, waste acceptance criteria, financial status, distance from anticipated waste generation points, costs, community concerns</i></p>	<p>This section should be updated as needed during an incident with facilities that are used or may be used to manage waste during the incident.</p> <p>Communicating with facilities before an incident occurs can help to determine the facilities' waste acceptance criteria, which may be more stringent than what is legally required (e.g., in order to help determine sampling and analysis needs, size requirements).</p> <p>Identify multiple waste management facilities to choose from in case an incident occurs. Waste from wide area incidents may exceed the capacity of local facilities, or facilities may refuse to accept the waste. Out-of-country facilities may be necessary, in which case permissions may be required and different regulations and requirements may apply.</p> <p>In the event that existing waste management facilities do not have the capacity or capability to manage all generated wastes, including those in other communities that are accessible by rail, barge, or truck, planners should consider storing waste long-term, reopening a closed facility, or constructing a new facility. Consider pre-identifying sites for potential new facilities or developing criteria for siting new facilities.</p> <p>Proximity to transportation is an important consideration when selecting a waste management facility, as well as proximity to waste management sites (e.g., whether heavy</p>

	equipment can access the site to load the large quantities of waste onto barges or railcars for transport to facilities).
VII. Transportation <ol style="list-style-type: none"> 1. Logistical options 2. Routes (including maps) 3. Hauler information <i>Provide detailed information on each potential hauler to aid in selection at time of the incident, including some or all of the following: hauler's name, type, contact information, wastes they are permitted to handle, community concerns, security and legal requirements, decontamination needs, insurance requirements, PPE requirements, any special documentation requirements, spill response plan, and prenegotiated contracts, if applicable</i> 	<p>Consult with transportation officials on alternate routes, damaged infrastructure, and other matters impacting transport of waste.</p> <p>Prior to transportation, hazardous material must be classified according to the risks it presents and packaged, marked, labeled, and described on a shipping paper, as required by relevant local laws and regulations.</p> <p>Consider all modes of transportation, including aircraft, vessel and rail, as well as possible differences in restrictions for highways and local roads. Keep in mind packaging, labeling, permitting, security (e.g., for certain waste streams, escorts and computerized, real-time tracking systems may be required), and other transportation permit requirements.</p> <p>National or local government permission may be required, which may include obtaining a permit. Expedited permit procedures may be appropriate.</p> <p>Highway weight restrictions may vary based on time of year. Consider including a pre-scripted outline or fact sheet of hauler responsibilities, including health and safety requirements.</p> <p>Drivers may be considered emergency workers and subject to applicable exposure limits.</p> <p>Drivers and personnel who prepare hazardous materials for transportation may be considered hazmat employees and be subject to training requirements.</p>
VIII. Waste and Material Tracking and Reporting System <ol style="list-style-type: none"> 1. General principles 2. Databases or other tracking software to be used 3. Waste tracking report templates <i>Indicate information to be tracked</i> 	<p>Tracking the waste from cradle to grave helps increase transparency and aids in allaying community concerns. Keep in mind security concerns regarding sensitive information.</p> <p>Use of portable measurement and digital tracking devices should be considered.</p> <p>Haulers, government entities, and receiving facilities may use different surveying equipment and units of measurement, which should be adjusted as needed to maintain consistency.</p>
IX. Community Communications/ Outreach Plan	It is important to ensure that the community, including its residents, receive accurate and timely information about

<ol style="list-style-type: none"> 1. Strategy 2. Contact information for key stakeholder groups <i>(e.g., community groups, media, government officials)</i> 3. Pre-scripted information for waste management activities involving the public <i>(e.g., fact sheets, public service announcements (PSAs), frequently asked questions (FAQs))</i> 4. Information to aid in establishing a response website once an incident occurs and/or contribute to an incident response website created by the Incident Command or other entity <i>(e.g., hosting information, format, potential contents)</i> 	<p>the parameters, rules, and guidelines for waste management activities.</p> <p>Community outreach may include detailing special training, required PPE, and safety information, especially during a chemical, biological, or radiological incident, for facility personnel, people who choose not to evacuate their homes and, thus, are living with contamination in their homes, and responders, including volunteers who are helping to clean up the waste.</p> <p>Develop outreach and training materials for stakeholders and the public in multiple languages, as applicable to the target populations.</p> <p>Also consider the use of social media and the need for interpreters/translators.</p>
<p>X. Health and Safety for Waste Management Activities <i>(for emergency workers and the public)</i></p>	<p>While a general health and safety plan for the incident will be developed, specific waste management activities may require additional guidance and should be addressed. Waste handling at all stages may require environmental monitoring and additional measures to detect and prevent releases to the environment, which may result in harmful exposures to workers or the public (e.g., For potential exposure to fibers from friable asbestos, an Asbestos Management Plan may be necessary).</p> <p>Include specific details on safety rules and procedures to protect workers and the public and specific measures for adherence to safety rules and procedures.</p> <p>Ensure that the overall incident health and safety plan includes information related to waste management activities.</p>
<p>XI. Resource Summary <i>Gathered from all previous sections</i></p> <ol style="list-style-type: none"> 1. Resource needs <i>(e.g., equipment, staff, packaging materials, PPE)</i> 2. Resource sources 	<p>Resources may be available in-house, from contracts, or through agreements.</p> <p>For any contracting need, possible contractors should be identified and prequalified. Identify the types of work that will be performed with contracted resources. Describe the process and procedure for acquiring competitively procured contracted services, provide specific contract requirements, and explain how contractor qualifications are established.</p>

<ul style="list-style-type: none"> a. Mutual Aid Agreements b. Pre-negotiated contracts c. Specialized experts 3. Specialized technical assistance contacts 4. Contracting <ul style="list-style-type: none"> a. Emergency procurement procedures b. Contract oversight plan 5. Cost accounting/financial management 	<p>Consider that the availability of resources may be impacted by the incident itself (e.g., contamination, physical damage), lack of access (e.g., road damage), adverse weather conditions, competing needs from other jurisdictions or responses, etc.</p>
<p>XII. Oversight Activities and Exit Strategy</p> <p><i>Describe the process for transitioning each waste management activity back to its pre-incident state, including the scale-down/close-out of each waste management response activity (e.g., waste collection and staging, air monitoring of staging areas) and each waste management oversight activity performed (e.g., site visits/inspections of waste management facilities and sites, sampling and analysis of waste streams), the transition of roles and responsibilities, and the frequency of each activity</i></p>	<p>This section should be developed and added at the time of an incident.</p> <p>It is important to note that there may be some waste management activities that extend beyond the end of the response that should be addressed in the exit strategy (e.g., long-term monitoring).</p>

