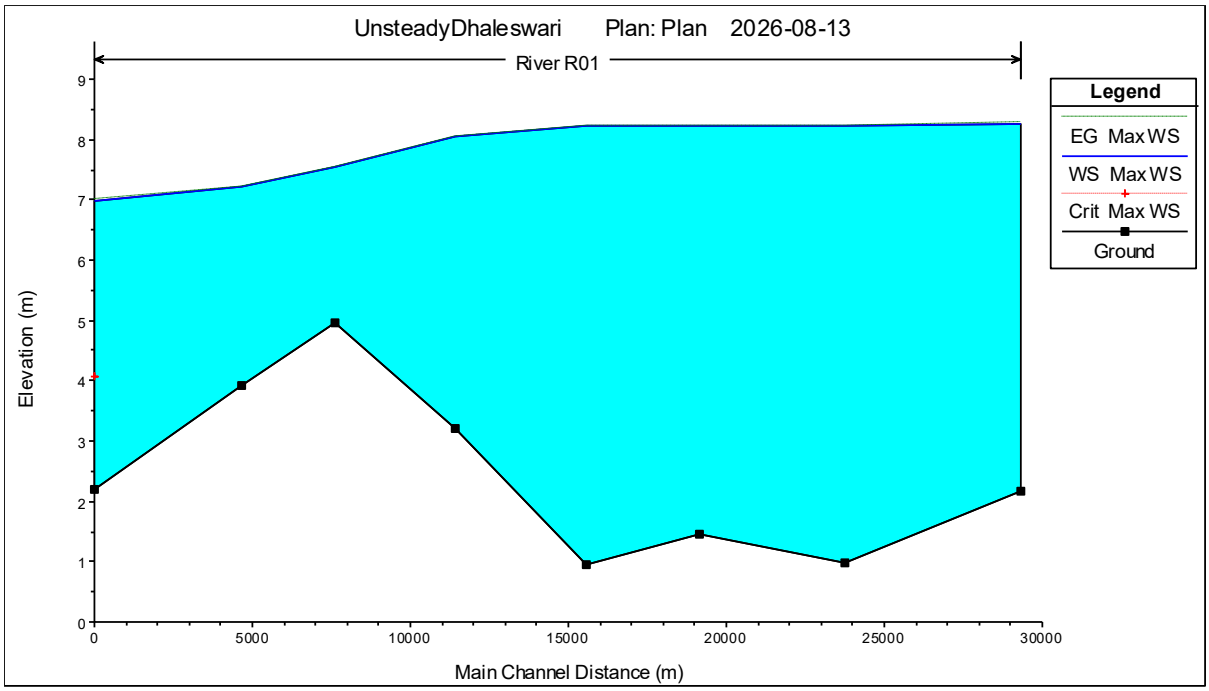
Experiment Name: Unsteady Flow Simulation of the Dhaleswari River

