

SHANAG MIDDLE MICRO HYDEL ELECTRIC PROJECT

Proprietor- Mr Prakash Chand, VPO- Shanag,

Thesil- Manali, Distt-Kullu, H.P.

Ref No: SM/DFO-Kullu/1601202501

Date: 16-01-2025

To,

The Divisional Forest Officer, Kullu,
Distt- Kullu, H.P.

Subject:- Diversion of 0.1669 ha of forest land in favor Sh. Prakash Chand, VPO-Shanag, Tehsil-Manali, District Kullu, for the construction of Shanag Middle HEP(100 KW), within the jurisdiction of Kullu Forest Division, Distt. Kullu Himachal Pradesh. (Online Proposal No. FP/HP/HYD/123608/2020)-reg.

Sir,

This is in reference to your online query date 09-12-2024, it is submitted that that as per the hydrology of the stream, minimum average flow during lean season is 0.06 cumecs.

The hydrological data of the stream is a part of Detailed Project Report (attached as Annexure-I) and based on information provided in the DPR, the Technical Concurrence has been accorded by Directorate of Energy, Govt of Himachal Pradesh on dated 18-10-2021 and thus it is clarified that the data has been reviewed and validated by the competent authority i.e. Directorate of Energy based on which the technical concurrence was accorded. (Attached as Annexure-II)

The Point No- 2 (xxii) of the technical Concurrence for Shanag Middle Mini Hydro Electric Project, 0.1 MW (100KW) is related to release of 15% E-flow as per the DPR submitted and shall be complied with after the commission of the project. The calculations of E- Flow is attached as Annexure-III.

The 15% e- flow is considered to be .06 cumecs and this e-flow shall be ensured in the stream at all times of the year through a calibrated pipe of 100mm diameter from the diversion weir into the stream.

Yours Sincerely,



Authorized Signatory

For Shanag Middle SHEP

CHAPTER 6

HYDROLOGY

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6.1 GENERAL

This Chapter deals with the discharge characteristics of the basin and the methodology applied for planning and design of the project. For this, the hydrological investigation and studies have been carried out for Shanag Middle Micro Hydel Project. The objectives of the hydrological study are to calculate the availability of water at diversion weir site for power generation for next 40 years and flood calculations for the safety of the project.

6.2 EFFECT OF PROJECT DEVELOPMENT ON HYDRAULIC REGIME

Shanag Middle Micro Hydel project is a run-of-river project and there is no major effect of the project development on the hydraulic regime.

6.3 HYDROLOGIC STUDIES

6.3.1 BASIN CHARACTERISTICS

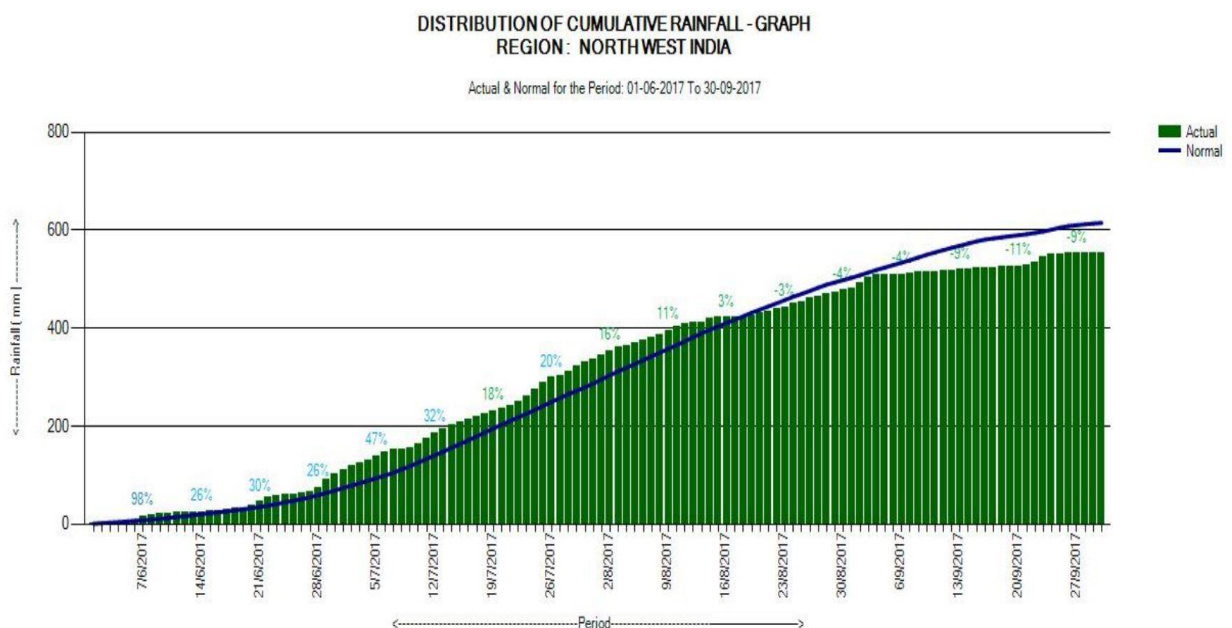
Halindi Stream River is tributary of Beas River. The stream has a gradual slope in its entire reach. Total catchment area of the project above weir comes out to be 12.50 Sq. KM. Catchments is rain and snow fed, so continuous discharge is available throughout the year. The discharge reduces in lean season from December to February.

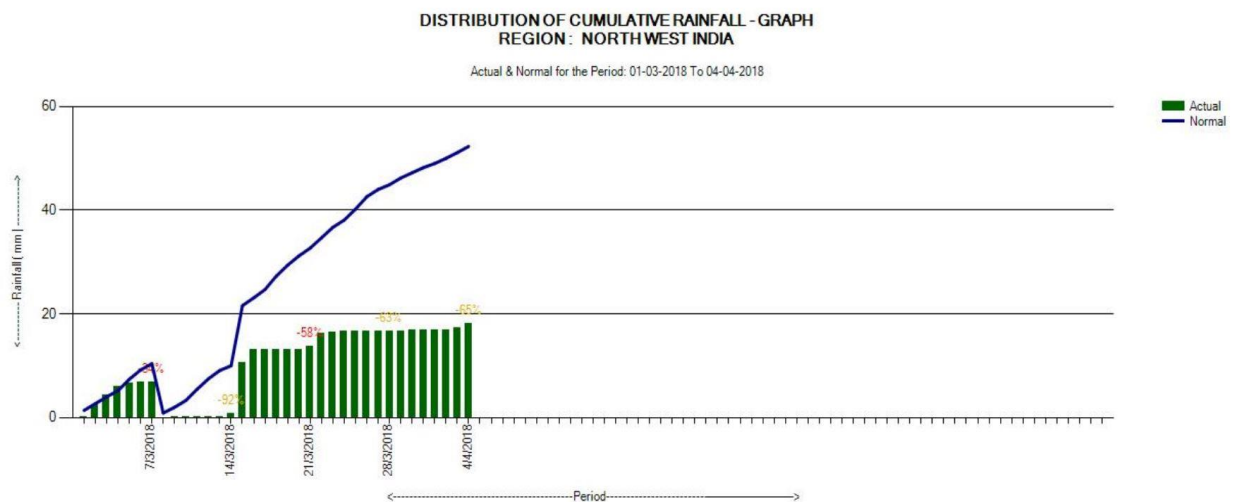
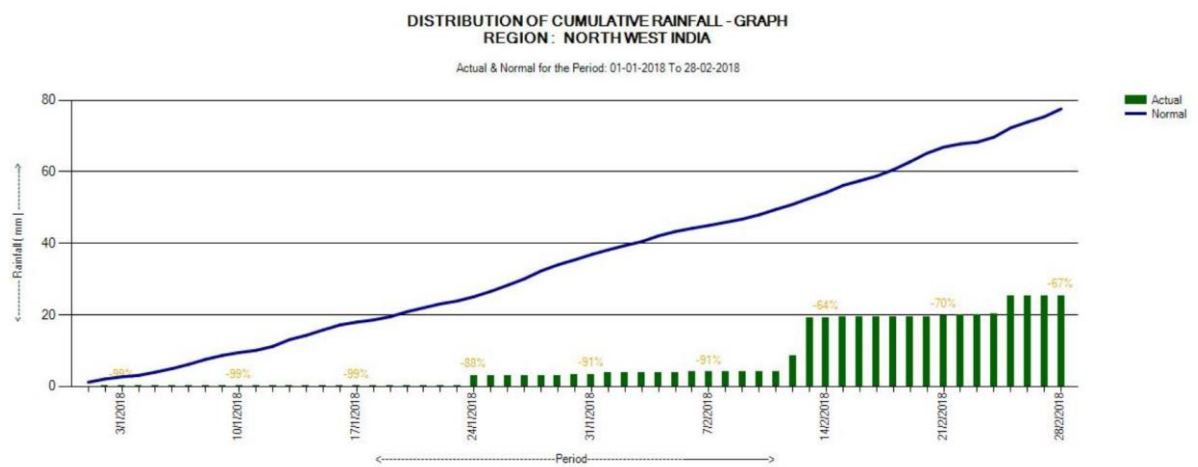
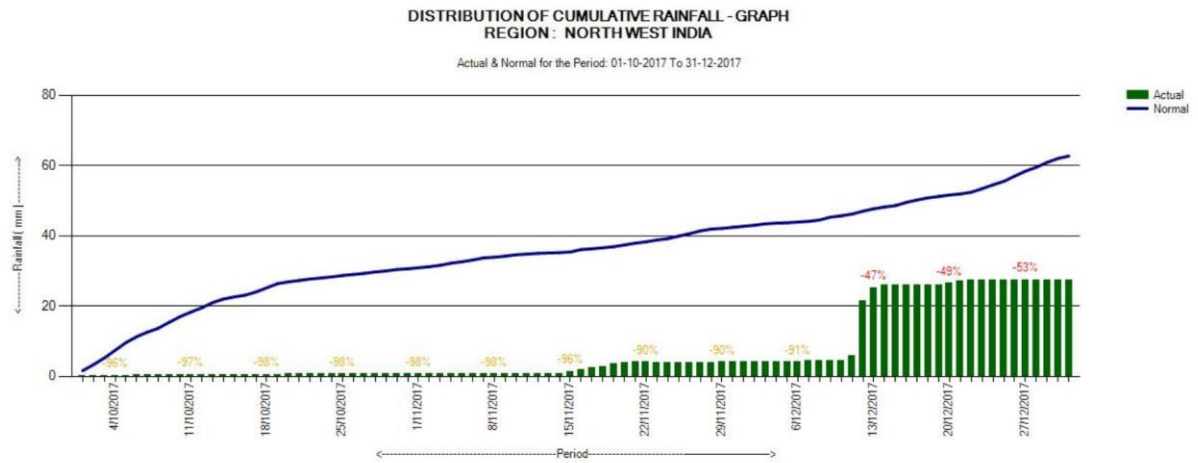
6.3.2 CATCHMENT CHARACTERISTICS

