

**BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI
Execution Application No. 45/2024
In
Original Application No. 498/2015**

IN THE MATTER OF:

GANESH SINGH PANCHAL

...PETITIONER

VERSUS

STATE OF UTTARAKHAND & ORS

...RESPONDENTS

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PLACE – NEW DELHI

DATE - 14.04.2025

**BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI
Execution Application No. 45/2024
In
Original Application No. 498/2015**

IN THE MATTER OF:

GANESH SINGH PANCHAL

...PETITIONER

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STATE OF UTTARAKHAND & ORS

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**COMPLIANCE AFFIDAVIT PURSUANT TO THE ORDER
DATED 20.02.2025 ON BEHALF OF THE RESPONDENT NO.4
(PARVATIYA POWER PLANT LTD, HYDRO ELECTRIC POWER
PLANT)**

MOST RESPECTFULLY SHOWETH:

1. That the present Compliance Affidavit is being filed on behalf of the Respondent No.4 (Parvatiya Power Plant Ltd, Hydro Electric Power plant) pursuant to the order dated 20.02.2025 passed by this Hon'ble Tribunal in the captioned matter.
2. That this Hon'ble Tribunal *vide* its order dated 20.02.2025 in the captioned matter granted liberty to the Respondent No.4 to instal the Water Discharge Measurement Device in 45 days. That the relevant paras of the order dated 20.02.2025 passed by this Hon'ble Tribunal is reproduced herein below for ready reference:

“9. Learned counsel for Respondent No. 4 has submitted that respondent number 4 requires 45 days' time for installation of the Discharge Measurement Devices.

10. Respondent No. 4 is granted 45 days' time for installation of the Discharge Measurement Devices”.

3. That the in compliance of the order dated 20.02.2025 passed by this Hon'ble Tribunal in the captioned matter, the Respondent No.4 herein after consultation with the experts got constructed the Sharp Crested Rectangular Weir Design to measure the minimum flow of 15-20% of the average lean season flow in the river. That the Sharp Crested Rectangular Weir Design (Water Flow Discharge Measurement) measures the flow of water being released from the intake of project in question. That a report has been prepared on the Weir Design by an expert institute i.e., Civil Engineering Department Sustainability Cluster, UPES with respect to Parvatiya Power Plant Ltd/ Respondent No.4 herein.

A copy of the report on the Weir Design prepared by the Civil Engineering Department Sustainability Cluster, UPES with respect to Parvatiya Power Plant Ltd is annexed herewith and marked as **ANNEXURE R-1**.

A copy of the Photographs depicting the installed and operational Water Flow Discharge Measurement is annexed herewith and marked as **ANNEXURE R-2 (Colly)**.

4. That it is further submitted that the Respondent No.4 in complete compliance of this Hon'ble Tribunal order dated 20.02.2025, the Flow Discharge Measurement Devices was duly installed on 30.03.2025 and became operational on 02.04.2025. Thereafter, the it was duly informed to the State Authorities qua the said compliance and pursuant to which inspection of project in question was carried out by the State Authorities on 04.04.2024. Hence, the

said compliance of the order has been made within the 45 days from the date of passing the order.

5. That the supporting Affidavit has been annexed along with this Additional Affidavit.

FILED BY

THROUGH



**SAURABH RAJPAL & AKSHAT AGARWAL
(ADVOCATE FOR THE RESPONDENT NO.4)**

OFFICE:-D-206, 2ND FLOOR,

LAJPAT NAGAR I,

NEW DELHI-110024

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PLACE – NEW DELHI

DATE - 14.04.2025

BEFORE THE NATIONAL GREEN TRIBUNAL PRINCIPAL BENCH
NEW DELHI
E.A NO. 45 OF 2024
IN
ORIGINAL APPLICATION NO. 498/2015

IN THE MATTER OF:
GANESH SINGH PANCHAL

...APPLICANT

VERSUS

STATE OF UTTARAKHAND & ORS

...RESPONDENTS

AFFIDAVIT

I, Rajesh Upadhyay, S/o Harish Chandra Upadhyay, Aged About 35 Years, R/o. H. No. 05 Waja Dewaldhar Bageshwar, Uttarakhand Authorized representative of the Parvatiya Power LIT. do hereby solemnly affirm and declare as under:

1. That I am the Respondent No./ 4 in the instant Original Application and I am well conversant with the facts and circumstances of the case and thus competent to swear this affidavit.
2. That the accompanying compliance Affidavit have been drafted under my instructions, which I have read and understood. I further state that the averments made therein are true and correct to my knowledge and belief.
3. That the Annexures filed along with the reply are true copy of their respective originals.