RECOMMENDED APPENDICES

- Job descriptions for waste management staff positions
- List of training classes available for different waste management roles
- Pre-written waste management emergency ordinances, orders, directives, declarations, designations, permits, etc.
- Maps of waste management facilities and sites, transportation routes, critical waste management infrastructure, and key resources
- Links to health and safety information
- Glossary and list of acronyms

Appendix 13: Environmentally Sound Design Considerations for Sewage Facilities at Construction Camps or Temporary Work Sites

Pit Privy

Outdoor pit privies must:

- be maintained in a clean and sanitary condition and in good working order;
- be protected so that insects, rodents or other animals do not have access to the contents;
- be constructed so as to prevent the entry of either rain or surface water into the pit;
- be located more than 7.5 meters from a well or camp facilities (e.g. residence, kitchen, etc.);
- be located more than 30 meters from any river, stream, creek, lake, spring or other body of surface water;
- be located as far as possible but at least 15 meters from a water well or other supply. A 30 meters setback is recommended for water supplies other than a properly constructed drilled water well;
- include a 1.5 meter separation from the bottom of the pit to a water table if the soil is clay or 7.6 meter separation if the soil is sand;
- have setbacks to other features and structures so as to not create a health hazard; and
- only be used for human waste.

Privy Vaults

Outdoor privy vaults must:

- be maintained in a clean and sanitary condition and in good working order;
- utilize a sewage holding tank or portion of a holding tank conforming to septic tank standards;
- be protected so that insects, rodents or other animals do not have access to the contents;
- be pumped and the sewage hauled to an appropriate disposal location by a licensed sewage hauler;
- be located more than 7.5 meters from a well or camp facilities (e.g. residence, kitchen, etc.);
- be located as far as possible but at least 7.5 meters from any river, stream, creek, lake, spring or other body of surface water;
- be located as far as possible but at least 7.5 meters from a properly constructed drilled water well or any other type of water well or water supply;
- have appropriate setbacks to other features and structures should be considered when constructing a privy vault; and
- be constructed so as to prevent the entry of either rain or surface water into the vault.

Seepage Pits

A seepage pit is a pit that has been excavated in the soil. A seepage pit is not intended to be a permanent structure.

The seepage pit should:

- be maintained in a clean and sanitary condition and in good working order;
- be protected so that insects, rodents or other animals do not have access to the contents;

- be located more than 30 meters from any river, stream, creek, lake, spring or other body of surface water;
- be located more than 30 meters from a properly constructed drilled water well or any other type of water well or water supply;
- include a 1.5 meter separation from the bottom of the seepage pit to a water table if the soil is clay or 7.6 meters separation if the soil is sand;
- be located such that individuals do not walk through sewage during the performance of duties;
- be located so as to contain sewage within the seepage pit;
- Be located such that surface runoff and overland flooding does not enter the seepage pit;
- be covered with a cover capable of holding the weight of an adult male (103 kg); and
- be constructed and located to as not pose a physical hazard. Seepage pits should be filled in with native soil when the contents reach to within 0.6 m (2 ft of the ground surface) or the pit will no longer be used.

Appendix 14: Sample Outline of Health and Safety Plan



Adobe Acrobat
Document

(please double click the PDF icon to see the document)

Appendix 15: Summary of Minutes of Consultation Meetings

(Complete copies of minutes of meetings is more than 60 pages. For detailed information on the minutes of meetings, copies may be requested from NCC)

Report on Focus Group Discussion (FGD)

Category of Participants for these FGD:

For this Inventory of Loss Survey for Water Network, FGD participants were of different professional groups. Local Businessmen, Day labor, Local Elites, Councilors, Businessmen, Landowner, Female participants, and general people of the area, Non-Title group, and Probable Project affected persons were the participants of the FGD.

Water Network – NCC - Ward 01 to Ward 18

Ward wise Location of the FGD:

Sl. no.	FGD no.	Place Description	Ward no.	No of Participants	Date	Participants Group
1	01	Wapda Colony, Bow Bazar	Ward 04	12	11 th September, 2022	Small Business Group
2	02	Siddirganj Pool, East Painadi	Ward 01	17	11 th September, 2022	Businessmen (Mixed)
3	03	Shimul para, Behari Colony, Pocket Gate, Adamjee	Ward 06	15	13 th September, 2022	Ethnic Group Behari
4	04	Kadamtoli Maddho Poshchim Para, Siddirganj	Ward 07	13	13 th September, 2022	Mixed Day Labor Group
5	05	Rail line, Adarsha Bazar	Ward 08	13	13 th September, 2022	Business Group
6	06	Mir para, Ghat Road	Ward 10	17	15 th September, 2022	Female Group Mixed
7	07	Chashara Hajigonj Rai Line Road	Ward 12	13	15 th September, 2022	Small Business Group
8	08	Majdair Bazar, Fatullah	Ward 13	17	16 th September, 2022	Low Income Group
9	09	Majdair bazar, Fatullah	Ward 13	14	16 th September, 2022	Female Labor
10	10	Sahid Suhrawardi Sarak, Near Bus Terminal	Ward 15	17	17 th September, 2022	Hawkers Group

11	11	Majdair, Fatullah	Ward 13	10	18 th September, 2022	Professional Group (Teacher)
12	12	Deovog, Pacca Road, Sadar	Ward 16	13	18 th September, 2022	Child Labor
13	13	Chashara, Sadar	Ward 13	17	18 th September, 2022	Auto Rickshaw Driver Group
14	14	1 no. Baburail Bou Bazar, Noyapara More	Ward 16	17	19 th September, 2022	Business & Job Holder Group
15	15	Paikpara	Ward 17	14	20 th September, 2022	Land Owner Group
16	16	15, Bango Bandhu Road, Sadar	Ward 15	13	21 th September, 2022	Professional Group (Doctor, Nurse)
17	19	Narayangonj 3no. Fisheries Ghat	Ward 15	16	20 th September, 2022	Fisheries Businessmen Group

FGD Findings and Recommendations:

In this Inventory of Loss Survey, 17 FGDs have been carried out and the findings and recommendations those were received from the sessions have been briefly stated below.

