INLAND WATERWAYS AUTHORITY OF INDIA, A-13, SECTOR-1, NOIDA DIST-GAUTAM BUDHA NAGAR, UTTAR PRADESH, PIN- 201 301(UP)

"FINAL FEASIBILITY REPORT ON HYDROGRAPHIC SURVEY

SIMSANG RIVER (NW-93) (62.600 km)

FROM "BANGLADESH BORDER AT BAGHMARA TO BRIDGE ON NH-62 NEAR NONGALBIBRA"

Survey Period from 10.03.17 to 25.03.17

FINAL REPORT ON HYDROGRAPHICAL SURVEY OF SIMSANG RIVER, MEGHALAYA

REPORT SUBMISSION DATE- 13.09.2018

SUBMITTED BY:

PRECISION SURVEY CONSULTANCY

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Acknowledgement

Precision Survey Consultancy (PSC), Salap, Howrah express its sincere gratitude to **IWAI** for awarding the work and guidance for completing this Project of detailed Hydrographic Survey and the Feasibility Report in **Region-IX (Simsang River) from Bangladesh Border near Baghmara to Bridge on NH-62 near Nongalbibra (62.600 Km)**.

We would like to use this opportunity to pen down our profound gratitude and appreciations to **Ms. Nutan Guha Biswas, IAS, Chairperson, IWAI** for spending their valuable time and guidance for compleing this project of " Detailed Hydrography and Topography survey in Simsang River." PSC would also like to thanks **Shri Pravir Pandey, Vice Chairman, IA&AS., Shri Shashi Bhushan Shukla, Member (Traffic), Shri Alok Ranjan, Member (Finance) and Shri S.K.Gangwar, Member (Technical).**

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List of Abbreviations

CD	Chart Datum
DGPS	Differential Global Positioning Systems
ETS	Electronic Total Station
GPS	Global Positioning Systems
LBM	Local Bench Mark
MSL	Mean Sea Level
RL	Reference Level
SD	Sounding Datum
SBAS	Satellite-Based Augmentation System
TBC	Trimble Business Centre
FRP	Fiber Reinforced Plastic

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ii) 1.2 m to 1.4 m
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iv) 1.8 m to 2.0 m
v) > 2.0 m

i) < 1.2 m
ii) 1.2 m to 1.4 m
iii) 1.5 m to 1.7 m
iv) 1.8 m to 2.0 m
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<tr><td>1.45</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
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<tr><th>Sub-Stretch-6 (50-62.600 km)</th><th>Total (km)</th></tr>
<tr><td>12.600</td><td>52.99</td></tr>
<tr><td>0</td><td>1.45</td></tr>
<tr><td>0</td><td>3.29</td></tr>
<tr><td>0</td><td>1.85</td></tr>
<tr><td>0</td><td>3.02</td></tr>
<tr><td>Total = 12.600</td><td>Total = 62.600</td></tr>
</table></td></tr>
</table>

6. LAD status (w.r.t. CD)

i) < 1.2 m
ii) 1.2 m to 1.4 m
iii) 1.5 m to 1.7 m
iv) 1.8 m to 2.0 m
v) > 2.0 m

Reduced Depth

Sub-Stretch-1 (0 -10 km)	Sub-Stretch- 2 (10 -20 km)	Sub-Stretch - 3 (20-30 km)	Sub-Stretch-4 (30-40 km)	Sub-Stretch-5 (40-50 km)
8.65	8.8	10.00	10.00	10.00
1.35	1.2	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
Total = 10.00	Total =10.00	Total =10.00	Total = 10.00	Total=10.00

i) < 1.2 m
ii) 1.2 m to 1.4 m
iii) 1.5 m to 1.7 m
iv) 1.8 m to 2.0 m
v) > 2.0 m

Sub-Stretch-6 (50-62.600 km)	Total (km)
12.600	60.05
0	2.55
0	0
0	0
0	0
Total = 10	Total = 62.600

7. Cross structures
i) Dams, weirs, barrages etc
(total number; with navigation locks or not)
ii) Bridges, Power cables etc
[total number; range of horizontal and vertical clearances w.r.t H.F.L /MHWS]

i) There is no Dam, weir or Barrage found in this zone of river.

ii) Total number of RCC Bridge- 2 (Two), Wooden Bridge – 1(one)
iii) Total number of Steel Bridge-1 (one)

Clearance w.r.t H.F.L	Min (m)	Max (m)
Horizontal Clearance (m)	39.250	150.00
Vertical Clearance w.r.t. H.F.L (m)	4.400	9.500

iv) H.T.Line-2 (Two)

Clearance w.r.t H.F.L	Min (m)	Max (m)
Horizontal Clearance (m)	287.78	340.47
Vertical Clearance w.r.t. H.F.L (m)	5.756	6.545

8. Slope

Reach		River / Canal Bed Level Change (m)	Distance (km)	Slope (m/km)	Slope (cm/km)
From	To				
2.402	3.552	0.535	1.150	0.465	46.52
3.553	8.750	0.397	5.197	0.076	7.64
8.751	12.4	0.605	3.649	0.166	16.58
12.5	16.500	8.680	4.000	2.170	217.00
16.600	23.000	15.100	6.400	2.359	235.94
23.100	27.705	10.705	4.605	2.325	232.46
27.706	33.510	13.775	5.804	2.373	237.34
33.511	38.000	10.120	4.489	2.254	225.44
38.100	43.000	11.900	4.900	2.429	242.86
43.100	48.000	11.900	4.900	2.429	242.86
48.100	53.000	11.700	4.900	2.388	238.78
53.100	58.000	11.100	4.900	2.265	226.53
58.100	62.600	10.500	4.500	2.333	233.33
Total			59.394	Avg-1.848	Avg-184.86

9. Discharge Report

Sl. No	Chainage (km)	Discharge (Cubic meter/sec)	Dated
1	2.400	173.49	10.03.17 to 25.03.17
2	5.300	157.61	
3	12.100	128.7	
Avg. Discharge		153.26 Cubic. m/sec	

10. i) Present IWT operations
ii) Ferry services, tourism, cargo, if any

As follows

There is no ferry service available in this zone of river. There is no cargo available in this zone of river. Williamnagar, the Headquarters of East-Garo hills district and Baghmara, the headquarter of the south-Garo hills located in this zone of river. Garo, Khasi etc. tribal men are located in this zone of river.

11. Approx. distance of Rail & Road from waterway

Nearest Railway station- Nil
Name of National highway close to the River- NH-62, NH-127B
Name of SH-1, SH-4, SH- 10

12. Any other information / comment

Section-1: Introductory Considerations

1.1 River Course: Background information, Historical Information, Origin, End

Someshwari River is known as Simsang River in the Indian state of Meghalaya, is a major river in the Garo hills of Meghalaya and Netrakona district of Bangladesh. In Bangladesh, it flows through the Susang-Durgapur and other areas of Netrakona District till it flows into the Kangsha River. A branch of the river flows towards Kalmakanda and meets the Balia River. Another branch of the river flows into the haor areas of Sunamganj District and flows into the Surma River. It is one of Bangladesh's trans-boundary rivers which divide the Garo Hills into two parts. It starts from Nokrek Mountains and runs towards the east, passing through Rongrenggre, Williamnagar, the headquarters of East Garo Hills district, Nongalbibra, Siju, Rewak and lastly Baghmara, the headquarters of South Garo Hills district. The upper course of this river is not navigable due to the high number of cataracts and numerous huge stones. However the lower course has many deep pools and falls. They are Mirik, Matma, Kan´chru Suk, Jamiseng, Warisik, Bobra, Goka etc. The chief tributaries of this river are Chibok, Rongdik, Rompa and Ringdi rivers.

Figure 1-Site Map of Simsang River

1.2 Tributaries / Network of River/ Basin

The major tributaries of this river are –

i) Chibok River

ii) Rongdik River

iii) Rompa River

iv) Ringdi River.

1.3 State / District through which river passes

The River passes through East Garo hills district of Meghalaya and Netrakona district of Bangladesh.