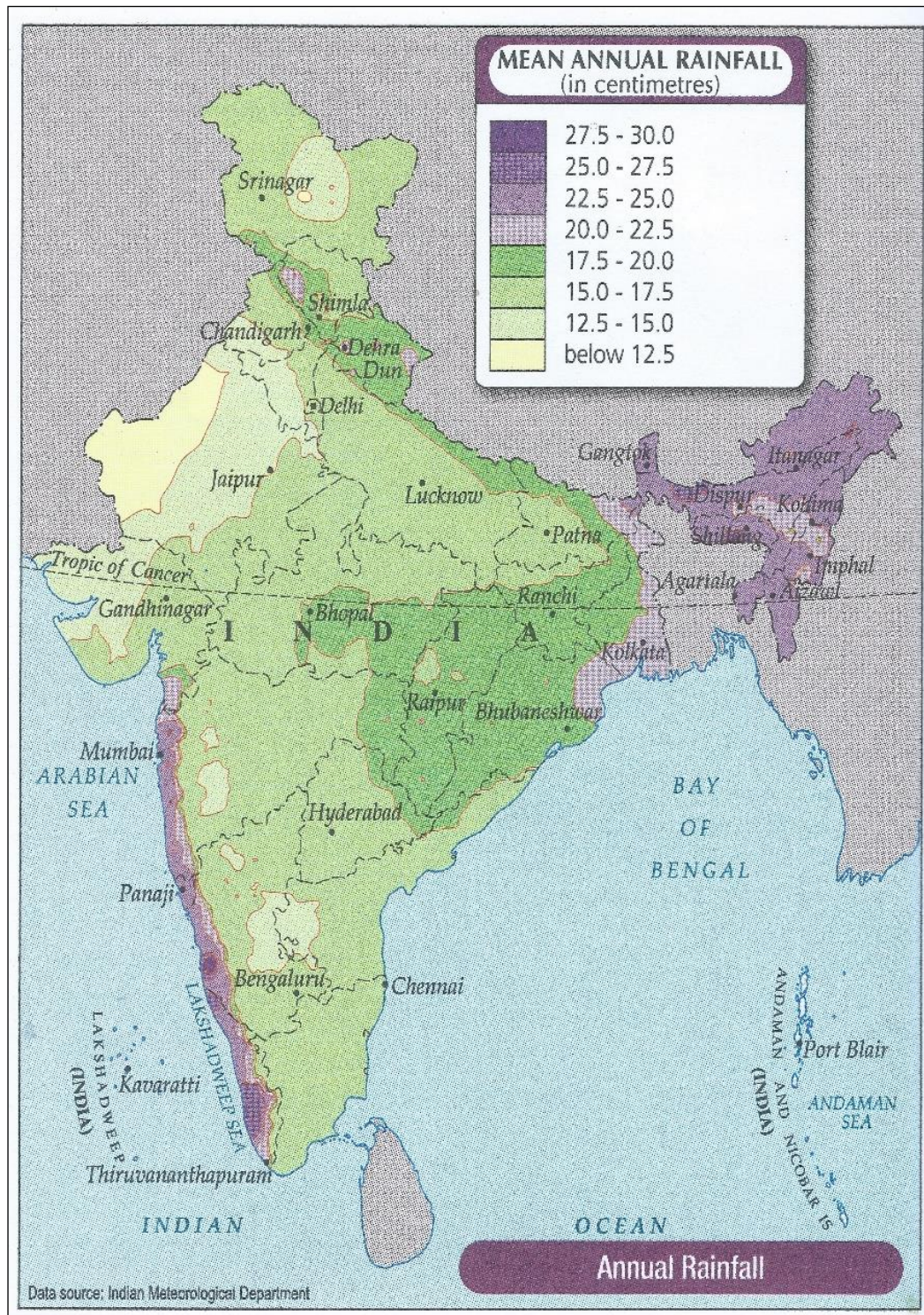
The stream is a perennial stream. It originates from the peaks having an elevation of EL 4200 m above Mean Sea Level (MSL). The catchment area for location above the proposed Diversion Weirs at EL. 2135 m is 12.50 Sq. km. It gives perennial flow in the stream throughout the year. There is less human habitation in the catchment above the project site. The catchment is covered with thick forests. The project area does not fall in any wildlife sanctuary and preserved forest. There is negligible seepage in catchment terrain and most part of the rain fall results in run-off in the stream.

6.3.3 RAINFALL

The project area is located near the high range, the heavy rain fed area in Himachal Pradesh. Substantial rainfall occurs during monsoon months of July to September. The winter precipitation occurs in the form of Snow and sub-soil water.







AVERAGE 10-DAILY DISCHARGE (CUMECs) OF SARWARI KHAD

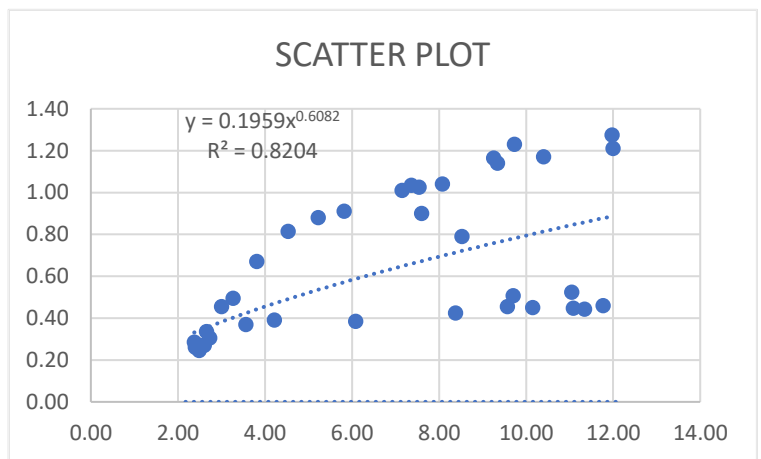
MONTH	PERIOD	1968	1969	1970	1971	1972	1973	1974	1975
JAN	I	2.68	2.64	2.78	1.88	2.46	3.01	1.88	1.82
	II	2.58	2.65	3.45	1.85	2.62	3.36	2.39	1.85
	III	3.18	3.50	3.51	2.25	3.08	3.46	2.59	1.97
FEB	I	3.07	4.26	3.28	2.08	3.70	2.69	3.08	2.16
	II	3.54	5.71	3.29	2.68	2.99	3.50	3.02	3.28
	III	6.05	6.59	3.86	3.15	2.92	5.63	3.24	3.59
MAR	I	9.40	9.40	4.85	3.37	4.94	7.81	4.53	4.83
	II	11.30	11.30	5.26	4.99	5.37	7.17	5.35	6.71
	III	10.59	10.59	6.10	6.23	7.30	7.20	5.89	9.84
APR	I	11.13	11.13	5.90	5.37	7.52	7.21	6.09	11.12
	II	15.62	15.62	7.30	5.43	8.81	8.28	6.11	11.36
	III	16.33	16.33	7.26	5.57	7.57	11.32	5.45	11.26
MAY	I	11.58	11.58	6.87	4.61	7.41	11.65	4.96	8.29
	II	13.28	13.28	5.61	4.46	7.23	11.24	5.14	9.79
	III	12.41	12.41	6.32	4.13	6.95	11.10	4.50	9.46
JUN	I	9.12	9.12	5.23	4.74	5.86	8.67	4.85	13.37
	II	7.35	7.35	4.53	5.44	5.17	7.69	4.87	12.77
	III	6.63	6.63	3.48	6.85	5.07	7.92	8.13	8.63
JUL	I	5.82	5.82	4.60	8.20	5.47	10.51	7.23	5.89
	II	6.03	6.03	4.77	8.20	9.66	9.66	7.48	10.71
	III	8.15	8.15	7.36	8.09	9.88	9.88	7.83	10.50
AUG	I	11.52	11.52	3.81	15.80	12.56	12.56	6.58	6.46
	II	14.03	14.03	28.71	14.10	6.44	14.10	6.44	6.08
	III	14.50	14.50	17.93	9.33	5.13	9.33	5.13	8.82
SEP	I	14.30	15.72	14.30	15.72	7.27	12.20	3.80	6.35
	II	13.62	11.29	13.62	11.29	6.51	8.65	3.55	6.13
	III	12.66	7.61	12.66	7.61	5.08	5.11	3.34	5.38
OCT	I	5.54	5.54	7.25	5.34	4.82	4.21	2.65	4.99
	II	6.23	6.23	5.87	4.56	4.41	3.29	2.32	4.31
	III	4.49	4.49	4.75	4.08	4.15	2.47	2.62	4.90
NOV	I	4.39	2.35	4.38	3.32	3.56	2.14	2.23	4.08
	II	3.69	2.35	3.67	3.17	3.53	1.84	2.34	3.20
	III	2.95	2.35	3.25	2.90	4.11	2.09	2.18	2.46
DEC	I	2.65	2.72	2.65	2.77	3.58	1.99	2.25	1.88
	II	2.47	3.07	2.48	2.78	3.53	1.84	2.31	1.77
	III	2.49	2.99	2.13	2.67	2.86	1.86	2.14	1.79

