

Project Report  
on

**Proxy measurement of the sediment flux by means of seismic noise in the presence of the river siltation and river bank erosion**



Innovative and Indigenous Research work by the Young Scientists especially belonging to Schools/Colleges/Science Organizations/ Associations under Special Allocation for Science and Technology

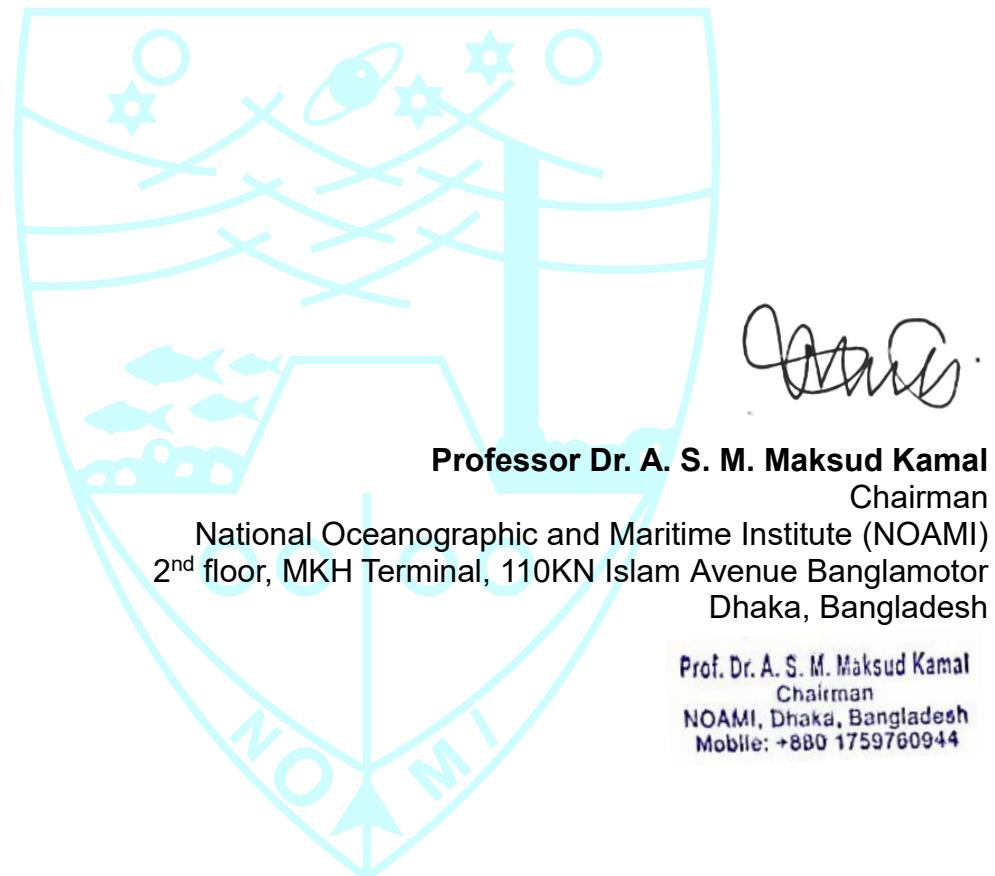
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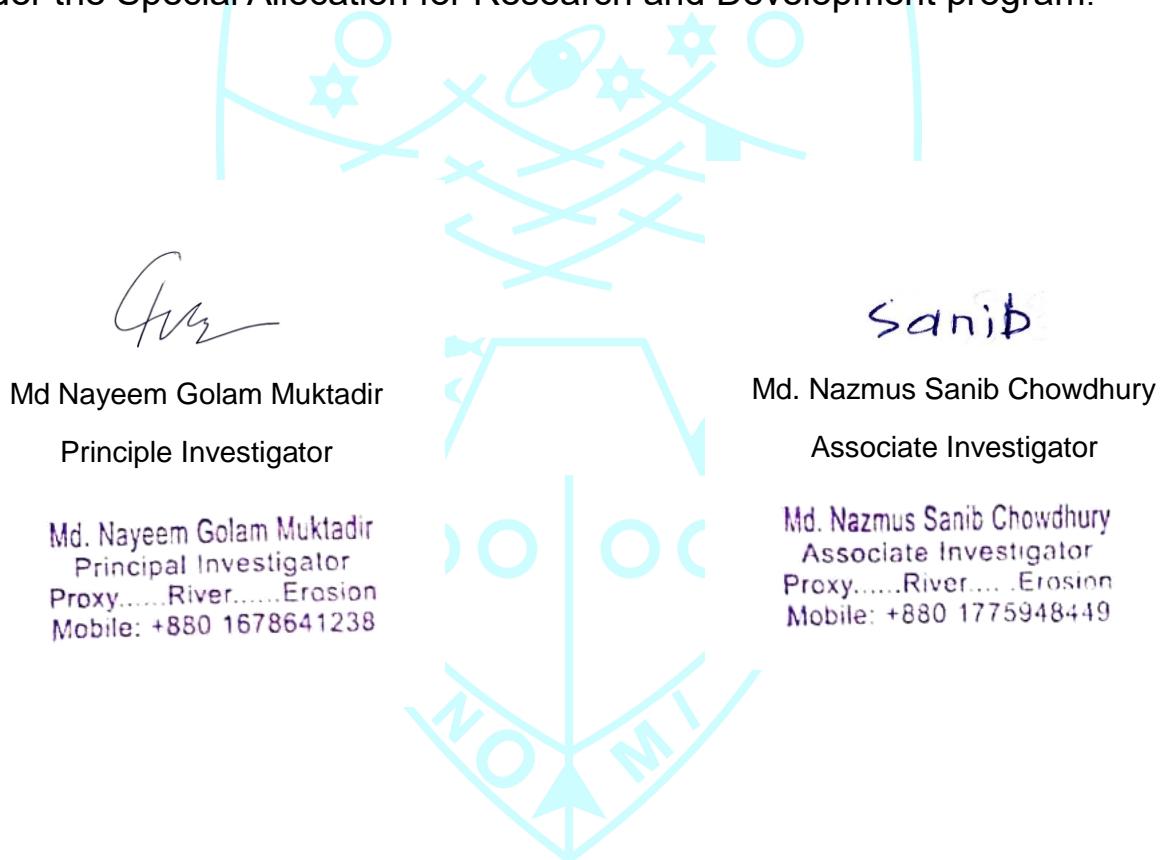
## CERTIFICATE

It is hereby certified that the project report entitled "**Proxy measurement of the sediment flux by means of seismic noise in the presence of the river siltation and river bank erosion**" is a research work carried out by Md. Nayeem Golam Muktadir, Md. Nazmus Sanib Chowdhury. All the constitutions and analysis of this research have been conducted under NOAMI.



## DECLARATION

We hereby declare that the whole report entitled "**Proxy measurement of the sediment flux by means of seismic noise in the presence of the river siltation and river bank erosion**" is the result of our original investigation which is funded by the Ministry of Science and Technology under the Special Allocation for Research and Development program.



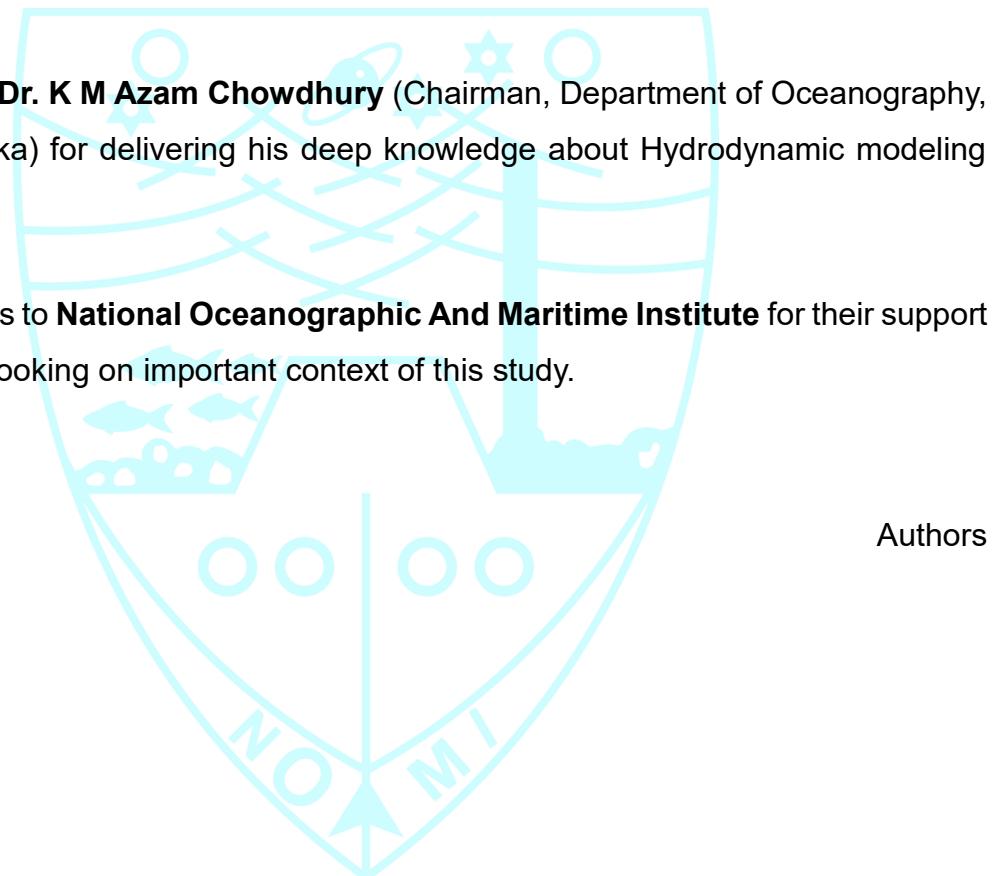
## Acknowledgement

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I would like to thanks “**Ministry of Science and Technology**” for supporting this study financially.

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## Abstract

Karnaphuli river hosts major economical hub and plays important aspect to the local community for their livelihood. Severe draught and flood causes land loss and badly affects the local community. Maintaining river morphological balance is a strategy to mitigate the land loss. Sediment flux is an important variable for the analysis of the river morphology. Measuring sediment flux in the vicinity of the flooded area with extreme river discharge is difficult to measure. In the contrary, the importance of the sediment flux demanded robust amount measurement data. Scientists solved this problem by using seismic noise as a proxy to the river discharge. Huge amount of numerical data through the hydrodynamic modeling is required to correlate the seismic noise with the sediment flux and to find the location of the siltation of most occurrence. In this study, we provides calculations of the sediment flux and seismic noise from the result of the hydrodynamic model based on the Saint Venant equation to provide more insights about the proxy measurement of the sediment flux with the seismic noise. Moreover the hydrodynamic model for the downstream portion of the Karnaphuly river was studied under the different constraint of the timestep and river discharge. A map of the occurrence of the siltation was constructed using the hydrodynamic model results. The sediment flux and seismic noise were calculated using the hydrodynamic model results. The seismic noise power in the place of siltation are -0.015, 0.025, -0.015,-0.01, -0.04, 0.22, -0.025, -0.15, -0.1, 0.01. Sediment flux, seismic noise, river discharge, depth average velocity, difference between depth average velocity and sediment settlement velocity were founded to be linear to each other. These are also founded to be linear with initial river discharge.

Keywords: Saint-Venant Equation (SVE), River Discharge, Sediment Flux, Seismic Noise Power, Siltation, Depth Average Velocity, Sediment Settlement.

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## **Chapter One**

### **Introduction**

#### **1.1 Background of the study**

Sediment flux refers to the transportation rate of sediment in unit area. Besides, sediment is transported basically in two ways. These are the suspended sediment transportation and bedload transportation flux (Govi et al., 1993; Barton et al., 2006; Burtin et al., 2008; Hsu et al., 2011).

Suspended sediment transportation is the process of transporting sediment through the water column. In support to the Suspended sediment transport is an important factor in the rate of siltation.

On the contrary, bedload transportation occurs in the river basin and held by the transportation of the bigger particle. The study of the Tsai et al. (2012) showed that, the bedload transportation is correlated with the median diameter of the sediment which is found in the bedload.

Sediment concentration is the weight of the suspended sediment in unit volume of the river water. Sediment flux is the multiplication if the sediment concentration average stream velocity (Garcia and parker, 1989).

The measurement of the sediment flux is crucial to know the river morphology. Incapability to the data gathering from the river during flood is a limitation to build up the good estimation between the sediment flux and river morphology (Tsai et al. 2012). Scientists are trying to overcome this limitation by using the acoustic or seismic data as an alternative to the sediment flux (Govi et al., 1993; Barton et al., 2006; Burtin et al., 2008; Hsu et al., 2011).

#### **1.2 Karnaphuli river**

Karnaphuli river is a major meandering and tidal river of Bangladesh which is originated at Lushai Hills in Mizoram state of India, stretched through the Kaptai Hydroelectric Power Plant, Halda-Karnaphuli confluence, several bridges (e.g., Shah Amanat bridge, Kalurghat bridge) and ended into the bay of Bengal after flowing 270 km path (Alam and Matin, 2012). The major sea port of Bangladesh, Chittagong Sea Port is situated at the mouth of this river. River discharge increases by 1.5 folds from dry season to wet season in the Karnaphulli river (Islam et al., 2019).



Figure 1: Google Earth view of the Karnaphuli river from Kaptai to river mouth

### 1.3 Statement of the problem

Scientists already established the correlation between sediment flux and seismic noise. Scientists also studied the correlation between the river discharge and seismic noise ((PC and Sawazaki, 2021). But no study found that considered hydrodynamic modeling to predict the river discharge and changes of the form of the river siltation and hence river erosion and associated changes of the sediment flux and seismic noise.

In this study we conduct a hydrodynamic modeling to predict the depth average velocity, river discharge, siltation by the sediment settlement, sediment flux according to the model hydrodynamics and sediment seismic noise according to the hydrodynamic result and early studies.

### 1.4 Significance of the study

Accurate determination of the sediment flux has diverse applications.

1. Sedimentation Engineering: Sedimentation engineering included the simulation of the prediction of the sedimentation process. These calculation included the sediment flux as a variable. Sedimentation process is important, because human activity, such that infrastructure may causes sedimentation. Moreover, to understand the process of alteration causes by the human, theories of erosion, sediment transport, and deposition

are considered in the sedimentation engineering.

2. River Restoration: River restoration is the activity to restore the natural state and functioning of the river system in support of biodiversity, recreation, flood management and landscape development. These activities included the ecological, physical, spatial and management measures. The study of the Nowacki and Grossman (2020) highlighted that the quantification of the sediment restoration rate is included the sediment budgets as an essential variable.

3. Flood Hazard Mitigation: Flood hazard mitigation reduces the risk of flooding the severity of flood damage when it occurs. This includes flood insurance policy, building the structure in elevation, or relocating the whole community out of the floodplain, providing outreach and education to the community. The river flood causes the geological events such as the erosion.

## **1.5 Scope and Limitations**

1. The study area is not covered the whole Karnaphuli river, it only covers a segment of the Karnaphuli river.
2. Surface velocity was not adjusted with the wind stress to maintain the simplicity of the model.
3. Tide data was not adjusted with the water level due to the lacking of the tide amplitude and phase data.
4. Model run in 1D while an accurate prediction of the hydrodynamic parameters required 2D modeling.

## **1.6 Research objectives**

1. Predict the time series of the depth averaged water velocity, river discharge and height of the fluid pressure surface from the hydrodynamic modeling.
2. Calculate the time series of the difference between the settling velocity of the silt-loam and clay and model predicted average water velocity. Predict the locations of siltation based on this calculation.
3. Calculate the time series of the sediment flux and seismic noise power based on the model prediction.
4. Predict depth averaged water velocity, river discharge, fluid pressure surface, difference between the settling velocity of the silt and clay and averaged water velocity, sediment flux and seismic noise power for different initial river discharge.

## **Chapter Two**

### **Literature Review**

The 2D saint equation was discretized by using explicit finite difference method and a MATLAB program was written to run the model in a study (Kamboh et al, 2015). Though this study was useful to understand the flood behavior, the model of this study was simplified in a rectangular fluid computational domain.

In a study (Cornelius and Bernt, 2014), Non Newtonian fluid flow behavior was studied in a Venturi channel. This study found that both the fluid contraction and fluid apparent viscosity are the critical parameters that determine the fluid flow behavior. Moreover this study suggested that if there has a sufficient contraction to cause flow jump to subcritical levels within the throat, then the standard specific energy model could be used.

A study (Lich, 1992) established an unique set of equations for the boundary conditions from 2D saint Venant equation. Wind stress was considered to be a boundary condition in this study. Moreover, equation was established based on the difference between subcritical flow and supercritical flow.

A study (Yu et al., 2017) demonstrate the effects of synthetic initial conditions for the modeling of the river network with 1D saint Venant instead of synoptic initial conditions. They found that the first one lead to long spin-up time as consistent initial conditions are associate with the first one.

A study (Islam et al., 2019) used 1D Saint Venant equation to predict the water levels and river discharge at the different cross sections of the Karnaphuli river in unsteady state condition.

A study (Alam and Matin, 2012) used two dimensional depth averaged hydrodynamic Delft3D model to simulate the lower Karnaphuli river. The model of this study generated velocity field, bed shear stress and water level for Khal no-18 to Kalurghat Bridge.

A study (Sleigh and Goodwill, 2000) established a more convenient form of the equation by considering small gravity wave in a rectangular channel. This study also examined the characteristics form of the equation under an example fluid dynamic condition.

Earlier studies found the correlation between the river discharge and the seismic noise. Tsai et al. (2012) developed an analytical model for the seismic noise produced by the impacting of the sediment into the bottom of the river.

A study (Garcia and Parker, 1989) described the relation between sediment flux and river discharge.

Some studies (Govi et al., 1993; Barton et al., 2006; Burtin et al., 2008; Hsu et al., 2011) used acoustic or seismic data as a proxy measurement of the sediment flux.

## Chapter 3

### Methodology

#### 3.1 Study area



Figure 2: Study Area

Study area is extended from  $22^{\circ}13'33.63''$  N,  $91^{\circ}49'44.58''$  E (downstream) to the  $22^{\circ}16'16.55''$  N,  $91^{\circ}49'13.23''$  E (Upstream).

### **3.2 Primary data collection**

Primary data collection was held through the fieldwork. Primary data included salinity, water temperature, turbidity, seismic noise, air speed etc.