1.4 Project Site Location Map

Figure 2 Project Site Location Map of Simsang River

1.5 Site Map:-

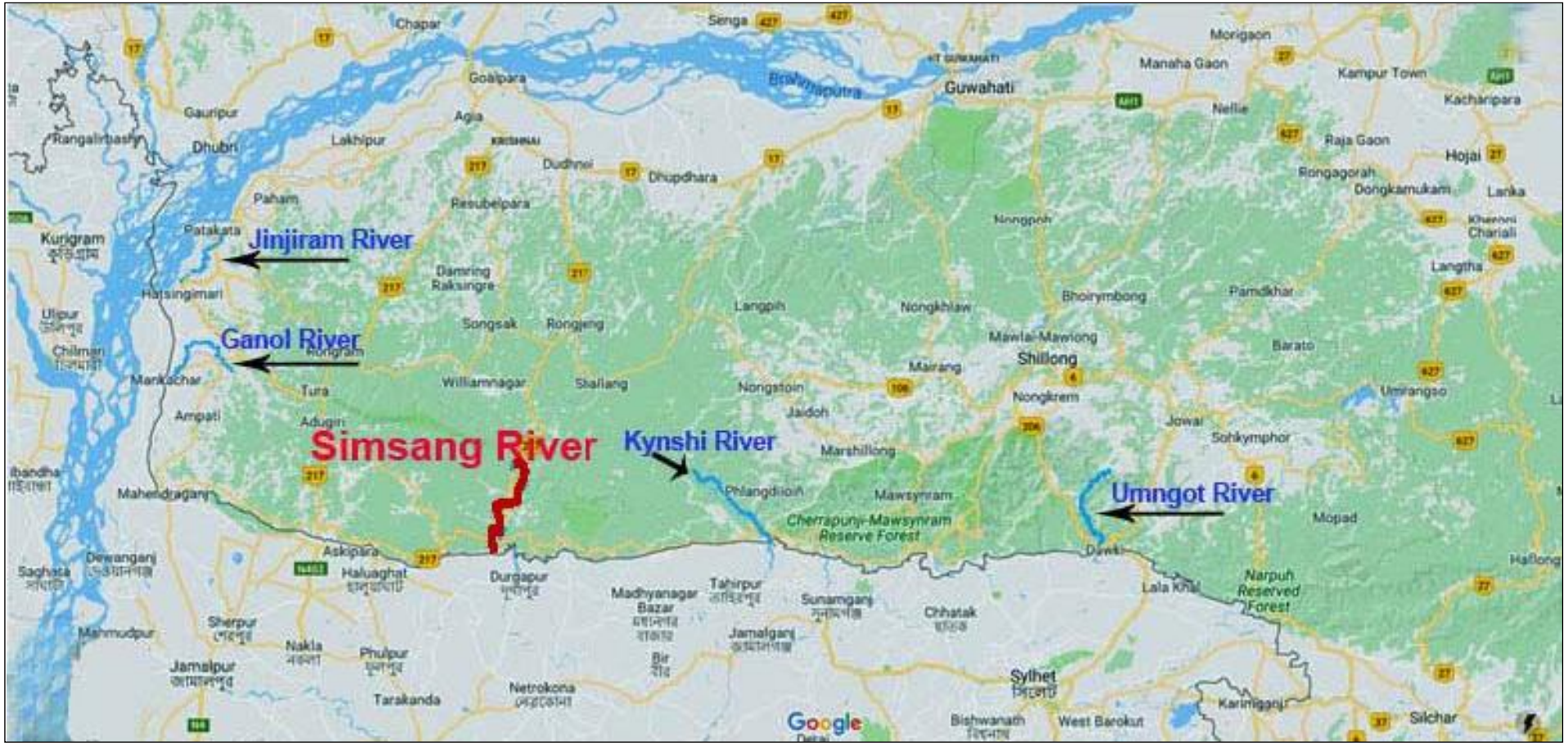


Figure 3- Site map of Simsang River

1.6 Scope of work

The Scope of work shall cover all technical aspects of Hydrographic survey at par with International Standards including the following for development of the river/canal for inland navigation.

The detailed Hydrographic survey has been carried out by using Automated Hydrographic Survey System (using digital Echo sounder for depth measurement, DGPS Beacons Receivers for position fixing and Hypackmax or equivalent software for data logging). The survey is to be conducted in WGS"84 datum.

- Detailed Hydrographic Survey to assess the navigability of the waterway.
- To collect Water and bottom samples, current meter observation and discharge from the deepest route at every 10 km interval.
- To identify cross structures which are obstructing navigation.
- To identify the length of bank protection required.
- The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cm X 30cm X 150cm.
- The pillar extends 60.cms above ground level with inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar.
- The main objective of the Study was to recommend the strategy and programs for the development of the Simsang River waterway and to provide an appropriate economic and organizational framework for restoring trade and navigation (cargo and passengers) on the Simsang River with an aim to do as follows:
- Improve public and private investments into transport on the Simsang River, in accordance with adequate economic and financial analysis;
- Propose enhancement of coordination of activities regarding inland navigation and to set up priorities of public interests;
- Obtain an integrated approach considering water management, energy production, flood control and environmental aspects in the Simsang River basin and Propose improvement of the infrastructure.

Section-2: Methodology Adopted to undertake Study

2.1 Methodology Adopted including Resources and equipment used and calibration

- **Equipment:-**

Followings equipments were employed for the Bathymetry and Topography survey:-

Equipment	Make	Version	Qty Employed
Echo sounder	Bathy MF 500	……	1
Current Meter	AEM 213-D	……	1
Tide Gauge	Manual (Pole type)	-	4
RTK	South S86T	-	3
GPS Sets	Trimble –Becon Rover SPS 361	-	1
Software	HYPACK data acquisition	Version 14	1
Software	AUTOCAD	2013	1
Software	Microsoft Office	2013	1

Table 1-Detail Equipment list

- **Conduct of survey work**

- **Topographic Survey**

  - The Topographic Survey of Simsang River has been carried out from "Bangladesh Border near at Baghmara (Lat. - 25°11'05.16"N, Long.-90°39'25.47"E) to Bridge on NH-62 near Nongalbibra (Lat. - 25°27'20.00"N, Long. - 90°42'22.21"E)." The Length of Topography survey is from Chainage 0.00 km (Bangladesh Border near Baghmara) to Chainage 62.600 km (Bridge on NH-62 near Nongalbibra).

The Topographic survey was conducted to ascertain following in the survey area:-

- Spot levels
- High bank Line
- Vegetation covered
- Bridges and permanent structures
- Road, culvert and other communication network

GPS RTK (Real Time Kinematic) satellite navigation is a technique used in land survey and in hydrographic survey based on the use of carrier phase measurements of the GPS, GLONASS and / or Galileo signals where a single reference station provides the real-time corrections, providing up to centimeter-level accuracy. When referring to GPS in particular, the system is also commonly referred to as Carrier-Phase Enhancement, CPGPS. RTK systems use a single base station receiver and a number of mobile units. The Base station re-broadcasts the phase of the carrier that it measured, and the mobile units compare their own phase measurements with the ones received from the Base station. There are several ways to transmit a correction signal from Base station to mobile station. The most popular way to achieve real-time, low-cost signal transmission is to use a radio modem, typically in the UHF band. This allows the units to calculate their relative position to millimeters, although their absolute position is accurate only to the same accuracy as the position of the base station.

- **Bathymetry Survey**

The Bathymetry survey has been carried out from Chainage 0.00 km to Chainage 12.750 km. After that chinage, the bathymetry survey was not possible due to the lack of water. Bathy 500 MF was used to obtain soundings onboard the survey boat. A working frequency of 210 KHz was used for sounding operations. The digital output from the echo sounder was automatically fed to the HYPACK data logging software on a real-time basis for the acquisition of survey data. No breakdown of equipment was reported and the performance of the equipment was found to be satisfactory during the entire duration of the survey.

The sound velocity was set to 1500 m/s on single beam echo sounder during acquisition. The Daily bar checks were done prior to the sounding operation and before the closing of the sounding operation for the day. Being very shallow depths, the echo sounder depths were also cross-checked in between by using demarcated sounding poles during the conduct of the survey. The sounding lines were run using Survey boat to identify the design line of the river for the possible stretch. The cross lines were run perpendicular to the orientation of river flow (i.e. perpendicular to the orientation of depth contours) in respective stretches. The spot sounding was also carried out in the area where the survey boat cannot be operated due to low depth. The hemisphere DGPS and Sounding Pole were used for Spot sounding at shallow locations in the Simsang River. The DGPS position along with water depths was recorded simultaneously and the tidal reduction was applied to the obtained depths.