2. Longitudinal Profile of Water Surface Elevation



3. Cross Sectional Views

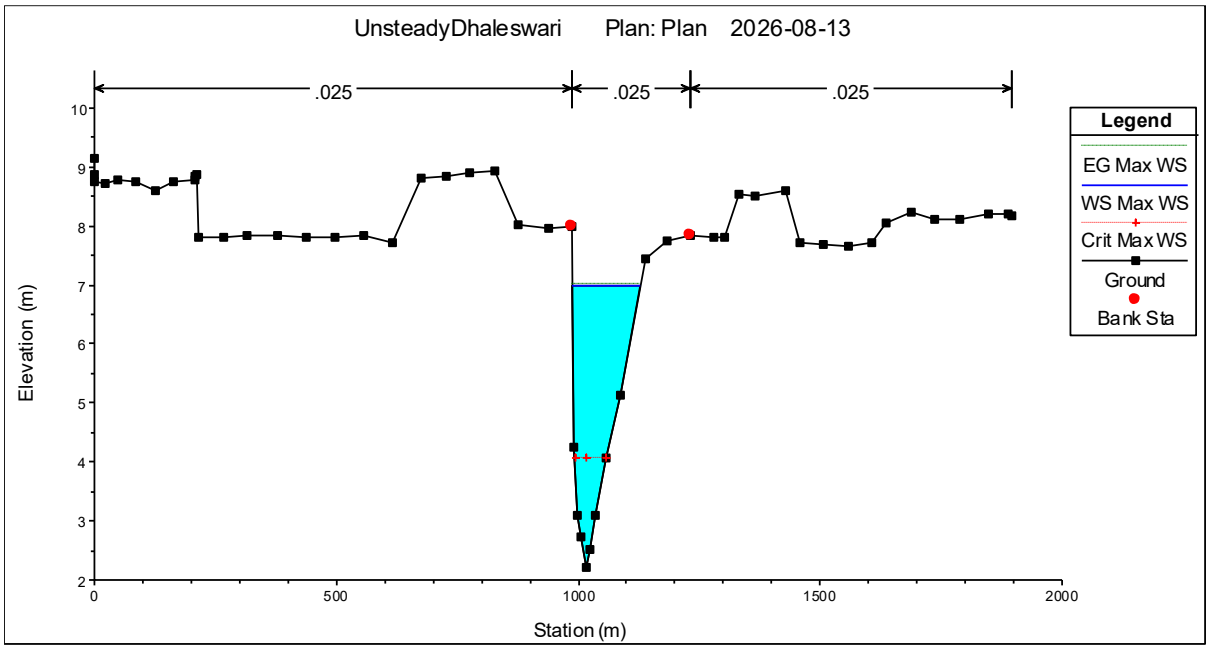


Figure 1 Cross section of station 1.

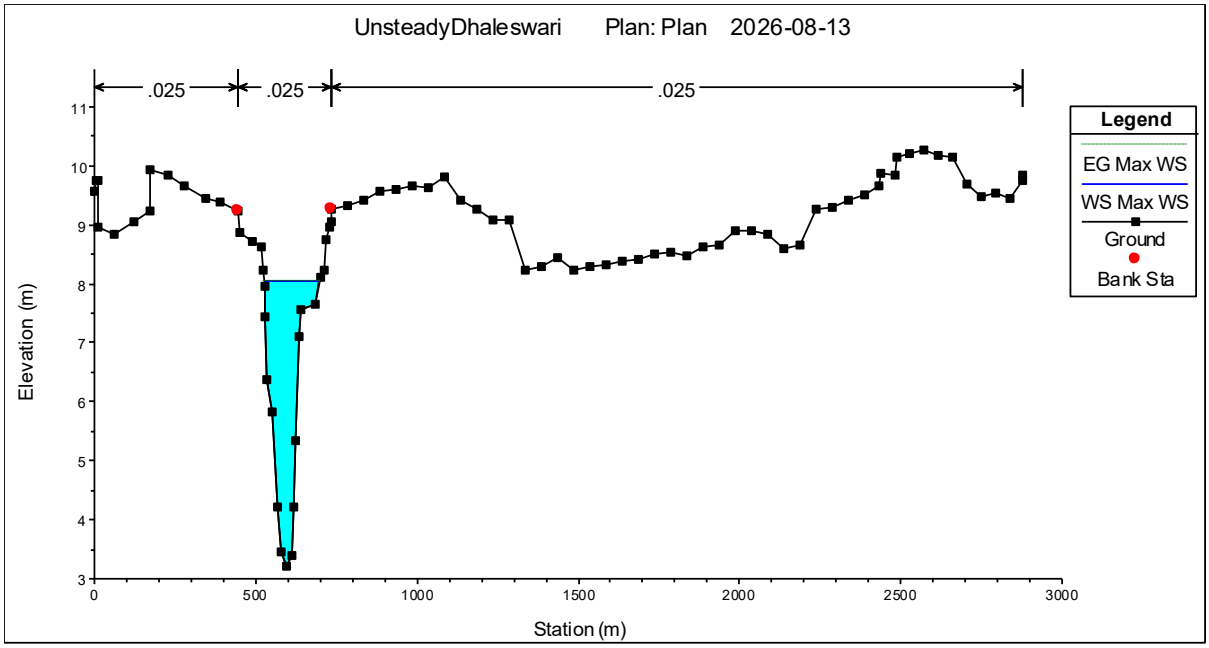


Figure 2 Cross section of station 4.