Figure 3: Data collection activity by the researchers

### **3.3 Secondary data collection**

Bathymetry data of Karnaphuli river was collected from the study of Alam and Matin, 2012.

### 3.4 Data Preprocessing

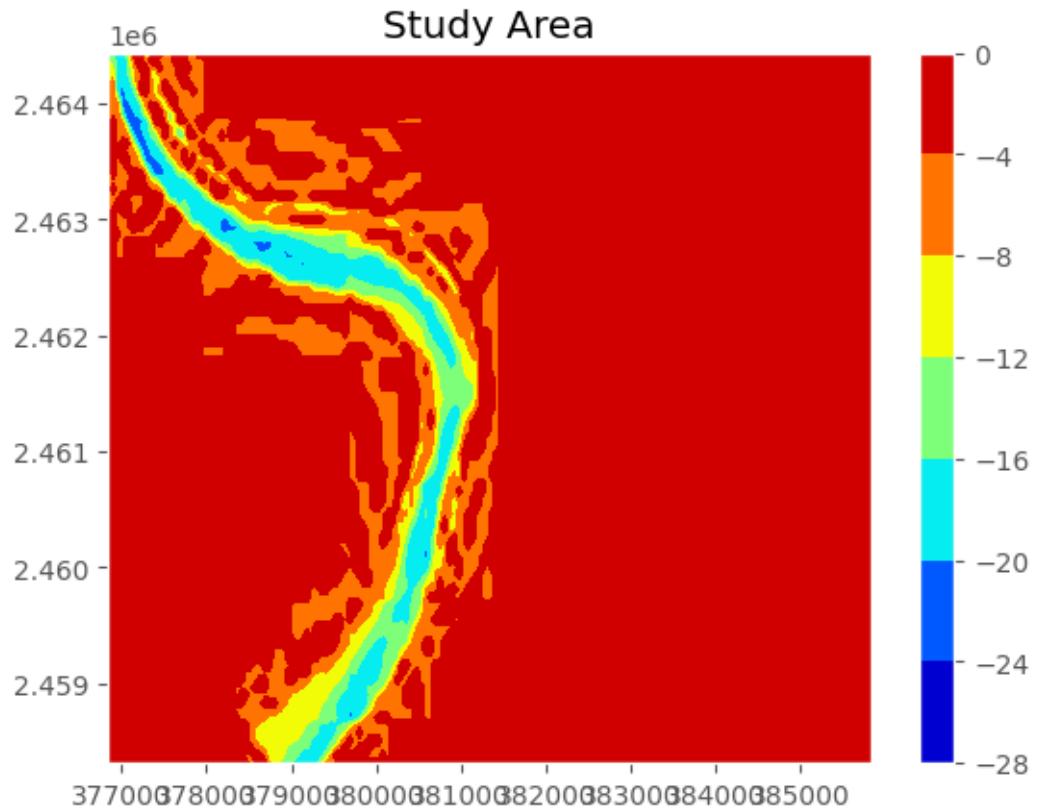


Figure 4: The bathymetry of the study area

The data format of the bathymetry was in image file format. Different color of pixel indicate different values of bathymetry. The pixel value of the bathymetry was replaced by the bathymetry value with the python programming based on the pixel value to bathymetry value relationship. The python script for this program is located in the following link: [https://github.com/Nazmus-Sanib/Modeling\\_program\\_with\\_python/blob/main/Bathymetry\\_data\\_preparation.ipynb](https://github.com/Nazmus-Sanib/Modeling_program_with_python/blob/main/Bathymetry_data_preparation.ipynb)

The output of this program is shown in figure 4.

### 3.5 Model development

One dimensional hydrodynamic model was applied to simulate the hydrodynamics of the Karnaphuli river over the study area. A python program was written to simulate the hydrodynamics of the study area. The python script is located in the following link: [https://github.com/Nazmus-Sanib/Modeling\\_program\\_with\\_python/blob/main/success\\_code\\_saint\\_venant\\_1D.ipynb](https://github.com/Nazmus-Sanib/Modeling_program_with_python/blob/main/success_code_saint_venant_1D.ipynb)

### 3.5.1 Governing equations

Saint Venant Equation for one dimensional hydrodynamic model (Sleigh, P. A., & Goodwill, I. M., 2000) can be decomposed into two parts.

## 1. Continuity equation:

$$v \frac{\partial A}{\partial x} + A \frac{\partial v}{\partial x} + b \frac{\partial h}{\partial t} = 0 \quad (1)$$

Where, A = Cross sectional area

v = surface average velocity

**b** = width of the river cross section

$h$  = height of the fluid pressure surface

t = time

x = space

## 2. Momentum equation:

$$g \frac{\partial h}{\partial x} + v \frac{\partial v}{\partial x} + \frac{\partial v}{\partial t} = g(i - j) \quad (2)$$

Where, g = acceleration due to gravity

i = channel slope = 0

$$j = v^2/(C^2 m)$$

C = Chezzy's coefficient

$$m = \text{Area/wetted\_perimeter} = A/p$$

### 3. Calculation of settling velocity:

Settling velocity = (g(Density\_of\_sediment/Density\_of\_water - 1)d<sup>2</sup>)/(18 x Kinematic\_viscosity\_of\_water)

Where,  $g$  = Acceleration due to gravity = 9.81

$d$  = diameter of the sediment particle

Kinematic viscosity of water was taken from Omni Calculator in which field measured water temperature was used to acquire the kinematic viscosity of water.

Water density was taken from online density calculator of CGSN network by using the field measured water temperature and salinity data.

Sediment particle diameter was taken from study of the Reis et al, 2007.

Sediment density was taken from the study of Yu et al, 1993.

### 3.5.2. Equation Discretization

|  |  |  |
|--|--|--|
| Forward in time:<br>$\frac{\partial u}{\partial t} = \frac{u_i^{j+1} - u_i^j}{\Delta t}$ i: space, j: previous time, j+1: present time | Central in space:<br>$\frac{\partial u}{\partial x} = \frac{u_{i+1}^j - u_{i-1}^j}{2\Delta x}$ $\frac{\partial u}{\partial x} = \frac{u_{i+1}^{j+1} - u_{i-1}^{j+1}}{2\Delta x}$ | Central in space:<br>$\frac{\partial^2 u}{\partial x^2} = \frac{u_{i+1}^j - 2u_i^j + u_{i-1}^j}{\Delta x^2}$ j: time, i: central point, i+1 and i-1: neighbor points |
|--|--|--|

Figure: Discrete form of the 1<sup>st</sup> and 2<sup>nd</sup> order derivative,  
Image source: Canbolat et al., 2019

Governing equation 1 and 2 can be discretized using the taylor series expansion and by ignoring the higher order (Canbolat et al., 2019), which is shown in the figure 3.

According to the above figure, the discretization of the equation 1 is as following:

$$v_{[i]}((A_{[i+1]} - A_{[i-1]})/\Delta x) + A_{[i]} ((v_{[i+1]} - v_{[i-1]})/\Delta x) + b_{[i]} ((h^{n+1} - h^n)/\Delta t) = 0$$

and the discretization of the equation 2 is as following:

$$g((h_{[i+1]} - h_{[i-1]})/\Delta x) + v_{[i]} ((v_{[i+1]} - v_{[i-1]})/\Delta x) + ((v^{n+1} - v^n)/\Delta t) = g(-(v_{[i]})^2)/(C^2(A_{[i]}/p_{[i]}))$$

### 3.5.3 Time and space resolution

Time resolution is 0.0005s and the space resolution is 5m.

### 3.5.4 Initial Condition

1. Average surface velocity: Surface average velocity was calculated by the following:

Measured\_river\_discharge/Area\_of\_the\_cross\_section\_where\_data\_was\_collected

The initial average velocity for all the cross section were than calculated using the Continuity equation (Princeton University).

2. Fluid surface pressure height: Bathymetry data was collected from the study Alam and Matin, 2012. The deviation of the fluid surface was taken initially as zero.

### 3.5.5 Boundary Condition

There are two open boundary in the simulation. These two open boundaries are two river cross section one is in downstream and another is in upstream. The southern one is located in  $22^{\circ}13'33.63''$  N,  $91^{\circ}49'44.58''$  E. The northern one is located in the  $22^{\circ}16'16.55''$  N,  $91^{\circ}49'13.23''$  E.

### 3.5.6 Model diagram

The Model diagram is as follows:

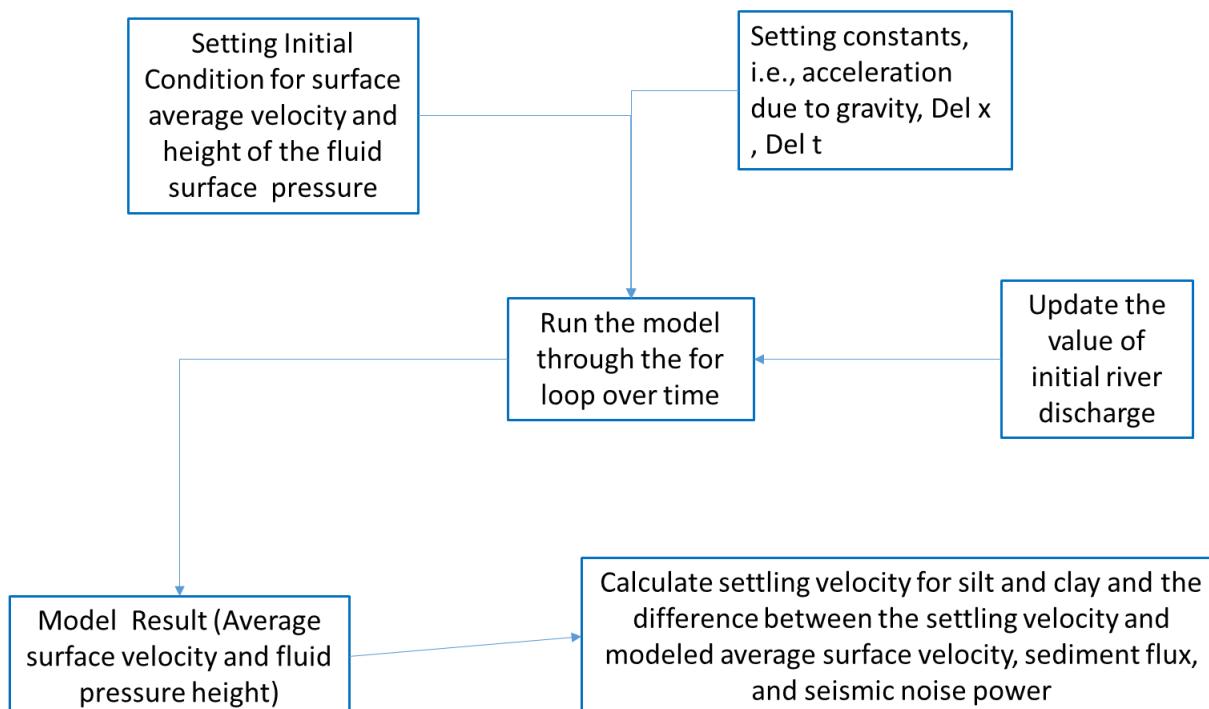


Figure 5 Model Diagram

## **3.6 Expected model result**

### **3.6.1 Calculation of sediment flux**

According to the study of the Garcia and Parker, 1989, sediment flux can be defined as the multiplication of the stream velocity and sediment concentration.

### **3.6.2 Calculation of seismic noise power**

A relation between sediment discharge and seismic noise power was established by a study (PC and Sawazaki, 2021) in which,

$$\text{Seismic Noise} = (\text{River\_discharge}-7)/200000$$

### **3.6.3 Calculation of the settling velocity**

Settling velocity is the terminal velocity of the fluid (Finlay, 2001). Settling velocity depends on the particle diameter, particle density, fluid density and fluid viscosity (Cheng, 1997). Settling velocity can be calculated by the Stoke's Law equation (Wang, 2023) which is as follows:

$$\text{Settling velocity, } v = \frac{g(\frac{\rho_1}{\rho} - 1)d^2}{18\vartheta}$$

Where, g = acceleration due to gravity

$\rho_1$  = density of sediment particle

$\rho$  = density of water

d = particle diameter

$\vartheta$  = Kinematic viscosity of water =  $1 \times 10^{-6}$

## **3.7 Data processing**

Data processing was done by the python programming.

## Chapter Four

### Result and Discussion

As per the experimental design depicted in the previous chapter, at first the mathematical model has been run for a given initial river discharge for the time series analysis of the model result. Then the model has been run for 5 different initial river discharge.

#### 4.1 Time series analysis of the model result for an initial river discharge

##### 4.1.1 Average Velocity

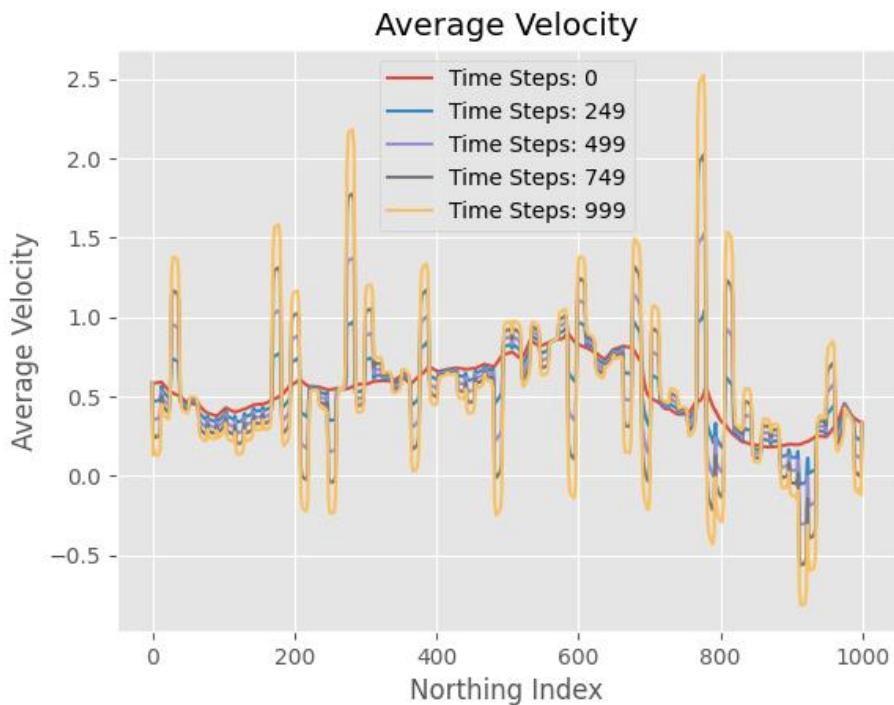


Figure 6: Depth Average Velocity

Depth average velocity is the average of the velocities of all water columns for a specific geographic location on the river. Northing index is the index number which is corresponded to the northing coordinate of interest. From the figure 6, we find that depth average water velocity is non-linear with the northing coordinate, while river within the study area is flown along these northing coordinates. Depth average velocity is not unidirectional. Positive value of the depth average velocity is pointed towards geographic north direction and the negative values are pointed towards geographic south direction. Over the time step of the simulation, depth average velocity is linear with time and this is true for almost all the northing index. Maximum depth average velocity is  $2.5 \text{ ms}^{-1}$  and the minimum average velocity is  $-0.8 \text{ ms}^{-1}$ .

#### 4.1.2 Water surface deviation from its bathymetry

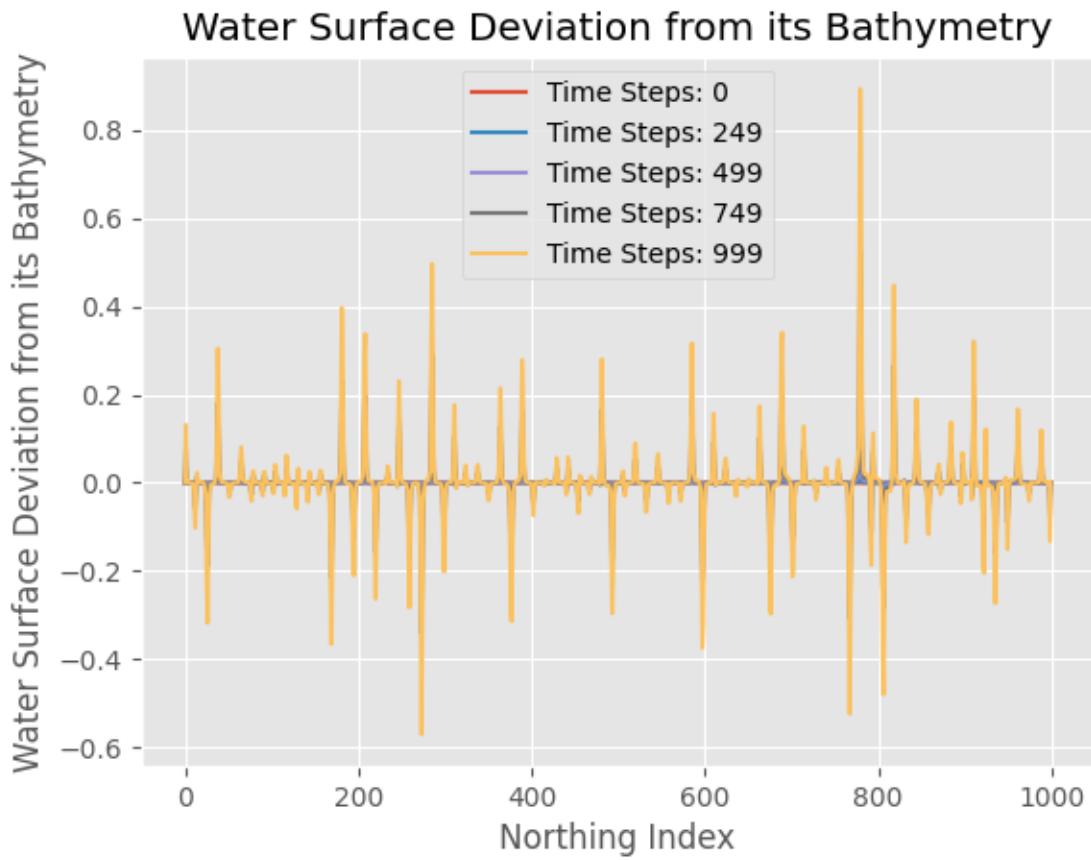


Figure 7: Water surface deviation from its bathymetry

Water surface deviation from its bathymetry along the river from North to South is shown in the figure 7. By comparing water surface deviation from its bathymetry with the depth average velocity from figure 6 we found that, changing of the curvature with the northing in the graph of the water surface deviation from its bathymetry along the vertical y-axis is approximately proportional in the most of place with change of the curvature with the northing in the graph of the depth average velocity along the y-axis. Thus water surface deviation from its bathymetry is linear with the depth average velocity. From the figure 7, we also found that maximum surface deviation is 0.8 m and the minimum surface deviation is -0.58m.