Figure 4- During Bathymetry survey

2.2 Description of Bench Marks (B.M) / authentic Reference Level used

For the Topography Survey, The Horizontal control / Vertical Control has been carried out from GPS-1 using GPS observation for 24 hrs at Baghmara Site. The value of the GPS-1 at Baghmara is –

Location Name	Geographic position		UTM position		Elevation (m)
	Latitude (N)	Longitude (E)	Northing	Easting	
Baghmara	25°11'53.58"	90°38'24.31"	2788982.668	262202.680	134.195

Figure 5- Reference level of Simsang River

2.3Tidal Influence Zone and tidal variation in different stretches:-

There is no tidal influence found in this part of the region of Meghalaya.

2.4 Methodology to fix Chart Datum / Sounding Datum-

The Topography Survey has been considered by DGPS observation method by 24 hrs at Baghmara site and its value (GPS-1) used for transfer of sounding datum and in topography the same level is used to interpolate the datum. The Lowest level in the each km of Stretch is taken as Datum and same is used for reduction and other calculations.

2.5 Six years minimum Water Levels to arrive at Chart Datum (CD) / Sounding Datum (SD).

For this NW, CD was not provided by IWAI. DGPS observation method by 24 hrs at Baghmara site and its value (GPS-1) used for transfer of sounding datum (show page-16). In topography also the same level is used to interpolate the datum. The Lowest level in the each km of Stretch is taken as Datum and same is used for reduction and other calculations as mentioned table no-4, page no-20-21.

2.6 Transfer of Sounding Datum table for tidal rivers / canals

There is no Tidal influence or Tidal effects found in this zone of river.

2.7 Table Indicating tidal variation at different observation points (say at every 10 Km)

There is no Tidal influence or Tidal effects found in this zone of river.

2.8 Salient Features of Dam, Barrages, Weirs, Anicut, Locks, Aqueducts etc

There are no Dams, Barrage, Weirs, Anicut, Locks, Aqueducts found in this zone of river.

2.9 Description of erected Bench Mark Pillars:-

Station	Location	Chainage (km)	Latitude (N)	Longitude (E)	Easting	Northing	BM Height above MSL (m)	BM Height above SD (m)
GPS- S 1	Baghmara Village	2.400	25°11'53.58"	90°38'24.31"	262202.680	2788982.668	134.195	118.412
GPS- S 2	Baghmara Village	2.405	25°11'53.08"	90°38'23.78"	262187.818	2788967.728	139.327	123.009
GPS- S 3	Arapara Village	3.550	25°12'32.24"	90°37'49.77"	261256.844	2790189.169	27.534	10.819
GPS- S 4	Rongbatgittim Village	8.750	25°15'15.62"	90°38'22.48"	3262260.343	2795201.115	160.910	143.59
GPS- S 5	Jantagri Village	27.700	25°19'18.83"	90°39'19.29"	263981.299	2802658.467	172.367	146.367
GPS S 6	Siju Asakbanda Village	33.500	25°21'39.94"	90°41'20.16"	267437.451	2806942.458	381.847	340.747
GPS S 7	Nongalbibra Village	62.600	25°27'19.15"	90°42'18.54"	269249.114	2817353.036	154.519	102.714

Table 2 Bench Mark Details

2.10 Details of collected Water level of different gauge stations:-

Chainage (km)	Gauge station	Location	Easting	Northing	Latitude (N)	Longitude (E)	W.L w.r.t M.S.L (m)
2.402	GS (TP) -1	Baghmara	262299.02	2789176.30	25°11'59.944"	90°38'27.649"	16.183
3.552	GS (TP) -2	Baghmara	261687.93	2790142.14	25°12'30.969"	90°38'05.225"	16.718
8.75	GS (TP) -3	Gitinggre	263032.09	2795073.62	25°15'11.926"	90°38'50.135"	17.115
12.4.	GS (TP) -4	Goka Wakchol	264758.07	2792986.25	25°14'05.1"	90°39'53.082"	17.72
13.5	GS(TP) -4a	Goka Wakchol	265482.76	2792746.07	25°13'57.706"	90°40'19.113"	19.5
14.5	GS (TP) -4b	Goka Wakchol	265749.86	2793671.60	25°14'27.922"	90°40'28.079"	22.00
15.5	GS (TP) -4c	Goka Wakchol	265913.43	2794648.89	25°14'59.76"	90°40'33.317"	24.1
16.5	GS (TP) -5	Gokapepchandal	265706.38	2795396.36	25°15'23.924"	90°40'25.459"	26.4
17.5	GS (TP) -5a	Gokapepchandal	266058.37	2796348.81	25°15'55.062"	90°40'37.443"	28.7
18.5	GS (TP) -5b	Gokapepchandal	266822.40	2795609.63	25°15'31.479"	90°41'05.192"	31.3
19.5	GS (TP) -5c	Gokapepchandal	267186.81	2796437.84	25°15'58.587"	90°41'17.7"	33.4
20.5	GS (TP) -5d	Gokapepchandal	266563.58	2797160.46	25°16'21.711"	90°40'54.99"	35.6
21.5	GS (TP) -5f	Gokapepchandal	265580.07	2797216.37	25°16'22.974"	90°40'19.819"	38.1
22.5	GS (TP) -5g	Gokapepchandal	265310.90	2797961.76	25°16'47.035"	90°40'09.74"	40.4
23	GS (TP) -6	Banakol	265462.05	2798433.85	25°17'02.456"	90°40'14.847"	41.5
24.5	GS (TP) -6a	Banakol	264414.36	2799185.45	25°17'26.278"	90°39'36.947"	44.9
25.5	GS (TP) -6b	Banakol	264327.40	2800152.40	25°17'57.638"	90°39'33.236"	47.3
26.5	GS (TP) -6c	Banakol	264379.16	2801102.77	25°18'28.539"	90°39'34.492"	49.7
27.705	GS (TP) -7	Jantagri	264664.89	2802258.14	25°19'06.231"	90°39'43.982"	52.205
28.5	GS (TP) -7a	Jantagri	265331.61	2802632.91	25°19'18.783"	90°40'07.577"	54.2
29.5	GS (TP) -7b	Jantagri	266134.98	2802984.90	25°19'30.67"	90°40'36.07"	56.5
30.5	GS (TP) -7c	Jantagri	266383.44	2803620.55	25°19'51.458"	90°40'44.557"	59.2

Chainage (km)	Gauge station	Location	Easting	Northing	Latitude (N)	Longitude (E)	W.L w.r.t M.S.L (m)
31.5	GS (TP) -7d	Jantagri	266402.08	2804608.20	25°20'23.551"	90°40'44.611"	61.3
32.5	GS (TP) -7e	Jantagri	266758.21	2805519.24	25°20'53.346"	90°40'56.776"	63.5
33.510	GS (TP) -8	Siju	267331.09	2806118.99	25°21'13.12"	90°41'16.88"	65.98
34.5	GS (TP) -8a	Siju	268282.38	2806097.22	25°21'12.976"	90°41'50.906"	67.9
35.5	GS (TP) -8b	Siju	269194.51	2806484.54	25°21'26.067"	90°42'23.277"	70.4
36.5	GS (TP) -8c	Siju	269978.75	2806901.79	25°21'40.057"	90°42'51.059"	72.7
38	GS (TP) -9	Siju Songmong	271089.08	2807756.16	25°22'08.426"	90°43'30.236"	76.1
39.5	GS (TP) -9a	Siju Songmong	272339.66	2808417.68	25°22'30.605"	90°44'14.55"	79.7
40.5	GS (TP) -9b	Siju Songmong	273271.17	2808755.45	25°22'42.089"	90°44'47.655"	81.8
41.5	GS (TP) -9c	Siju Songmong	273369.34	2809615.67	25°23'10.087"	90°44'50.646"	84.3
42.5	GS (TP) -9d	Siju Songmong	273889.45	2810242.13	25°23'30.722"	90°45'08.869"	86.6
43	GS (TP) -10	Badri Rongding Awe	274138.39	2810660.54	25°23'44.45"	90°45'17.52"	87.9
44.5	GS (TP) -10a	Badri Rongding Awe	274867.81	2811510.13	25°24'12.447"	90°45'43.097"	91.4
45.5	GS (TP) -10b	Badri Rongding Awe	274816.81	2812244.33	25°24'36.27"	90°45'40.833"	93.8
46.5	GS (TP) -10c	Badri Rongding Awe	275025.06	2813142.16	25°25'05.55"	90°45'47.743"	96
48	GS (TP) -11	Era Aning	274447.05	2814249.30	25°25'41.2"	90°45'26.402"	99.8
49.5	GS (TP) -11a	Era Aning	274732.87	2815490.32	25°26'21.671"	90°45'35.88"	103.1
50.5	GS (TP) -11b	Era Aning	274756.25	2816376.45	25°26'50.47"	90°45'36.184"	105.4
51.5	GS (TP) -11c	Era Aning	273844.61	2816673.96	25°26'59.635"	90°45'03.387"	107.9
52.5	GS (TP) -11d	Era Aning	274383.30	2817472.97	25°27'25.886"	90°45'22.18"	110.1
53	GS (TP) -12	Darang Chiga	274296.18	2817924.54	25°27'40.508"	90°45'18.79"	111.5
54.5	GS (TP) -12a	Darang Chiga	273694.79	2819125.18	25°28'19.18"	90°44'56.545"	114.6
55.5	GS (TP) -12b	Darang Chiga	272917.03	2819734.00	25°28'38.53"	90°44'28.343"	117.1
56.5	GS (TP) -12c	Darang Chiga	272093.58	2819420.56	25°28'27.893"	90°43'59.065"	119.2
57.5	GS (TP) -12d	Darang Chiga	271155.38	2819097.56	25°28'16.881"	90°43'25.688"	121.6
58	GS (TP) -13	Rongrekgre	270756.94	2818794.74	25°28'06.823"	90°43'11.616"	122.6
59.5	GS (TP) -13a	Rongrekgre	269894.17	2818698.05	25°28'03.201"	90°42'40.802"	126.2
60.5	GS (TP) -13b	Rongrekgre	270418.00	2817942.60	25°27'38.953"	90°43'00.01"	128.4
62.57	GS (TP) -14	Nongalbibra	269269.42	2817367.78	25°27'19.64"	90°42'19.266"	133.1