- The participants informed that they have heard the Government planning regarding new Water Network of adequate and safety water. They heard it from different corners, mainly from the NCC officials, public representatives etc.
- Participants shared their present water supply condition is very poor. They are getting inadequate water with 40/50 lpcd which is also color and smelled.
- Their present water supply pipe network is not in good shape, and they always search for alternative source.
- The maximum affective persons are street vendors, temporary shopkeepers, floating businessmen, etc. those who are running their business investing their own by pushcart/display table/tarpaulin etc. These people are anxious if they are displaced, specially the women, they demanded for rehabilitation and compensation. They were worried about their children and family- where they would go for living. Some people have occupied Gov. land for living and some has started business, what will be their future if they are displaced.
- They also told that NCC should monitor the compensation distribution process so that affected people could get their compensation dues directly without any harassment.
- Among the participants who are involved with business at the hat or bazar they were very much worried regarding their business because due to construction of newly pipe line of water, if they are displaced and go under total economic loss. Under such circumstances they expressed their anxiety where they will go to operate their business activities.
- Most of the participants expressed their opinion that their income will be reduced for this pipe line of water.
- The participants of the FGD supported the NCC's plan and told that it will give them better water, improve family health and reduce health cost, relief from water borne disease and develop the livelihood. Economically they will be benefitted.

- The participants have given thanks to the government & NCC for taking pragmatic plan aiming to ensure safe & adequate water facilities by improving and establishing new water pipe network.

Focus Group Discussion (FGD) Photograph



Fishermen Group



Professional Group (Teacher)



Land Owner Group



Professional Group (Doctor, Nurse)



Small Business Group



Low Income Group



Women Labor Group



Hawkers Group



Child Labor Group



Auto Rickshaw Driver Group



Business & Job Holder Group



Small Business Group



Business Group (Mixed)



Ethnic Group (Bihari)



Day Labor Group



Business Group



Female Mixed Group

Preparatory Studies and Procurement Support (PSPS) Project under Urban Infrastructure Improvement Preparatory Facility (UIIPF) and to Conduct Rehabilitation and Resettlement (R&R) Survey for Narayanganj City Corporation



**List of Participants in Focus Group Discussion (FGD)/
Stakeholder Consultation Meeting**



Address: Wapda Koloni, Bow Bazaar, Ati WARD-04
GPS: 23.6982N 90.5161E Participants Group: Small Business Group
Date: 11-09-2022 Time: 4:30 PM

Sl. No.	Participant's Name	Age	Occupation	Mobile No.	Signature
1	MD Masud	31	Business	01706796861	মাসুদ
2	MD Edris Ali	42	Business	01992425911	Eddis
3	MD AL Amin	29	Business	01866427791	আলমিন
4	MD Abdul Kadir	46	Business	01866420142	আব্দুল কাদির
5	MD. Shahn	27	Business	01684151573	শাহন
6	MD Selim	42	Business	01819295761	সেলিম
7	MD AMAN ULLAH	56	Business	01684151573	আমান
8	MD ANWAR Hossain	37	Business	01971674211	আনোয়ার হোসেন
9	MD ASLAM	28	Business	01743982394	আসলাম
10	MD Darog Ali	40	Business	01319785098	দারোগ আলি
11	MD Babul	52	Business	01830969785	বাবুল
12	MD Samsul Atom	43	Business	01831257922	সামসুল আতম

Facilitated By MD. Kausaruzzaman Roni

Signature Roni.

Preparatory Studies and Procurement Support (PSPS) Project under Urban Infrastructure Improvement Preparatory Facility (UIIPF) and to Conduct Rehabilitation and Resettlement (R&R) Survey for Narayananj City Corporation



**List of Participants in Focus Group Discussion (FGD)/
Stakeholder Consultation Meeting**



Address: SHADDIRGONJ POOL (east painadi) WARD:01

GPS: 23.41'10.446"N 90.9048.402"E Participants Group: BUSINESSMEN (MIXED)

Date: 11-09-22 Time 13:02

SL No.	Participant's Name	Age	Occupation	Mobile No.	Signature
1	আমাল হোসেন	40	দানমজুর	01857430893	আমাল
2	মাহিদুল মিয়া	38	কৃষক	01710-112919	মাহিদুল
3	মাহিদুল ইসলাম	40	ব্যবসায়ী	01033578859	মাহিদুল ইসলাম
4	আবদুল হকমান	45	ব্যবসায়ী	0183325325	আবদুল
5	মুঃ আমাল শিকদার	55	ব্যবসায়ী	01772430481	আমাল
6	আমাল ইসলাম	50	ব্যবসায়ী	01833677349	আমাল
7	আবদুল হকমান	45	চাকরি	01870121852	আবদুল
8	আবির	20	কৃষক	01770509549	আবির
9	মোঃ আমির হোসেন	28	ড্রাইভার	01792018165	আমির
10	মোঃ ইউসুফ	30	কৃষক	01779199948	ইউসুফ
11	মোঃ আবদুল	25	কৃষক	01714875155	আবদুল
12	মোঃ মাহিদুল	35	কৃষক	01868210648	মাহিদুল
13	মোঃ ইকবাল	32	কৃষক	01985159175	ইকবাল
14	মোঃ কওছর	35	কৃষক	01920313736	কওছর
15	মোঃ সুমন	21	কৃষক	01791551162	সুমন
16	মোঃ আবদুল হকমান	55	কৃষক	01831480815	আবদুল হকমান
17	মোঃ আবদুল	36	কৃষক	01909265611	আবদুল

Facilitated By Md. Yunus Ali

Signature Yunus

ADB

PADECO

ARRA

Preparatory Studies and Procurement Support (PSPS) Project under Urban Infrastructure Improvement Preparatory Facility (UIIPF) and to Conduct Rehabilitation and Resettlement (R&R) Survey for Narayanganj City Corporation



**List of Participants in Focus Group Discussion (FGD)/
Stakeholder Consultation Meeting**



Address: Bhimul para, Behari Colony, poket gat, Adomge (WARD-06)
 GPS: 23.67356688N 90.52430600E
 Date: 13.05.22 Time: 3:40 PM
 Participants Group: Ethnic Group (Bihari)

Sl No.	Participant's Name	Age	Occupation	Mobile No.	Signature
1	Fakrudin	62	স্বাস্থ্যকর্মী	01600275792	ফকরুদ্দিন
2	Montaz	55	কর্মী	01965097579	MD. Montaz
3	MD. Nazim	52	কর্মী	01731501630	Montaz
4	Aisub	65	স্বাস্থ্যকর্মী	01	আইসুব মাসুম
5	MD. Murma	70	স্বাস্থ্যকর্মী	01921296561	মুর্মা
6	MD. Azad	50	কর্মী	01863094990	- Azad
7	Rahangin	50	কর্মী	01609713399	রাহাঙ্গিন
8	Mohammad Ali	36	কর্মী	01866716528	- MD. Ali
9	Mojibur Rahman	48	কর্মী	01814982000	মজিবুর
10	Ziyakot	65	স্বাস্থ্যকর্মী	0172027358	জিয়াকট
11	MD. Rohit	20	কর্মী	01600275793	রোহিত
12	Rashidul	34	কর্মী	01923682413	রশিদুল
13	Rofiqur	43	কর্মী	01943336236	Rofiqur
14	Shamsu	57	কর্মী	0168213387	শামসু
15	Razzak	40	স্বাস্থ্যকর্মী	01918-168728	রাসসক

Facilitated By Md. Mahmudul Hasan

Signature

Hasan.