#### 4.1.3 River discharge

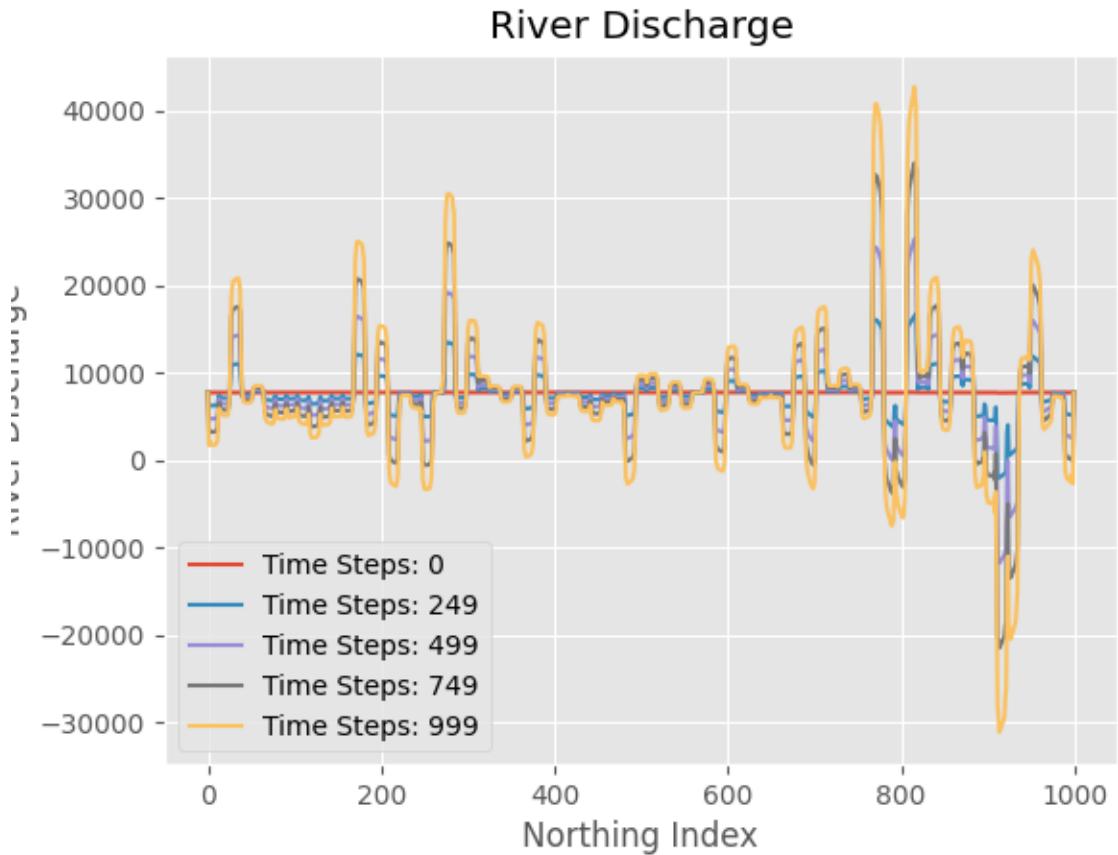


Figure 8: River discharge

Model predicted river discharge along the South to North of the Karnaphuli river is shown in figure 8. Maximum river discharge is approximately  $41500 \text{ m}^3\text{s}^{-1}$  and the minimum river discharge is  $30500 \text{ m}^3\text{s}^{-1}$ . The pattern of the changing of the curve along the y-axis in the graph of the river discharge is mostly similar to the pattern of the changing of the curve along the y-axis in the graph of the water surface deviation from its bathymetry of the figure 7 and in the graph of the depth average velocity of the figure 6.

#### 4.1.4 Deviation of settling velocity from water velocity

Settling velocity is a measure of velocity, at which the particle would be settled (Finlay, 2001). That means, deviation of settling velocity from the surface average velocity would be another measure of the degree of the sediment deposition. The settlement velocity of

the Silt loam and clay would be different as they are the class of the sediment based on the grain size (NICE CXone Expert, January 5, 2023).

#### 4.1.4.1.1 Deviation of settling velocity of silt-loam from water velocity

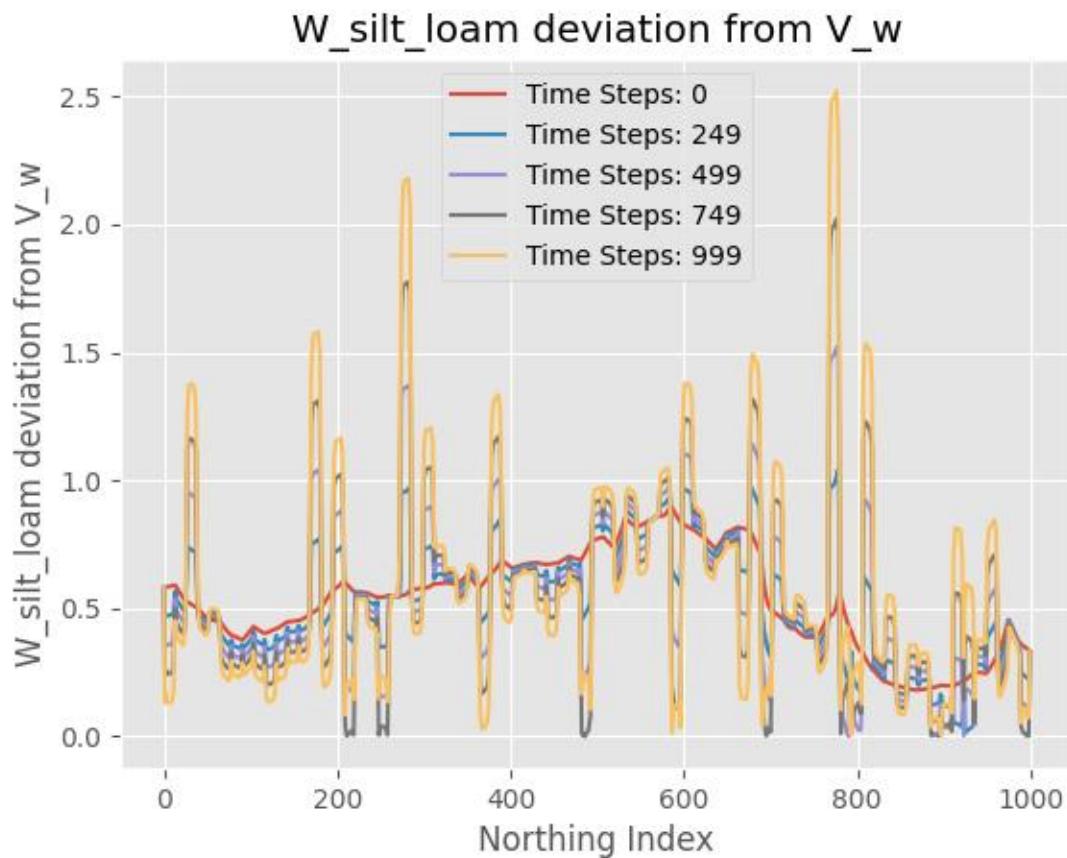


Figure 9: Deviation of settling velocity of the silt loam from the water velocity

The graph of the difference between depth average river-water velocity and sediment settlement velocity along the river from North to South within the study area is shown in figure 9. By comparing the figure 6 and figure 9, we find that difference between depth average river-water velocity and sediment settlement velocity is linear with depth average velocity and the shifting of the graph of the difference between depth average river-water velocity and sediment settlement velocity with time as like as the shifting of the depth average velocity with time.

#### 4.1.4.1.2 The locations of the settlement of silt-loam

The locations of the settlement of silt-loam

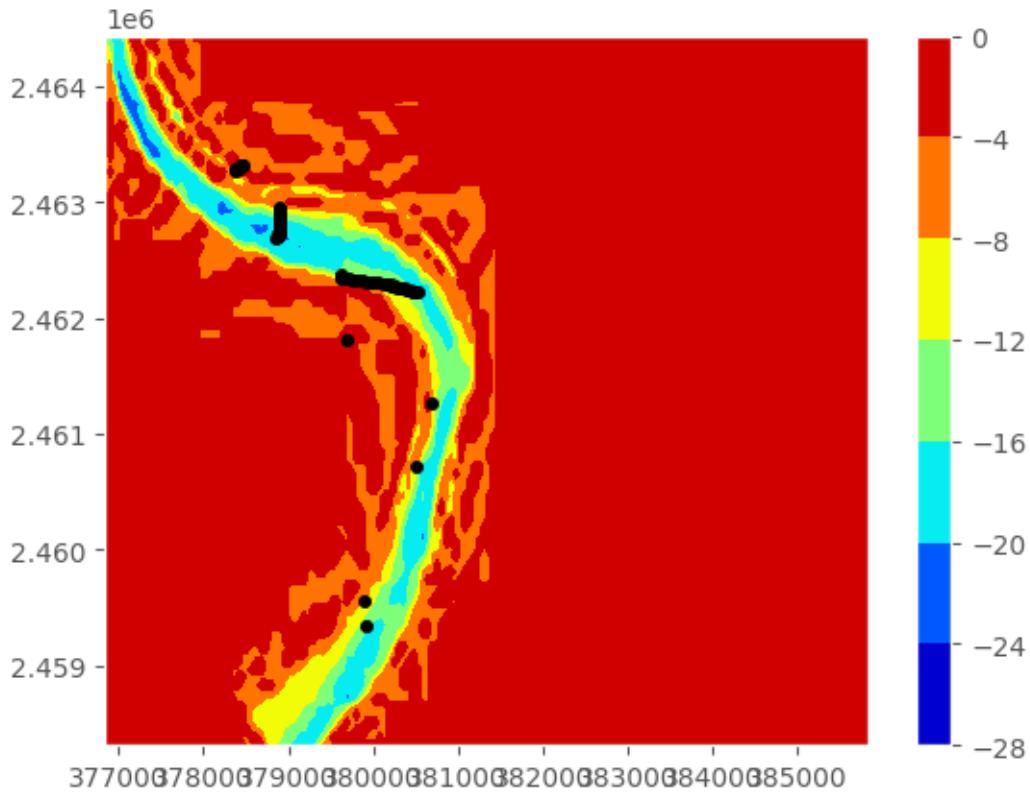


Figure 10: The locations of the settlement of silt-loam

The locations of the settlement of silt loam are where the difference between depth average river-water velocity and sediment settlement velocity according to figure 9 is zero and which are shown in figure 10.

#### 4.1.4.2 Deviation of settling velocity of clay from water velocity

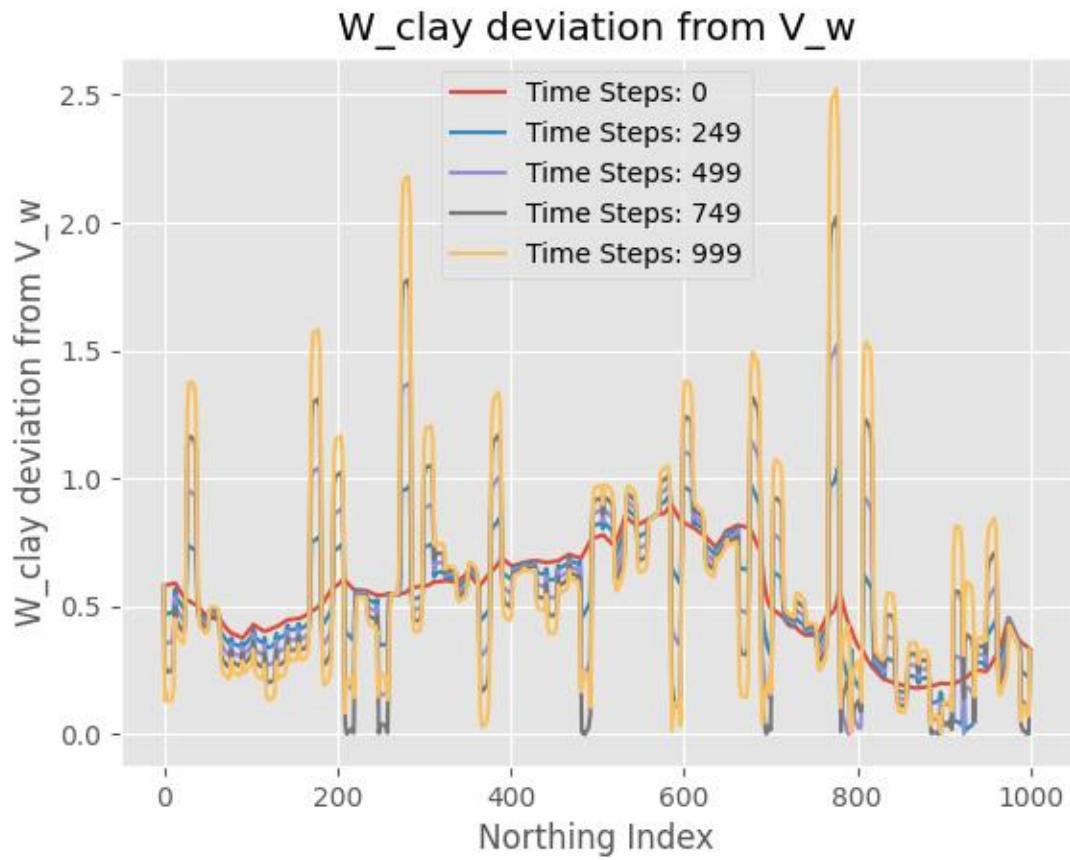


Figure 11: Deviation of settling velocity of the clay from the water velocity

The graph of the difference between depth average river-water velocity and settlement velocity of the clay along the North to South direction of the river within the study area is shown in figure 11. The curve is almost similar as the curve found in the Figure 9.

#### 4.1.5. Sediment Flux

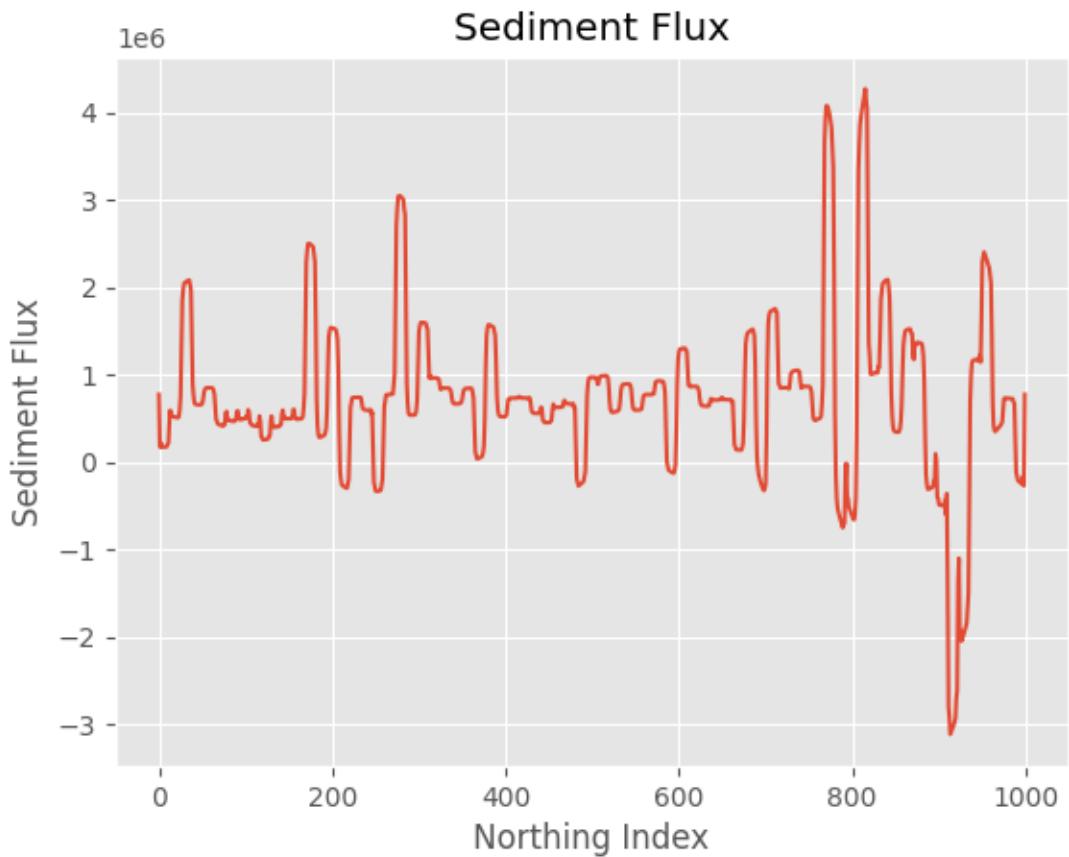


Figure 12: Sediment flux along the river within the study area

In figure 12, sediment flux is shown along the North to South direction of the Karnaphuli river within the study area. By comparing the figure 8 and figure 12, we find that, the graph of sediment flux and the graph of river discharge are almost similar to each other. Thus sediment flux is approximately linear with the river discharge. The minimum value of the absolute sediment flux is 0 and the maximum value is  $4.4 \times 10^6$ .