1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
1.80	1.81	1.77	1.82	2.38	2.25	2.00	3.88	1.71	1.69
1.86	1.81	1.99	1.83	1.59	2.17	3.01	3.64	1.69	1.54
2.35	2.27	2.07	2.20	2.09	2.44	3.32	4.05	1.60	1.74
2.23	1.74	2.03	2.80	2.34	2.73	3.24	4.04	1.66	2.01
4.37	2.05	2.80	2.95	2.42	3.43	4.96	6.87	1.74	2.08
4.46	1.95	2.90	3.10	3.31	4.36	5.42	7.17	1.97	2.72
10.03	2.25	4.70	3.65	4.72	5.56	9.14	9.76	3.30	4.01
12.12	3.85	10.40	3.90	4.62	6.70	9.79	10.74	3.92	3.76
16.44	3.81	8.83	3.68	6.18	12.55	15.46	15.85	5.48	5.08
16.52	3.81	8.20	3.55	8.61	12.20	19.33	16.46	5.91	5.26
16.28	3.11	10.77	3.25	9.46	13.13	19.23	16.91	5.38	7.68
19.20	4.03	9.87	3.24	9.73	13.16	23.21	21.23	5.22	6.64
16.96	5.88	10.90	3.95	8.56	12.95	19.69	20.99	4.98	5.95
16.46	5.47	9.67	4.10	7.46	13.46	20.25	22.16	4.53	5.98
14.09	4.80	9.11	4.15	5.90	12.89	19.66	20.89	4.34	5.01
13.37	4.49	8.97	4.56	5.67	8.49	17.46	16.85	3.72	4.31
12.77	4.43	8.36	5.02	5.34	6.66	17.22	12.52	3.45	3.54
8.63	4.61	8.06	5.68	5.96	7.21	14.61	10.93	3.06	3.42
7.01	6.06	9.25	6.02	5.84	6.59	12.66	11.22	3.18	3.03
8.80	11.14	14.67	11.12	16.39	7.46	11.00	10.07	3.89	9.52
14.70	11.67	12.59	11.58	11.24	14.25	12.51	11.19	4.87	10.89
20.85	16.11	17.48	16.01	14.61	10.11	12.96	10.67	5.39	8.01
16.79	9.27	19.56	9.15	9.47	7.84	20.60	10.39	4.77	9.02
13.69	5.70	13.65	5.65	7.07	4.34	13.51	10.35	5.20	9.83
11.33	6.25	12.22	6.21	5.70	3.19	11.31	10.36	6.08	7.11
9.01	9.20	11.19	9.15	5.51	3.02	9.67	7.69	4.34	5.82
5.47	6.32	10.86	6.22	4.91	2.76	7.99	6.49	3.14	5.49
4.78	5.38	9.65	5.28	4.53	2.44	7.42	4.86	2.49	5.83
4.10	4.07	9.02	4.05	4.33	2.15	7.16	3.94	2.17	6.32
3.50	3.73	8.12	3.73	4.15	1.57	7.59	3.27	1.98	4.87
3.17	2.61	9.67	2.59	4.05	3.02	6.82	2.53	1.85	3.70
2.79	2.47	7.51	2.46	3.76	2.08	6.74	2.28	1.54	2.37
2.59	2.29	7.38	2.30	3.53	1.71	6.27	2.16	1.41	2.03
2.30	2.15	4.73	2.18	3.04	1.36	5.19	1.94	1.45	1.79
2.08	1.88	4.03	1.89	2.54	1.30	4.55	1.89	1.80	1.59
1.90	2.35	3.51	2.34	2.59	1.28	4.13	1.84	1.69	2.17

1986	1987	1988	1989	1990	1991	Avg.
2.18	3.74	1.95	3.85	1.78	3.24	2.38
2.01	3.97	1.96	3.10	1.65	3.03	2.40
1.83	3.63	1.86	2.63	1.78	3.12	2.61
1.64	3.54	1.88	3.16	3.41	2.82	2.73
2.25	4.05	1.89	3.40	6.52	5.75	3.56
3.53	5.69	3.25	3.28	3.75	9.27	4.22
4.19	6.04	8.45	4.08	5.00	11.98	6.08
9.10	6.47	25.21	7.08	13.99	11.93	8.38
7.30	9.08	10.69	8.85	22.50	14.19	9.57
7.82	13.96	11.57	12.00	15.25	17.71	10.15
11.22	14.29	14.90	12.26	18.00	17.81	11.34
13.52	12.20	10.13	13.09	20.23	16.72	11.77
10.50	22.39	7.96	10.56	18.05	17.89	11.05
10.30	18.70	6.83	15.08	19.56	16.00	11.09
9.00	12.43	6.11	12.15	13.37	11.71	9.70
7.50	10.72	5.34	10.62	10.90	10.75	8.53
7.13	9.54	5.22	7.13	9.18	9.61	7.60
7.07	8.04	12.42	6.22	9.02	8.37	7.36
9.95	7.16	16.91	6.48	8.68	7.32	7.54
7.11	6.49	18.81	6.83	9.23	7.00	9.25
9.79	6.53	23.00	9.43	8.86	6.66	10.40
11.26	6.03	31.57	11.15	8.36	6.49	11.99
11.83	5.21	22.81	6.97	13.46	6.29	11.97
7.67	4.81	18.54	13.17	7.52	8.14	9.73
6.04	4.86	13.77	11.39	11.39	7.35	9.34
5.33	4.46	10.20	9.37	9.37	5.88	8.08
5.98	3.95	23.49	7.10	7.10	4.92	7.15
5.59	3.33	21.56	6.00	6.00	4.18	5.82
5.33	3.63	17.99	5.10	5.10	3.73	5.23
4.73	3.16	14.10	4.50	4.50	3.29	4.53
4.00	3.16	8.88	2.20	3.96	2.86	3.81
3.58	2.54	6.53	2.07	3.33	2.64	3.27
3.74	2.29	4.67	2.01	3.05	2.39	3.00
4.76	2.11	3.36	1.91	2.77	2.26	2.66
5.13	1.95	2.67	1.84	2.61	2.04	2.50
4.09	1.96	3.92	1.92	3.22	1.93	2.49

TEN DAILY DISCHARGE OF HALINDI NALLAH AT WEIR SITE OF SHANAG MIDDLE MHEP 100 K.W.						
S.NO	MONTH	PERIOD	2017	2018	2019	10 Daily Avg. Discharge Data
1	JAN	I		0.28	0.29	0.29
2		II		0.27	0.25	0.26
3		III		0.3	0.24	0.27
4	FEB	I		0.31	0.30	0.31
5		II		0.34	0.40	0.37
6		III		0.36	0.42	0.39
7	MAR	I		0.37	0.40	0.39
8		II		0.4	0.45	0.43
9		III		0.42	0.49	0.46
10	APR	I	0.55	0.35	0.45	0.45
11		II	0.59	0.35	0.39	0.44
12		III	0.62	0.36	0.40	0.46
13	MAY	I	0.61	0.51	0.45	0.52
14		II	0.65	0.39	0.30	0.45
15		III	0.66	0.44	0.42	0.51
16	JUN	I	0.78	0.80		0.79
17		II	0.91	0.89		0.90
18		III	1.01	1.06		1.04
19	JUL	I	1.02	1.03		1.03
20		II	1.18	1.15		1.17
21		III	1.20	1.14		1.17
22	AUG	I	1.23	1.19		1.21
23		II	1.25	1.30		1.28
24		III	1.18	1.28		1.23
25	SEP	I	1.09	1.19		1.14
26		II	1.03	1.05		1.04
27		III	0.99	1.03		1.01
28	OCT	I	0.92	0.90		0.91
29		II	0.85	0.91		0.88
30		III	0.74	0.89		0.82
31	NOV	I	0.62	0.72		0.67
32		II	0.49	0.50		0.50
33		III	0.46	0.45		0.46
34	DEC	I	0.35	0.32		0.34
35		II	0.29	0.25		0.27
36		III	0.26	0.23		0.25

REGRESSION ANALYSIS OF HALINDI NALLAH AT WEIR SITE OF SHANAG MIDDLE 100 K.W.				
S.NO.	MONTH	PERIOD	X	Y
1	JAN	I	2.38	0.29
2		II	2.40	0.26
3		III	2.61	0.27
4	FEB	I	2.73	0.31
5		II	3.56	0.37
6		III	4.22	0.39
7	MAR	I	6.08	0.39
8		II	8.38	0.43
9		III	9.57	0.46
10	APR	I	10.15	0.45
11		II	11.34	0.44
12		III	11.77	0.46
13	MAY	I	11.05	0.52
14		II	11.09	0.45
15		III	9.70	0.51
16	JUN	I	8.53	0.79
17		II	7.60	0.90
18		III	7.36	1.04
19	JUL	I	7.54	1.03
20		II	9.25	1.17
21		III	10.40	1.17
22	AUG	I	11.99	1.21
23		II	11.97	1.28
24		III	9.73	1.23
25	SEP	I	9.34	1.14
26		II	8.08	1.04
27		III	7.15	1.01
28	OCT	I	5.82	0.91
29		II	5.23	0.88
30		III	4.53	0.82
31	NOV	I	3.81	0.67
32		II	3.27	0.50
33		III	3.00	0.46
34	DEC	I	2.66	0.34
35		II	2.50	0.27
36		III	2.49	0.25



Discharge Measured at Halindi Nallah through Regression:

MONTH	PERIOD	1968	1969	1970	1971	1972	1973	1974	1975	1976
JAN	I	0.36	0.35	0.36	0.29	0.34	0.38	0.29	0.28	0.28
	II	0.35	0.35	0.42	0.28	0.35	0.41	0.33	0.28	0.29
	III	0.40	0.42	0.42	0.32	0.39	0.42	0.35	0.30	0.33
FEB	I	0.39	0.47	0.40	0.31	0.43	0.36	0.39	0.31	0.32
	II	0.42	0.57	0.40	0.36	0.38	0.42	0.38	0.40	0.48
	III	0.59	0.62	0.45	0.39	0.38	0.56	0.40	0.43	0.49
MAR	I	0.77	0.77	0.51	0.41	0.52	0.68	0.49	0.51	0.80
	II	0.86	0.86	0.54	0.52	0.54	0.65	0.54	0.62	0.89
	III	0.82	0.82	0.59	0.60	0.66	0.65	0.58	0.79	1.08
APR	I	0.85	0.85	0.58	0.54	0.67	0.65	0.59	0.85	1.08
	II	1.04	1.04	0.66	0.55	0.74	0.71	0.59	0.86	1.07
	III	1.07	1.07	0.65	0.56	0.67	0.86	0.55	0.85	1.18
MAY	I	0.87	0.87	0.63	0.50	0.66	0.87	0.52	0.71	1.10
	II	0.94	0.94	0.56	0.49	0.65	0.85	0.53	0.78	1.08
	III	0.91	0.91	0.60	0.46	0.64	0.85	0.49	0.77	0.98
JUN	I	0.75	0.75	0.54	0.50	0.57	0.73	0.51	0.95	0.95
	II	0.66	0.66	0.49	0.55	0.53	0.68	0.51	0.92	0.92
	III	0.62	0.62	0.42	0.63	0.53	0.69	0.70	0.73	0.73
JUL	I	0.57	0.57	0.50	0.70	0.55	0.82	0.65	0.58	0.64
	II	0.58	0.58	0.51	0.70	0.78	0.78	0.67	0.83	0.74
	III	0.70	0.70	0.66	0.70	0.79	0.79	0.68	0.82	1.00
AUG	I	0.87	0.87	0.44	1.05	0.91	0.91	0.62	0.61	1.24
	II	0.98	0.98	1.51	0.98	0.61	0.98	0.61	0.59	1.09
	III	1.00	1.00	1.13	0.76	0.53	0.76	0.53	0.74	0.96
SEP	I	0.99	1.05	0.99	1.05	0.65	0.90	0.44	0.60	0.86
	II	0.96	0.86	0.96	0.86	0.61	0.73	0.42	0.59	0.75
	III	0.92	0.67	0.92	0.67	0.53	0.53	0.41	0.55	0.55
OCT	I	0.55	0.55	0.65	0.54	0.51	0.47	0.35	0.52	0.51
	II	0.60	0.60	0.57	0.49	0.48	0.40	0.33	0.48	0.46
	III	0.49	0.49	0.51	0.46	0.47	0.34	0.35	0.52	0.42
NOV	I	0.48	0.33	0.48	0.41	0.42	0.31	0.32	0.46	0.40
	II	0.43	0.33	0.43	0.40	0.42	0.28	0.33	0.40	0.37
	III	0.38	0.33	0.40	0.37	0.46	0.31	0.31	0.34	0.35
DEC	I	0.35	0.36	0.35	0.36	0.43	0.30	0.32	0.29	0.33
	II	0.34	0.39	0.34	0.36	0.42	0.28	0.33	0.28	0.31
	III	0.34	0.38	0.31	0.36	0.37	0.29	0.31	0.28	0.29
		24.18	23.97	20.88	19.49	19.60	21.59	16.73	20.79	25.27