I identify the person who has signed/ Executed this document in my presence.

Rajesh Upadhyay

DEPONENT

Project Manager
Parvatiya Power Ltd.
Loharkhet Hydro Electric Power Plant
Loharkhet Distt.-Bageshwar
Uttarakhand

15 APR 2025

VERIFICATION

Verified at Uttarakhand, on this day of April 2025 that the contents of my aforesaid affidavit are true and correct to my knowledge and belief. No part of it is false nor anything material has been concealed therefrom.

15 APR 2025

Rajesh Upadhyay

DEPONENT

Parvatiya Power Ltd.
Loharkhet Hydro Electric Power Plant
Loharkhet Distt.-Bageshwar
Uttarakhand

NOTARY REGISTER

Page No. 07
Sl. No. 12781
R. No. 10
Date 15/04/2025

ATTESTED

NOTARY PUBLIC
DELHI (INDIA)





Report on

WEIR DESIGN

*Name of Site: Loharkhet Hydro Electric Power Plant, Loharkhet, Distt. Bageshwar,
Uttarakhand*

Submitted to:
Parvatiya Power Ltd.

Submitted by:
Civil Engineering Department
Sustainability Cluster, UPES
Energy Acres, P.O. Bidholi Via Prem Nagar
Dehradun 248007 (Uttarakhand) India
Ph.: +91.135.2102690,91, 2776093, 95 Fax: +91.135.2776094
Web: www.upes.ac.in

SUMMARY REPORT ON THE WEIR DESIGN

A. Project information

1. **Project Title:** Design of a weir for flow estimation for lean flow (0.05 to 0.30 m³/s).
2. **Principal Investigator:** Dr. Kuldeep Swarnkar, Assistant Professor, Department of Civil Engineering, Sustainability Cluster, School of Advanced Engineering, UPES
3. **Co-Principal Investigator:** Dr. Rahul Silori, Associate Professor, Department of Civil Engineering, Sustainability Cluster, School of Advanced Engineering, UPES
4. **PI and Co-PI's Institution:** UPES, Bidholi Campus, Dehradun-248007
5. **Date of Commencement:** 27th March 2025
6. **Approved Date of Completion:** 30th March 2025 (On extremely urgent basis)
7. **Objective for the Project:**

The objective of the project is to design a weir for lean flow that can estimate a flow from 0.05 m³/s to 0.30 m³/s.

The data provided is as follows:

Channel Geometry Data:

Lateral profile of the channel = 23 m RCC Channel

Bed elevation data = 0.4 m

Hydrological Data:

The minimum flow rate of river during lean season flow = 0.05 m³/s

Maximum flow rate of river during lean season flow = 0.30 m³/s

Water/bed Levels: No seasonal variations at bed level.

Geotechnical Data:

The channel is made up of RCC.

Soil Properties: Soil type, bearing capacity, and permeability = NA

Foundation Conditions: Depth to bedrock = NA

Environmental Data:

Sediment Transport: Sediment load = NA

Particle size distribution = 0.002 mm to 20 mm

Ecological Impact: Potential effects due to construction of weir on local flora and fauna, including fish migration= No ill effects to ecological system.

B. Project Outcomes

1. Brief description of the project's requirements:

The project aims to construct a weir for flow measurement during lean flow. Mainly there are three types of weirs namely, Broad crested, Ogee crested, and Sharp crested. Based on the channel's conditions and requirements, we recommend having contracted sharp crested rectangular weir that can have portable weir plate. The weir can be dismantled during storm weather flow, and it will not cause an obstruction in the flow. A sharp-crested weir consists of a vertical flat plate with a sharp edge at the top (the crest), placed in an open channel so that the liquid must flow over the crest to drop into the pool below the weir. In sharp crested weirs we have mainly three types: Rectangular, V-notch, and trapezoidal. For this case rectangular weir will be suitable as per the discharge range. Again, as the width of the reach is 23 m so it is not feasible to have a rectangular sharp crest weir throughout the width of the reach. Hence, concluding all requirements and conditions contracted sharp crested rectangular weir will be best suitable. A cross-section and projection of the required weir is shown in Figure 1. Also, the weir can be designed in a way that it can be dismantled during storm weather flow and for this purpose, it should have portable weir plate.