ADB

PADECO ARRA

Preparatory Studies and Procurement Support (PSPS) Project under Urban Infrastructure Improvement Preparatory Facility (UIIPF) and to Conduct Rehabilitation and Resettlement (R&R) Survey for Narayanganj City Corporation



**List of Participants in Focus Group Discussion (FGD)/
Stakeholder Consultation Meeting**



Address: বাদামতলী মসজিদ-কাজির পাড়, মিনদিয়া-গাওঁ, নারায়ণগঞ্জ-৩২০০০৭
 GPS: 23° 40' 36.534" N 90° 38' 24.6" E
 Date: 13-09-22 Time 13:03 P. Participants Group: ব্যবসায়ী, দিন মজুর

SL No.	Participant's Name	Age	Occupation	Mobile No.	Signature
1	মো: সাদ্দুন্নাহ আলী	37	ডে-লোভা	01761079782	সাদ্দুন্নাহ আলী
2	মো: মিলন	30	ডে-লোভা	01770558612	মিলন
3	মো: আনা সাদ্দ	25	ডে-লোভা	01788699986	আনা
4	মো: আহম্মদ	45	ব্যবসায়ী	01671980536	আহম্মদ
5	মো: জুয়েল	28	ব্যবসায়ী	01789502708	জুয়েল
6	মো: সাদ্দুল আলী	55	ব্যবসায়ী	01811165436	সাদ্দুল আলী
7	মো: মোস্তাফিজ	42	মজুর	01985604861	মোস্তাফিজ
8	মুজিব মিমর	50	মজুর	01732500049	মুজিব
9	বাসমত মিমর	52	ব্যবসায়ী	017405242802	বাসমত
10	সুলতান	40	ব্যবসায়ী	01812553092	Sultan
11	তমিজ-বাসমত	16	স্টুডেন্ট	01645256490	তমিজ
12	মোস্তাফিজ	24	লোভা	01757040699	মোস্তাফিজ
13	বাসমত	35	লোভা	01745775334	বাসমত

Facilitated By Md. Yunus Ali

Signature Yunus.

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Preparatory Studies and Procurement Support (PSPS) Project under Urban Infrastructure Improvement Preparatory Facility (UIPF) and to Conduct Rehabilitation and Resettlement (R&R) Survey for Narayanganj City Corporation



**List of Participants in Focus Group Discussion (FGD)/
Stakeholder Consultation Meeting**



Address: Railline, Adarsha Bazaar (WARD-08)

GPS: 23.6475N 90.5148E Participants Group: Business Group

Date: 13.09.2022 Time 04:52 Pm

Sl. No.	Participant's Name	Age	Occupation	Mobile No.	Signature
1	Masud Atom	28	Business	01997618624	মাসুদ
2	MD Saiful Islam	37	Business	01717465954	সাইফুল ইসলাম
3	MD Kausar	38	Business	01822250933	কাসর
4	MD Tuhin	22	Business	01857800920	TUHIN
5	MD Mohiuddin	36	Business	01914273117	মোহিউদ্দিন
6	MD Ali	42	Business	01718187694	আলি
7	MD Mahfuzul Islam	40	Business	01930086578	মাহফুজুল ইসলাম
8	MD Razu Ahmed	32	Business	01925018979	Raju Ahmed
9	MD Jewel Bepari	38	Business	01637528511	জুয়েল
10	MD Rubel	32	Business	0191446653	রুবল
11	MD Hafeez	36	Business	01838170638	হাফিজ
12	MD Foyez	28	Business	01684993074	ফয়েজ
13	MD Shah Atom	30	Business	01873844995	শাহ আলম
14					
15					
16					
17					

Facilitated By MD: KausaruzZaman Roni

Signature Roni

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Preparatory Studies and Procurement Support (PSPS) Project under Urban Infrastructure Improvement Preparatory Facility (UIIPF) and to Conduct Rehabilitation and Resettlement (R&R) Survey for Narayanganj City Corporation



**List of Participants in Focus Group Discussion (FGD)/
Stakeholder Consultation Meeting**



Address: Mir Para, Ghat road, W-10 WARD-10

GPS: 23.6556811N 90.51786396E Participants Group: Female Group Mixed

Date: 15-09-22 Time: 12.40

SL No.	Participant's Name	Age	Occupation	Mobile No.	Signature
1	Farida Begum	50	House wife	01912701318	ফরিদা বেগম
2	Hazina Begum	48	"	01914217498	হাজিনা
3	Aysha Begum	60	House wife	01913899355	আইশা বেগম
4	Selina Begum	53	"	01914217498	সেলিনা বেগম
5	Roksana Akter	40	Business	01912701318	রোকসানা
6	Mitu Begum	30	House wife	01717431214	মিতু
7	Halima Begum	63	"	01927255244	হালিমা বেগম
8	Koli Akter	22	Student	01689034421	কলি আক্তার
9	Halima Khatun	53	House wife	—	হালিমা খাতুন
10	ফরিদা বেগম	30	"	01963502378	ফরিদা
11	Momotaz Begum	63	H.W	01922237023	মমতাজ বেগম
12	Tanija Akter	37	H.W	01998588317	Tanija
13	Roksana Begum		H.W	01975947536	রোকসানা
14	Farida Begum	62	H.W	01937018159	ফরিদা বেগম
15	Santa Akter	23	H.W	01937018159	সান্তা আক্তার
16	Fachana	27	H.W	01964676233	ফাচানা
17	Lucky	29	H.W	01947422097	লুকি

Facilitated By Burhan

Signature Burhan

Preparatory Studies and Procurement Support (PSPS) Project under Urban Infrastructure Improvement Preparatory Facility (UIIPF) and to Conduct Rehabilitation and Resettlement (R&R) Survey for Narayanganj City Corporation



**List of Participants in Focus Group Discussion (FGD)/
Stakeholder Consultation Meeting**



Address: Choshara Hojigonj Rail Line Road (WARD-12)