1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
0.28	0.28	0.28	0.33	0.32	0.30	0.45	0.27	0.27	0.31
0.28	0.30	0.28	0.26	0.31	0.38	0.43	0.27	0.25	0.30
0.32	0.30	0.32	0.31	0.34	0.41	0.46	0.26	0.27	0.28
0.27	0.30	0.37	0.33	0.36	0.40	0.46	0.27	0.30	0.26
0.30	0.37	0.38	0.34	0.41	0.52	0.63	0.27	0.31	0.32
0.29	0.37	0.39	0.41	0.48	0.55	0.65	0.30	0.36	0.42
0.32	0.50	0.43	0.50	0.56	0.75	0.78	0.40	0.46	0.47
0.44	0.81	0.45	0.50	0.62	0.78	0.83	0.45	0.44	0.75
0.44	0.74	0.43	0.59	0.91	1.04	1.05	0.55	0.53	0.66
0.44	0.70	0.42	0.73	0.90	1.19	1.08	0.58	0.54	0.68
0.39	0.83	0.40	0.77	0.94	1.18	1.09	0.55	0.68	0.85
0.46	0.79	0.40	0.78	0.94	1.33	1.26	0.54	0.62	0.95
0.58	0.84	0.45	0.72	0.93	1.20	1.25	0.52	0.58	0.82
0.55	0.78	0.46	0.67	0.95	1.22	1.29	0.49	0.58	0.81
0.51	0.75	0.47	0.58	0.93	1.20	1.24	0.48	0.52	0.75
0.49	0.74	0.49	0.56	0.72	1.12	1.09	0.44	0.48	0.67
0.48	0.71	0.52	0.54	0.62	1.11	0.91	0.42	0.42	0.65
0.50	0.70	0.56	0.58	0.65	1.00	0.84	0.39	0.41	0.64
0.59	0.76	0.58	0.57	0.62	0.92	0.85	0.40	0.38	0.79
0.85	1.00	0.85	1.07	0.67	0.84	0.80	0.45	0.77	0.65
0.87	0.91	0.87	0.85	0.99	0.91	0.85	0.51	0.84	0.78
1.06	1.12	1.06	1.00	0.80	0.93	0.83	0.55	0.69	0.85
0.76	1.20	0.75	0.77	0.69	1.23	0.81	0.51	0.75	0.88
0.56	0.96	0.56	0.64	0.48	0.95	0.81	0.53	0.79	0.68
0.60	0.90	0.59	0.56	0.40	0.86	0.81	0.59	0.65	0.58
0.76	0.85	0.75	0.55	0.38	0.78	0.68	0.48	0.57	0.54
0.60	0.84	0.60	0.52	0.36	0.69	0.61	0.39	0.55	0.58
0.55	0.78	0.54	0.49	0.34	0.66	0.51	0.34	0.57	0.56
0.46	0.75	0.46	0.48	0.31	0.65	0.45	0.31	0.60	0.54
0.44	0.70	0.44	0.47	0.26	0.67	0.40	0.30	0.51	0.50
0.35	0.78	0.35	0.46	0.38	0.63	0.34	0.28	0.43	0.46
0.34	0.67	0.34	0.44	0.31	0.63	0.32	0.25	0.33	0.43
0.32	0.66	0.33	0.42	0.27	0.60	0.31	0.24	0.30	0.44
0.31	0.50	0.31	0.39	0.24	0.53	0.29	0.25	0.28	0.51
0.29	0.46	0.29	0.35	0.23	0.49	0.29	0.28	0.26	0.53
0.33	0.42	0.33	0.35	0.23	0.46	0.28	0.27	0.31	0.46
17.39	25.07	17.51	19.87	19.83	29.11	26.06	14.36	17.61	21.36

1987	1988	1989	1990	1991
0.44	0.29	0.44	0.28	0.40
0.45	0.29	0.39	0.27	0.38
0.43	0.29	0.35	0.28	0.39
0.42	0.29	0.39	0.41	0.37
0.46	0.29	0.41	0.61	0.57
0.56	0.40	0.40	0.44	0.76
0.58	0.72	0.46	0.52	0.89
0.61	1.39	0.64	0.97	0.88
0.75	0.83	0.74	1.30	0.98
0.97	0.87	0.89	1.03	1.13
0.99	1.01	0.90	1.14	1.13
0.90	0.80	0.94	1.22	1.09
1.30	0.69	0.82	1.14	1.13
1.16	0.63	1.02	1.20	1.06
0.91	0.59	0.89	0.95	0.87
0.83	0.54	0.82	0.84	0.83
0.77	0.54	0.65	0.75	0.78
0.70	0.91	0.60	0.75	0.71
0.65	1.09	0.61	0.73	0.66
0.61	1.17	0.63	0.76	0.64
0.61	1.32	0.77	0.74	0.62
0.58	1.60	0.85	0.71	0.61
0.53	1.31	0.64	0.95	0.60
0.51	1.16	0.94	0.67	0.70
0.51	0.97	0.86	0.86	0.66
0.49	0.80	0.76	0.76	0.58
0.45	1.34	0.65	0.65	0.52
0.41	1.27	0.58	0.58	0.47
0.43	1.14	0.53	0.53	0.44
0.39	0.98	0.49	0.49	0.40
0.39	0.74	0.32	0.45	0.37
0.35	0.61	0.30	0.41	0.35
0.32	0.50	0.30	0.39	0.33
0.31	0.41	0.29	0.36	0.32
0.29	0.36	0.28	0.35	0.30
0.29	0.45	0.29	0.40	0.29
21.38	28.58	21.86	24.87	23.21

CALCULATION OF 75% DEPENDABLE YEAR						
Sr. No.	YEAR	DISCHARGE		DESCENDING		% DEPENDABILITY
				YEAR	DISCHARGE	
1	1968	24.18		1984	14.36	4.17
2	1969	23.97		1974	16.73	8.33
3	1970	20.88		1977	17.39	12.50
4	1971	19.49		1979	17.51	16.67
5	1972	19.60		1985	17.61	20.83
6	1973	21.59		1971	19.49	25.00
7	1974	16.73		1972	19.60	29.17
8	1975	20.79		1981	19.83	33.33
9	1976	25.27		1980	19.87	37.50
10	1977	17.39		1975	20.79	41.67
11	1978	25.07		1970	20.88	45.83
12	1979	17.51		1986	21.36	50.00
13	1980	19.87		1987	21.38	54.17
14	1981	19.83		1973	21.59	58.33
15	1982	29.11		1989	21.86	62.50
16	1983	26.06		1991	23.21	66.67
17	1984	14.36		1969	23.97	70.83
18	1985	17.61		1968	24.18	75.00
19	1986	21.36		1990	24.87	79.17
20	1987	21.38		1978	25.07	83.33
21	1988	28.58		1976	25.27	87.50
22	1989	21.86		1983	26.06	91.67
23	1990	24.87		1988	28.58	95.83
24	1991	23.21		1982	29.11	100.00

50% DEPENDABLE YEAR IS 1986			
MONTH.	PERIOD	DISCHARGE	DISCHARGE(AFTER DEDUCTING E FLOW)
JAN	I	0.31	0.26
	II	0.30	0.24
	III	0.28	0.23
FEB	I	0.26	0.21
	II	0.32	0.26
	III	0.42	0.37
MAR	I	0.47	0.41
	II	0.75	0.69
	III	0.66	0.60
APR	I	0.68	0.63
	II	0.85	0.80
	III	0.95	0.90
MAY	I	0.82	0.76
	II	0.81	0.75
	III	0.75	0.69
JUNE	I	0.67	0.61
	II	0.65	0.59
	III	0.64	0.59
JUL	I	0.79	0.74
	II	0.65	0.59
	III	0.78	0.73
AUG	I	0.85	0.80
	II	0.88	0.82
	III	0.68	0.62
SEP	I	0.58	0.53
	II	0.54	0.49
	III	0.58	0.52
OCT	I	0.56	0.50
	II	0.54	0.49
	III	0.50	0.45
NOV	I	0.46	0.40
	II	0.43	0.37
	III	0.44	0.38
DEC	I	0.51	0.45
	II	0.53	0.47
	III	0.46	0.40

LEAN PERIOD DISCHARGE	
DEC	0.51
	0.53
	0.46
JAN	0.31
	0.30
	0.28
FEB	0.26
	0.32
	0.42
Avg.	0.378
15%	0.057

AVERAGE 10 DAILY DISCHARGE OF HALINDI STREAM 50 % DEPENDABILITY				
Month	Ten daily discharge in cumecs	Discharge(Cumecs) (Descending order)	S.No.	Percentage dependability
JANUARY,				
I	0.26	0.90	1	2.78
II	0.24	0.82	2	5.56
III	0.23	0.80	3	8.33
FEBRUARY,				
I	0.21	0.80	4	11.11
II	0.26	0.76	5	13.89
III	0.37	0.75	6	16.67
MARCH,				
I	0.41	0.74	7	19.44
II	0.69	0.73	8	22.22
III	0.60	0.69	9	25.00
APRIL,				
I	0.63	0.69	10	27.78
II	0.80	0.63	11	30.56
III	0.90	0.62	12	33.33
MAY				
I	0.76	0.61	13	36.11
II	0.75	0.60	14	38.89
III	0.69	0.59	15	41.67
JUNE				
I	0.61	0.59	16	44.44
II	0.59	0.59	17	47.22
III	0.59	0.53	18	50.00
JULY				
I	0.74	0.52	19	52.78
II	0.59	0.50	20	55.56
III	0.73	0.49	21	58.33
AUGUST				
I	0.80	0.49	22	61.11
II	0.82	0.47	23	63.89
III	0.62	0.45	24	66.67
SEPTEMBER				
I	0.53	0.45	25	69.44
II	0.49	0.41	26	72.22
III	0.52	0.40	27	75.00
OCTOBER				
I	0.50	0.40	28	77.78
II	0.49	0.38	29	80.56
III	0.45	0.37	30	83.33
NOVEMBER				
I	0.40	0.37	31	86.11
II	0.37	0.26	32	88.89
III	0.38	0.26	33	91.67
DECEMBER				
I	0.45	0.24	34	94.44
II	0.47	0.23	35	97.22
III	0.40	0.21	36	100.00