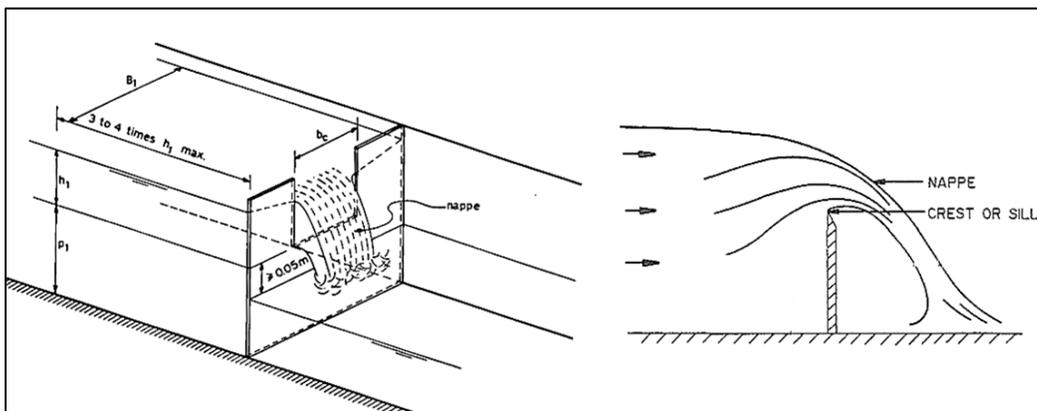


Figure 1: A contracted sharp crested rectangular weir and its side view.

Illustrations in Figure 1 are summarized here:

h_1 : Depth of the flow over the crest of the weir (in upstream).

p_1 : Depth of water from channel bed to crest of the weir (in upstream).

B_1 : Width of the channel, and b_c : Width of the crest.

Some of the basic terminology used in connection with sharp-crested weirs are:

Drawdown occurs upstream of the weir plate due to the acceleration of the water as it approaches the weir. For that the depth of the flow should be measured upstream (3-4 times of the h_1). The term Nappe is used for the sheet of water flowing over the weir. Free flow is the flow condition over a sharp-crested weir when there is free access to air under the nappe.

2. Design of the weir

When we design a weir, it requires several data sets such as:

- (i) Detailed topographic survey
- (ii) Collection of hydrological, sediment and evaporation data
- (iii) Surface and sub surface investigation including laboratory tests
- (iv) Diversion requirements
- (v) Construction material
- (vi) Communication system
- (vii) Other miscellaneous studies.

For these data sets detailed investigations need to be carried out and based on that basic components can be designed such as: upstream protection arrangement, type and design of crest, stilling basin, downstream protection arrangement, divide walls, fish pass, under sluices, abutments, guide bunds etc.

In the present case, an RCC structure is already there (Figure 2) and it is required to have a small weir just for measurement of the lean flow ranging from 0.05 to 0.30 m^3/s . For this design, based on the available data it is suggested that a contracted sharp crested rectangular weir can function well. Also, it will be feasible to have portable weir plates in this case. In storm weather, the weir plates can be removed and stored to be used for the lean flow whenever it occurs. In this way neither will the weir be affecting the flow and nor will it be getting damaged.



Figure 2: A photograph from site.

As shown in the photograph the slope of the channel is sufficient to retard depth of flow in downstream. Since water won't be accumulating downstream during the lean flow, the height of the crest can be taken as 0.15 m from the bed level. Now, the relationship between the flow and depth of the water over the crest of the contracted sharp crested rectangular weir can be defined by the Kindsvater-Carter equation as follows:

$$Q = \left[C_1 \left(\frac{h_1}{p_1} \right) + C_2 \right] (b_c - 0.003)(h_1 + k_b)^{1.5} \quad (\text{Equation 1})$$

Where, "Q" is the flow (m^3/s); "C₁ and C₂" are site specific coefficients; "h₁" is the depth of the flow over the crest of the weir (to be measured 3-4 times of the h_{max} in upstream) in meters; "p₁" is the depth of water from channel bed to crest of the weir (in upstream) in meters; "b_c" is the width of the crest in meters; and "k_b" value is also site-specific and for reference it can be used from the Figure 3 shown below in meters.