GPS: 23.6284 N 90.4986 E Participants Group: Small Business Group

Date: 15.09.2022 Time: _____

SL No.	Participant's Name	Age	Occupation	Mobile No.	Signature
1	MD Imman	36	Business	01943983082	
2	MD Sohel	40	Business	01826502112	
3	MD Sofiqul	55	Business	01704151390	
4	MD Motaleb Fokir	60	Business	01631554212	
5	MD Nasim Hossen	30	Business	01621382872	
6	MD Saju Mullah	42	Business	01978780588	
7	Mohammad Ali	50	Business	01951172910	
8	MD Jewel	30	Business	01798805697	
9	MD Helal Mia	36	Business	01765191215	
10	MD Masud	55	Business	01965284242	
11	MD Khoka Mondal	40	Business	01749830441	
12	MD Bulu Mia	50	Business	01858522440	
13	MD Fozlu	40	Business	01612636137	

Facilitated By MD. Kausaruzzaman Roni

Signature Roni

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Preparatory Studies and Procurement Support (PSPS) Project under Urban Infrastructure Improvement Preparatory Facility (UIIPF) and to Conduct Rehabilitation and Resettlement (R&R) Survey for Narayanganj City Corporation



**List of Participants in Focus Group Discussion (FGD)/
Stakeholder Consultation Meeting**



Address: সাতারীক বাগান, ২৫৯শী, নারায়নগঞ্জ, ডায়াড নং ২৬

GPS: 23.620920N90.492422E Participants Group: Low Income Group.

Date: 16.09.22 Time: 3:23 PM

Sl. No.	Participant's Name	Age	Occupation	Mobile No.	Signature
1	শ্রী: সাদিক হোসেন	25	লোক	01646398282	সাদিক
2	শ্রী: সাদিক	25	লোক	01944942046	সাদিক
3	শ্রী: সাদিক	32	লোক	01817317853	সাদিক
4	শ্রী: সাদিক হোসেন	40	কাজ	01942609591	সাদিক
5	শ্রী: সাদিক	40	কাজ	01631376927	সাদিক
6	শ্রী: সাদিক	70	কাজ	01902165019	সাদিক
7	শ্রী: সাদিক হোসেন	29	কাজ	01719242485	সাদিক
8	শ্রী: সাদিক	65	কাজ	01849418214	সাদিক
9	শ্রী: সাদিক হোসেন	47	কাজ	01742563655	সাদিক
10	শ্রী: সাদিক হোসেন	50	কাজ	01932818317	সাদিক
11	শ্রী: সাদিক হোসেন	22	কাজ	01721770304	সাদিক
12	শ্রী: সাদিক	46	কাজ	01917452622	সাদিক
13	শ্রী: সাদিক হোসেন	38	কাজ	0198672026	সাদিক
14	শ্রী: সাদিক হোসেন	45	কাজ	01024028245	সাদিক
15	শ্রী: সাদিক	46	কাজ	01701626543	সাদিক
16	শ্রী: সাদিক	52	কাজ	01818482005	সাদিক
17	শ্রী: সাদিক হোসেন	55	কাজ	01041566325	সাদিক

Facilitated By MD. YUNUS ALI

Signature [Signature] 16.09.22

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Preparatory Studies and Procurement Support (PSPS) Project under Urban Infrastructure Improvement Preparatory Facility (UIIPF) and to Conduct Rehabilitation and Resettlement (R&R) Survey for Narayanganj City Corporation



**List of Participants in Focus Group Discussion (FGD)/
Stakeholder Consultation Meeting**



Address: স্বাস্থ্যকেন্দ্র বাসার, রংগুলা, নারায়নগঞ্জ, ডাকাটন ১৬

GPS: 23.620700N 90.492567E Participants Group: সহিলা মেসার

Date: 16.09.22 Time: 3:58 PM

SL No.	Participant's Name	Age	Occupation	Mobile No.	Signature
1	সহিলা	40	মেসার	—	সহিলা
2	সহিলা	50	মেসার	—	সহিলা
3	সহিলা	50	মেসার	—	সহিলা
4	সহিলা	50	সহিলা	—	সহিলা
5	সহিলা	60	মেসার	—	সহিলা
6	সহিলা	60	মেসার	—	সহিলা
7	সহিলা	60	মেসার	01944536216	সহিলা
8	সহিলা	65	মেসার	—	সহিলা
9	সহিলা	50	মেসার	—	সহিলা
10	সহিলা	70	মেসার	—	সহিলা
11	সহিলা	38	মেসার	01762321176	সহিলা
12	সহিলা	50	মেসার	01747746374	সহিলা
13	সহিলা	70	মেসার	01027442165	সহিলা
14	সহিলা	40	মেসার	01743749004	সহিলা

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**List of Participants in Focus Group Discussion (FGD)/
Stakeholder Consultation Meeting**



Address: Sahid Suhrawardi Sarak, Near Bus Terminal (Ward-15)

GPS: 25.164759 N 20.5045188 E Participants Group: Hawkers Group

Date: 17-09-22 Time 3.30 PM

SL No.	Participant's Name	Age	Occupation	Mobile No.	Signature
01	Dsthal Borun Bissae	60	PS COMMISSIONARY + Business	01943029081	—
02	Md. Rabby	28	Business	01924513756	(Mr: 21990)
03	Milon	50	"	01712919421	Roman
04	Sadek	44	"	01993965809	Sadek
05	Sajib	32	"	01681629215	Sajib
06	Relax	25	"	01944818404	Relax
07	Shabik	30	"	01927370333	Shabik
08	Ali Hossain	32	"	01830877350	Ali Hossain
09	Pavel	24	"	01646549210	Pavel
10	Masud Karim	50	"	01402910055	Masud
11	Rashed	39	"	01718384471	Rashed
12	Motazzod	35	"	01910265363	Motazzod
13	Minky	40	"	01758101711	Minky
14	Milon	32	"	01687094245	Milon
15	Farid uddin	52	"	01	Farid uddin
16	Arif	22	"	01982470713	Arif
17	Nasir	33	"	01956669458	Nasir

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Preparatory Studies and Procurement Support (PSPS) Project under Urban Infrastructure Improvement Preparatory Facility (UIIPF) and to Conduct Rehabilitation and Resettlement (R&R) Survey for Narayanganj City Corporation



**List of Participants in Focus Group Discussion (FGD)/
Stakeholder Consultation Meeting**



Address: MAISDAIR, FATULLAH, NARAYANGANJ (Begum Rokya Kh. High School)
GPS: 23.624872N 90.49264E Participants Group: Teachers (Ward-13) Group
Date: 18.09.2022 Time 15.43