Table 3- Water level data of different Gauge stations

2.11 Chart Datum / Sounding Datum and Reductions details:

Sl no	CWC gauge / Dam / Barrage / Weir / Anicut / Bench Mark / tide gauges	Chain age (km)	Stretch for corrected soundings and topo levels (km)	Established Sounding Datum w.r.t. MSL (m) at col. A.	Sounding Datum of Tide Gauge w.r.t. MSL (m)	Correction in WL data for Bathymetric survey (m)	Topo level data to be converted as depth for volume calculation w.r.t. SD (m)
	A	B	C (50% stretch is to be selected on both side of tide gauge)	D +ve indicates above MSL -ve indicates below MSL	E	F = (E- WL data in MSL)	G = ((E- topo levels in MSL)
1	GS (TP) -1	2.402	0-3.0		15.783	-0.400	Simsang Reduced Topo.xyz
2	GS (TP) -2	3.552	3.0-6.2		16.318	-0.400	
3	GS (TP) -3	8.750	6.2-10.9		16.715	-0.400	**Submitted in Soft Copy**
4	GS (TP) -4	12.4.	10.9-12.4		17.320	-0.400	
5	GS(TP) -4a	13.500	12.4-14.0		19.100	-0.400	
6	GS (TP) -4b	14.500	14.0-15.0		21.600	-0.400	
7	GS (TP) -4c	15.500	15.0-16.0		23.700	-0.400	
8	GS (TP) -5	16.500	16.0-17.0		26.000	-0.400	
9	GS (TP) -5a	17.500	17.0-18.0		28.300	-0.400	
10	GS (TP) -5b	18.500	18.0-19.0		30.900	-0.400	
11	GS (TP) -5c	19.500	19.0-20.0		33.000	-0.400	
12	GS (TP) -5d	20.500	20.0-21.0		35.200	-0.400	
13	GS (TP) -5f	21.500	21.0-22.0		37.700	-0.400	
14	GS (TP) -5g	22.500	22.0-23.0		40.000	-0.400	
15	GS (TP) -6	23.000	23.0-24.0		41.100	-0.400	
16	GS (TP) -6a	24.500	24.0-25.0		44.500	-0.400	
17	GS (TP) -6b	25.500	25.0-26.0		46.900	-0.400	
18	GS (TP) -6c	26.500	26.0-27.0		49.300	-0.400	
19	GS (TP) -7	27.705	27.0-28.0		51.805	-0.400	
20	GS (TP) -7a	28.500	28.0-29.0		53.800	-0.400	
21	GS (TP) -7b	29.500	29.0-30.6		56.100	-0.400	
22	GS (TP) -7c	30.500	30.5-31.50		58.800	-0.400	
23	GS (TP) -7d	31.500	31.50-32.50		60.900	-0.400	
24	GS (TP) -7e	32.500	32.50-33.50		63.100	-0.400	
25	GS (TP) -8	33.510	33.50-34.0		65.580	-0.400	
26	GS (TP) -8a	34.500	34.00-35.00		67.500	-0.400	
27	GS (TP) -8b	35.500	35.00-36.00		70.000	-0.400	
28	GS (TP) -8c	36.500	36.00-37.50		72.300	-0.400	
29	GS (TP) -9	38.000	37.5-39.00		75.700	-0.400	
30	GS (TP) -9a	39.500	39.00-40.00		79.300	-0.400	
31	GS (TP) -9b	40.500	40.00-41.00		81.400	-0.400	
32	GS (TP) -9c	41.500	41.00-42.00		83.900	-0.400	
33	GS (TP) -9d	42.500	42.00-43.50		86.200	-0.400	
34	GS (TP) -10	43.000	43.50-44.00		87.500	-0.400	
35	GS (TP) -10a	44.500	44.0-45.00		91.000	-0.400	
36	GS (TP) -10b	45.500	45.00-46.00		93.400	-0.400	
37	GS (TP) -10c	46.500	46.00-47.00		95.600	-0.400	
38	GS (TP) -11	48.000	47.00-48.00		99.400	-0.400	
39	GS (TP) -11a	49.500	48.00-50.00		102.700	-0.400	

40	GS (TP) -11b	50.500	50.0-51.0		105.000	-0.400	**Submitted in Soft copy**
41	GS (TP) -11c	51.500	51.0-52.0		107.500	-0.400	
42	GS (TP) -11d	52.500	52.0-53.0		109.700	-0.400	
43	GS (TP) -12	53.000	53.0-54.0		111.100	-0.400	
44	GS (TP) -12a	54.500	54.0-55.0		114.200	-0.400	
45	GS (TP) -12b	55.500	55.00-56.00		116.700	-0.400	
46	GS (TP) -12c	56.500	56.00-57.00		118.800	-0.400	
47	GS (TP) -12d	57.500	57.00-58.00		121.200	-0.400	
48	GS (TP) -13	58.000	58.00-59.00		122.200	-0.400	
49	GS (TP) -13a	59.500	59.00-60.0		125.800	-0.400	
50	GS (TP) -13b	60.500	60.00-61.00		128.000	-0.400	
51	GS (TP) -14	62.570	61.0- 62.600		132.700	-0.400	

Table 4-Chart Datum / Sounding Datum & Reduction Details

2.12-High Flood Level (H.F.L) at known Gauge Stations:-

Sl no	Location and description of CWC gauge / Dam / Barrages / Weirs / Anicut / Locks / Aqueducts / BM	Cross-structure details	Chainage (km)	Established HFL / MHWS / FSL / MWL / FRL w.r.t. MSL (m)	Computed HFL at Cross-Structures w.r.t. MSL (m)
1		RCC Bridge	3.625		22.400

Table 5- High Flood Level Details

2.13 Average Bed Slope:-

Reach		River / Canal Bed Level Change (m)	Distance (km)	Slope (m/km)	Slope (cm/km)
From	To				
2.402	3.552	0.535	1.150	0.465	46.52
3.553	8.750	0.397	5.197	0.076	7.64
8.751	12.4	0.605	3.649	0.166	16.58
12.5	16.500	8.680	4.000	2.170	217.00
16.600	23.000	15.100	6.400	2.359	235.94
23.100	27.705	10.705	4.605	2.325	232.46
27.706	33.510	13.775	5.804	2.373	237.34
33.511	38.000	10.120	4.489	2.254	225.44
38.100	43.000	11.900	4.900	2.429	242.86
43.100	48.000	11.900	4.900	2.429	242.86
48.100	53.000	11.700	4.900	2.388	238.78
53.100	58.000	11.100	4.900	2.265	226.53
58.100	62.600	10.500	4.500	2.333	233.33
Total			59.394	Avg-1.848	Avg-184.86

Table 6-Average Bed Slope

2.14 Details of Dam/Barrage/Weirs/Anicut etc. w.r.t MSL:-

There are no Dams, Barrage, weirs, Anicut found in this river zone.