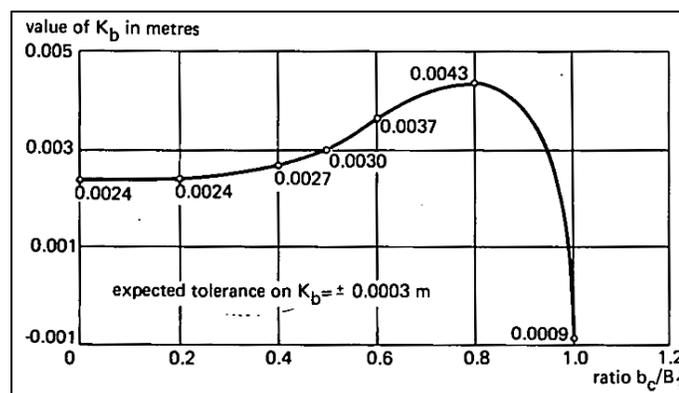


Figure 3: Values of k_b , as a function of b/B .

As the equation is too specific and difficult to apply on site so it can be used in a simplified way based on some conditions. The following equation provides simplified calculations for discharge:

$$Q = 1.84(b_c - 0.2h_1)(h_1^{1.5}) \quad \text{(Equation 2)}$$

Here, the nomenclature is the same as for Equation 1 and the minimum criteria for applying this equation is as follows:

1. $(B_1 - b_c) \geq 4h_1$
2. $(h_1/b_c) \leq 0.5$
3. $0.04 \text{ m} \leq h_1 < 0.14 \text{ m}$
4. $b_c \geq 0.30 \text{ m}$

Further simplifying the Equation 1 by using $b_c = 3\text{m}$,

$$Q = 1.84(3 - 0.2h_1)(h_1^{1.5}) \quad \text{(Equation 3)}$$

Now, on the basis of Equation 3 and using the observed value of h_1 , the discharge can be calculated at the site. Note that the value of h_1 is in meters and the discharge Q is in m^3/s .

Dimensions for the fully contracted sharp crested rectangular weir:

Carrying out computations using discharge equations, the appropriate dimensions for the weir are as follows:

- Width of the channel (B_1) = 23 meters (given)
- Width of the weir opening (b_c) = **3 meters**
- Depth of the water from channel bed to weir crest (p_1) = 0.15 meters
- $h_{\text{max}} = 0.14 \text{ meters (for flow)} + 0.01 \text{ meters of free board}$
- Total height of the weir plate from RCC channel bed = **0.30 meters**
- Width of the channel to be obstructed = $23 - 3 = 20 \text{ meters}$
- For obstruction of the flow, an RCC wall of width 0.30 m and height 0.30 m is already constructed at the site.
- Dimensions of the plate for weir opening = **3 m x 0.15 m**
- Thickness of the weir plate = 8 mm

The drawings for contracted sharp crest rectangular weir

1. Weir plate:

- The weir plate can be 3.5 m x 0.35 m.
- It can be fixed in mortar from bottom after inserting it, 5 cm below bed. On both sides it can be supported by RCC, because of that width of 0.2 meters is considered on both sides.
- In between RCC wall and nappe remaining 0.05 m width on both sides of the weir plate is required to act as a vent to have free flow condition.
- The opening of the weir will be 3 m x 0.15 m.
- The thickness of the weir plate can be 8 mm.
- The weir plate should be attached to the RCC wall in a manner that there should be no leakages of the water.
- The weir plate should be aligned with the upstream surface of the RCC wall.
- A drawing of weir plate as per these dimensions is shown below:

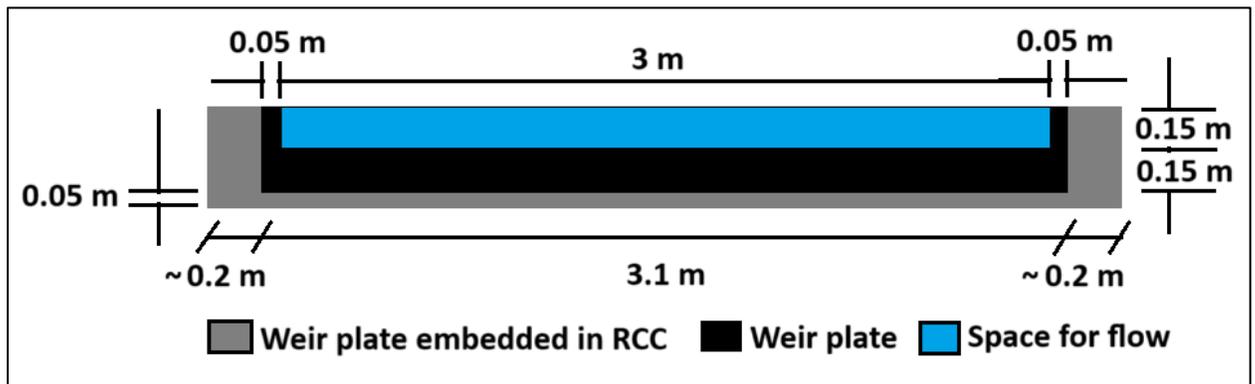


Figure 4: Drawing of the weir plate.