75% DEPENDABLE YEAR IS 1968					
MONTH.	PERIOD				
		DISCHARGE			DISCHARGE
JAN	I	0.36			0.30
	II	0.35			0.29
	III	0.40			0.34
FEB	I	0.39			0.33
	II	0.42			0.36
	III	0.59			0.53
MAR	I	0.77			0.71
	II	0.86			0.80
	III	0.82			0.76
APR	I	0.85			0.79
	II	1.04			0.98
	III	1.07			1.01
MAY	I	0.87			0.81
	II	0.94			0.89
	III	0.91			0.85
JUNE	I	0.75			0.69
	II	0.66			0.60
	III	0.62			0.56
JUL	I	0.57			0.51
	II	0.58			0.53
	III	0.70			0.64
AUG	I	0.87			0.81
	II	0.98			0.92
	III	1.00			0.94
SEP	I	0.99			0.93
	II	0.96			0.90
	III	0.92			0.86
OCT	I	0.55			0.50
	II	0.60			0.54
	III	0.49			0.43
NOV	I	0.48			0.42
	II	0.43			0.37
	III	0.38			0.32
DEC	I	0.35			0.30
	II	0.34			0.28
	III	0.34			0.28

LEAN PERIOD DISCHARGE	
DEC	0.35
	0.34
	0.34
JAN	0.36
	0.35
	0.40
FEB	0.39
	0.42
	0.59
Avg.	0.392
15%	0.059

AVERAGE 10 DAILY DISCHARGE OF HALINDI STREAM 75 % DEPENDABILITY				
Month	Ten daily discharge in cumecs	Discharge(Cumecs) (Descending order)	S.No.	Percentage dependability
JANUARY,				
I	0.30	1.01	1	2.78
II	0.29	0.98	2	5.56
III	0.34	0.94	3	8.33
FEBRUARY,				
I	0.33	0.93	4	11.11
II	0.36	0.92	5	13.89
III	0.53	0.90	6	16.67
MARCH,				
I	0.71	0.89	7	19.44
II	0.80	0.86	8	22.22
III	0.76	0.85	9	25.00
APRIL,				
I	0.79	0.81	10	27.78
II	0.98	0.81	11	30.56
III	1.01	0.80	12	33.33
MAY				
I	0.81	0.79	13	36.11
II	0.89	0.76	14	38.89
III	0.85	0.71	15	41.67
JUNE				
I	0.69	0.69	16	44.44
II	0.60	0.64	17	47.22
III	0.56	0.60	18	50.00
JULY				
I	0.51	0.56	19	52.78
II	0.53	0.54	20	55.56
III	0.64	0.53	21	58.33
AUGUST				
I	0.81	0.53	22	61.11
II	0.92	0.51	23	63.89
III	0.94	0.50	24	66.67
SEPTEMBER				
I	0.93	0.43	25	69.44
II	0.90	0.42	26	72.22
III	0.86	0.37	27	75.00
OCTOBER				
I	0.50	0.36	28	77.78
II	0.54	0.34	29	80.56
III	0.43	0.33	30	83.33
NOVEMBER				
I	0.42	0.32	31	86.11
II	0.37	0.30	32	88.89
III	0.32	0.30	33	91.67
DECEMBER				
I	0.30	0.29	34	94.44
II	0.28	0.28	35	97.22
III	0.28	0.28	36	100.00

90% DEPENDABLE YEAR IS 1976 & 1983					
MONTH.	PERIOD				
		DISCHARGE			
		1976	1983	AVG	DISCHARGE
JAN	I	0.28	0.45	0.36	0.30
	II	0.29	0.43	0.36	0.30
	III	0.33	0.46	0.39	0.34
FEB	I	0.32	0.46	0.39	0.33
	II	0.48	0.63	0.56	0.50
	III	0.49	0.65	0.57	0.51
MAR	I	0.80	0.78	0.79	0.73
	II	0.89	0.83	0.86	0.80
	III	1.08	1.05	1.06	1.00
APR	I	1.08	1.08	1.08	1.02
	II	1.07	1.09	1.08	1.02
	III	1.18	1.26	1.22	1.16
MAY	I	1.10	1.25	1.17	1.11
	II	1.08	1.29	1.18	1.12
	III	0.98	1.24	1.11	1.05
JUNE	I	0.95	1.09	1.02	0.96
	II	0.92	0.91	0.92	0.86
	III	0.73	0.84	0.78	0.72
JUL	I	0.64	0.85	0.75	0.69
	II	0.74	0.80	0.77	0.71
	III	1.00	0.85	0.93	0.87
AUG	I	1.24	0.83	1.03	0.98
	II	1.09	0.81	0.95	0.89
	III	0.96	0.81	0.89	0.83
SEP	I	0.86	0.81	0.83	0.78
	II	0.75	0.68	0.71	0.65
	III	0.55	0.61	0.58	0.52
OCT	I	0.51	0.51	0.51	0.45
	II	0.46	0.45	0.46	0.40
	III	0.42	0.40	0.41	0.35
NOV	I	0.40	0.34	0.37	0.31
	II	0.37	0.32	0.34	0.29
	III	0.35	0.31	0.33	0.27
DEC	I	0.33	0.29	0.31	0.25
	II	0.31	0.29	0.30	0.24
	III	0.29	0.28	0.29	0.23

LEAN PERIOD DISCHARGE	
DEC	0.31
	0.30
	0.29
JAN	0.36
	0.36
	0.39
FEB	0.39
	0.56
	0.57
Avg.	0.391
15%	0.059

AVERAGE 10 DAILY DISCHARGE OF HALINDI STREAM 90 % DEPENDABILITY				
Month	Ten daily discharge in cumecs	Discharge(Cumecs) (Descending order)	S.No.	Percentage dependability
JANUARY,				
I	0.30	1.16	1	2.78
II	0.30	1.12	2	5.56
III	0.34	1.11	3	8.33
FEBRUARY,				
I	0.33	1.05	4	11.11
II	0.50	1.02	5	13.89
III	0.51	1.02	6	16.67
MARCH,				
I	0.73	1.00	7	19.44
II	0.80	0.98	8	22.22
III	1.00	0.96	9	25.00
APRIL,				
I	1.02	0.89	10	27.78
II	1.02	0.87	11	30.56
III	1.16	0.86	12	33.33
MAY				
I	1.11	0.83	13	36.11
II	1.12	0.80	14	38.89
III	1.05	0.78	15	41.67
JUNE				
I	0.96	0.73	16	44.44
II	0.86	0.72	17	47.22
III	0.72	0.71	18	50.00
JULY				
I	0.69	0.69	19	52.78
II	0.71	0.65	20	55.56
III	0.87	0.52	21	58.33
AUGUST				
I	0.98	0.51	22	61.11
II	0.89	0.50	23	63.89
III	0.83	0.45	24	66.67
SEPTEMBER				
I	0.78	0.40	25	69.44
II	0.65	0.35	26	72.22
III	0.52	0.34	27	75.00
OCTOBER				
I	0.45	0.33	28	77.78
II	0.40	0.31	29	80.56
III	0.35	0.30	30	83.33
NOVEMBER				
I	0.31	0.30	31	86.11
II	0.29	0.29	32	88.89
III	0.27	0.27	33	91.67
DECEMBER				
I	0.25	0.25	34	94.44
II	0.24	0.24	35	97.22
III	0.23	0.23	36	100.00

6.3.5 SOURCE OF RUN-OFF

Mostly the run-off is contributed by rainfall, snow and sub soil water. The main source of winter precipitation is the western disturbance which approaches India from the west through Pakistan. The contribution from snowfall is significant during February and March when snow start melting and contribution from rainfall is significant during monsoon.

6.3.6 SEDIMENT LOAD

This stream carries significant sediment load in summer and monsoon. In the winter water is quite clear and free from all kind of impurities. The Stream bed is characterized by accumulation of boulders of different sizes along the course of the stream. The size of such boulder varies from small pebbles to big boulders.

6.3.7 WATER QUALITY

The water in the stream is free from any kind of pollution during winter. It is also suitable for drinking purposes after proper treatment and suitable for construction activities in this period. However, it is muddy and contaminated during monsoon.

6.3.8 EXISTING WATER USES

Project vicinity is the mostly rain and snow fed area in Himachal Pradesh. There is little consumptive use of water upstream of weir site. The installation of this project will not affect the water uses of the residents at all.

6.3.9 TEMPERATURE AND HUMIDITY

Records of Temperature, Pressure and humidity are not available for the project catchment; generally, the temperature varies from -6°C to 26°C approx. The lowest temperature is recorded in the month of December and highest temperature is recorded in the month of June. In post monsoon and winters the humidity reduces. Summer is the driest part of the year. Generally, it is mild warm in summers, a bit humid during monsoon and cold in winter.

6.3.10 DESIGN FLOOD

The 100 years peak design flood at diversion site of Shanag Middle MHEP is proposed to be recommended for the design of civil structures and electromechanical equipment at diversion site.