2.15 Details of Locks:-

There are no locks found in this river zone.

2.16 Details of Aqueducts:-

There are no aqueducts found in this zone of river.

2.17 Details of existing Bridge and Crossing over waterway:-

Sl. No	Structure Name	Chainage (km)	Location	Position		Position		Length (m)	Width (m)	Nos. of Piers	Horizontal Clearance (m)	Vertical Clearance w.r.t H.F.L (m)	Remarks
				Latitude (N)	Longitude (E)	Easting	Northing						
1	RCC Bridge	3.625	Baghmara	25°12'34.85"	90°38'6.69"	261731.576	2790261.915	392.23	8.026	10	39.250	4.400	Complete
2	Steel Bridge	33.560	Siju	25°21'10.642"	90°41'18.117"	267364.222	2806041.209	152.80	3.23	2	150.00	9.500	Complete
3	RCC Bridge	62.480	Nongalbibra	25°27'20.43"	90°42'21.67"	269337.946	2817391.570	107.01	8.876	2	62.00	9.450	Complete
4	Wooden Bridge	62.500	Nongalbibra	25°27'19.44"	90°42'20.79"	269312.076	2817361.063	113.43	5.188	2	59.490	6.250	Complete

Table 7- Bridge Details

2.18 Details of other Cross structures, pipe-lines, under water cables:-

There are no cross structures, pipe lines or under water cables found in this zone of river.

2.19 High Tension Lines / Electric Lines/Tele-communication lines:-

Line	Chainage (km)	Location	Position				No of Piers	Horizontal clearance (m)	Vertical clearance w.r.t HFL (m)	Remarks
			Latitude (N)	Longitude (E)	Easting (m)	Northing (m)				
H.T.Line	2.222	Baghmara	25°11'59.45"	90°38'35.94"	262531.540	2789157.735	8	340.47	5.756	Complete
H.T.Line	2.639	Baghmara	25°12'7.85"	90°38'26.96"	262284.873	2789420.015	8	287.78	6.545	Complete

Table 8- High Tension / Electrical Line

2.20 Current Meter and Discharge Details:-

Since water depth was too low between chainage 12.100 km and 62.600 km, no bathymetry survey, current or discharge measurements have been conducted. The data recorded for Ch.-2.400 km and Ch.-3.550 km are given below-

Stretch No.	Chainage (km)	Position				Observed Depth (m) (D)	Velocity (m/sec.)	Average Velocity (m/sec.)	X-Sectional area (sq. m.)	Discharge (Cub.m/sec)
		Easting (m)	Northing (m)	Latitude (N)	Longitude (E)		0.5 D			
1	2.400	262359.50	2789177.66	25°12'00.023"	90°38'29.808"	0.500	0.512	0.512	338.86	173.49
2	5.300	261787.9719	2791919.6213	25°13'28.764"	90°38'07.68"	0.300	0.422	0.422	373.50	157.61
3	12.100	264951.4303	2793282.3166	25°14'14.826"	90°39'59.804"	0.600	0.621	0.621	207.25	128.70

Table 9- Details Current Meter List

2.21-a. Soil Sample Locations:-

Sample No.	Chainage (km)	Easting (m)	Northing (m)	Latitude (N)	Longitude (E)	Depth (m)
1	2.400	262359.5	2789177.66	25°12'00.023"	90°38'29.808"	0.700
2	2.405	262318.415	2789209.88	25°12'01.046"	90°38'28.321"	0.700
3	3.550	261908.6144	2790263.4486	25°12'35.036"	90°38'13.028"	0.500
4	8.750	263083.0710	2795139.2485	25°15'14.087"	90°38'51.915"	1.00
5	27.700	264592.5400	2802231.4500	25°19'05.323"	90°39'41.413"	0.200
6	33.500	267327.3678	2806134.6002	25°21'13.655"	90°41'16.742"	0.100

Table 10-Soil Sample Location

b. Water Sample Locations:-

Sample No.	Chainage (km)	Easting (m)	Northing (m)	Latitude (N)	Longitude (E)	Total Depth (d) (m)	Mid-Depth (0.5d) (m)
1	2.400	262359.5	2789177.66	25°12'00.023"	90°38'29.808"	0.700	0.35
2	2.405	262318.415	2789209.88	25°12'01.046"	90°38'28.321"	0.700	0.35
3	3.550	261908.6144	2790263.4486	25°12'35.036"	90°38'13.028"	0.500	0.25
4	8.750	263083.0710	2795139.2485	25°15'14.087"	90°38'51.915"	1.00	0.5
5	27.700	264592.5400	2802231.4500	25°19'05.323"	90°39'41.413"	0.200	0.1
6	33.500	267327.3678	2806134.6002	25°21'13.655"	90°41'16.742"	0.100	0.05

Table 11- Water Sample Location

Section-3: Detailed Hydrographic Survey- Stretch Wise

3.1From Chainage 0.00 Km to Chainage 10.00 Km (Vabanipur village to Gitinggre village)

Figure 6- Chainage 0.00 km to 10.00 km

The River width of Simsang from chainage 0.00 km to chainage 10.00 km is approximately 197 m to 194 m. The average width portion of the river is 195 m.

During the survey it was noticed that a RCC Bridge has been situated near at chainage of 3.628 km near at Baghmara village. The Bridge is connected with NH-62 and SH-4. The Bridge has been communicated through Dasanggiri to Dabigre village. The RCC Bridge's position is (**Lat. - 25°12'34.85"N, Long. - 90°38'6.69"E**). Two H.T.Lines have been crossed over this river and these lines are located near Baghmara site. The position of H.T.Lines are (**Lat. - 25°11'59.45"N, Long. - 90°38'35.94"E), (Lat.- 25°12'7.85"N, Long.- 90°38'26.96"E**). The Four G.P.S station has been situated in this zone of river near at chainage of 2.400 km, 2.405 km, 3.550 km and 8.750 km respectively. Bijaypur, Baghmara, Dabram, Dasanggiri, Arapara, Netri, Upper Dosogiri etc. villages are situated left bank side of the river and Doldamgre, Dabigre, Jaksongram, Dubagiri, Masighat, Dabit Ampangdam, Gitinggre etc. villages are located right bank side of the river.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	0.00	10.00	0.08	11.42	10000	231565.57	-0.2	10.20	10000	334045.98
II	0.00	10.00	0.003	11.44	10000	401920.09	-0.2	10.30	10000	539253.33
III	0.00	10.00	0.002	11.44	10000	685683.64	-0.2	10.30	10000	859653.53
IV	0.00	10.00	0.002	11.45	10000	873490.98	-0.2	10.30	10000	1054747.28

Figure 7- RCC Bridge (Chainage- 3.628 km)

