

Addendum-1 (This addendum forms an integral part of the tender documents)

EIA/EMP for Channel Stabilization Works (CSW) on 07 locations on NW-1

1. The development of eco-friendly channel stabilization measures for sustainable fairway development in river Ganga (National Waterway-1) between Varanasi - Patna stretch was done with the objective to stabilize lean season navigation channel using innovative river training measures
2. The seven sites located in the reach of Mathara (D/s of Zamania) (Ch 1200 km) to Haldi site (Ch 1078km) of National Waterway-1 are given below:

S. No.	Location	Chainage	Coordinates	
			Latitude	Longitude
1.	Mathara (d/s Zamania)	Ch.1200km.	25°25'38.84" N	83°32'46.91" E
2.	Chhatarpur	Ch.1197km.	25°26'42.33" N	83°31'37.37" E
3.	Raghunathpur	Ch.1194km.	25°30'27.11" N	83°31'42.23" E
4.	Khalishpur to Ghazipur	Ch.1173-1171km	25°35'37.07" N	83°37'33.44" E
5.	Arjunpur near Buxar	Ch.1120km.	25°36'14.03" N	84°00'02.07" E
6.	Srirampur P.B. site	Ch.1183km.	25°42'56.81" N	84°13'16.35" E
7.	Haldi site	Ch.1078km.	25°42'03.29" N	84°14'35.62" E

3. The following channel stabilization measures shall be implemented on the above 07 sites:
 - Submerged Vanes – for effecting tactical sediment redistribution in the channel harnessing Stream Energy.
 - Balli Screen – to weaken erosive stream currents for inducing desired siltation.
 - Vetiver Grass – to consolidate and stabilize sediment bars / shoals & bankline.
4. IIT Indore carried out the Environment Impact Assessment (EIA) Study was conducted for the Channel Stabilization Works at above 07 locations on NW-1. The Environment friendly material i.e., Bamboo, Balli and Vetiver Grass shall be used in the above Channel Stabilization measures.
5. In single vane, as per study, the influence length in longitudinal direction i.e., River Flow Direction will be 20H and in the transverse flow direction will be 3H, where H is the height of the vane. Accordingly, the vanes can affect the river bed up to

60m from the location of vanes in the longitudinal direction of flow and 9m on either side of the location of vanes in the transverse direction of flow.

6. The Environment Impact Assessment Study of Channel Stabilization Works yielded the following:

- The contribution of vane volume in the total control volume within the vane influence area is around 0.02 to 0.05% which is very less to impact the water slope in the control volume.
- The change in channel energy slope is of the order of 10^{-8} to 10^{-10} which is almost insignificant to allow substantial changes in the channel pattern of the study area.
- The critical slope for the channel is of the order of 0.008 according to critical slope formula given by Leopold and Wolman (1957) while the existing bed slope in the reach is of the order of 0.0002 (1 in 5000), which is far below from critical value. This indicates that small channel adjustments shall not lead to large change in channel pattern.
- The channel's depth-width ratio is ranging from 0.002 to 0.007, which is small enough to play a major role in the redistribution of sediment.

7. The major highlights of the direct and indirect impacts of the interventions on baseline parameters are as mentioned below:

- There shall be readjustments in river bed along the cross-section where vanes are installed which shall be of the order of 1m. This shall also be confirmed during performance evaluation of the vanes at the 7 sites. Whereas there shall be insignificant change in the river bed profile along the flow of the river
- Further, there is a possibility that the aquatic flora and fauna shall be supported due to increase in flow in the main channel.
- The increase in flow depth in the main channel can also provide suitable areas for fish spawning and breeding which can support the livelihood measures of the river dependent communities.

8. Further, if requested, a copy of the EIA Study report for Channel Stabilization Works on above 07 locations shall be shared for reference.

Clause for Environment Monitoring and Management in Channel Stabilization works in NW-1:

- i. The client shall undertake environment monitoring through an independent agency during the execution of the proposed works and the Contractor shall allow any/all such monitoring activities of the possible environmental impacts.
- ii. If there are any potential environmental concerns based on the findings of the environment monitoring agency, the contractor shall undertake environment mitigation measures as recommended by the environment monitoring agency.
- iii. Additional cost on mitigation measures, if any shall be additionally paid to the contractor

Indirect Impacts due to Channel Stabilization Works							
Location →	Mathara	Chhatarpur	Raghunathpur	Khalishpur to Ghazipur	Arjunpur near Buxar	Srirampur P.B. site	Haldi site
Parameter ↓							
Impact on Environment and Ecology	<ul style="list-style-type: none"> • No negative impacts • Potential of positive impacts 	<ul style="list-style-type: none"> • No negative impacts • Potential of positive impacts 	<ul style="list-style-type: none"> • No negative impacts • Potential of positive impacts 	<ul style="list-style-type: none"> • No negative impacts • Potential of positive impacts 	<ul style="list-style-type: none"> • No negative impacts • Potential of positive impacts 	<ul style="list-style-type: none"> • No negative impacts • Potential of positive impacts 	<ul style="list-style-type: none"> • No negative impacts • Potential of positive impacts
Impact on Population and Livelihood	<ul style="list-style-type: none"> • No negative impacts • Potential of positive impacts 	<ul style="list-style-type: none"> • No negative impacts • Potential of positive impacts 	<ul style="list-style-type: none"> • No negative impacts • Potential of positive impacts 	<ul style="list-style-type: none"> • No negative impacts • Potential of positive impacts 	<ul style="list-style-type: none"> • No negative impacts • Potential of positive impacts 	<ul style="list-style-type: none"> • No negative impacts • Potential of positive impacts 	<ul style="list-style-type: none"> • No negative impacts • Potential of positive impacts
Impact on Other Important Installations	No Impact	No Impact	No Impact	No Impact	No Impact, but care to be taken during installation near the power transmission towers	No Impact	No Impact
Mitigation Plans for Channel Stabilization Works							
Location →	Mathara	Chhatarpur	Raghunathpur	Khalishpur to Ghazipur	Arjunpur near Buxar	Srirampur P.B. site	Haldi site
Parameter ↓							