Design flood at Intake site of Shanag Middle site has been worked out based on the following empirical methods:

The Dicken's formula is given as follows:

FLOOD ESTIMATION		
AS PER METHOD RECOMMENDED BY CWC FOR DESIGN FLOOD AT DIVERSION SITE		
CATCHMENT AREA IN Sq.km	12.50	Sq. km
PEAK FLOOD DISCHARGE /cm OF RAINFALL EXCESS	Qtp	
$Q_{tp} = 1.7474 A^{.75}$		

	Qtp	11.616	
	$t_c = 2.078(A / Q_{tp})^{.9}$	2.220	hrs
POINT RAINFALL		3	cm
AREA RAINFALL		2.16	cm
PEAK DESIGN FLOOD		25.092	Cumecs
AS PER METHOD RECOMMENDED BY DICKEN'S DESIGN FLOOD METHOD			
MAXIMUM FLOOD DISCHARGE (Qp)			
	$Q_p = C_d (A)^{3/4}$		
Cd (DICKEN'S COEFFICIENT VALUED FROM 6 - 30)			
Cd (IN NORTH INDIAN HILLY REGION IS 11 TO 14)			
ASSUME VALUE OF Cd		11	
	Qp	73.13	Cumecs
MAXIMUM FLOOD DISCHARGE (Qp)		73	Cumecs

FLOOD ESTIMATION			
CALCULATION OF HFL AT WEIR SITE			
Average river bed level at weir site	D	2135	m
Flood discharge		73	Cumecs
Slope of river	S	0.10	
Length of Weir	L	7	m
Manning coefficient assumed	n	0.04	
Width of river = Length of Weir	b	7	m
Height of river section at weir site	h	1	m
Area of river section at weir site	A	7	sqm.
Perimeter of weir site	P	9	m
Hydraulic mean depth	R	0.78	m
Velocity at weir site in river	V	2	Sqm./sec
Discharge at weir site	Q	14	Cumecs
SAFE AGAINST MAXIMUM FLOOD		TRUE	
H.F.L at weir site	m	2136	m
Maximum Flood discharge	Qp	73	cumecs
Average parcticle size in mm	f	0.02	mm
Silt Factor		0.249	
Q		0.42	Cumecs
Scour depth		2.79	m
H.F.L at weir site		2136	m
Taking 25% factor for maximum		0.11	

Depth below bed level	D	2	m
Upstream Filter Equivalent to depth		2	m
Downstream filter equivalent to depth 1.5D		3	m
HFL AT WEIR SITE		2136	
Average level at power house	D	2102.00	m
Highest Flood Discharge		73	Cumecs
CALCULATION OF HFL AT POWER HOUSE SITE			
Slope of river	S	0.10	
Manning coefficient assumed	n	0.04	
Length of river at power house site	b	7	m
Assume the water depth	h	1	m
Area of river section at power house site	A	7	sqm.
Perimeter at power house site	P	9	m
Hydraulic mean depth	R	0.78	m
Velocity in river	V	2	Sqm./sec
Discharge capacity	Q	14	Cumecs
SAFE AGAINST MAXIMUM FLOOD	FALSE		
HFL at power house during flood		1999.50	m
Proposed bed elevation of power house		2102.00	m
Safe elevation / height of power house		2.5	m

6.3.11 FLOW DURATION CURVE

The stream flow varies over a year. A flow duration curve of a stream is a plot of (10- daily average discharge) against the percent of time the flow was equalled or exceeded. This curve is also known as discharge –frequency curve.

The entire yield series flow data has been arranged in a descending order to arrive at Flow Duration Curve for proposed diversion site.

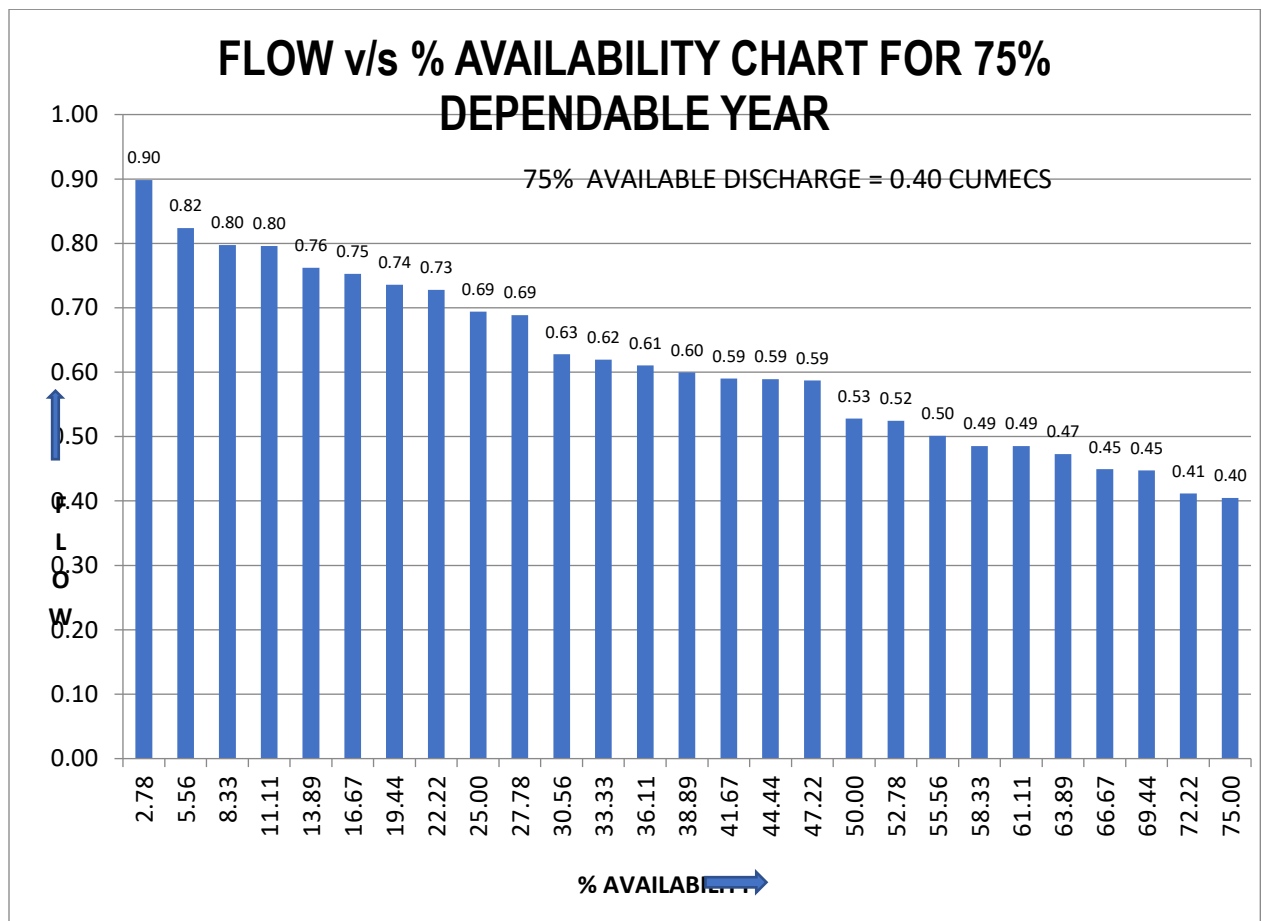
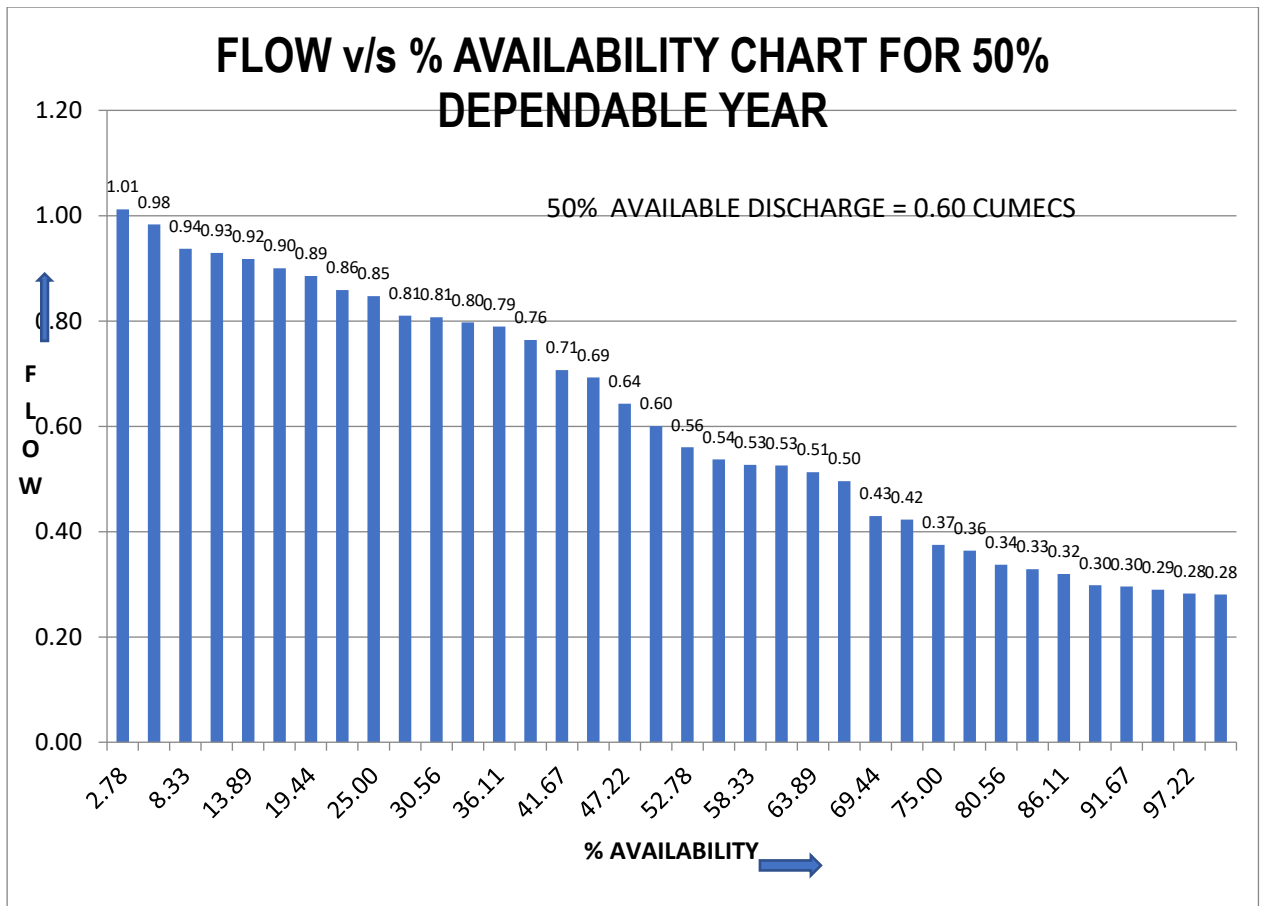
If 'n' numbers of data are used, the plotting position of any discharge Q is given by:

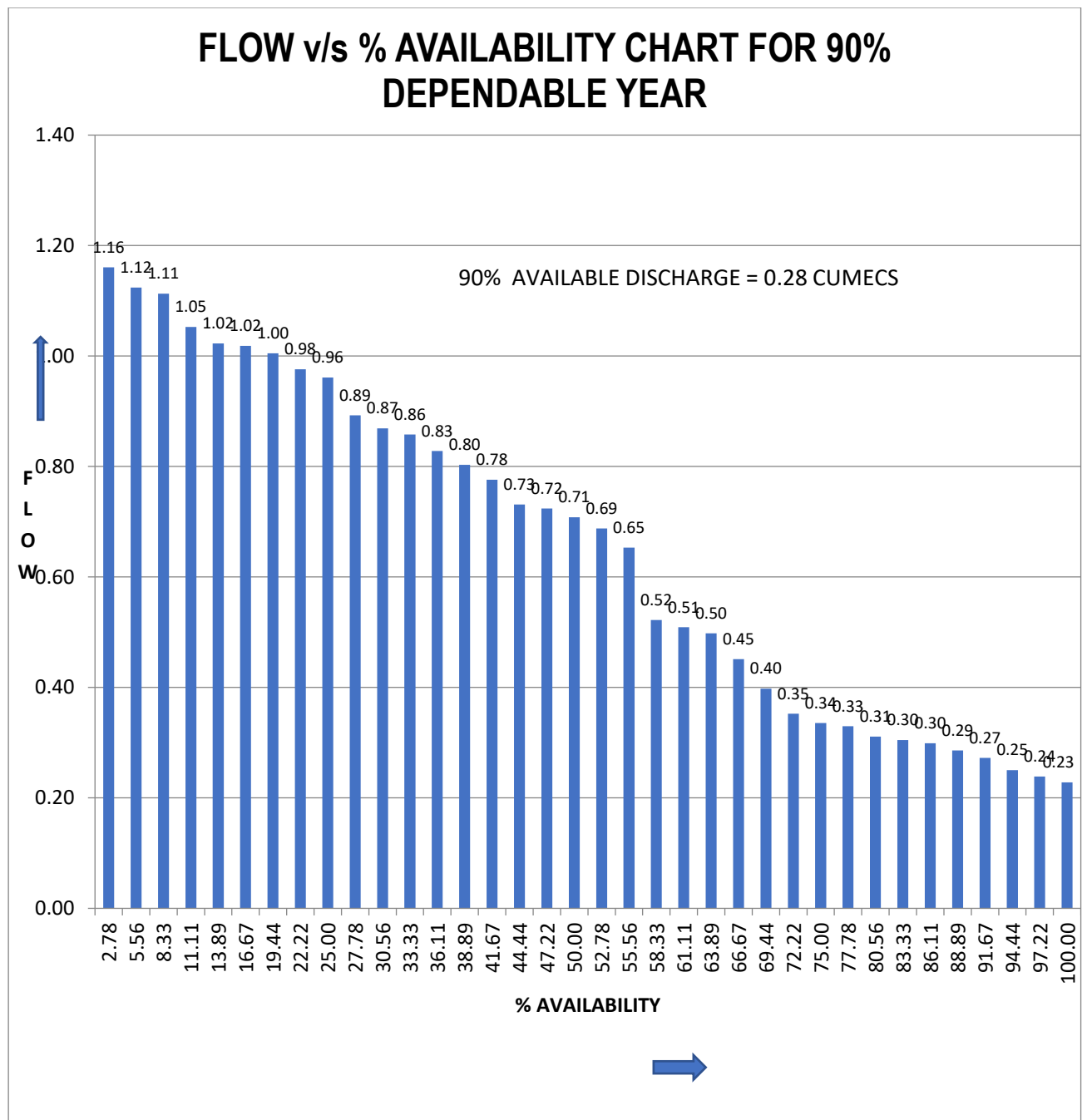
$$P = (m/n+1)*100$$

Where, m=order number of discharge

n=total number of data and

P=percentage probability of flow magnitude being equalled or exceeded





ANNEXURE-II

**DIRECTORATE OF ENERGY
GOVERNMENT OF HIMACHAL PRADESH
SHANTI BHAWAN, PHASE-III, SECTOR-VI, NEW SHIMLA-171009 (HP)**

OFFICE ORDER

Directorate of Energy (DoE), Government of Himachal Pradesh, is pleased to accord Technical Concurrence (TC) to Shanag Middle MHEP (100 kW) within elevation range of El.± 2135.00 m to El.± 2100.00 m on Halindi Stream, tributary of Beas river in Distt. Kullu, Himachal Pradesh allotted to "M/s Prakash Chand, S/o Nokhu, V.P.O- Shanag, Tehsil Manali, Distt. Kullu, H.P.", at an estimated cost of Rs. 182.10 (Rupees One Hundred Eighty Two Lakh and Ten Thousand only) including Interest During Construction (IDC), Escalation, Financial Charges (FC) and Local Area Development Fund (LADF) @ 1% (one percent) of total project cost with the following stipulations:-

1. i) The abstract of the Estimated Cost approved by DoE, GoHP is enclosed at **Annex-I** and the Salient Features of the scheme are enclosed at **Annex-II**.
ii) The completion cost shall not exceed the above cost except on account of the following:-
 - a) Interest During Construction (IDC) and Financial Charges (FC) shall be as per actuals but not exceeding the amount as indicated at **Annex-I**, unless revised by DoE, GoHP while according concurrence under Section-8 of Indian Electricity Act 2003 after review of the financial package.
 - b) Change in rates of Indian taxes and duties such as Goods and Service Tax (GST), Custom Duty and levy of any other taxes/duties subsequent to issue of Technical Concurrence (TC).
 - c) Change in Indian law resulting in change in the cost.
2. The Technical Concurrence (TC) is subject to the fulfilment of the following conditions:
 - i) Completed cost/Technical Concurrence (TC) shall not be re-opened due to the following:
 - a) Non acquisition of land.
 - b) Non- finalization of Power Purchase Agreement (PPA)
 - c) Delay in financial closure.
 - ii) The final financial arrangement shall not be inferior to the financing arrangement projected in the Detailed Project Report (DPR) for Concurrence.
 - iii) As proposed and agreed upon by the developer during appraisal of the DPR, the project is viable by considering Central Financial Assistance (CFA)/MNRE subsidy. The cost of the project cleared by the DoE, GoHP is indicative and shall have no binding on the regulator while fixing the tariff. The tariff of the project shall be regulated by the appropriate Electricity Regulatory Commission.
 - iv) The public issue expenses, if any, shall be reconsidered at the time of approval of completion cost based on documentary proof and in accordance with Security Exchange Board of India (SEBI) guidelines regarding regulation of public issue expenses.
 - v) Fulfilment of conditions stipulated in Central Electricity Authority (CEA)/Central Water Commission (CWC) guidelines in respect of civil works at the stage of detailed designs/execution.
 - vi) In case, changes are made in design parameters during construction due to site conditions or otherwise, the same shall be intimated and got Concurred from DoE, GoHP before implementation of such changes.
 - vii) Any increase in the cost estimate due to design modifications and geological surprises would be absorbed by "M/s Prakash Chand, S/o Nokhu, V.P.O- Shanag, Tehsil Manali, Distt. Kullu, H.P."
 - viii) No additional cost shall be allowed due to Resettlement & Rehabilitation (R&R) Plan.


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- ix) Normal operation life of the hydro power plant shall be as per provisions of latest CWC/CEA guidelines or Central Electricity Regulatory Commission (CERC)/ Himachal Pradesh Electricity Regulatory Commission (HPERC) regulations.
- x) The statutory and administrative clearances as per Hydro Power Policy of HP Govt. for setting up of Micro Hydel Projects up to 100 kW in the state shall be obtained before implementation of the project.
- xi) For evacuation of power, the interconnection point with the State grid and interconnection facilities at the interconnection point shall be provided, operated and maintained at the cost of the Developer.
- xii) The cost of providing and/or strengthening/additions etc. of the system at and beyond the Interconnecting Sub-station, which may also include the cost of replacement of switchgear/ protection and provision of shunt capacitors, strengthening of bus bars, apart from other works required at injection voltage level and other one or more successively higher voltages, civil works relocation of existing bays etc. shall be recovered by HPSEBL/HPPTCL, as per the regulations of HPERC read with the clarifications/decisions by HPERC and/or any other competent authority as may be finally applicable. The share of Developer on this account shall be paid by the Developer to Himachal Pradesh State Electricity Board Limited (HPSEBL)/ Himachal Pradesh Power Transmission Corporation Limited (HPPTCL) as per the final decision of the competent authority.
- xiii) Whereas the HPSEBL/HPPTCL shall endeavour to provide the power evacuation system at the earliest, the scheduled date for providing evacuation arrangements shall be spelt out in the PPAs on case to case basis inter-alia, keeping in view the time lines indicated in the relevant plan and approved by HPERC.
- xiv) The powerhouse generating equipments as well as other electrical equipments to be provided by the Developer shall be compatible for parallel operation with the State grid after interfacing. The Developer shall be responsible for any loss of generation on this account.
- xv) O&M charges for maintenance of inter connection facilities at the interconnection sub-station shall be paid by the Developer to HPSEBL/HPPTCL throughout the period, the Developer runs the project and the same shall be reviewed at the beginning of every financial year.
- xvi) The power of Shanag Middle MHEP (100 kW) can be evacuated through existing 11 kV Burwa feeder by providing solid tap arrangement at 250 kVA, 11/0.4 kV DTR subject to following conditions :-
- a) The IPP shall bear the cost of construction of 11 kV dedicated HT line from power house to inter connection point and the inter connection facilities.
 - b) The IPP shall arrange necessary right of way for dedicated HT line and inter connection facilities. It shall also arrange land for inter connection facilities.
 - c) The IPP shall not be allowed any deemed generation benefits due to back down of power generation on account of system constraints.
 - d) The losses on account of wheeling of power upto the 33/11 kV substation Palchan shall be borne by the IPP.
 - e) The IPP shall provide appropriate protection arrangements as per CEA safety code at the inter connection point.
- xvii) The project line shall be provided, operated and maintained by the Developer at his cost as per normal conditions after obtaining approval of HP Govt. under Section 68(1) of Electricity Act, 2003.