SL No.	Participant's Name	Age	Occupation	Mobile No.	Signature
	Sultana Begum	47	Teaching Headmaster	01715532133	
	Md. Moazzem Hossain	47	Assistant Head Teacher	01911798725	
	MD. NARZUL ISLAM	54	Teaching	01924077018	
	Asma-ul-Husna	44	Teaching	01981777658	
	MD. MAHAN ALI	36	Teaching	01718649011	
	Mohammad Mostafizur Rahman	43	Teacher	01811112538	
	Sujana Akter	36	Teacher	01629204739	
	M. Asghar	56	Teacher	01818410253	
	MD RAKIBUL ISLAM	28	Teacher	012068111052	
	Masius Rahman	37	Teacher	01671335574	

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Preparatory Studies and Procurement Support (PSPS) Project under Urban Infrastructure Improvement Preparatory Facility (UIIPF) and to Conduct Rehabilitation and Resettlement (R&R) Survey for Narayanganj City Corporation



**List of Participants in Focus Group Discussion (FGD)/
Stakeholder Consultation Meeting**



Address: মেডেলোডা, পাটকা ব্রোড, অদা, নারায়ণ নগর, ডাকা, ১২১০

GPS: 23.6143 N 90.5005 E Participants Group: ফিল্ড অফিস

Date: 18.09.22 Time: 17:23 P

SL No.	Participant's Name	Age	Occupation	Mobile No.	Signature
1	শ্রী: ফারুক	11	শেখার	01946427262	[Signature]
2	শ্রী: মাহবুবুল হক	14	শেখার	01824821212	[Signature]
3	শ্রী: মুহাম্মদ	16	শেখার	01989817983	[Signature]
4	শ্রী: ইয়াছিন	16	শেখার	01935865169	[Signature]
5	শ্রী: মিসবাব	11	শেখার	01676566698	[Signature]
6	শ্রী: মাহমুদ	17	শেখার	01930235426	[Signature]
7	শ্রী: মাহমুদ	16	শেখার	01648575800	[Signature]
8	শ্রী: ফাহিম	15	শেখার	01773343178	[Signature]
9	শ্রী: মোস্তাফিজ	12	শেখার	01923435810	[Signature]
10	শ্রী: মাহমুদ	14	শেখার	01822516702	[Signature]
11	শ্রী: মাহমুদ	10	শেখার	01842368693	[Signature]
12	শ্রী: মুহাম্মদ	13	শেখার	01946487262	[Signature]
13	শ্রী: মাহমুদ	10	শেখার	01814345717	[Signature]

Facilitated By MD. YUNUS ALI

Signature [Signature] 18.09.22

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Preparatory Studies and Procurement Support (PSPS) Project under Urban Infrastructure Improvement Preparatory Facility (UIIPF) and to Conduct Rehabilitation and Resettlement (R&R) Survey for Narayanganj City Corporation



**List of Participants in Focus Group Discussion (FGD)/
Stakeholder Consultation Meeting**



Address: CHASARA, SADAR, NARAYANGONJ WARD NO -13

GPS: 23.623853N 90.497862E Participants Group: Auto Rickshaw Driver Group

Date: 18.09.2022 Time: 14:14

SL No.	Participant's Name	Age	Occupation	Mobile No.	Signature
1	MD. MAJNU MIA	36	AUTO DRIVER	01786619426	
2	ATIKUR RAHMAN	47	"	01786404402	
3	MD. WALIUZZAH	26	"	01959532106	
4	ANIS	38	"	01586196244	
5	HIMEL	19	"	01952956292	
6	MD. MUKTAR HOSSAIN	58	"	01403124146	
7	MJNHAZUL ISLAM	30	"	01946445794	
8	MENTU	30	"	01318675798	
9	AMIR HOSSAIN	28	"	01689266394	
10	RONY GAZI	43	"	01726212892	
11	MD. EMON HOSSAIN	30	"	01933710587	
12	TOFAZZEL HOSSAIN	26	"	01982997172	
13	MD. ASHRAG	42	"	01722315580	
14	MD. RASEL	26	"	01947356247	
15	MD. SUMON	25	"	01957129106	
16	MD. RASEL	28	"	01984167016	
17	MD. FARUKE	32	"	01787830799	

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Preparatory Studies and Procurement Support (PSPS) Project under Urban Infrastructure Improvement Preparatory Facility (UIIPF) and to Conduct Rehabilitation and Resettlement (R&R) Survey for Narayanganj City Corporation

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List of Participants in Focus Group Discussion (FGD)/ Stakeholder Consultation Meeting



Address: ২ নং বাবু হাটের ত্রিবাড়িয়া, নয়া বাজার রোড, নারায়নগঞ্জ ডিবি-২৬

GPS: 23.6089 N 90.4953 E Participants Group: Business & Job Holder

Date: 19.09.22 Time: 14:30 Group

Sl No.	Participant's Name	Age	Occupation	Mobile No.	Signature
1	শ্রী: মোহাম্মদ	53	কাজ	01677206332	শ্রী:
2	শ্রী: মাহমুদ	28	কাজ	01673480100	শ্রী:
3	শ্রী: মাহমুদ	48	কাজ	01941429527	শ্রী:
4	শ্রী: মোহাম্মদ	40	কাজ	01715797042	শ্রী:
5	শ্রী: মোহাম্মদ	27	কাজ	01818823114	শ্রী:
6	শ্রী: মোহাম্মদ	26	কাজ	01836388137	শ্রী:
7	শ্রী: মোহাম্মদ	45	কাজ	01852696837	শ্রী:
8	শ্রী: মোহাম্মদ	45	কাজ	01814897596	শ্রী:
9	শ্রী: মোহাম্মদ	44	কাজ	01976667278	শ্রী:
10	শ্রী: মোহাম্মদ	28	কাজ	01985009765	শ্রী:
11	শ্রী: মোহাম্মদ	28	কাজ	01941431512	শ্রী:
12	শ্রী: মোহাম্মদ	61	কাজ	01936609540	শ্রী:
13	শ্রী: মোহাম্মদ	47	কাজ	01972208269	শ্রী:
14	শ্রী: মোহাম্মদ	30	কাজ	01721760415	শ্রী:
15	শ্রী: মোহাম্মদ	25	কাজ	01812874820	শ্রী:
16	শ্রী: মোহাম্মদ	42	কাজ	01811515555	শ্রী:
17	শ্রী: মোহাম্মদ	40	কাজ	01715797042	শ্রী:

Facilitated By MD. YUNUS ALI

Signature [Signature] 19.09.22



Preparatory Studies and Procurement Support (PSPS) Project under Urban Infrastructure Improvement Preparatory Facility (UIIPF) and to Conduct Rehabilitation and Resettlement (R&R) Survey for Narayanganj City Corporation



**List of Participants in Focus Group Discussion (FGD)/
Stakeholder Consultation Meeting**



Address: Paikpara

W-17

GPS: 23.607508N 90.499902E Participants Group: ১২ জন সাফল্যে গেল

Date: 20-09-22 Time 5:00 P.M

total = 9

SL No.	Participant's Name	Age	Occupation	Mobile No.	Signature
1	LAL MIA	55	BUSINESS	01643913655	লাল মিয়া
2	MD. JAKER HOSSAIN	58	SERVICE	01718940963	মদ জাকের হোসেন
3	RUKSANA	50	HOUSEWIFE	0	রুকসানা
4	PANNA	45	"	0	পান্না
5	LAILY AKTER	28	"	01677717198	লাইলী আকter
6	MAHMUDA	35	"		মাহমুদা
7	SUMONA	35	"	01720833877	সুমোনা
8	SAGCOR	35	BUSINESS	01994705593	সাগর
9	SHIMU	35	HOUSEWIFE		শিমু
10	MD. HANIF	67	SERVICE	01988286618	মদ হানিফ
11	HENA	60	HOUSEWIFE	0	হেনা
12	SONIA AKTER	25	"	01742161398	সোনিয়া আকter
13	MD. RATAN	52	SERVICE	01676683130	মদ রতান
14	NILVFA	40	HOUSEWIFE		নিলুফা

Facilitated By

Burhan

Signature

Burhan

ADB

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Preparatory Studies and Procurement Support (PSPS) Project under Urban Infrastructure Improvement Preparatory Facility (UIPF) and to Conduct Rehabilitation and Resettlement (R&R) Survey for Narayanganj City Corporation



**List of Participants in Focus Group Discussion (FGD)/
Stakeholder Consultation Meeting**



Address: 15, BANGTOBONDHU ROAD, SADAR, NARAYANGONJ (Word-15)

GPS: 23.608254N 90.502787E Participants Group: DOCTOR, NURSE Group.

Date: 21.09.2022 Time: 11:47

Sl. No.	Participant's Name	Age	Occupation	Mobile No.	Signature
1.	Dr. Fatema Shiraz	57	Medical Officer	01711696695	Fatema 24/9/22
2.	Md. Abdul Baten	56	Pharmacist	01720539153	Abdul Baten 21/9/22
3.	Asma Begum	50	FMA	01717825992	Asma 21/9/22
4.	Bashara Bala	30	AN A	01739670622	Bashara 21/9/2022
5.	Sumona Barui.	25	A.N.A.	01941195012	Sumona 21/9/22
6.	Umme Habiba Huma	21	V.P.L	01633606598	Umme 21/09/2022
7.	সৌদিয়া সুলতানা	42	MLSS	01999200313	Soudia 21/9/22
8.	Anisur Rahman	43	Suprv.	01922444537	Anisur 21/9/22
9.	MUKTA AKTER	30	F.W.V	01924039588	Mukta
10.	PURABI DHAR	32	F.W.V	01840662919	Purabi
11.	Jaharata Akter	52	F.W.V	01711266094	Jaharata
12.	Setara Akter.	48	A.N.A	01815151216	Setara
13.	Jhumar das.	29	F.W.V	01626714980	Jhumar

Facilitated By Md. Anisur Rahman

Signature [Signature]

ADB

PADECO

ARRA

Preparatory Studies and Procurement Support (PSPS) Project under Urban Infrastructure Improvement Preparatory Facility (UIIPF) and to Conduct Rehabilitation and Resettlement (R&R) Survey for Narayanganj City Corporation



**List of Participants in Focus Group Discussion (FGD)/
Stakeholder Consultation Meeting**



Address: নাবানগড় ৩ নং ওয়ার্ড মসজিদ জায়গা কবরী পল্লী (Ward-15)
GPS: 23.6180N 90.5058E Participants Group: মসজিদ কবরী
Date: 20-09-2022 Time: 04:15 PM

SL No.	Participant's Name	Age	Occupation	Mobile No.	Signature
1	Md. Hossem Sony	38	Fisheries	01816840351	<i>[Signature]</i>
2	Jahangir Alam	45	"	01923488364	<i>[Signature]</i>
3	Siddikur Rahman	40	"	01711222454	MD. Sumon
4	Jewel	25	"	01814734035	<i>[Signature]</i>
5	Sumon	40	"	01925214186	Sumon
6	Humaiun Kabir	45	"	01681742037	মুসাব্বিহ
7	Md. Jakir	30	"	01778747123	জাকির
8	Md. Shahin	40	"	01646113501	শাহিন
9	Nur Alam	51	"	01740401820	নূর আলম
10	Shajahan	41	"	01779589572	শাহজাহান
11	Mona Baby	43	"	01716035734	মোনা বেবি
12	Liakat	55	"	01913-566156	
12	Abdur Rahim	52	"	01934213285	Rahim
13	Monoranjan	55	"	01716035734	
14	Khalidur	60	"	01627369148	
15	Razhid	48	"	01718041675	রাজিড
16	Shahadat	32	"	01956969383	<i>[Signature]</i>

Facilitated By Ahsanul Kabir Rasel

Signature Rasel

ADB

PADECO

ARRA

Appendix 16: Sample Grievance Registration Form

The _____ Project welcomes complaints, suggestions, queries and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback.

Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing *(CONFIDENTIAL)* above your name. Thank you.

Date		Place of Registration	
Contact Information/Personal Details			
Name	Gender	* Male * Female	Age
Home Address			
Place			
Phone no.			
E-mail			
Complaint/Suggestion/Comment/Question Please provide the details (who, what, where, and how) of your grievance below:			
If included as attachment/note/letter, please tick here:			
How do you want us to reach you for feedback or use on your comment/grievance?			

FOR OFFICIAL USE ONLY

Registered by: (Name of Official Registering Grievance)	
Mode of Communication: Note/Letter E-mail Verbal/Telephonic	
Reviewed by: (Names/Positions of Officials Reviewing Grievance)	
Action Taken:	
Whether Action Taken Disclosed:	Yes No
Means of Disclosure:	

Appendix 17: Sample Daily Monitoring Sheet for Contractor

(Note: This checklist is indicative which can be further enhanced depending on the project circumstances.)