3.2 From Chainage 10.00 Km to Chainage 20.00 Km (Gitinggre village to Gokapepchandal village)

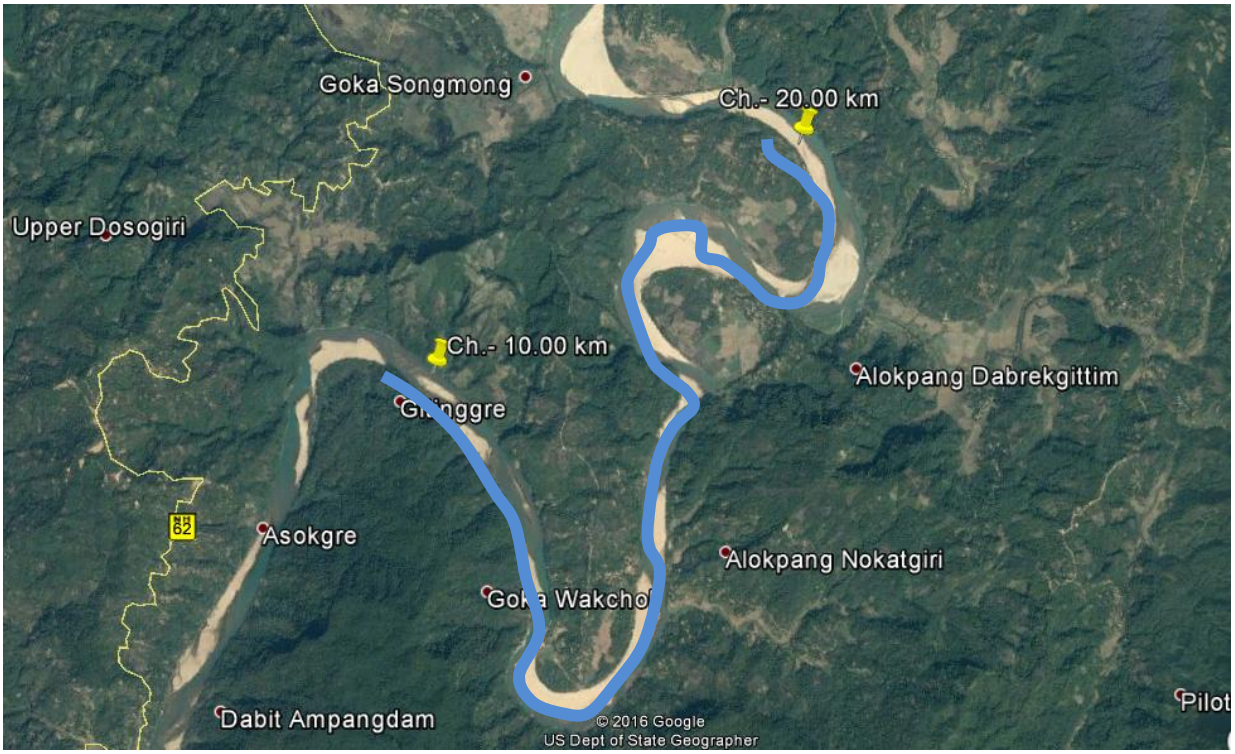


Figure 8- Chainage 10.00 km to Chainage 20.00 km

The River width from chainage 10.00 km to chainage 20.00 km is approximately 194 m to 181 m. The average width portion of the river is 187.5 m.

In this stretches, there are no cross-structures found. After chainage 10.00 km, the river channel has been becoming bent curve to down portion and arise suddenly which shaped like figure-V. Agronggiri, Goka Wakchol, Alokpang Nokatgiri, Alokpang Dabrekgittim , Rongrengpal etc. villages are situated right bank side of the river and Goka Imbika, Gokapepchandal etc. villages are situated left bank side of the river. Dense forest side is covered with both side of the river bank. Char lands are also noticed in this stretch of river.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	10.00	20.00	0.1	10.21	10000	278201.23	-0.3	9.52	10000	353915.32
II	10.00	20.00	0.097	10.23	10000	462149.38	-0.3	10.11	10000	565760.75
III	10.00	20.00	0.094	10.23	10000	758911.28	-0.3	10.11	10000	896207.48
IV	10.00	20.00	0.091	10.23	10000	950664.58	-0.3	10.21	10000	1097408.72

3.3 From Chainage 20.00 Km to Chainage 30.00 Km (Gokapepchandal village to Jantagri village)

Figure 9- Chainage 20.00 km to 30.00 km

The River width from chainage 20.00 km to chainage 30.00 km is approximately181 m to 140 m. The average width portion of the river is 160.5 m.

The G.P.S station-5 is situated near at chainage of 27.700 km near jantagri village. NH-62 passes left side from the river channel. Goka Songmong, Kharukol Konagittim, Alokpang, Matmagitak, Nengkong Songmong, Jantagri etc. villages are situated left bank side of the river and Balkal watregittim, Kharukol Adinggre, Banakol, Ronchekgiri etc. villages are situated right bank side of the river. Some agricultural lands are found both side of the river bank but most of the parts of the lands are covered with dense forests. Char lands are also found in this stretch of river.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	20.00	30.00	0.1	0.3	10000	347441.37	-0.3	0	10000	414369.49
II	20.00	30.00	0.097	0.3	10000	555049.64	-0.3	0	10000	644903.01
III	20.00	30.00	0.094	0.3	10000	877041.2	-0.3	0	10000	995172.53
IV	20.00	30.00	0.091	0.3	10000	1078765.11	-0.3	0	10000	1203784.52

3.4 From Chainage 30.00 Km to Chainage 40.00 Km (Jantagri village to Siju Rongmikgittim village)

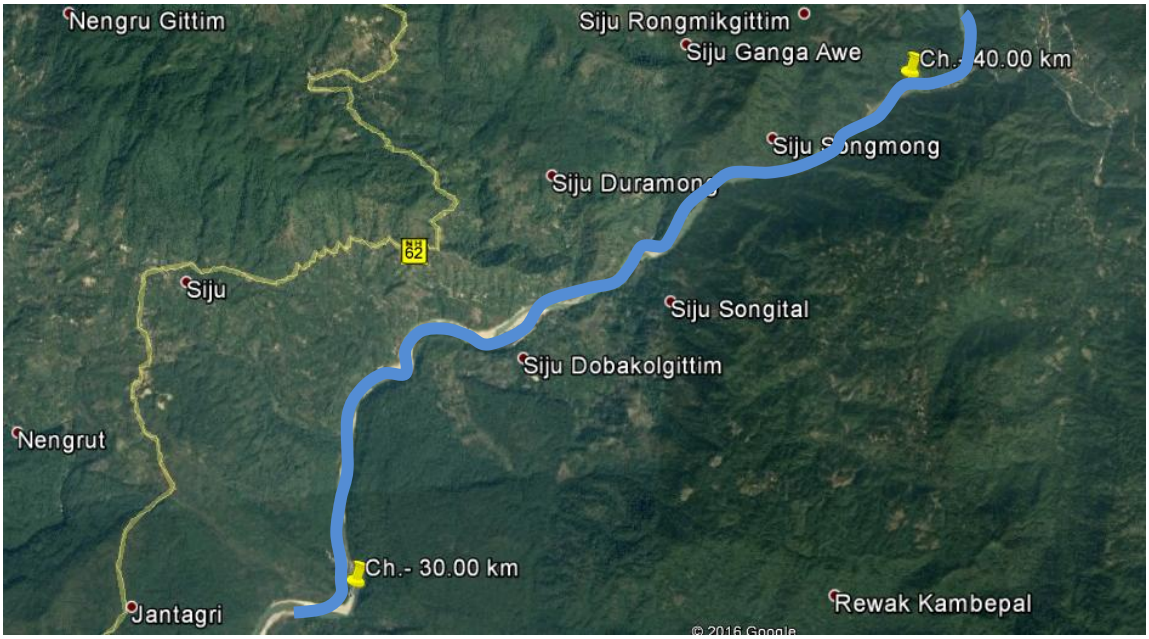


Figure 10- Chainage 30.00 km to Chainage 40.00 km

The River width from chainage 30.00 km to chainage 40.00 km is approximately 140 m to 53 m. The average width portion of the river is 96.5 m.

The G.P.S station-6 is situated in this stretch near at chainage of 33.500 km at Siju Asakbanda Village. No cross structures are found in this stretch of river. Siju Songital, Siju Dobakolgittim, Siju Anteka etc. villages are situated right bank side of the river and Siju Asakbanda, Siju Duramong, Siju Songmong etc. villages are situated left bank side of the river. Dense forest sides are noticed both side bank of the river. Char lands are noticed in this stretch of river.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	30.00	40.00	0.1	0.3	10000	384628.81	-0.3	0	10000	478487.82
II	30.00	40.00	0.097	0.3	10000	599494.65	-0.3	0	10000	723120.51
III	30.00	40.00	0.094	0.3	10000	924968.76	-0.3	0	10000	1082865.04
IV	30.00	40.00	0.091	0.3	10000	1127395.83	-0.3	0	10000	1294003.87

3.4 From Chainage 40.00 Km to Chainage 50.00 Km (Siju Rongmikgittim village to Era aning village)

Figure 11- Chainage 40.00 km to Chainage 50.00 km

The River width from chainage 40.00 km to chainage 50.00 km is approximately 53 m to 77 m. The average width portion of the river is 65 m.