2. Sharp edges of the weir plate:

- The weir plate has a thickness of 8 mm.
- To have a free flow condition of the flow over the weir, the weir plate should have sharp crest and sides for opening edges.
- The opening of the weir should have a thickness of 2 mm in left, right, and bottom (it will be required for smooth free flow).

- Both sides and bottom of the opening should be perpendicular to the direction of the flow.
- The crest of the weir should be aligned parallel to the water level. That means it should not have any tilt.
- The drawing for the sharp crest and sides is shown in Figure 5.

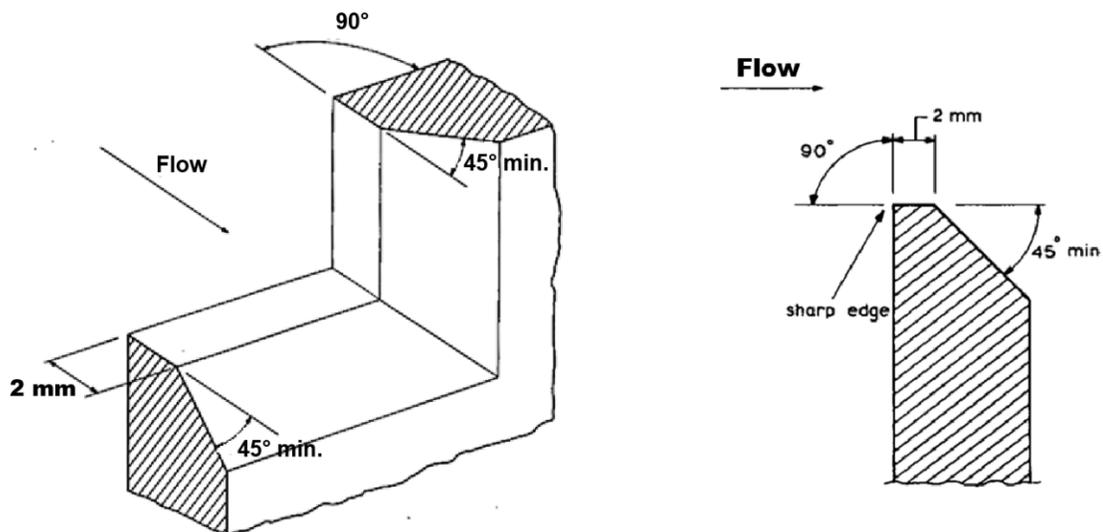


Figure 5: Flow-wise enlarged view of crest and side corner with cross-section over a sharp-crested (thin-plate) weir.

3. Arrangement of weir plate to the RCC wall:

- All plates should be arranged together with supports using nuts and bolts of 15 mm diameter.
- All supports should be attached to the RCC channel bed using 15 mm bolts of appropriate length (as per the strength of the bed).
- Side supports on the left and right should also have bolts fixed inside walls.
- All the joints should have a 5 mm rubber layer between plates and supports for water tightness.
- Once the structure has been deployed it will form a weir for discharge measurement in the range of 0.2 to 2 m³/s. The arrangement of the structure will look as shown in Figure 6.



Figure 6: A view of the weir once it gets deployed at the site.

- Also, note that the discharge will deviate in a narrow range based on the unrecognized site conditions.
- The discharge values from Equation 3 need to be cross checked with the actual discharge at the site.
- Once the weir is constructed the calibration of weir will take place and that will result in a final site-specific updated equation for the discharge measurement based on the height of the flow.
- Please reach out to us for calibration purpose after the construction work is completed.

S. S. S.
(True Copy)

ANNEXURE R-2





Shyama
(True Copy)

Advance Service in Ganesh Singh Panchal Vs. state of Uttarakhand EA No. 45/2024

1 message

Saurabh <saurabhrajpal.sc.aor@gmail.com>
To: ganeshsinghpanchal@gmail.com

Tue, Apr 15, 2025 at 6:10 PM

Respected Sir,

Kindly find attached herewith the Advance Service of compliance affidavit in Ganesh Singh Panchal Vs. State of Uttarakhand & ORS EA No. of 45 of 2024.

Thanks & Regards

Saurabh Rajpal
Advocate for the Respondent No. 4

 **Pushp Saini Additional Affidavit.pdf**
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