[NAME OF ADB PROJECT]
Contractor Monitoring Sheet

Name of Subproject: _____
 Location: _____
 Contractor: _____
 Contractor EHS Supervisor (or equivalent): _____
 Date of monitoring: _____

Summary of Findings

Monitoring Item	Status	Remarks
1. Compliance with Local Permit Requirements	(Obtained / Application Submitted / Not Applicable)	
<i>Location/zoning permits</i>		
<i>Permit to construct</i>		
<i>Building permit</i>		
<i>Transport / hauling permits</i>		
2. Compliance with IEE Requirements	(Approved / Under Preparation / Submitted to PMU for Approval / Not Applicable)	
<i>Site-specific EMP (SEMP)</i>		
<i>Corrective Action Plan, if any</i>		
3. Compliance with SEMP		
Construction Site	(Satisfactory / Needs Improvement / Not Implemented/Not Applicable)	
- Conduct of toolbox talk		
- Use of PPE		
- Rest areas for male and female workers		
- Toilets for male and female workers		
- Medical kits		
- Drinking water supply		
- Dust control		
- Noise control		
- Solid waste management		
- Wastewater management		
- Chemicals storage (fuel, oil, etc.)		
- Siltation or erosion control		
- Heavy equipment staging / parking area		
- Barricades around excavation sites		
- Access to residential houses/shops/businesses		
- Traffic routing signages		
- Lightings at night		

Monitoring Item	Status	Remarks
- Trench shoring / landslide protection		
Construction Workers' Camp Site	(Available / Needs Improvement / Not Available / Not Applicable)	
- Quarters for male and female workers		
- Sleeping utilities (e.g. beds, pillows, blankets, mosquito nets, etc.)		
- Power/Electricity supply		
- Drinking water supply		
- Toilets for male and female workers		
- General purpose water supply (cooking, washing, bathing)		
- Cooking facilities and areas		
- Solid waste management		
- Wastewater management		
- Pest control		
4. Implementation of GRM	(Yes / No or None / Under Resolution)	
<i>Complaints</i>		
<i>Complaints resolution</i>		
5. Environmental Quality Measurement	(Passed / Failed / Not Applicable)	
<i>Ambient air quality sampling</i>		
<i>Noise level measurement</i>		
<i>Receiving water quality sampling</i>		

Other Issues: _____

Attachments:

1. Copies of new permits obtained, if any.
2. Photos taken at worksites, if any.
(photos attached in previous monitoring sheets should not be used again).
3. Laboratory results of environmental quality measurements, if any.

Prepared by: _____
 Name, Designation and Signature

Appendix 18: Sample Inspection Checklist for Project Management Unit

(Note: This checklist is indicative which can be further enhanced depending on the project circumstances.)

[NAME OF ADB PROJECT]
SITE INSPECTION CHECKLIST

Subproject / Location: _____

Date: _____

MONITORING/INSPECTION QUESTIONS		FINDINGS			COMMENTS / CLARIFICATIONS
1.	Supervision and Management On-Site	Yes	No	NA	
	a. Is an EHS supervisor available?				
	b. Is a copy of the SEMP available?				
	c. Are daily toolbox talks conducted on site?				
2.	The Facilities	Yes	No	NA	
	a. Are there a medical and first aid kits on site?				
	b. Are emergency contact details available on-site?				
	c. Are there PPEs available? What are they?				
	d. Are the PPEs in good condition?				
	e. Are there firefighting equipment on site?				
	f. Are there separate sanitary facilities for male and female workers?				
	g. Is drinking water supply available for workers?				
	h. Is there a rest area for workers?				
	i. Are storage areas for chemicals available and with protection? in safe locations?				
3.	Occupational Health and Safety	Yes	No	NA	
	a. Are the PPEs being used by workers?				
	b. Are excavation trenches provided with shores or protection from landslide?				
	c. Is breaktime for workers provided?				
	d. How many for each type of collection vehicle is in current use?				
4.	Community Safety	Yes	No	NA	
	a) Are excavation areas provided with barricades around them?				
	b) Are safety signages posted around the sites?				
	c) Are temporary and safe walkways for pedestrians available near work sites?				
	d) Is there a record of treated wastewater quality testing/measurement?				
5.	Solid Waste Management	Yes	No	NA	
	a. Are excavated materials placed sufficiently away from watercourses?				
	b. Is solid waste segregation and management in place?				

MONITORING/INSPECTION QUESTIONS		FINDINGS			COMMENTS / CLARIFICATIONS
	c. Is there a regular collection of solid wastes from work sites?				
6.	Wastewater Management	Yes	No	NA	
	a) Are there separate sanitary facilities for various types of use (septic tanks, urination, washing, etc.)?				
	b) Is any wastewater discharged to storm drains?				
	c) Is any wastewater being treated prior to discharge?				
	d) Are measures in place to avoid siltation of nearby drainage or receiving bodies of water?				
	e) Are silt traps or sedimentation ponds installed for surface runoff regularly cleaned and freed of silts or sediments?				
7.	Dust Control	Yes	No	NA	
	a. Is the construction site watered to minimize generation of dust?				
	b. Are roads within and around the construction sites sprayed with water on regular intervals?				
	c. Is there a speed control for vehicles at construction sites?				
	d. Are stockpiles of sand, cement and other construction materials covered to avoid being airborne?				
	e. Are construction vehicles carrying soils and other spoils covered?				
	f. Are generators provided with air pollution control devices?				
	g. Are all vehicles regularly maintained to minimize emission of black smoke? Do they have valid permits?				
8.	Noise Control	Yes	No	NA	
	a) Is the work only taking place between 7 am and 7 pm, week days?				
	b) Do generators operate with doors closed or provided with sound barrier around them?				
	c) Is idle equipment turned off or throttled down?				
	d) Are there noise mitigation measures adopted at construction sites?				
	e) Are neighboring residents notified in advance of any noisy activities expected at construction sites?				
9.	Traffic Management	Yes	No	NA	
	a) Are traffic signages available around the construction sites and nearby roads?				
	b) Are re-routing signages sufficient to guide motorists?				

MONITORING/INSPECTION QUESTIONS		FINDINGS			COMMENTS / CLARIFICATIONS
	c) Are the excavation sites along roads provided with barricades with reflectors?				
	d) Are the excavation sites provided with sufficient lighting at night?				
10.	Recording System	Yes	No	NA	
	a) Do the contractors have recording system for SEMP implementation?				
	b) Are the daily monitoring sheets accomplished by the contractor EHS supervisor (or equivalent) properly compiled?				
	c) Are laboratory results of environmental sampling conducted since the commencement of construction activities properly compiled?				
	d) Are these records readily available at the site and to the inspection team?				

Other Issues: _____

Prepared by: _____
 Name, Designation and Signature