The Both side of the river bank are covered with dense forest. Agrengittim, Rongsa Awe, Badri Jaisrugittim etc. villages are situated right bank side of the river and Rongsa awe, Jadigittim, Badri Rongding awe, Jadigittim etc. villages are situated left bank side of the river.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	40.00	50.00	0.1	0.4	10000	338407.39	-0.3	0	10000	410508.49
II	40.00	50.00	0.097	0.4	10000	547471.45	-0.3	0	10000	649026.12
III	40.00	50.00	0.094	0.4	10000	868464.55	-0.3	0	10000	1005378.69
IV	40.00	50.00	0.091	0.4	10000	1068817.66	-0.3	0	10000	1214578.55

3.4 From Chainage 50.00 Km to Chainage 62.600 Km (Era aning village to Nongalbibra village)

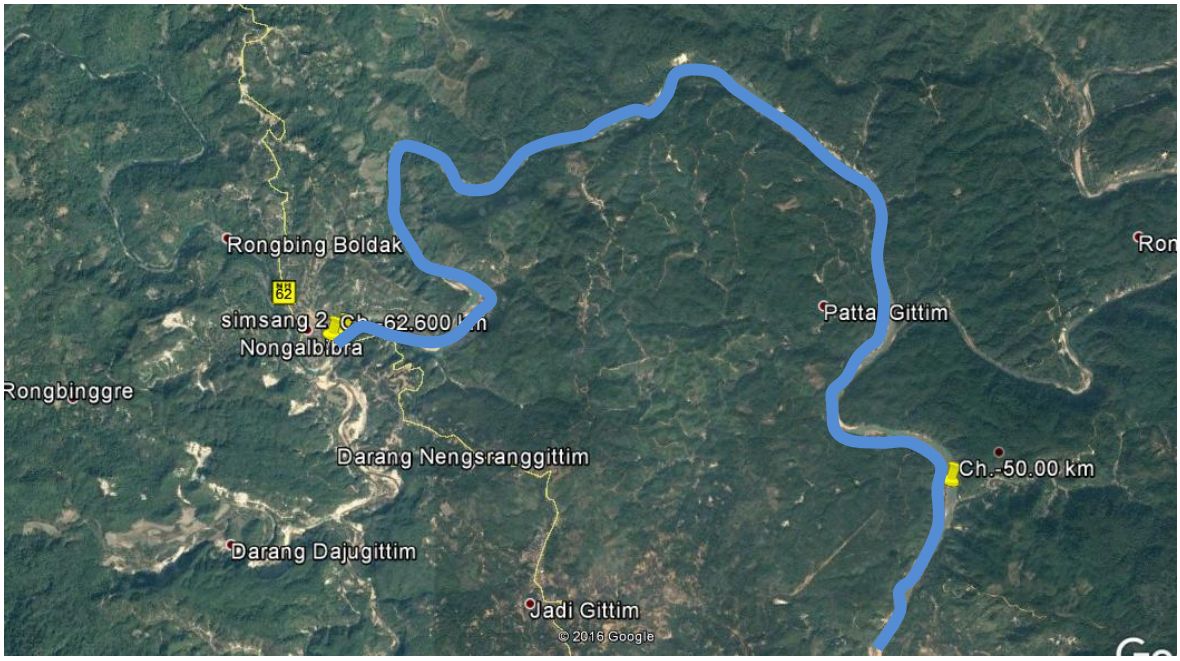


Figure 12- Chainage 50.00 km to Chainage 62.600 km

The River width from chainage 50.00 km to chainage 62.600 km is approximately 77.00 m to 85.34 m. The average width portion of the river is 81 m.

The GPS station-7 is situated near at chainage of 62.600 km near Nongalbibra village. One RCC Bridge and one wooden Bridge are situated near at chainage of 62.480 km and 62.500 km respectively near at Nongalbibra village. The position of the RCC Bridge is (Lat. - 25°27'20.43"N, Long. - 90°42'21.67"E). The wooden Bridge position is (Lat. - 25°27'19.44"N, Long. - 90°42'20.79"E). The RCC Bridge is connected with NH-62 and communicated through Nengkhra to Darang Nengsranggittim. Pattal Gittim, Dobakol nengjagittim etc. villages are situated left bank side of the river and Gare Rongdenggittim, Darang Chiga, Nongalbibra etc. villages are situated right bank side of the river.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	50.00	62.600	0.1	0.4	10000	448582.58	-0.3	0	10000	548696.08
II	50.00	62.600	0.091	0.4	10000	712669.13	-0.3	0	10000	851774.19
III	50.00	62.600	0.09	0.4	10000	1118976.17	-0.3	0	10000	1302747.1
IV	50.00	62.600	0.08	0.4	10000	1371417.48	-0.3	0	10000	1564728.01

Figure 13- RCC Bridge (Chainage- 62.480 km)

Figure 14- Wooden Bridge (Chainage- 62.500 km)

- **Bathymetry Survey**

a) Length of the stretch for which the Bathymetric Survey has been carried out:-

The layer of water in the river Simsang is not sufficient for carrying out the Bathymetric survey of the total stretches. The length of the Bathymetry survey in this river is 0.00 km to 12.750 km.

- **Topographic Survey**

a) Length of the stretch for which the Topographic survey has been carried out:-

The Topography survey has been carried out from Bangladesh Border near Baghmara to Bridge on NH-62 near at Nongalbibra. The length of the Topography survey is 0.00 km to 62.600 km.

a) Prominent Dams / Barrage:-

There are no Dams, Barrage found in this zone of River.

b) Tidal stretch, tidal range. Pondage stretch / length of Dam, Barrages, Weirs, Anicut, Locks:-

There are no Dams, Barrages, weirs, Anicut; Locks are found in this zone of river.

c) Conditions of banks (protected, un-protected):-

Simsang River annually bears the brunt of floods and where embankment construction and repairing seems like permanent affair. Displacement of people living on the banks of rivers due to river bank erosion is another major issue here. The tributaries continue to erode the banks rapidly. The River banks are constantly being changed by means of flood of very high magnitude, channel widening, and change in channel pattern and of river bank erosion. To protect the shore and its properties various methods are in use like, geobags filling with sand, porcupine (triangle shaped concrete structure), sand bags and boulder bags called Gabions are in use to strengthen the embankments. The Embankment and the Boulder pitching are needful some places for protecting the banks of the river and also prevent the soil erosion. Beside this, the bank of the river includes with agricultural land, High Tension lines, RCC Bridges, Steel Bridge, wooden Bridge etc. Most of the river bank side area is covered with dense forests.

d) Hindrances - Hyacinth, rocks, rapid waterfalls, steep gradient, forest, wild-life sanctuary, security issues. Obstruction (if any) for navigation, e.g. fishing stakes:-

Nokrek National park is located 27 km far from the river side of Simsang. Besides, Balpakram National park, Siju Bird Sanctuary, Selbagre Hoolock Gibbon Reserve at Chandigre have been located in this zone of river. Besides, dense forest has been also located in this zone of river which defence with another states. Wildlife animals like Tiger, wild Elephant, wild Bear, wild snake, Birds have been located in Nokrek National Park area.

e) Details of Protected Area- Wildlife, Defence, Atomic Power Plants and any other issue attached to it:-

Near the bank side of the Simsang River, the wild life like Nokrek National Park, Balpakram National Park, Siju Bird Sanctuary have been located in this zone of river. So the Forest side and Wildlife area have become Unapproachable and also defence its own states from another states or country. Hoolock Gibon Reserve at Selbagre and Rombagre Falls, a Fish Sanctuary are also situated in this zone of river.

f) NH/SH/MDR along and/or within 5 km from the waterways:-

NH- 62, NH- 127B are the two major communications way near the river side. Besides, SH- 4, SH-1 are also communicative way for the local villagers.

g) Railway Line and Stations in the vicinity:-

No Railway line or stations have been found in this zone of river.

h) Land Use Pattern along Waterway on visual assessment:-

The major portion of the land is occupied by agriculture. Major crops are Rice, Tea, Mustard, Maize etc have been cultivated in this zone of river. The right bank mostly occupied with scattered forest area and agriculture. The most important forest products are timber, bamboo and firewood. The land is also used for Jhum cultivation.

i) Crops / Agriculture in the region on visual assessment:-

The Major crops along the river are Rice and Maize. Besides, the Horticulture crops are Orange, Lemon, Pineapple, Guava, Litchi, Banana, Jackfruit etc have been cultivated in this zone of river. Beside this, Non-traditional crops like Tea, Cashew nut, Oilseeds, Tomato, Mushroom, wheat etc. have been cultivated in this zone of river. Besides, Jhum cultivation is still practised in this zone of river.

j) Availability of Bulk / Construction Material:-

The cement factories and the brick fields are available in this stretch of river. Besides, sand is also available from the river side. These materials are useful for the Building construction or industrial hub. Coal, Limestone, Uranium and Sillimanite have been found in this zone of river.

k)Existing Industries along Waterway with their types and details:-

Meghalaya is an industrially backward state. The Number of Industries like cement, wood, Oil Refinery and Petro Chemical are available in this zone of river. Apart from these there are a number of small-scale industries like bakeries, furniture making, steel fabrication, tyre retreading, spice etc have been located in this zone of river.