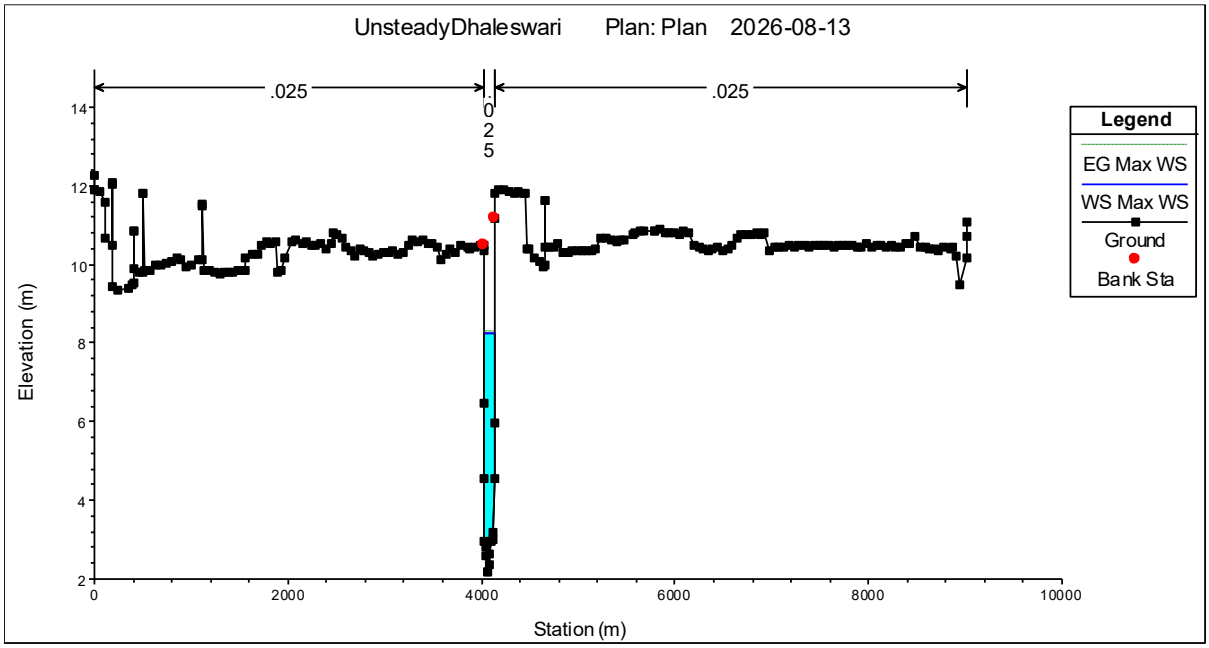


Figure 3 Cross section of station 8.

4. What do You Mean by Steady and Unsteady Flow?

Steady flow: Flow conditions where hydraulic parameters (such as discharge, depth, and velocity) at a specific location remain constant with respect to time.

That is,

$$\frac{\partial Q}{\partial t} = 0, \frac{\partial \mathrm{y}}{\partial t} = 0$$

Unsteady flow: Flow conditions where hydraulic parameters at a specific location change over time.

That is,

$$\frac{\partial Q}{\partial t} \neq 0, \frac{\partial y}{\partial t} \neq 0$$

5. When Should You Use Unsteady Flow Simulation? Describe.

Unsteady flow simulation is required whenever flow rates, stage elevations, or boundary conditions vary dynamically over time. Key applications:

- **Flood wave routing:** Modeling how a storm or flood hydrograph moves downstream through a channel over time.
- **Tidal influence & estuaries:** Simulating coastal or tidal rivers (like downstream reaches in Bangladesh) where water levels reverse or fluctuate continuously with tides.
- **Dam Break or levee breaches:** Analyzing sudden structural failures where rapid, extreme variations in water volume and velocity occur.
- **Flow control operations:** Modeling dynamic hydraulic structures, such as opening/closing sluice gates, weir operations, or turning pumps on and off.
- **Flat slope & backwater loops:** Channels with very mild bed slopes where backwater effects create a loop rating curve (hysteresis), meaning discharge depends on both depth and the rate of change of depth.