#### 4.1.6. Seismic Noise power

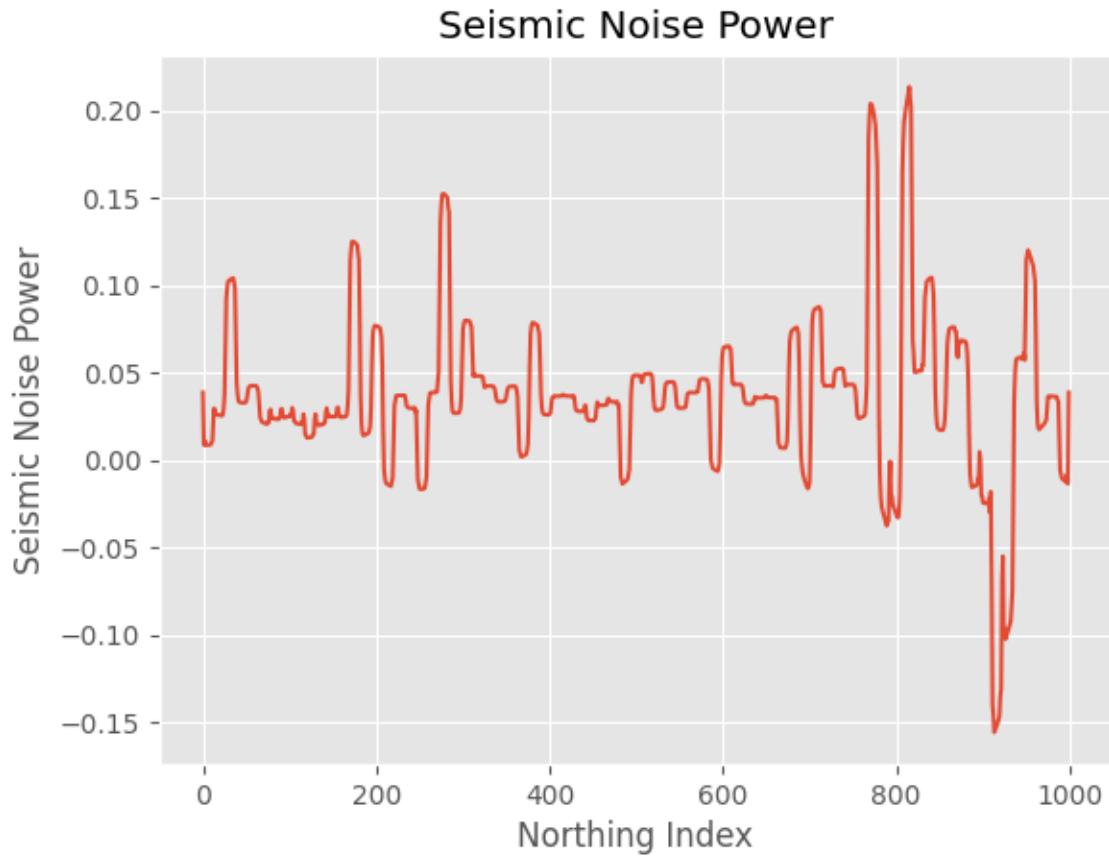


Figure 13: Seismic Noise Power

In figure 13, seismic noise power is shown along the North to South direction of the Karnaphuli river within the study area. By comparing the figure 8, figure 12 and figure 13, we find that, the graph of the graph of river discharge, sediment flux and the graph of the seismic noise power are almost similar to each other. Thus seismic noise power is approximately linear with the river discharge and sediment flux. Maximum and minimum absolute seismic noise power are respectively 0.2 and 0.

#### 4.2 Shallow water model with changing river discharge

In the section we are going to discuss the hydrodynamic modeling result which was run for 5 different dataset of initial river discharge. These are the river discharge ( $R_d$ ) in accordance with the field calculation, an river discharge with 25% increase from  $R_d$ , an

river discharge with 50% increase from Rd, an river discharge with 25% decrease from Rd and an river discharge with 50% decrease from Rd.

#### 4.2.1 Depth average velocity

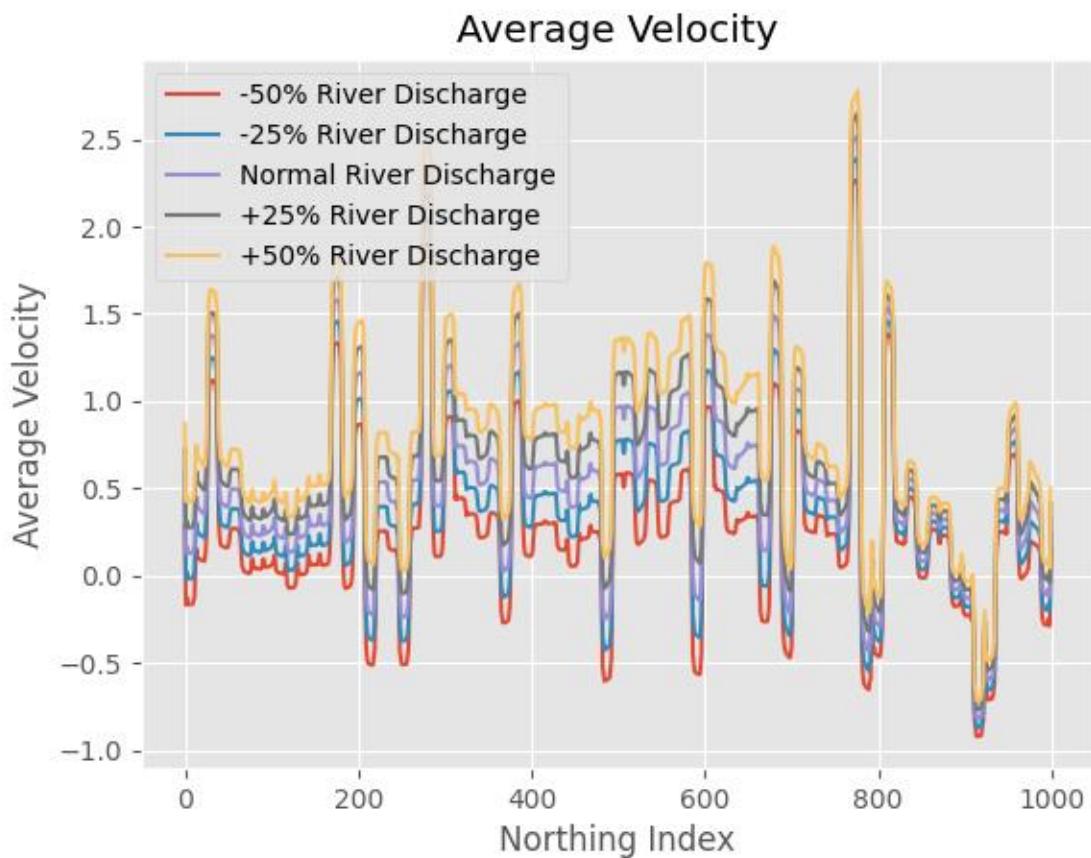


Figure 14: Depth average velocity

In a Cartesian coordinate system a point is defined by the distances of two perpendicular lines which intersects at a point called origin (Dictionary.com). The horizontal distances are almost same for all the curve of the corresponded surface average velocity while the curves are spanning equal vertical distance for each point as seen in the figure 14. That means depth average velocity is linear with the initial river discharge. Moreover, the depth average velocity is not linearly changing from along the North to South direction of the Karnaphuli river within the study area as the cross-sectional area is different along the river track according the figure 3.

#### 4.2.2 Water surface deviation from its bathymetry for different river discharge

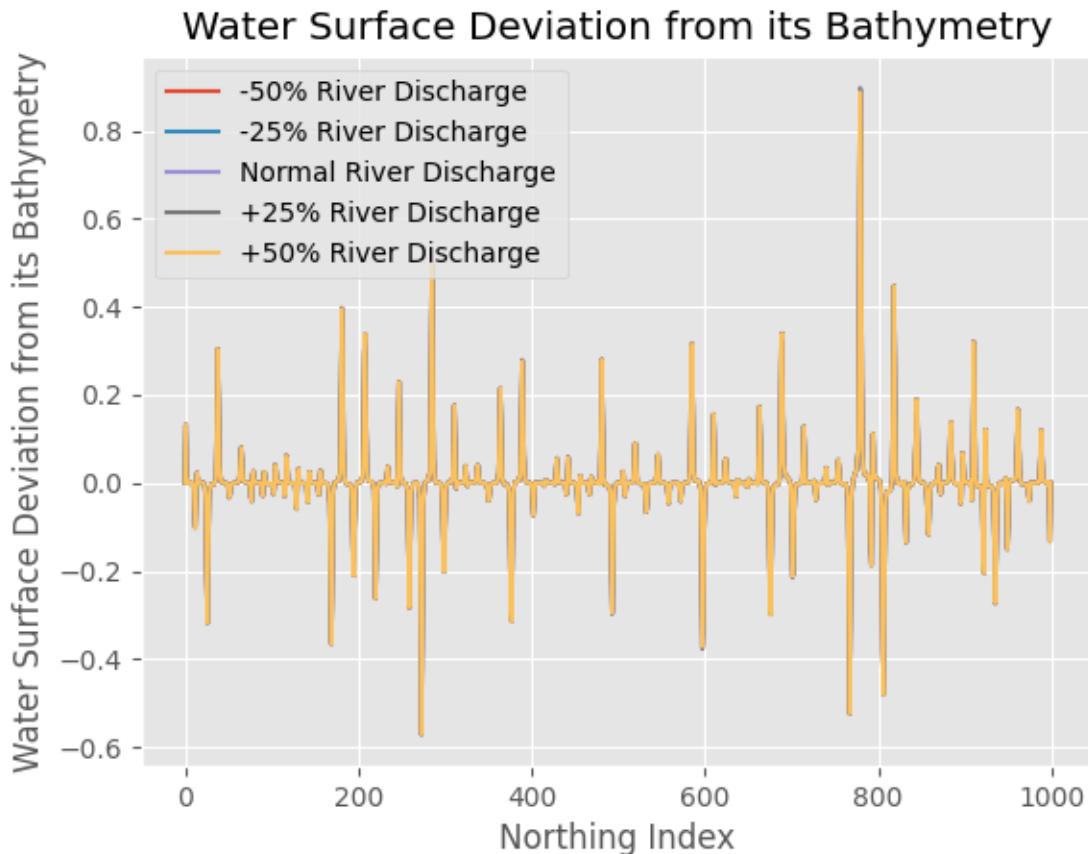


Figure 15: Water surface deviation from its bathymetry for different river discharge

In the figure 15, water surface deviation is shown along the North to South direction of the Karnaphuli river within the study area. From this figure it is apparent that, all curves are almost coincided with each other. That means, water surface deviation from its bathymetry is not founded to be changing with the initial river discharge.

#### 4.2.3 Modeled river discharge for different initial river discharge

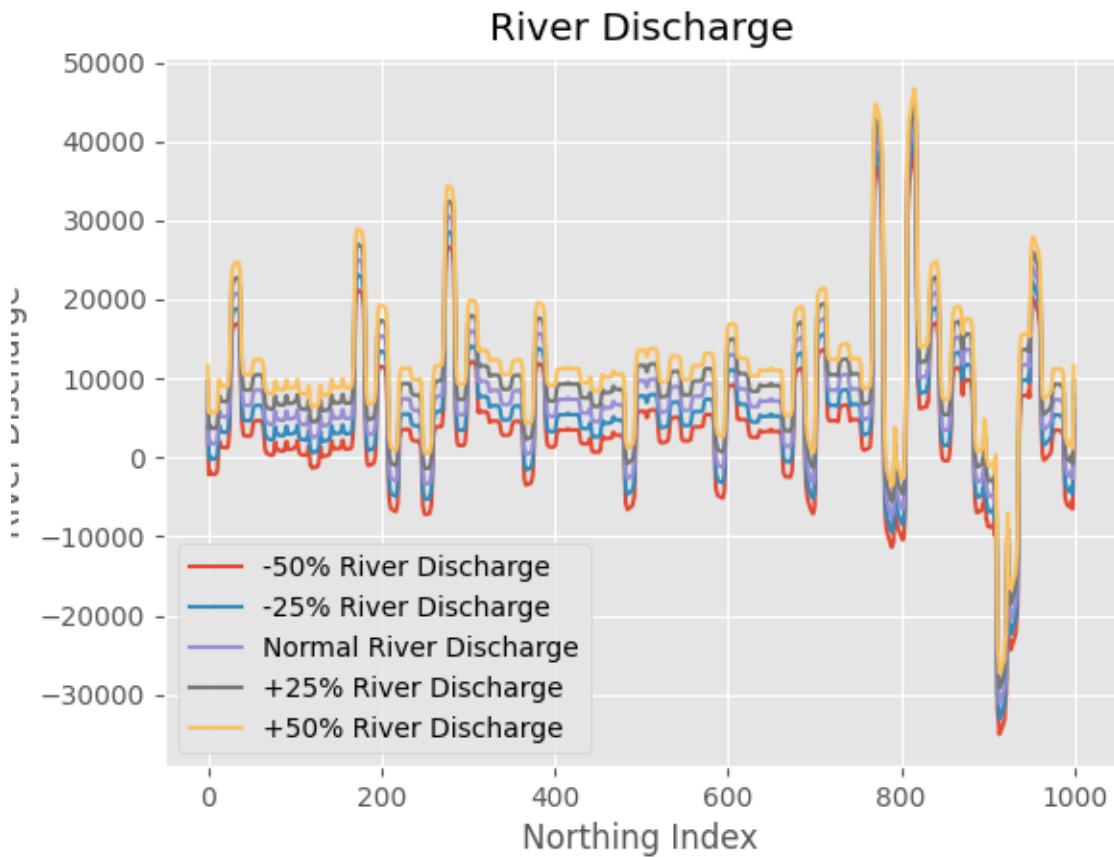


Figure 16: Modeled river discharge for different initial river discharge

From the figure 16 we found that, modeled river discharge is linear with initial river discharge.

#### 4.2.4 Deviation of settling velocity from the average surface water velocity

##### 4.2.4.1 Deviation of settling velocity of silt-loam from the average surface water velocity

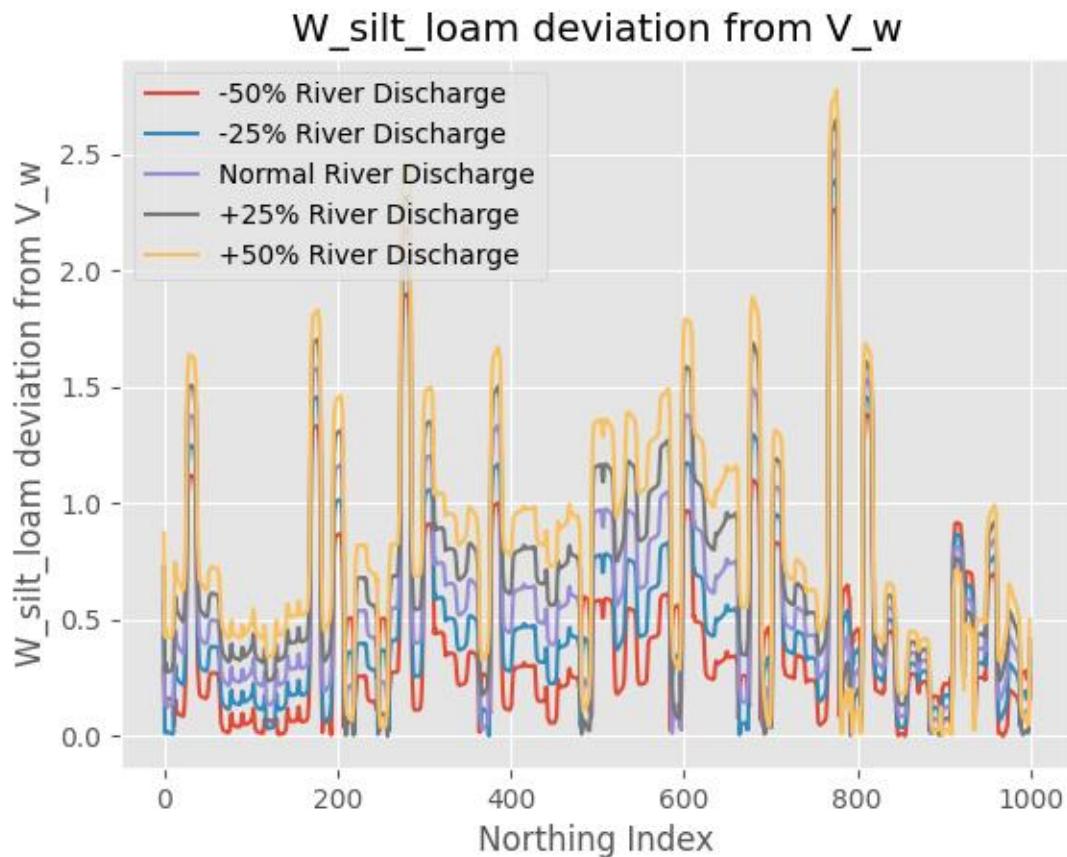


Figure 17: Settling velocity deviation of silt-loam from surface water velocity for different river discharge

From the figure 17, we found that, the settling velocity deviation of silt-loam from surface water velocity is linear with initial river discharge.

#### 4.2.4.2 Deviation of settling velocity of clay from the average surface water velocity for different river discharge

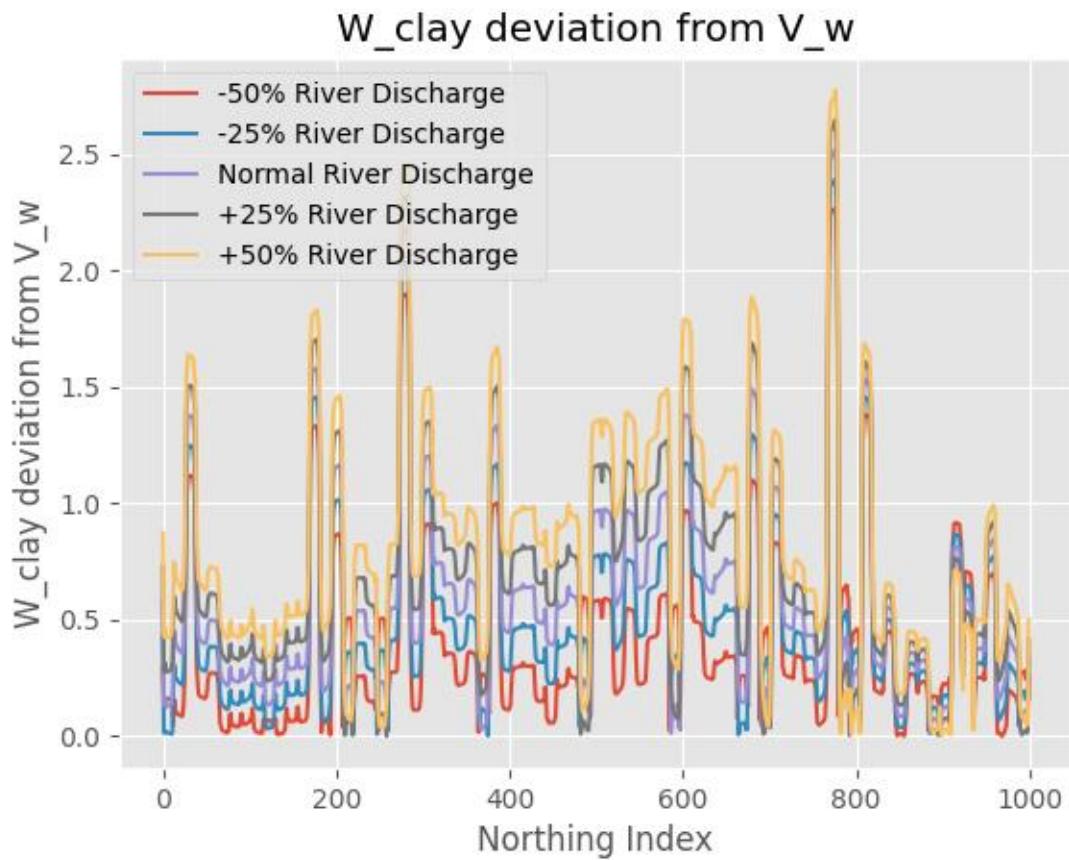


Figure 18: Settling velocity deviation of clay from surface water velocity for different river discharge

From the figure 18, we found that, the settling velocity deviation of clay from surface water velocity is linear with initial river discharge.