- xviii) The Developer shall develop, operate and maintain the Project including the dedicated transmission system subject to compliance with the following:
- a) Grid code and standards of grid connectivity.
 - b) Technical as well as Mechanical standards for construction of Electrical lines.
 - c) Norms of System Operation of the concerned State Load Dispatch Center (SLDC) or Regional Load Dispatch Center (RLDC).
 - d) Directions of the concerned SLDC or RLDC regarding operation of dedicated transmission line.
 - e) The Developer will only be allowed to inject power in HP system with the undertaking that necessary action to provide tele-metering to SLDC shall be provided by them and specifications required to be got approved from the office of SLDC, HP Load Dispatch Society, Shimla from compatibility point of view with existing Supervisory Control and Data Acquisition (SCADA) system.
- xix) The Hydro generating units shall be capable of generating up to 110% of rated capacity (Subject to rated head being available) on continuous basis as per Sr. No 7 (Part-II) of Ministry of Power (Central Electricity Authority) notification No 12/X/STD (CONN) GM / CEA dated 15/10/2013 and subsequent amendments thereof.
- xx) The conditions on these lines shall have to be suitably included by the Developer in the PPA etc. apart from other standard conditions.
- xxi) The observations of DoE, GoHP on the DPR and replies thereof shall form an integral part of the DPR.
- xxii) Minimum 15% release of water immediately downstream of diversion structure shall be ensured all the times including lean season as per prevailing GoHP notification. The necessary monitoring equipment as prescribed by the Pollution Control Board for the same shall be installed by the IPP during execution of the project.
- xxiii) The levels as specified and approved shall strictly be adhered to for construction of project, also the riparian distances within upstream and downstream projects as per allotment of projects or any other project specific directions / conditions shall be maintained.
- xxiv) The proposed arrangement of laying Penstock with length 358 m should be designed w.r.t all necessary parameters of earth pressure/water pressure in empty/full condition, earthquake condition and with regard to all safety standards norms. The design should be vetted from an authorized & approved agency.
- xxv) LADF/LADC and local area development activities shall be applicable as per Hydro Power Policy of HP Govt. for setting up of Micro Hydel Projects upto 100 kW in the state.
- xxvi) The TC is based on the reports and data furnished by the Developer in the DPR and the relevant information provided therein. It is presumed that information furnished is correct and has been collected reliably after carrying out detailed field investigations and surveys under the supervision of competent personnel. The scrutiny of DPR does not cover the examination of the detailed designs & working drawings of project components in regard to their structural, hydraulic and mechanical performance, safety and also of their positioning and fixing at site. This shall be ensured by the Developer as per standard norms & manuals.
3. The project shall be completed within 18 months from the date of start of the construction work.



4. The completion cost of the scheme shall be submitted to DoE, GoHP within 3 months from the Commercial Operation Date (COD) of the plant.
5. The IPP's shall give free accessibility to the officers and representatives of DoE, Himurja and other relevant Govt. Departments, Commissions etc. to have on the spot assessment of various aspects of the project.
6. The firm financial package and tie-up of balance inputs/clearances shall be completed within the period as stipulated in the HP Govt. power Policy, 2006 and subsequent amendments thereof /Implementation Agreement (IA)/Supplementary Implementation Agreement (SIA).
7. In case the time gap between the Technical Concurrence (TC) of the scheme and actual start of work on the project is three years or more, a fresh Concurrence shall be obtained from DoE, GoHP before start of actual work.
8. The DoE, GoHP reserve the right to revoke the TC, if the conditions stipulated above are not complied with to the satisfaction of the GoHP.

BY ORDER OF THE GoHP

K. S. NAKH
**Chief Engineer,
 Directorate of Energy, GoHP,
 New Shimla- 171009(HP).**

No. DoE/CE(Energy)/TC-Shanag Middle/2021- *5679-88*

Dated: *18/10/2021*

Copy for kind information and necessary action please, to the:-

1. The Addl. Chief Secretary (MPP & Power) to H.P. Govt., Shimla-171002.
2. The Addl. Chief Secretary (NES) to H.P. Govt., Shimla-171002.
3. The Secretary, Ministry of Non-Conventional Energy Sources (MNES), Block No.14, CGO Complex, Lodhi Road, New Delhi-110003.
4. The Director, Environmental & Scientific Technologies, Narayan Villa, Near Wood Villa Palace, Shimla-171002.
5. The Deputy Commissioner, Distt. Kullu, Himachal Pradesh – 175101.
6. The General Manager, HPPTCL, Himfed Bhawan, Panjari, Below Old MLA Quarters, Shimla-171005.
7. The Chief Engineer (SP), HPSEB Ltd, Uttam Bhawan, Dogra Lodge, Shimla-171004.
8. The Chief Engineer (SO), HPSEB Ltd, Vidyut Bhawan, Shimla –171004.
9. The Chief Executive Officer, Himurja, 8A-SDA Complex, Kasumpti, Shimla-171009.
- ✓ 10. M/s Prakash Chand, S/o Nokhu, V.P.O- Shanag, Tehsil Manali, Distt. Kullu, H.P.

K. S. NAKH
**Chief Engineer,
 Directorate of Energy, GoHP
 New Shimla-171009(HP).**

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Shanag Middle MHEP (100 kW) in Distt. Kullu of Himachal Pradesh allotted to "M/s Prakash Chand, S/o Nokhu, V.P.O- Shanag, Tehsil Manali, Distt. Kullu, H.P."

ABSTRACT OF COST ESTIMATE

Sr.No.	Description of work	Cost (Rs. in lakh)	
(a)			
i)	Civil works i/c other Misc. expenses	103.24	} Price level Jan, 2021
ii)	Electro Mechanical Work	60.89	
iii)	Transmission Works	0.75	
	Sub-total (a)	164.88	
(b)			
i)	Interest During Construction (IDC)	9.75	
ii)	Escalation	4.73	
ii)	Financial Charges	1.82	
	Sub-total (b)	16.30	
	Grand Total (a+b)	182.10 Lakh	

(Rupees One Hundred Eighty Two Lakh and Ten Thousand only)

Kainchi
Chief Engineer,
Directorate of Energy, GoHP
New Shimla-171009(HP).

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ANNEXURE-II

Shanag Middle MHEP (100 kW) in Distt. Kullu of Himachal Pradesh allotted to "M/s Prakash Chand, S/o Nokhu, V.P.O- Shanag, Tehsil Manali, Distt. Kullu, H.P."

SALIENT FEATURES

I. LOCATION

State	Himachal Pradesh
District	Kullu
Village	Near Shanag village
River/ Nallah	Halindi Stream, a Tributary of Beas river
Proposal	Diversion weir on Halindi Stream at El. 2135 m and Power House site on left bank of Halindi Stream at El 2102 m with Min. Tail Water Level at El 2100.00 m.
Accessibility	By Road 8 km from NH3 (near manali)
	By Rail 171 km (Joginder Nagar Railway station)
	By Air 57 km (Bhuntar Kullu)

Geographical Coordinates

	Longitude	Latitude
• Weir	77° 10' 3.85" E	32° 17' 3.91" N
• Power House	77° 10' 16.53" E	32° 16' 59.82" N
SOI Topo sheet	52 H/3	

II. HYDROLOGY

Stream	Halindi
Tributary of	Beas river
Catchment area at diversion site	12.50 Sq. km.
Design discharge	0.42 cumecs
Design flood	73 cumecs
HFL	Weir El 2136.00 m
	Power House El 1999.50 m

III. PROJECT COMPONENTS:-

A. DIVERSION STRUCTURE/INTAKE

Type	RCC trench type weir
Size	7.00 m (L) x 0.75 m (W)
Depth	Varies from 0.50 m to 1.00 m
Design discharge	0.42 cumecs plus flushing and overloading discharge
Crest level at weir	El 2135.00 m
Type of Intake	Well Type
Size of Intake	1.50 m (L) x 1.00 m (W) x 3.24 m (D)

B. FEEDER PIPE (Intake to De- silting Tank)

Size	0.64 m ϕ
Length	10.00 m
Design discharge	0.42 cumecs plus flushing and overloading discharge

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Velocity 1.758 m/sec

C. DESILTING CUM FOREBAY

Type	RCC Surface tank
Size	10.00 m (L) x 2.50 m (W)
Depth	3.24 m
Design Discharge	0.42 cumecs plus flushing and overloading discharge
Full Supply Level	El. 2134.99 m
Min. Draw Down Level	El. 2133.91 m

D. PENSTOCK

Type	Mild Steel fabricated pipe
Number /size of main penstock	One/ 490 mm ϕ
Length of main penstock	358 m
Plate Thickness	Varies from 6 mm to 10 mm
Material of steel liner	IS: 2062 grade B

E. POWER HOUSE

Type	Surface Power House
Size	10.00 m (L) x 6.00 m (W) x 5.00 m (D)
C/L of Jet	El 2102 m
Installed Capacity	100 kW
Gross Head	32.99 m
Net Head	29.02 m
Power House Crane	EOT crane

TURBINE

Type of Turbine	Horizontal Shaft Francis Turbine
Number	1 Nos.
Rated capacity	100 kw (each)
Rated Speed	800 rpm

GENERATOR

Type	Synchronous
Number	1 Nos.
Rated capacity	100 kW (each)
Power Factor	0.9 lag
Rated Voltage	415 volts
Rated Frequency	50 Hz
Rated Speed	800 rpm
Overloading Capacity	10%

F. TAIL RACE

Size	17.00 m (L) x 0.60 m (W)
Slope	1 in 400
Min. Tail Water Level	El 2100.00 m

G. Construction Period 18 months

Kanau
Chief Engineer,
Directorate of Energy, GoHP,
New Shimla-171009(HP).

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ANNEXURE-III

15% E-Flow Calculations for Shanag Middle Mini HEP- 0.1MW (100KW)

As Per DPR

MONTH.	PERIOD	DISCHARGE AVAILBALE IN STREAM (in Cumecs)	E-Flow (in Cumecs)	DISCHARGE AVAILABLE FOR TURBINES AFTER DEDUCTION OF E-FLOW (in Cumecs)	LEAN PERIOD DISCHARGE (in Cumecs)	
JAN	I	0.36	0.06	0.3	DEC	0.35
	II	0.35	0.06	0.29		0.34
	III	0.4	0.06	0.34		0.34
FEB	I	0.39	0.06	0.33	JAN	0.36
	II	0.42	0.06	0.36		0.35
	III	0.59	0.06	0.53		0.4
MAR	I	0.77	0.06	0.71	FEB	0.39
	II	0.86	0.06	0.8		0.42
	III	0.82	0.06	0.76		0.59
APR	I	0.85	0.06	0.79	Avg.	0.392
	II	1.04	0.06	0.98	15%	0.06
	III	1.07	0.06	1.01		
MAY	I	0.87	0.06	0.81		
	II	0.94	0.06	0.89		
	III	0.91	0.06	0.85		
JUNE	I	0.75	0.06	0.69		
	II	0.66	0.06	0.6		
	III	0.62	0.06	0.56		
JUL	I	0.57	0.06	0.51		
	II	0.58	0.06	0.53		
	III	0.7	0.06	0.64		
AUG	I	0.87	0.06	0.81		
	II	0.98	0.06	0.92		
	III	1	0.06	0.94		
SEP	I	0.99	0.06	0.93		
	II	0.96	0.06	0.9		
	III	0.92	0.06	0.86		
OCT	I	0.55	0.06	0.5		
	II	0.6	0.06	0.54		
	III	0.49	0.06	0.43		
NOV	I	0.48	0.06	0.42		
	II	0.43	0.06	0.37		
	III	0.38	0.06	0.32		
DEC	I	0.35	0.06	0.3		
	II	0.34	0.06	0.28		
	III	0.34	0.06	0.28		