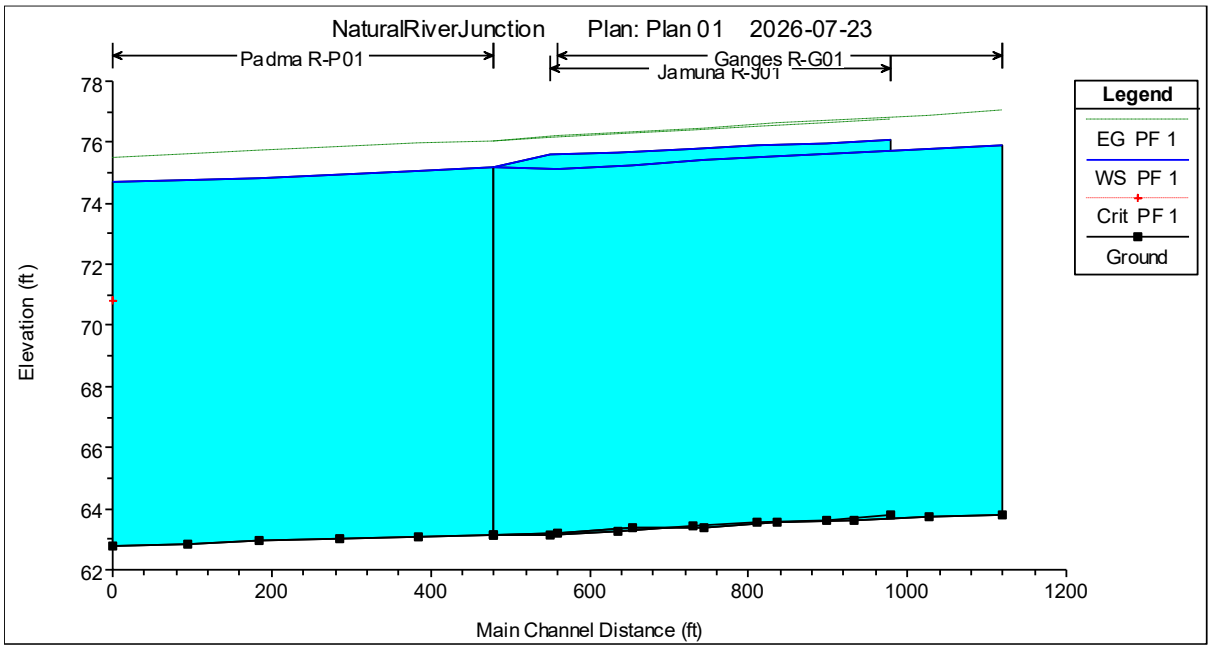
Experiment Name: Steady Flow Modeling – Modelling Water Surface Profiles for Natural Rivers with a Junction

1. Longitudinal profile of water surface elevation



2. What is calibration and validation?

Calibration: The process of tuning model parameters (such as Manning's n) using a specific set of observed data to make the model's outputs match real-world conditions.

Validation: The subsequent verification of the calibrated model's accuracy using an entirely separate set of observed data to ensure its consistency.

3. What do you mean by confluence and bifurcation. Explain with figures.

Confluence: A junction where two or more flowing rivers meet at a single point to form a single downstream channel.

Bifurcation: A junction where a single river divides or splits into two or more separate downstream channels.



Figure 1 Confluence of Ganges and Jamuna



Figure 2 Bifurcation of Ganges and Gorai River

4. What is a junction? How a junction is handled in HEC-RAS?

Junction: A junction is a node within a river network where two or more reaches connect, representing either a confluence or a bifurcation.

How HEC-RAS handles a junction:

In HEC-RAS, a junction is handled using two conditions:

1. Continuity equation: For confluence, the equation becomes,

   $$Q_1 + Q_2 = Q_3$$

   where Q_1 and Q_2 are upstream inflows, and Q_3 is the total downstream outflow. For bifurcation, the equation becomes,

   $$Q_1 = Q_2 + Q_3$$

   where Q_1 is the upstream inflow, and Q_2 and Q_3 are the downstream outflows.

2. Energy or momentum condition, where the water surface elevation (or energy level) is assumed to be equal at the junction for all connected reaches.