#### 4.2.5 Sediment flux for different river discharge

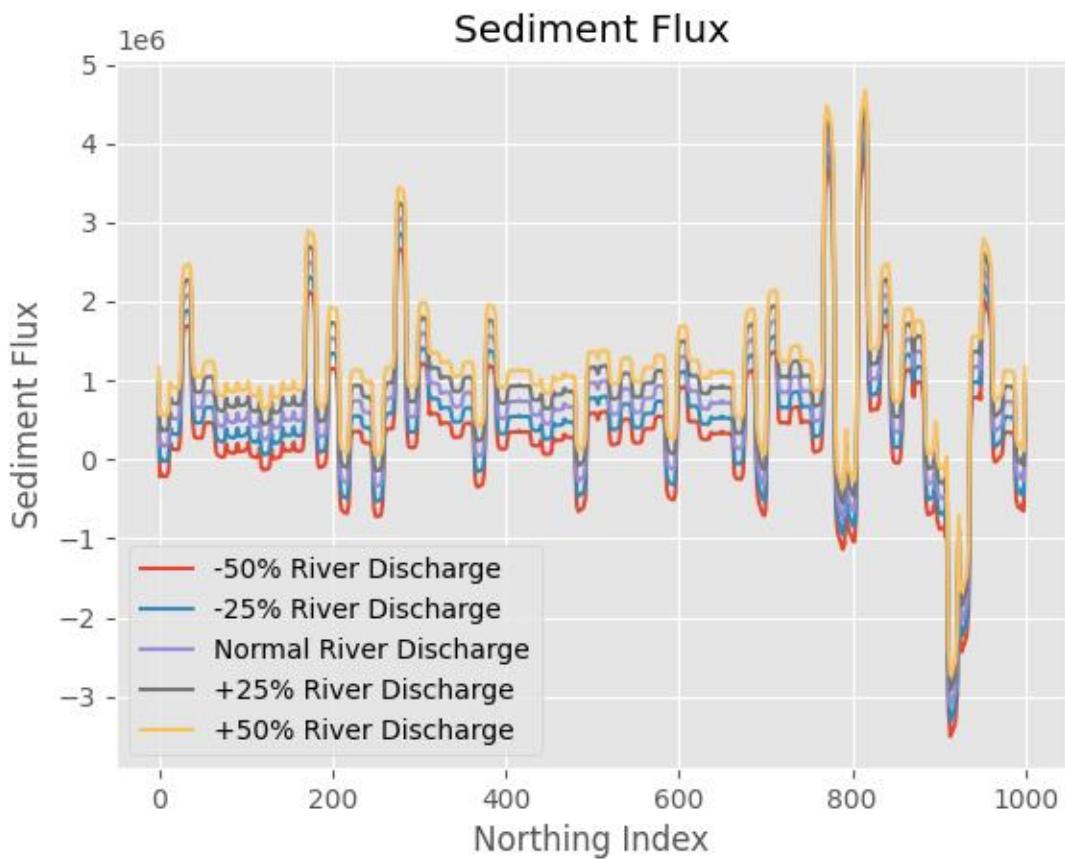


Figure 19: Sediment flux for different river discharge

From the figure 19, we found that, the sediment flux is linear with the river discharge.

#### 4.2.6 Seismic noise power for different initial river discharge

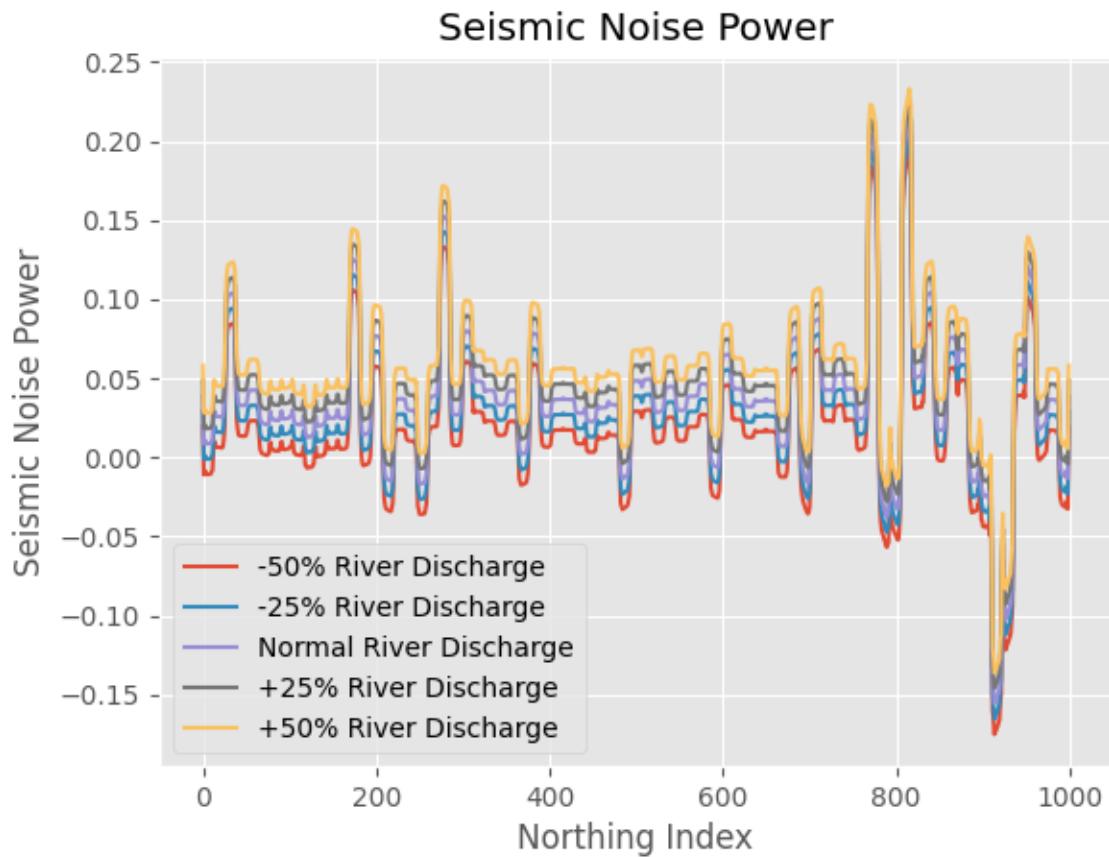


Figure 20: Seismic noise power for different initial river discharge

From the figure 20, we found that, the seismic noise power is linear with the river discharge.

## **Chapter 5**

### **Conclusion**

Seismic noise power is -0.15 to 0.2. Seismic noise power is linearly varied with the initial river discharge. 50% increase of the river discharge resulted in seismic noise power of -0.10 to 0.25. Figure 10 shows the locations of the suspended settlement of the suspended sediment. Thus the locations showed in the figure 10 are also the locations of the siltation according to the model result. Moreover, the decision of siltation is directly controlled by the difference between depth average velocity and the settling velocity of the sediment particle and hence the resulted seismic noise power is controlled by the difference between depth average water velocity and settling velocity. The seismic noise power in the place of siltation are -0.015, 0.025, -0.015,-0.01, -0.04, 0.22, -0.025, -0.15, -0.1, 0.01. These values of seismic noise power in the place of modeled siltation is linear with the initial river discharge. On the other hand according to a study (Akter and Dayem, 2020), the river erosion is taken place along all the river bank area. Thus the whole calculation of the seismic noise power taken the consideration of the river erosion.

Calculated sediment flux is linear with the initial river discharge.

As the seismic noise power is linear with the river discharge and sediment flux is linear with the river discharge, thus the seismic noise power is linear with the sediment flux. Hence, the seismic noise power can be used as the proxy to the sediment flux while river erosion and river siltation are considered in the calculation of the seismic noise power.

In the future, the calculation of suspended load and bedload can be added with the Saint Venant equation by considering the active layer thickness.

## Reference

- Akter, A., & Dayem, A. (2020, August). Mapping river bathymetry using Stumpf model. In Proceedings of the IABSE-JSCE Conference on Advances in Bridge Engineering-IV (IABSE 2020), Dhaka, Bangladesh (pp. 26-27).
- Alam, S., & Matin, M. A. (2012). Application of Delft3D Mathematical Model in the river Karnaphuli For Two-Dimensional simulation. In *ICACE 2012-Conference Proceeding, CUET, Chittagong.* pp (Vol. 7).
- Barton, J. S., Slingerland, R. L., Pittman, S., & Gabrielson, T. B. (2006, April). Passive acoustic monitoring of coarse bedload transport on the Trinity River. In Eighth Federal Interagency Sedimentation Conference (pp. 2-6).
- Burton, A., Bollinger, L., Vergne, J., Cattin, R., & Nábělek, J. L. (2008). Spectral analysis of seismic noise induced by rivers: A new tool to monitor spatiotemporal changes in stream hydrodynamics. *Journal of Geophysical Research: Solid Earth*, 113(B5).
- Canbolat, G., Kose, H. A., Iperen Yildizeli, A., & Cadirci, S. 5TH INTERNATIONAL CONFERENCE ON ADVANCES IN MECHANICAL ENGINEERING ISTANBUL 2019, 17-19 DECEMBER 2019.
- Cartesian coordinate system Definition & Meaning | Dictionary.com. In: Dictionary.Com. <https://www.dictionary.com/browse/cartesian-coordinate-system#:~:text=%5B%20k%C3%A4r%2Dt%C4%93%E2%80%B2zh%C9%99n%20%D,a%20point%20called%20the%20origin.>
- Cheng, N. S. (1997). Effect of concentration on settling velocity of sediment particles. *Journal of Hydraulic Engineering*, 123(8), 728-731.
- CGSNnetwork (n.d.). Water Density Calculator. <http://www.csqnetwork.com/h2odenscalc.html>
- Cornelius, E. A., & Bernt, L. (2014). Numerical solution of the Saint Venant equation for non-Newtonian fluid. In *The 55th Conference on Simulation and Modelling (SIMS 55), Aalborg.*
- Finlay, W. H. (2001). Motion of a single aerosol particle in a fluid. The mechanics of inhaled pharmaceutical aerosols, 17-45.
- Garcia, M., & Parker, G. (1989). Experiments on hydraulic jumps in turbidity currents near a canyon-fan transition. *Science*, 245(4916), 393-396.
- Govi, M., Maraga, F., & Moia, F. (1993). Seismic detectors for continuous bed load monitoring in a gravel stream. *Hydrological sciences journal*, 38(2), 123-132.

Hsu, L., Finnegan, N. J., & Brodsky, E. E. (2011). A seismic signature of river bedload transport during storm events. *Geophysical Research Letters*, 38(13).

Islam, T., Hasan, M., & Sharmin, T. (2019, February). Development of a Mathematical Model for Unsteady Flow in a Single Channel of the Karnaphuli River for Dry and Wet Season. In *Proceedings of International Conference on Planning, Architecture and Civil Engineering* (pp. 07-09).

Kamboh, S. A., Sarbini, I. N., Labadin, J., & Eze, M. O. (2015). Simulation of 2D Saint-Venant equations in open channel by using MATLAB. *Journal of IT in Asia*, 5(1), 15-22.

Lich, T. G. (1992). Boundary conditions for the two-dimensional Saint-Venant equation system. *Applied mathematical modelling*, 16(9), 498-502.

NICE CXone Expert (2023, January 5). Sediments Classification Based On Grain Size. LibraTexts GEOSCIENCES. Retrieved August 11, 2023, from [https://geo.libretexts.org/Bookshelves/Oceanography/Oceanography\\_101\\_\(Miracosta\)/06%3A\\_Marine\\_Sediments/6.11%3A\\_Sediments\\_Classification\\_Based\\_On\\_Grain\\_Size](https://geo.libretexts.org/Bookshelves/Oceanography/Oceanography_101_(Miracosta)/06%3A_Marine_Sediments/6.11%3A_Sediments_Classification_Based_On_Grain_Size)

Omni Calculator (n.d.). Water Viscosity Calculator. Omniccalculator. <https://www.omniccalculator.com/physics/water-viscosity>

PC, S., & Sawazaki, K. (2021). River discharge prediction for ungauged mountainous river basins during heavy rain events based on seismic noise data. *Progress in Earth and Planetary Science*, 8(1), 1-17.

Princeton University (n.d.). Continuity Equation. Princeton.edu. [https://www.princeton.edu/~asmits/Bicycle\\_web/continuity.html](https://www.princeton.edu/~asmits/Bicycle_web/continuity.html)

Reis, E., Lodolo, A., & Miertus, S. (2007). Survey of sediment remediation technologies. *International Centre for Science and High Technology*, 3-5.

Sleigh, P. A., & Goodwill, I. M. (2000). The St Venant equations. *School of Civil Engineering: University of Leeds*.

Tsai, V. C., Minchew, B., Lamb, M. P., & Ampuero, J. P. (2012). A physical model for seismic noise generation from sediment transport in rivers. *Geophysical Research Letters*, 39(2).

Yu, C., Cheng, J. J., Jones, L. G., Wang, Y. Y., Faillace, E., Loureiro, C., & Chia, Y. P. (1993). *Data collection handbook to support modeling the impacts of radioactive material in soil* (No. ANL/EAIS--8). Argonne National Lab.

Yu, C. W., Liu, F., & Hodges, B. R. (2017). Consistent initial conditions for the Saint-Venant equations in river network modeling. *Hydrology and Earth System Sciences*, 21(9), 4959-4972.

Wang, J. (2023). Airborne microplastics: analysis, fate and human health effects. (No Title).

## Attachment 1

### Financial statements with Breakdown in Components

| Items                       | Item Details                               | Cost  | VAT           | TAX           |
|-----------------------------|--|-------|---------------|---------------|
| 1. Equipment                | 1. River Discharge Sensor                  | 535   | 40<br>(7.5%)  | 16<br>(3%)    |
|                             | 2. Turbidity Sensor                        | 820   | 57<br>(7%)    | 25<br>(3%)    |
|                             | 3. Thermal Imager Array Temperature Sensor | 6700  | 469<br>(7%)   | 201<br>(3%)   |
|                             | 4. TFM mini LIDAR with accessories         | 11533 | 865<br>(7.5%) | 346<br>(3%)   |
|                             | 5. MPU 6050 Seismic noise sensor           | 2250  | 169<br>(7.5%) | 68<br>(3%)    |
|                             | 6. Multiparameter                          | 3050  | 229<br>(7.5%) | 92<br>(3%)    |
|                             | 7. Anemometer                              | 1800  | 135<br>(7.5%) | 54<br>(3%)    |
|                             | 8. Raspberry Pi 4 GB with Accessories      | 13219 | 925<br>(7%)   | 397<br>(3%)   |
|                             | 9. Digital Microscope                      | 2023  | 152<br>(7.5%) | 61<br>(3%)    |
|                             | 10. Underwater Camera with accessories     | 10050 | 754<br>(7.5%) | 302<br>(3%)   |
| 2. Sample Collection        | 1. Car Rent (two times up and down)        | 23600 |               |               |
|                             | 2. Hotel Room                              | 2000  |               |               |
|                             | 3. Boat fare (two times)                   | 24190 |               |               |
| 3. Other Essential Expenses | 1. Remuneration of PI                      | 18000 |               | 1800<br>(10%) |

|                           |   |        |      |              |
|---------------------------|---|--------|------|--------------|
|                           | 2. Remuneration of Co-PI                    | 8310   |      | 831<br>(10%) |
|                           | 3. Report Printing and Binding              | 3433   |      |              |
|                           | 4. Bank Charges                             | 488    |      |              |
|                           | 5. Last Balance                             | 511    |      |              |
|                           | 4. Seminar Expenses                         | 9500   |      |              |
| 5. Institutional Overhead | 25% of total Budget as per the NOAMI policy | 50000  |      |              |
| Total                     |   | 192012 | 3795 | 4193         |
|                           | Grand Total                                 |        |      | 200000       |

# Bank Statement

|   | Results 1 - 12 of 12  |                     |                   |             |              |            |            |        |         |           |                    |  |              |         |  |            |            |           |          |                     |              |  |        |  |           |           |                     |       |              |         |            |  |           |           |                 |       |              |         |            |  |          |           |                  |                    |                 |         |  |            |            |           |          |                |                 |  |             |  |          |           |                  |    |                   |         |  |            |            |           |             |  |              |  |         |  |            |           |          |       |              |  |            |  |           |           |                  |  |              |  |         |  |           |           |                 |               |                  |         |            |  |          |           |                 |                   |              |         |           |  |        |                 |  |               |  |  |  |  |  |                  |  |                    |  |  |  |  |  |                  |  |                   |  |  |  |  |  |
|--|---|---------------------|-------------------|-------------|--------------|------------|------------|--------|---------|-----------|--------------------|--|--------------|---------|--|------------|------------|-----------|----------|---------------------|--------------|--|--------|--|-----------|-----------|---------------------|-------|--------------|---------|------------|--|-----------|-----------|-----------------|-------|--------------|---------|------------|--|----------|-----------|------------------|--------------------|-----------------|---------|--|------------|------------|-----------|----------|----------------|-----------------|--|-------------|--|----------|-----------|------------------|----|-------------------|---------|--|------------|------------|-----------|-------------|--|--------------|--|---------|--|------------|-----------|----------|-------|--------------|--|------------|--|-----------|-----------|------------------|--|--------------|--|---------|--|-----------|-----------|-----------------|---------------|------------------|---------|------------|--|----------|-----------|-----------------|-------------------|--------------|---------|-----------|--|--------|-----------------|--|---------------|--|--|--|--|--|------------------|--|--------------------|--|--|--|--|--|------------------|--|-------------------|--|--|--|--|--|
| <b>JANATA BANK LIMITED</b><br>Sonargaon Road Branch (0873)   |   |                     |                   |             |              |            |            |        |         |           |                    |  |              |         |  |            |            |           |          |                     |              |  |        |  |           |           |                     |       |              |         |            |  |           |           |                 |       |              |         |            |  |          |           |                  |                    |                 |         |  |            |            |           |          |                |                 |  |             |  |          |           |                  |    |                   |         |  |            |            |           |             |  |              |  |         |  |            |           |          |       |              |  |            |  |           |           |                  |  |              |  |         |  |           |           |                 |               |                  |         |            |  |          |           |                 |                   |              |         |           |  |        |                 |  |               |  |  |  |  |  |                  |  |                    |  |  |  |  |  |                  |  |                   |  |  |  |  |  |
| <b>ACCOUNT STATEMENT</b>   |   |                     |                   |             |              |            |            |        |         |           |                    |  |              |         |  |            |            |           |          |                     |              |  |        |  |           |           |                     |       |              |         |            |  |           |           |                 |       |              |         |            |  |          |           |                  |                    |                 |         |  |            |            |           |          |                |                 |  |             |  |          |           |                  |    |                   |         |  |            |            |           |             |  |              |  |         |  |            |           |          |       |              |  |            |  |           |           |                  |  |              |  |         |  |           |           |                 |               |                  |         |            |  |          |           |                 |                   |              |         |           |  |        |                 |  |               |  |  |  |  |  |                  |  |                    |  |  |  |  |  |                  |  |                   |  |  |  |  |  |
| <p> <b>Account/Contract ID :</b> 0100238358641<br/> <b>Customer ID :</b> 1004346752<br/> <b>Legacy ID :</b> 1<br/> <b>Currency :</b> BDT<br/> <b>Account Opening Date :</b> 28 NOV 2022<br/> <b>Account in Branch :</b> Sonargaon Road (0873)<br/> <b>Statement for Period of :</b> 01 JAN 2022<br/> <b>Account Status :</b> Active       </p>   | <p> <b>Account/Contract Title :</b> PROXY MEASUREMENT-RIVER BANK EROSION<br/> <b>Address :</b> NOAMI, 10.8.ESTERN PLAZA(9TH FLOOR)<br/> <b>SONARGAON ROAD, HATIRPOOL, DHAKA, Bangladesh</b><br/> <b>Account/Contract Type :</b> Current Deposit - Commercial<br/> <b>Generation Date :</b> 24 JUL 2023<br/> <b>To :</b> 24 JUL 2023<br/> <b>Balance at Period Start :</b> 0.00       </p> |                     |                   |             |              |            |            |        |         |           |                    |  |              |         |  |            |            |           |          |                     |              |  |        |  |           |           |                     |       |              |         |            |  |           |           |                 |       |              |         |            |  |          |           |                  |                    |                 |         |  |            |            |           |          |                |                 |  |             |  |          |           |                  |    |                   |         |  |            |            |           |             |  |              |  |         |  |            |           |          |       |              |  |            |  |           |           |                  |  |              |  |         |  |           |           |                 |               |                  |         |            |  |          |           |                 |                   |              |         |           |  |        |                 |  |               |  |  |  |  |  |                  |  |                    |  |  |  |  |  |                  |  |                   |  |  |  |  |  |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Date</th> <th>Transaction Type</th> <th>Description</th> <th>Reference No</th> <th>Cheque No</th> <th>Debit</th> <th>Credit</th> <th>Balance</th> </tr> </thead> <tbody> <tr> <td>07 MAR 23</td> <td>Chq deposited sent</td> <td></td> <td>TT23066FFYCP</td> <td>6048023</td> <td></td> <td>100,000.00</td> <td>100,000.00</td> </tr> <tr> <td>20 MAR 23</td> <td>Transfer</td> <td>NON MICR CHQ CHARGE</td> <td>FT23079F9KY7</td> <td></td> <td>-28.75</td> <td></td> <td>99,971.25</td> </tr> <tr> <td>09 APR 23</td> <td>Outward Cheque - Dr</td> <td>Noami</td> <td>FT23099M4ITG</td> <td>2812231</td> <td>-25,000.00</td> <td></td> <td>74,971.25</td> </tr> <tr> <td>11 APR 23</td> <td>Cash Withdrawal</td> <td>DIPTA</td> <td>TT2310158X52</td> <td>2812232</td> <td>-70,000.00</td> <td></td> <td>4,971.25</td> </tr> <tr> <td>13 JUN 23</td> <td>Clg Chq Honoured</td> <td>mohi hisab nirkhok</td> <td>TT231646YRB0493</td> <td>7023190</td> <td></td> <td>100,000.00</td> <td>104,971.25</td> </tr> <tr> <td>13 JUN 23</td> <td>Transfer</td> <td>WRONGLY POSTED</td> <td>FT23164JJFQ0493</td> <td></td> <td>-100,000.00</td> <td></td> <td>4,971.25</td> </tr> <tr> <td>14 JUN 23</td> <td>Clg Chq Honoured</td> <td>BB</td> <td>TT231656G6GDS0493</td> <td>7023190</td> <td></td> <td>100,000.00</td> <td>104,971.25</td> </tr> <tr> <td>16 JUN 23</td> <td>SMS Charges</td> <td></td> <td>FT2316795BTV</td> <td></td> <td>-115.00</td> <td></td> <td>104,856.25</td> </tr> <tr> <td>18 JUN 23</td> <td>Transfer</td> <td>NOAMI</td> <td>FT231699ZCC5</td> <td></td> <td>-25,000.00</td> <td></td> <td>79,856.25</td> </tr> <tr> <td>23 JUN 23</td> <td>Ac Maint Fee-VAT</td> <td></td> <td>FT23174SV13W</td> <td></td> <td>-345.00</td> <td></td> <td>79,511.25</td> </tr> <tr> <td>26 JUN 23</td> <td>Cash Withdrawal</td> <td>dipta chandra</td> <td>TT23177WWRD20493</td> <td>2812235</td> <td>-70,000.00</td> <td></td> <td>9,511.25</td> </tr> <tr> <td>24 JUL 23</td> <td>Cash Withdrawal</td> <td>dipto chandra das</td> <td>TT232055VDQ5</td> <td>2812233</td> <td>-9,000.00</td> <td></td> <td>511.25</td> </tr> <tr> <td colspan="2"><b>BALANCE:</b></td> <td style="text-align: right;"><b>511.25</b></td> <td colspan="5"></td> </tr> <tr> <td colspan="2"><b>TOTAL DR:</b></td> <td style="text-align: right;"><b>-299,488.75</b></td> <td colspan="5"></td> </tr> <tr> <td colspan="2"><b>TOTAL CR:</b></td> <td style="text-align: right;"><b>300,000.00</b></td> <td colspan="5"></td> </tr> </tbody> </table> |   | Date                | Transaction Type  | Description | Reference No | Cheque No  | Debit      | Credit | Balance | 07 MAR 23 | Chq deposited sent |  | TT23066FFYCP | 6048023 |  | 100,000.00 | 100,000.00 | 20 MAR 23 | Transfer | NON MICR CHQ CHARGE | FT23079F9KY7 |  | -28.75 |  | 99,971.25 | 09 APR 23 | Outward Cheque - Dr | Noami | FT23099M4ITG | 2812231 | -25,000.00 |  | 74,971.25 | 11 APR 23 | Cash Withdrawal | DIPTA | TT2310158X52 | 2812232 | -70,000.00 |  | 4,971.25 | 13 JUN 23 | Clg Chq Honoured | mohi hisab nirkhok | TT231646YRB0493 | 7023190 |  | 100,000.00 | 104,971.25 | 13 JUN 23 | Transfer | WRONGLY POSTED | FT23164JJFQ0493 |  | -100,000.00 |  | 4,971.25 | 14 JUN 23 | Clg Chq Honoured | BB | TT231656G6GDS0493 | 7023190 |  | 100,000.00 | 104,971.25 | 16 JUN 23 | SMS Charges |  | FT2316795BTV |  | -115.00 |  | 104,856.25 | 18 JUN 23 | Transfer | NOAMI | FT231699ZCC5 |  | -25,000.00 |  | 79,856.25 | 23 JUN 23 | Ac Maint Fee-VAT |  | FT23174SV13W |  | -345.00 |  | 79,511.25 | 26 JUN 23 | Cash Withdrawal | dipta chandra | TT23177WWRD20493 | 2812235 | -70,000.00 |  | 9,511.25 | 24 JUL 23 | Cash Withdrawal | dipto chandra das | TT232055VDQ5 | 2812233 | -9,000.00 |  | 511.25 | <b>BALANCE:</b> |  | <b>511.25</b> |  |  |  |  |  | <b>TOTAL DR:</b> |  | <b>-299,488.75</b> |  |  |  |  |  | <b>TOTAL CR:</b> |  | <b>300,000.00</b> |  |  |  |  |  |
| Date   | Transaction Type  | Description         | Reference No      | Cheque No   | Debit        | Credit     | Balance    |        |         |           |                    |  |              |         |  |            |            |           |          |                     |              |  |        |  |           |           |                     |       |              |         |            |  |           |           |                 |       |              |         |            |  |          |           |                  |                    |                 |         |  |            |            |           |          |                |                 |  |             |  |          |           |                  |    |                   |         |  |            |            |           |             |  |              |  |         |  |            |           |          |       |              |  |            |  |           |           |                  |  |              |  |         |  |           |           |                 |               |                  |         |            |  |          |           |                 |                   |              |         |           |  |        |                 |  |               |  |  |  |  |  |                  |  |                    |  |  |  |  |  |                  |  |                   |  |  |  |  |  |
| 07 MAR 23  | Chq deposited sent  |                     | TT23066FFYCP      | 6048023     |              | 100,000.00 | 100,000.00 |        |         |           |                    |  |              |         |  |            |            |           |          |                     |              |  |        |  |           |           |                     |       |              |         |            |  |           |           |                 |       |              |         |            |  |          |           |                  |                    |                 |         |  |            |            |           |          |                |                 |  |             |  |          |           |                  |    |                   |         |  |            |            |           |             |  |              |  |         |  |            |           |          |       |              |  |            |  |           |           |                  |  |              |  |         |  |           |           |                 |               |                  |         |            |  |          |           |                 |                   |              |         |           |  |        |                 |  |               |  |  |  |  |  |                  |  |                    |  |  |  |  |  |                  |  |                   |  |  |  |  |  |
| 20 MAR 23  | Transfer  | NON MICR CHQ CHARGE | FT23079F9KY7      |             | -28.75       |            | 99,971.25  |        |         |           |                    |  |              |         |  |            |            |           |          |                     |              |  |        |  |           |           |                     |       |              |         |            |  |           |           |                 |       |              |         |            |  |          |           |                  |                    |                 |         |  |            |            |           |          |                |                 |  |             |  |          |           |                  |    |                   |         |  |            |            |           |             |  |              |  |         |  |            |           |          |       |              |  |            |  |           |           |                  |  |              |  |         |  |           |           |                 |               |                  |         |            |  |          |           |                 |                   |              |         |           |  |        |                 |  |               |  |  |  |  |  |                  |  |                    |  |  |  |  |  |                  |  |                   |  |  |  |  |  |
| 09 APR 23  | Outward Cheque - Dr   | Noami               | FT23099M4ITG      | 2812231     | -25,000.00   |            | 74,971.25  |        |         |           |                    |  |              |         |  |            |            |           |          |                     |              |  |        |  |           |           |                     |       |              |         |            |  |           |           |                 |       |              |         |            |  |          |           |                  |                    |                 |         |  |            |            |           |          |                |                 |  |             |  |          |           |                  |    |                   |         |  |            |            |           |             |  |              |  |         |  |            |           |          |       |              |  |            |  |           |           |                  |  |              |  |         |  |           |           |                 |               |                  |         |            |  |          |           |                 |                   |              |         |           |  |        |                 |  |               |  |  |  |  |  |                  |  |                    |  |  |  |  |  |                  |  |                   |  |  |  |  |  |
| 11 APR 23  | Cash Withdrawal   | DIPTA               | TT2310158X52      | 2812232     | -70,000.00   |            | 4,971.25   |        |         |           |                    |  |              |         |  |            |            |           |          |                     |              |  |        |  |           |           |                     |       |              |         |            |  |           |           |                 |       |              |         |            |  |          |           |                  |                    |                 |         |  |            |            |           |          |                |                 |  |             |  |          |           |                  |    |                   |         |  |            |            |           |             |  |              |  |         |  |            |           |          |       |              |  |            |  |           |           |                  |  |              |  |         |  |           |           |                 |               |                  |         |            |  |          |           |                 |                   |              |         |           |  |        |                 |  |               |  |  |  |  |  |                  |  |                    |  |  |  |  |  |                  |  |                   |  |  |  |  |  |
| 13 JUN 23  | Clg Chq Honoured  | mohi hisab nirkhok  | TT231646YRB0493   | 7023190     |              | 100,000.00 | 104,971.25 |        |         |           |                    |  |              |         |  |            |            |           |          |                     |              |  |        |  |           |           |                     |       |              |         |            |  |           |           |                 |       |              |         |            |  |          |           |                  |                    |                 |         |  |            |            |           |          |                |                 |  |             |  |          |           |                  |    |                   |         |  |            |            |           |             |  |              |  |         |  |            |           |          |       |              |  |            |  |           |           |                  |  |              |  |         |  |           |           |                 |               |                  |         |            |  |          |           |                 |                   |              |         |           |  |        |                 |  |               |  |  |  |  |  |                  |  |                    |  |  |  |  |  |                  |  |                   |  |  |  |  |  |
| 13 JUN 23  | Transfer  | WRONGLY POSTED      | FT23164JJFQ0493   |             | -100,000.00  |            | 4,971.25   |        |         |           |                    |  |              |         |  |            |            |           |          |                     |              |  |        |  |           |           |                     |       |              |         |            |  |           |           |                 |       |              |         |            |  |          |           |                  |                    |                 |         |  |            |            |           |          |                |                 |  |             |  |          |           |                  |    |                   |         |  |            |            |           |             |  |              |  |         |  |            |           |          |       |              |  |            |  |           |           |                  |  |              |  |         |  |           |           |                 |               |                  |         |            |  |          |           |                 |                   |              |         |           |  |        |                 |  |               |  |  |  |  |  |                  |  |                    |  |  |  |  |  |                  |  |                   |  |  |  |  |  |
| 14 JUN 23  | Clg Chq Honoured  | BB                  | TT231656G6GDS0493 | 7023190     |              | 100,000.00 | 104,971.25 |        |         |           |                    |  |              |         |  |            |            |           |          |                     |              |  |        |  |           |           |                     |       |              |         |            |  |           |           |                 |       |              |         |            |  |          |           |                  |                    |                 |         |  |            |            |           |          |                |                 |  |             |  |          |           |                  |    |                   |         |  |            |            |           |             |  |              |  |         |  |            |           |          |       |              |  |            |  |           |           |                  |  |              |  |         |  |           |           |                 |               |                  |         |            |  |          |           |                 |                   |              |         |           |  |        |                 |  |               |  |  |  |  |  |                  |  |                    |  |  |  |  |  |                  |  |                   |  |  |  |  |  |
| 16 JUN 23  | SMS Charges   |                     | FT2316795BTV      |             | -115.00      |            | 104,856.25 |        |         |           |                    |  |              |         |  |            |            |           |          |                     |              |  |        |  |           |           |                     |       |              |         |            |  |           |           |                 |       |              |         |            |  |          |           |                  |                    |                 |         |  |            |            |           |          |                |                 |  |             |  |          |           |                  |    |                   |         |  |            |            |           |             |  |              |  |         |  |            |           |          |       |              |  |            |  |           |           |                  |  |              |  |         |  |           |           |                 |               |                  |         |            |  |          |           |                 |                   |              |         |           |  |        |                 |  |               |  |  |  |  |  |                  |  |                    |  |  |  |  |  |                  |  |                   |  |  |  |  |  |
| 18 JUN 23  | Transfer  | NOAMI               | FT231699ZCC5      |             | -25,000.00   |            | 79,856.25  |        |         |           |                    |  |              |         |  |            |            |           |          |                     |              |  |        |  |           |           |                     |       |              |         |            |  |           |           |                 |       |              |         |            |  |          |           |                  |                    |                 |         |  |            |            |           |          |                |                 |  |             |  |          |           |                  |    |                   |         |  |            |            |           |             |  |              |  |         |  |            |           |          |       |              |  |            |  |           |           |                  |  |              |  |         |  |           |           |                 |               |                  |         |            |  |          |           |                 |                   |              |         |           |  |        |                 |  |               |  |  |  |  |  |                  |  |                    |  |  |  |  |  |                  |  |                   |  |  |  |  |  |
| 23 JUN 23  | Ac Maint Fee-VAT  |                     | FT23174SV13W      |             | -345.00      |            | 79,511.25  |        |         |           |                    |  |              |         |  |            |            |           |          |                     |              |  |        |  |           |           |                     |       |              |         |            |  |           |           |                 |       |              |         |            |  |          |           |                  |                    |                 |         |  |            |            |           |          |                |                 |  |             |  |          |           |                  |    |                   |         |  |            |            |           |             |  |              |  |         |  |            |           |          |       |              |  |            |  |           |           |                  |  |              |  |         |  |           |           |                 |               |                  |         |            |  |          |           |                 |                   |              |         |           |  |        |                 |  |               |  |  |  |  |  |                  |  |                    |  |  |  |  |  |                  |  |                   |  |  |  |  |  |
| 26 JUN 23  | Cash Withdrawal   | dipta chandra       | TT23177WWRD20493  | 2812235     | -70,000.00   |            | 9,511.25   |        |         |           |                    |  |              |         |  |            |            |           |          |                     |              |  |        |  |           |           |                     |       |              |         |            |  |           |           |                 |       |              |         |            |  |          |           |                  |                    |                 |         |  |            |            |           |          |                |                 |  |             |  |          |           |                  |    |                   |         |  |            |            |           |             |  |              |  |         |  |            |           |          |       |              |  |            |  |           |           |                  |  |              |  |         |  |           |           |                 |               |                  |         |            |  |          |           |                 |                   |              |         |           |  |        |                 |  |               |  |  |  |  |  |                  |  |                    |  |  |  |  |  |                  |  |                   |  |  |  |  |  |
| 24 JUL 23  | Cash Withdrawal   | dipto chandra das   | TT232055VDQ5      | 2812233     | -9,000.00    |            | 511.25     |        |         |           |                    |  |              |         |  |            |            |           |          |                     |              |  |        |  |           |           |                     |       |              |         |            |  |           |           |                 |       |              |         |            |  |          |           |                  |                    |                 |         |  |            |            |           |          |                |                 |  |             |  |          |           |                  |    |                   |         |  |            |            |           |             |  |              |  |         |  |            |           |          |       |              |  |            |  |           |           |                  |  |              |  |         |  |           |           |                 |               |                  |         |            |  |          |           |                 |                   |              |         |           |  |        |                 |  |               |  |  |  |  |  |                  |  |                    |  |  |  |  |  |                  |  |                   |  |  |  |  |  |
| <b>BALANCE:</b>  |   | <b>511.25</b>       |                   |             |              |            |            |        |         |           |                    |  |              |         |  |            |            |           |          |                     |              |  |        |  |           |           |                     |       |              |         |            |  |           |           |                 |       |              |         |            |  |          |           |                  |                    |                 |         |  |            |            |           |          |                |                 |  |             |  |          |           |                  |    |                   |         |  |            |            |           |             |  |              |  |         |  |            |           |          |       |              |  |            |  |           |           |                  |  |              |  |         |  |           |           |                 |               |                  |         |            |  |          |           |                 |                   |              |         |           |  |        |                 |  |               |  |  |  |  |  |                  |  |                    |  |  |  |  |  |                  |  |                   |  |  |  |  |  |
| <b>TOTAL DR:</b>   |   | <b>-299,488.75</b>  |                   |             |              |            |            |        |         |           |                    |  |              |         |  |            |            |           |          |                     |              |  |        |  |           |           |                     |       |              |         |            |  |           |           |                 |       |              |         |            |  |          |           |                  |                    |                 |         |  |            |            |           |          |                |                 |  |             |  |          |           |                  |    |                   |         |  |            |            |           |             |  |              |  |         |  |            |           |          |       |              |  |            |  |           |           |                  |  |              |  |         |  |           |           |                 |               |                  |         |            |  |          |           |                 |                   |              |         |           |  |        |                 |  |               |  |  |  |  |  |                  |  |                    |  |  |  |  |  |                  |  |                   |  |  |  |  |  |
| <b>TOTAL CR:</b>   |   | <b>300,000.00</b>   |                   |             |              |            |            |        |         |           |                    |  |              |         |  |            |            |           |          |                     |              |  |        |  |           |           |                     |       |              |         |            |  |           |           |                 |       |              |         |            |  |          |           |                  |                    |                 |         |  |            |            |           |          |                |                 |  |             |  |          |           |                  |    |                   |         |  |            |            |           |             |  |              |  |         |  |            |           |          |       |              |  |            |  |           |           |                  |  |              |  |         |  |           |           |                 |               |                  |         |            |  |          |           |                 |                   |              |         |           |  |        |                 |  |               |  |  |  |  |  |                  |  |                    |  |  |  |  |  |                  |  |                   |  |  |  |  |  |
|  <span style="font-size: 2em; color: blue; margin-left: 10px;">S. 24/07/2024</span>   |   |                     |                   |             |              |            |            |        |         |           |                    |  |              |         |  |            |            |           |          |                     |              |  |        |  |           |           |                     |       |              |         |            |  |           |           |                 |       |              |         |            |  |          |           |                  |                    |                 |         |  |            |            |           |          |                |                 |  |             |  |          |           |                  |    |                   |         |  |            |            |           |             |  |              |  |         |  |            |           |          |       |              |  |            |  |           |           |                  |  |              |  |         |  |           |           |                 |               |                  |         |            |  |          |           |                 |                   |              |         |           |  |        |                 |  |               |  |  |  |  |  |                  |  |                    |  |  |  |  |  |                  |  |                   |  |  |  |  |  |

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|--|---|---|---------|---|---|
| চালান ফরম  | ১ম (মুল) কপি   ২য় কপি   ৩য় কপি            |   |         |   |   |
| তি, আর ফরম নং ৬ (এস, আর ৩৭ দ্রষ্টব্য)  | তারিখ: ১০.০৭.২০২৩                           |   |         |   |   |
| চালান নং.....<br>বাংলাদেশ ব্যাংক/সোনালী ব্যাংক লিমিটেডের.....  | জেলার.....<br>শাখায় টাকা জমা দেওয়ার চালান |   |         |   |   |
| কোড নং   | ১   | ১ ০ ৩ ০   | ০ ০ ৯ ০ | ০ ৩ ৯ ৯   |   |
| অমা প্রদানকারী কর্তৃক পূরণ করিতে হইবে<br>যাহার মারফত প্রদত্ত হইল তাহার<br>নাম ও ঠিকানা।<br><br><b>Md. Nayem<br/>Golam Muktadir</b><br><i>Life member<br/>MHTK Terminal (end 5)<br/>110 KN Islam Avenue<br/>Banglamotor,<br/>Dhaka - 1000</i> |   | যে ব্যাংকের/প্রতিষ্ঠানের পক্ষ<br>হইতে টাকা প্রদত্ত হইল<br>তাহার নাম, পদবী ও<br>ঠিকানা।<br><br><b>Md. Nayem<br/>Golam Muktadir</b><br><i>Life member<br/>MHTK Terminal (end 5)<br/>110 KN Islam Avenue<br/>Banglamotor,<br/>Dhaka - 1000</i> |         | কি ব্যবস জমা দেওয়া<br>হইল তাহার বিবরণ।<br>মুদ্রা ও নোটের বিবরণ/ক্রাফ্ট,<br>গে-অর্ডার ও চেকের বিবরণ।<br><br><b>Vet Board Final<br/>repair and<br/>Financial report<br/>of Special<br/>Allocation Board<br/>Science and<br/>Technology<br/>under ministry<br/>of Science and<br/>Technology<br/>FY 2022-2023</b> |   |
|  |   |   |         | টাকার অংক   | বিভাগের নাম এবং<br>চালানের<br>পঞ্জীয়নকারী<br>কর্মকর্তার নাম,<br>পদবী ও দণ্ডন।* |
|  |   | টাকা  | পয়সা   | <b>Cash</b><br><b>৩৭৭৫</b><br><i>৩৭৭৫</i>   |   |
|  |   |   |         | <b>মোট টাকা</b><br><b>৩৭৭৫</b>  |   |
| <b>জমা (কোটি):</b> Three thousand seven hundred ninety<br><i>five only</i>   |   |   |         | <b>ম্যানেজার</b><br><b>বাংলাদেশ ব্যাংক/সোনালী<br/>                 Principal Officer (JCG)<br/>                 G-3939<br/>                 Sonali Bank Limited<br/>                 Sonargaon Road Br. Dhaka</b>   |   |
| <b>তারিখ:</b> ১০.০৭.২০২৩   |   |   |         | <i>30 JUL 2023</i><br><b>সরকারী খাতে</b><br><b>সোনালী</b>   |   |

নথি: ০১। সংশ্লিষ্ট দণ্ডনের সহিত যোগাযোগ করিয়া সামীক কোড নম্বর জালিয়া লাইবেন।  
 ০২। \* যে সকল ক্ষেত্রে কর্মকর্তা কর্তৃক পৃষ্ঠাকেন ঘোষণ, সে সকল ক্ষেত্রে ঘোষণা হইবে।

|   |   |   |  |      |      |   |
|---|---|---|--|------|------|---|
| চালান ফরম   | ঠি. আর ফরম নং ৬ (এস, আর ৩৭ প্রিটের)   | ১ম (মুক্তি) কলি   ২য় কলি   তৃতীয় কলি  |  |      |      |   |
| চালান নং.....   | তারিখ: ৩০.০৭.২০২৩   |   |  |      |      |   |
| বাংলাদেশ যাত্রা/ স্মারক যাত্রা লিমিটেডের.....   |   | প্রধান পোর্ট অফ সেপ্টেম্বর চালান  |  |      |      |   |
| কোড নং  | ২   | ১২৩২   ০০২২   ০২২২  |  |      |      |   |
| জমা এদানকারী কর্তৃক পূরণ করিতে হইবে   |   |   |  |      |      |   |
| যাত্রীর মানবত প্রদত্ত ইহুল আহার<br>নাম ও ঠিকানা।  | যে যাত্রীর/প্রতিষ্ঠানের নাম<br>ইহুলে টাকা প্রদত্ত ইহুল<br>আহার নাম, পদবী ও<br>ঠিকানা। | কি বাবন জমা দেওয়া<br>ইহুল আহার বিবরণ।  | জমা ও নেটো বিবরণ/ভাবক,<br>স্পে-অর্ডার ও তারের বিবরণ।   | টাকা | পদবী | বিভাগের নাম এবং<br>জমানাম<br>স্পে-অর্ডার<br>স্পে-অর্ডার নাম,<br>পদবী ও স্থান : *                    |
| Md. Nayeem<br>Golam Muktadir  | Md. Nayeem<br>Golam Muktadir  | Tax for<br>Financial report<br>& Special Meeting<br>for science and<br>Technology under<br>the ministry<br>of science and<br>Technology | cash   | ৫১৯৩ |      | * প্রতিষ্ঠানের নাম এবং জমানাম<br>স্পে-অর্ডার নাম, পদবী ও স্থান<br>স্পে-অর্ডার নাম, পদবী ও স্থান : * |
| জমা (ক্রমাংক): Four thousand one hundred ninety<br>Three only                           |   |   | মোট টাকা   |      |      | বাংলাদেশ যাত্রা/স্মারক যাত্রা লিমিটেড   |
| টাকা পাওয়া গেল   |   |   |  |      |      | বাংলাদেশ যাত্রা/স্মারক যাত্রা লিমিটেড   |
| তারিখ: ৩০.০৭.২০২৩   |   |   |  |      |      | *   |
| নথি:  |   |   | শাসনকার্য<br>বাংলাদেশ যাত্রা/স্মারক যাত্রা লিমিটেড   |      |      |   |
| ০১। সপ্তিষ্ঠ দণ্ডনের সমিতি স্বাগামোগ করিয়া সঠিক কোড নম্বর জানিয়া লাইবেন।              |   |   | Shusama Sharma<br>Principal Officer (JCG)<br>C-3236<br>Sonali Bank Limited<br>Sonargaon Road St, Dhaka |      |      |   |
| ০২। * যে সকল ক্ষেত্রে কর্মকর্তা কর্তৃক পৃষ্ঠাকেন প্রযোজন, সে সকল ক্ষেত্রে প্রযোজন হইবে। |   |   |  |      |      |   |

## **ANNEXURE-I**

### **Assets acquired Partly or solely out of the S&T Allocation**

(Register to be maintained by the Implementing Institution/Organization)

1. Name of the Organization/Institution. National Oceanographic and Maritime Institute (NOAMI)
2. Name of the Programme/Project: Proxy measurement of the sediment flux by means of seismic noise in the presence of the river siltation and river bank erosion
3. Number of date of sanction order. No.: 39.00.0000.009.99.024.22-193 Date: 9 April 2023
4. Particulars of assets acquired. NA
5. Value of assets. NA
6. List of asset which are needed by the Organization. NA
7. Reasons for such need. NA
8. Lists of asset to be disposed of. NA
9. Lists of asset already disposed of. NA
10. Reasons and authority for such disposal. NA
11. Amount realized on disposal. NA

Principal Investigator/  
Programme Manager/  
Programme Co-ordinator/  
Project Counterpart

Financial Officer

(Signature with seal, Telephone number & Mobile number)

**Prof. Dr. Md. Kamrul Alam Khan**  
Treasurer  
NOAMI, Dhaka, Bangladesh  
Mobile: +880 1911357447

(Signature with Seal, Telephone number &  
Mobile number)

**Md. Nayeem Golam Muktadir**  
Principal Investigator  
Proxy.....River.....Erosion  
Mobile: +880 1678641238

Head of the Organization/Institutes/University  
(Signature with seal, Telephone number & Mobile number)

**Prof. Dr. A. S. M. Maksud Kamal**  
Chairman  
NOAMI, Dhaka, Bangladesh  
Mobile: +880 1759760944

**ANNEXURE-K**

**Statement of Expenditure**

Period: From.....9<sup>th</sup> April, 2023.....to.....25<sup>th</sup> July, 2023.....

(all in thousand taka)

| Item | Unspent balance carried forward from previous year | Allocation received from the Ministry of Science and technology during the year | Other receipts/interest on S&T allocation | Total<br>(2+3+4=) | Expenditure incurred during the year | Balance<br>(5+6=) | Remarks |
|------|--|---|---|-------------------|--------------------------------------|-------------------|---------|
| 1    | 2  | 3   | 4   | 5                 | 6                                    | 7                 | 8       |
| 1    | 0.00   | 200000  | 0.00                                      |                   | 200000                               |                   |         |

**1. Non recurring:**

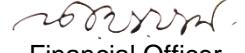
(i) Equipment NA

**2. Recurring:**

(i) Consumables NA

(ii) Contingency NA

(iii) Others NA

|   |  |
|---|--|
| <br>Principal Investigator/ Programme Manager/<br>Programme Co-ordinator/<br>Project Counterpart<br>(Signature with Seal, Telephone number &<br>Mobile number) | <br>Financial Officer<br>(Signature with seal, Telephone number & Mobile number)<br><b>Prof. Dr. Md. Kamrul Alam Khan</b><br>Treasurer<br>NOAMI, Dhaka, Bangladesh<br>Mobile: +880 1911357447 |
| <b>Md. Nayeem Golam Muktadir</b><br>Principal Investigator<br>Proxy.....River.....Erosion<br>Mobile: +880 1678641238  |  |



Head of the National Ocean  
 (Signature with seal, Telephone number & Mobile number)

**Prof. Dr. A. S. M. Maksud Kamal**  
 Chairman  
 NOAMI, Dhaka, Bangladesh  
 Mobile: +880 1759760944

## Vouchers



Order Ref: # UAFQYYPZK  
Order ID: # 33690  
Order Date: 11/07/2023  
Phone : 01783 007 004

**Shipping Address:**  
**Md. Nazmus Sanib Chowdhury**  
Celestial Tech Limited  
4th floor, Plot # 95, Suhrawardy Avenue, Baridhara diplomatic zone, Dhaka,  
4th floor, Plot # 95, Suhrawardy Avenue, Baridhara diplomatic zone, Dhaka  
**Dhaka - 1212**  
**01775948449**

**Shipping Method:** Dhaka Metro Premium Delivery (Only for Dhaka City)  
**Conditional Amount: BDT 535**  
**Payment Method:** Cash on delivery (Inside Dhaka)

### TERMS & NOTES

| SKU  | IMAGE | PRODUCT NAME   | QTY | PRICE   | ITEM TOTAL |
|------|-------|--|-----|---------|------------|
| 0311 |       | YF-S201 Hall Effect Water Flow Meter / Sensor                      | 1   | BDT 480 | BDT 480    |
| --   |       | Shipping Cost [Dhaka Metro Premium Delivery (Only for Dhaka City)] | 1   | BDT 55  | BDT 55     |

### Discount

|                    |                |
|--------------------|----------------|
| <b>Grand Total</b> | <b>BDT 535</b> |
| <b>Amount Paid</b> | <b>BDT 0</b>   |
| <b>Amount Due</b>  | <b>BDT 535</b> |

### THANK YOU

<https://www.facebook.com/RoboticsBD>  
Email: ask@roboticsbd.com

**RoboticsBD**  
House#5, Road#3, Sector#7, Uttara, Dhaka  
Phone: 01783 007 004 || 01792 007 004  
<https://store.roboticsbd.com>

\*Goods once sold will not be refunded & changed  
\*No Warranty  
\*Terms & Conditions are mentioned in  
<http://store.roboticsbd.com/content/3-terms-and-conditions>



Page 1 of 1



Order Ref: # CWAUZCWPZ

Order ID: # 33653

Order Date: 10/07/2023

Phone : 01783 007 004

Shipping Address:  
Md. Nazmus Sanib Chowdhury  
Celestial Tech Limited  
4th floor, Plot # 95, Suhrawardy  
Avenue, Baridhara diplomatic zone,  
Dhaka,  
4th floor, Plot # 95, Suhrawardy  
Avenue, Baridhara diplomatic zone,  
Dhaka  
**Dhaka - 1212**  
01775948449

Shipping Method: Dhaka Metro Premium  
Delivery (Only for Dhaka City)

**Conditional Amount: BDT 8,639**

Payment Method: Cash on delivery (Inside  
Dhaka)

TERMS & NOTES

| SKU  | IMAGE | PRODUCT NAME   | QTY | PRICE     | ITEM TOTAL |
|------|-------|--|-----|-----------|------------|
| 1062 |       | AMG8833 IR Infrared 8*8 Thermal Imager<br>Array Temperature Sensor             | 1   | BDT 6,700 | BDT 6,700  |
| 0813 |       | Liquid Suspended Particles Turbidity Sensor<br>Detection Module Kit            | 1   | BDT 820   | BDT 820    |
| 0939 |       | Mini Wireless 2.4GHz Keyboard with Mouse<br>Touchpad Remote Control, Backlight | 1   | BDT 899   | BDT 899    |
| 1933 |       | Raspberry Pi Power Cable with On/Off Switch<br>Type C USB                      | 1   | BDT 220   | BDT 220    |

**Discount**

|                    |                  |
|--------------------|------------------|
| <b>Grand Total</b> | <b>BDT 8,639</b> |
| <b>Amount Paid</b> | <b>BDT 0</b>     |
| <b>Amount Due</b>  | <b>BDT 8,639</b> |

THANK YOU

Page 1 of 2

**ROBOTICSBD**  
DISCOVER YOURSELF



Order Ref: # IXPKXFOCP

Order ID: # 32751

Order Date: 04/06/2023

Phone : 01783 007 004

**Shipping Address:**  
**Md. Nazmus Sanib Chowdhury**  
Celestial Tech Limited  
4th floor, Plot # 95, Suhrawardy Avenue, Baridhara diplomatic zone, Dhaka,  
4th floor, Plot # 95, Suhrawardy Avenue, Baridhara diplomatic zone, Dhaka  
**Dhaka - 1212**  
**01775948449**

**Shipping Method:** Dhaka Metro Premium Delivery (Only for Dhaka City)

**Conditional Amount: BDT 11,900**

**Payment Method:** Cash on delivery (Inside Dhaka)

**TERMS & NOTES**

| SKU  | IMAGE | PRODUCT NAME                                      | QTY | PRICE              | ITEM TOTAL |
|------|-------|---|-----|--------------------|------------|
| 0925 |       | 18650 Battery Holder 4S with wire                 | 1   | BDT 100            | BDT 100    |
| 1687 |       | 3.7V 18650 Rechargeable Battery Solderable        | 4   | BDT-125<br>BDT 115 | BDT 460    |
| 0382 |       | GY-87 10DOF MPU6050 HMC5883L BMP180 Sensor Module | 1   | BDT 2,250          | BDT 2,250  |
| 2158 |       | TB6560 Single Axis 3A Stepper Motor Driver Board  | 1   | BDT 780            | BDT 780    |
| 1201 |       | TFMini - Micro LIDAR Module                       | 1   | BDT 7,990          | BDT 7,990  |
| 1371 |       | Universal Dual Battery Charger for Li-ion Battery | 1   | BDT 320            | BDT 320    |

**Discount**

|                    |                   |
|--------------------|-------------------|
| <b>Grand Total</b> | <b>BDT 11,900</b> |
| <b>Amount Paid</b> | <b>BDT 0</b>      |
| <b>Amount Due</b>  | <b>BDT 11,900</b> |

Page 1 of 2



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Order Ref: # CWYCJFVZK  
 Order ID: # 32935  
 Order Date: 11/06/2023  
 Phone : 01783 007 004

**Shipping Address:**  
**Md. Nazmus Sanib Chowdhury**  
 Celestial Tech Limited  
 4th floor, Plot # 95, Suhrawardy Avenue, Baridhara diplomatic zone, Dhaka,  
 4th floor, Plot # 95, Suhrawardy Avenue, Baridhara diplomatic zone, Dhaka  
**Dhaka - 1212**  
**01775948449**

Shipping Method: Dhaka Metro Premium Delivery (Only for Dhaka City)

**TERMS & NOTES**

**Conditional Amount: BDT 1,883**

Payment Method: Cash on delivery (Inside Dhaka)

| SKU  | IMAGE | PRODUCT NAME   | QTY | PRICE     | ITEM TOTAL |
|------|-------|--|-----|-----------|------------|
| 2106 |       | Female to Female DuPont Line 40 Pin 30cm                           | 1   | BDT 190   | BDT 190    |
| 0031 |       | Jumper Wire 40 Pcs Set - Jumper Wire Type : Male to Female         | 1   | BDT 100   | BDT 100    |
| 2105 |       | Male to Male Jumper Wires 40 Pin 30cm                              | 1   | BDT 190   | BDT 190    |
| 1390 |       | Nema 17 Stepper Motor 17HS4401S                                    | 1   | BDT 1,250 | BDT 1,250  |
| 1785 |       | USB3.0 Type A Female to Breadboard & PCB 2.54mm DIP 9P Adapter     | 1   | BDT 98    | BDT 98     |
| --   |       | Shipping Cost [Dhaka Metro Premium Delivery (Only for Dhaka City)] | 1   | BDT 55    | BDT 55     |

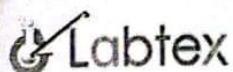
**Discount**

|                    |                  |
|--------------------|------------------|
| <b>Grand Total</b> | <b>BDT 1,883</b> |
| <b>Amount Paid</b> | <b>BDT 0</b>     |
| <b>Amount Due</b>  | <b>BDT 1,883</b> |

Page 1 of 2



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INVOICE# 23518

Labtex Bangladesh  
Eastern Kamalapur Complex, 64-68, North  
Kamalapur  
Dhaka, Dhaka, 1217  
Bangladesh  
01710136523

Invoice Date: 04/Jun/2023  
Order No.: 23518  
Order Date: 06/04/2023

**Billing Address:**

Md. Nazmus Sanib Chowdhury  
4th floor, Plot-#95, Block- K, Shohrawardi Avenue, Baridhara  
Diplomatic Zone  
Dhaka, Dhaka, 1212  
Bangladesh  
Email: nazmus.sanib@gmail.com  
Phone: 01775948449

**Shipping Address:**

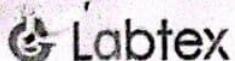
Md. Nazmus Sanib Chowdhury  
4th floor, Plot-#95, Block- K, Shohrawardi Avenue, Baridhara  
Diplomatic Zone  
Dhaka, Dhaka, 1212  
Bangladesh

| IMAGE | PRODUCT   | QUANTITY | PRICE      | TOTAL PRICE                            |
|-------|---|----------|------------|--|
|       | 6 in 1 Multi-Parameter Water pH, EC, TDS, Salt, S.G and Temp. Tester pH-786 | 1        | ৳ 3,000.00 | ৳ 3,000.00                             |
|       |   |          |            | Subtotal ৳ 3,000.00                    |
|       |   |          |            | Shipping ৳ 50.00 via 1-3 days delivery |
|       |   |          |            | Total ৳ 3,050.00                       |

Payment method: Cash on delivery



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Labtex is a Supplier, Seller & Online Store of Scientific, Surgical & Safety Products in Bangladesh.



INVOICE# 23521

Labtex Bangladesh  
Eastern Kamalapur Complex, 64-68, North  
Kamalapur  
Dhaka, Dhaka, 1217  
Bangladesh  
01710136523

Invoice Date: 04/Jun/2023  
Order No.: 23521  
Order Date: 06/04/2023

**Billing Address:**

Md. Nazmus Sanib Chowdhury  
4th floor, Plot-#95, Block- K, Shohrawardi Avenue, Baridhara  
Diplomatic Zone  
Dhaka  
Bangladesh  
Email: nazmus.sanib@gmail.com  
Phone: 01775948449

**Shipping Address:**

Md. Nazmus Sanib Chowdhury  
4th floor, Plot-#95, Block- K, Shohrawardi Avenue, Baridhara  
Diplomatic Zone  
Dhaka  
Bangladesh  
Phone: 01775948449

| IMAGE    | PRODUCT                               | QUANTITY | PRICE      | TOTAL PRICE |
|----------|---------------------------------------|----------|------------|-------------|
|          | Smart Sensor Digital Anemometer AS816 | 1        | ৳ 1,800.00 | ৳ 1,800.00  |
| Subtotal |                                       |          |            | ৳ 1,800.00  |
| Total    |                                       |          |            | ৳ 1,800.00  |

Payment method: Cash on delivery



This is Software Generated Report, Signature not Mandatory.  
Labtex is a Supplier, Seller & Online Store of Scientific, Surgical & Safety Products in Bangladesh.

**Rayhan Sarkar**

**INVOICE  
INV006**

**DATE  
Apr 16, 2023**

**BALANCE DUE  
USD \$11,500.00**

**BILL TO**

**MD Nazmus Sanib**

| DESCRIPTION           | RATE      | QTY | AMOUNT           |
|-----------------------|-----------|-----|------------------|
| Raspberry Pi 4B (2gb) | 11,500.00 | 1   | 11,500.00        |
| <b>TOTAL</b>          |           |     | <b>11,500.00</b> |

*Rayhan*

ক্যাশ মেমো



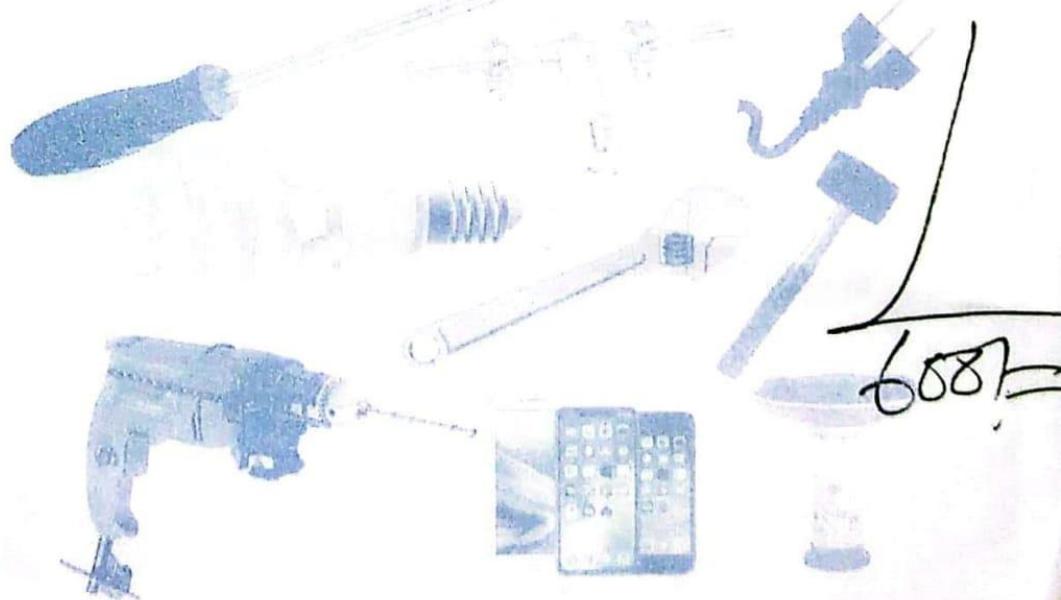
## হাসিবুর ইলেকট্রিক এন্ড টেলিকম **HASIBUR ELECTRIC & TELECOM**

এখানে সূলভ মূল্যে যাবতীয় ইলেকট্রিক, হার্ডওয়্যার, সেন্টারী মালামাল পাইকারী  
ও খুচরা বিক্রয় করা হয় এবং সুদক্ষ টেকনিশিয়ান দ্বারা কাজ করা হয়।  
ক-২০/৮, কালাটাঁদপুর, বারিধারা, নর্থ রোড, গুলশান-২, ঢাকা-১২১২  
মোবাইল : ০১৭৫৪-১০৫৮২৬, বিকাশ এজেন্ট-০১৮৪৭-২৫৫৬৪৫

সূত্র :

তারিখ : ০৬/০৬/০২৩

$$0 \cdot 6 \text{Kash} \text{ } B \text{ } (মুমগি) - 600 \times 1 = 600$$



ধন্যবাদ আবার আসবেন

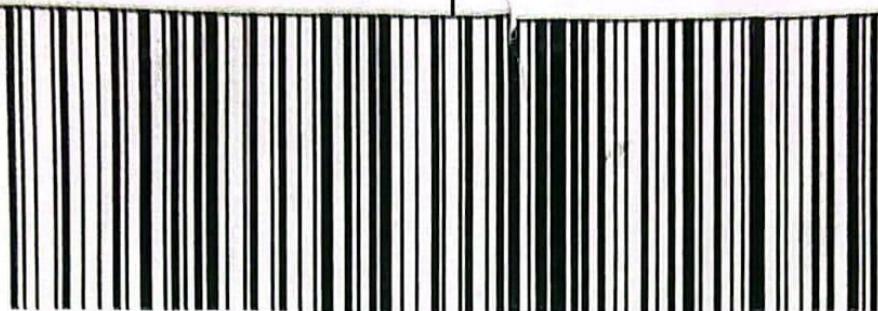
বিঃ দ্রঃ- বিক্রিত মাল ফেরৎ লওয়া হয় না।



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Sales\_order

marketplace



**Tracking Number: DEX-BDN-CB-0004140896**

|  |          |        |
|--|----------|--------|
|  <b>Daraz</b> | STANDARD |        |
|  | 0.08 KG  |        |
| COD  |          |        |
| D-002-0007   | BDT      | 2053.0 |



642152573214 07



|   |   |
|---|---|
| <b>Recipient:</b> Md. Aminul Islam Chowdhury<br>4th floor, Plot#03, No. 10 Mohorjheel Avenue,<br>Baridhara Diplomatic Enclave, Dhaka-1200,<br>Bangladesh<br>Baridhara<br>1775948449 | <b>Shipper Name:</b> Urbeauty (Shenzhen)<br><br>505, 28 Dong Xiayousongcun, Minqinglu,<br>Longhua Jiedao, Longhua Xinqu, Shenzhen, 518109,<br>China |
| Item Quantity: 1  | Order Creation Date: 2023-06-04   |



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# Bright Star IT

Hotline: 01729-389621, 01973-006831-34

87-92, Green Road, Farmview Super Market,

3rd Floor, 16/A, Farmgate, Dhaka-1215

Email: bstaritbd@gmail.com, facebook.com/brightstar.bd

www.bstaritbd.com, www.safewaygps.net



Invoice/Bill No.: 230104

Invoice Date: 11-07-2023

| Name    | Md. Naemus Sanib                 |     |       |        |
|---------|----------------------------------|-----|-------|--------|
| Address | Baridhara Diplomatic Zone, Dhaka |     |       |        |
| Phone   | 01775948449                      |     |       |        |
| SL No.  | Description                      | Qty | Rate  | Amount |
| 01      | Action Camera                    | 01  | 9500T | 9500T  |
|         |                                  |     |       | ↗      |
|         |                                  |     | Total | 9500T  |

Taka In words:

#### Terms & Conditions:

- Goods once sold will not be taken back
- Spy Items are not under any warranty
- Damage, Burning, Short Circuit Items are not under warranty

Customer Signature

Authorized Signature



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# **CLASSICOM**

## MULTIMEDIA

*All Kinds of Mobile Sim Card, Sim Replacement, Mobile Recharge, Computer Accessories, Mobile Accessories, TV Remote, Wifi Router Available Here*

KA-23, KALACHANDPUR, GULSHAN, DHAKA-1212

MOBILE : 01772-692300

**SL.NO.**

717

**CASH MEMO**

DATE : 12 JUL 2023

12 JUL 2023

NAME \_\_\_\_\_

ADDRESS .....

**TOTAL TAKA : (IN WORDS)**

|         |     |
|---------|-----|
| ADVANCE | 550 |
| DUE     | X   |

---

**CUSTOMER SIGNATURE**

---

**AUTHORISED SIGNATURE**



# SEVEN RENT-A-CAR

TIN-166266778600 Vat Reg.:18011077412

Rentacarsbd.com

Please Contact: 01911-511616, 01611-511616, 01712-971474

Date: 07/01/23

Dhaka to Ctg ————— 5900/-  
Ctg to Dhaka ————— 5900/- Date: 03/01/23

Total ————— 11800/-

*Kukut*



**SEVEN RENT-A-CAR**

TIN-166266778600 Vat Reg.:18011077412

Rentacarsbd.com

Please Contact: 01911-511616, 01611-511616, 01712-971474

Date: 07/06/23

Dhaka to Ctg ————— 5900/-

Date: 09/06/23

Ctg to Dhaka ————— 5900/-

Total ————— 11800/-

*Jasat*



# HOTEL GRAND AVALON PARK

Exclusive Luxurious Residential Hotel

|                        |   |  |                                  |  |                  |        |             |  |
|------------------------|---|--|----------------------------------|--|------------------|--------|-------------|--|
| Bill. No               | : |  |                                  |  | BILL             | Date : | 08 JUN 2023 |  |
| Client Code            | : |  | 8116/23                          |  | Type of Client : |        |             |  |
| Client Name            | : |  | MR. NARMOUS SANIB CITY           |  |                  |        |             |  |
| Address                | : |  |                                  |  |                  |        |             |  |
| Room No                | : |  | 505                              |  |                  |        |             |  |
| Type of Room           | : |  | HAC                              |  |                  |        |             |  |
| Cheque-in Date & Time  | : |  |                                  |  |                  |        |             |  |
| Cheque-Out Date & Time | : |  |                                  |  |                  |        |             |  |
| Staying Day            | : |  | 02                               |  |                  |        |             |  |
| Room Rent              | : |  | 100/-                            |  |                  |        |             |  |
| Total Amount           | : |  | 2000/-                           |  |                  |        |             |  |
| Total Bill Amount      | : |  | 2000/-                           |  |                  |        |             |  |
| Less Discount          | : |  | 0/-                              |  |                  |        |             |  |
| Net Payable            | : |  | 2000/-                           |  |                  |        |             |  |
| In Words               | : |  | TWO THOUSAND AND TEN RUPEES ONLY |  |                  |        |             |  |

Received By

Asst. Manager

Manager

Thanks will come again



S.S Tower, 3rd Floor, Wali Kha Mosque Moor, (East Side of Wali Kha Mosque), Panchlaish Road  
Chawkbazar, Chattogram. Mobile : +88 01789-350329. E-mail : grandavalonpark@gmail.com

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# মায়ের দোয়া মৎস্য বিতান

ক্ষাণ্প  
মাঘা

মোঃ সোহেল সওদাগর : 01820-191629

ফিফাত : 01846-769673

উত্তর মুনিয়ারহাট, ২ন্দ ওয়ার্ড, কক্ষবাজার।

নং ৮২০

তারিখ : ১৫/০৬/১৬

নাম : খেঁ: নাহুম্য এম্বিট

ঠিকানা :

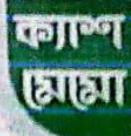
| সংখ্যা | বিবরণ | পরিমাণ | দর                  | টাকা       |
|--------|-------|--------|---------------------|------------|
| ১      |       |        |                     | ১২০ টাঙ্কি |
|        |       |        |                     | /          |
|        |       |        | মোট<br>অশিম<br>বাকী | ১২০ টাঙ্কি |

কথায় :

ক্রেতার স্বাক্ষর

মোঃসোহেল  
বিক্রেতার স্বাক্ষর

মোহাম্মদ আব্দুর রাজেল



# মায়ের দোয়া মৎস্য বিতান

মোঃ সোহেল সওদাগর : 01820-191629

ফিফাত : 01846-769673

উত্তর মুনিয়াবছড়া, ২ন্দ ওয়ার্ড, কক্ষিবাজার।

নং ৮২০

তারিখ : ০৫/০৬/১৬

নাম : প্রে: রাজেশ মানি

ঠিকানা :

| সংখ্যা | বিবরণ | পরিমাণ | দল                    | টাকা |
|--------|-------|--------|-----------------------|------|
|        |       |        |                       | ৫২০০ |
|        |       |        |                       | ।    |
|        |       |        | মোট<br>অগ্রিম<br>বাকী | ৫২০০ |

কথায় :

ক্রেতার স্বাক্ষর

মো:সোহেল  
বিক্রেতার স্বাক্ষর