l) Existing Ghats, Jetties and Terminals (with conditions and facilities). Existing navigation facilities (if any):-

The Jetty services are not found in this zone of river. New Baghmara Bus Terminal is situated near at chainage of 3.00 km.

m) Existing Cargo Movement:-

n) Prominent City / Town / Places of Worship / Historical places for Tourism:-

Nokrek National park is the famous historical places in this zone of river. Tura Peak, Ghasura Park, Katta Beel, Rongdong Falls, Chandigre Resort, Pelga Falls are the famous tourist spot in this zone of river. Baghmara, Siju, Jantagri, Banakol are the famous places in this zone of river.

o) Village / colonies along the sub-stretch and approx. Population:-

Baghmara, Dabram, Netri, Adinggiri, Dubagiri, Banakol, Siju Asakbanda, Siju Songital, Siju Rongkenggre, Nongalbibra, Gittinggre etc villages have been located in this zone of river.

p) Availability of Passenger Ferry Services and Recreational Facilities:-

The passenger ferry services are not found in this zone of river.

q) Available and probable Water Sport Recreational Facilities:-

There are no water sport recreational facilities available in this zone of river.

r) Fishing activities:-

Simsang River is the lifeline of the people of its important places for fishing culture. Simsang provides diverse habitat in its downstream for living biota such as stream, riparian zones and wetlands etc. Simsang has some of the richest riverine fisheries in India. The river has over fish species and forms an important component of livelihood and nutritional security in the downstream stretches in Meghalaya. The wetlands are ecologically and economically important for the local people. Fishing in Simsang River is very famous among the people.

s) Sand mining:-

Illegal river sand mining across the country is on the rise for past many years in India, which results in adverse impact on river system and dependent communities. In Simsang gravel mining was noticed during the survey period. Besides this, sand is also exported to other states as it becomes demandful for making Building or Industries.

Tributaries:-

The major tributaries of this river are -

i) Chibok

ii) Rongdik

iii) Rompa and

iv) Ringdi

t) Details of Irrigation Canals and Outlets:-

The Irrigation Canal and Outlets have been found near at chainage of 23.337 km, 40.758 km, 44.655 km and 52.500 km in the right bank side of the river and chainage of 3.265 km, 24.348 km, 24.500 km and 61.353 km in the left bank side of the river.

u) Details of Nalas. Polluted water discharge in to the rivers and treatment plants (if any):-

No Nalas are found in this zone of river.

v) Usage of water (drinking, irrigation, industries, navigation etc.) Water quality:-

In Recent time's man avoid to drinking the water of the river but the water is essential for cultivation which is the main occupation for the villagers of this region. The water is mainly used for irrigation purposes. Besides, the water is also used for industrial hubs. With the help of the irrigation system, the cultivation can easily accessible. Irrigation Canals supply the sufficient water for the cultivation. Ferry services are also available in this stretch of river. Besides, washing cloth, swimming etc. have become available in this zone of river.

Section 4: Terminals

There is no existing terminal found in this zone of river.

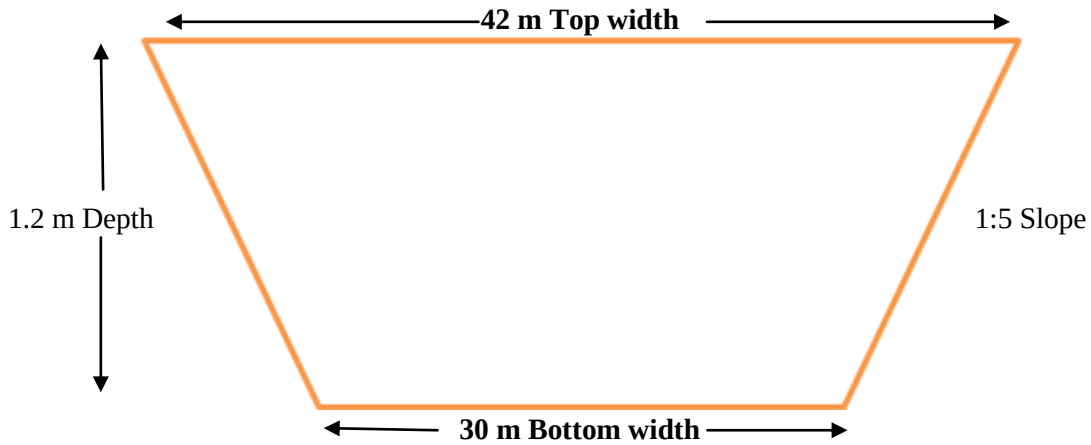
4.1 Details of Land use, owner etc.:-

The river bank is covered by dense forest, rock, boulders and small hill areas. Near the bank of the river, Fishing is used mainly for occupation. Besides, some agricultural fields are noticed near the bank side. But the Rocks and boulders mixed soil obstacle to cultivate in the field. The Farmers are cultivated their crops with using this fertile land and grows a huge amount of crops like Rice, Maize etc. every year. Besides, some portions of the land are surrounded by small industries and Forests. Nokrek National Park, Balpakram National park, Siju Bird Sanctuary have been also situated in this zone of river. Though boulder pitching is found in some places but in the Monsoon period, Flood and erosion has been affected both side of the river bank.

Section 5: Fairway development:-

Dredging sections, summary of depths and dredging quantity for different classification of waterways (stretch-wise)

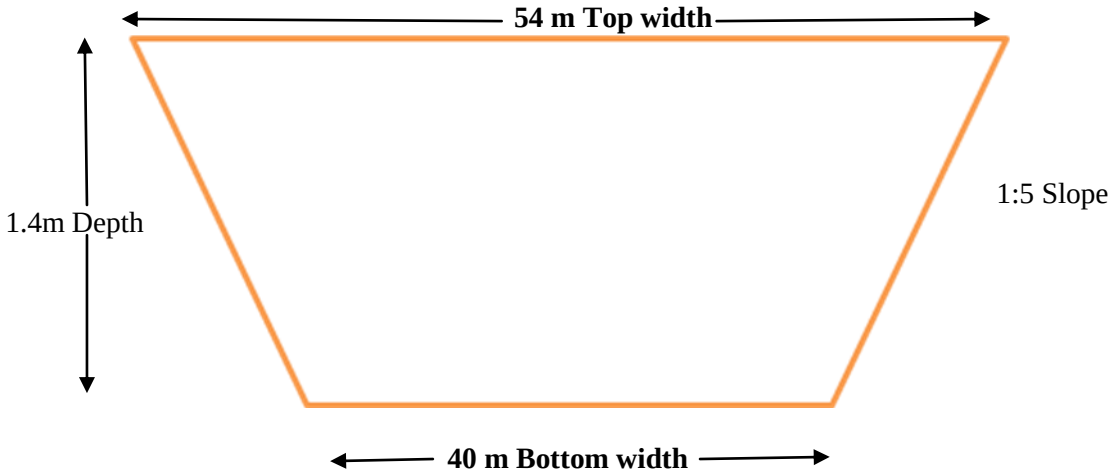
Class-I: - (Channel design: - Bottom width- 30 meter, Top width- 42 meter)



Location		Chainage (km)		As per Observed Soundings						As per Reduced Soundings					
From	To	From	To	Min. depth (m)	Max depth (m)	Length of Shoal (m)	Avg. Depth of Cut (m)	Dredging Qty. (Cubic Meter)	Cumulative Dredging Qty (Cubic Meter)	Min. Depth (m)	Max Depth (m)	Length of Shoal (m)	Avg. Depth of Cut (m)	Dredging Qty. (Cubic Meter)	Cumulative Dredging Qty (Cubic Meter)
Vabanipur	Gitinggre	0	10	0.08	11.42	10000	0.70	231565.57	231565.57	-0.2	10.2	10000	1.01	334045.98	334045.98
Gitinggre	Gokapepchandal	10	20	0.1	10.21	10000	0.84	278201.23	509766.8	-0.3	9.52	10000	1.07	353915.32	687961.3
Gokapepchan	Jantagri	20	30	0.1	0.3	10000	1.05	347441.37	857208.17	-0.3	0	10000	1.25	414369.49	1102330.79
Jantagri	Siju Rongmikgittim	30	40	0.1	0.3	10000	1.16	384628.81	1241836.98	-0.3	0	10000	1.45	478487.82	1580818.61
Siju Rongmikgitti	Eraaning	40	50	0.1	0.4	10000	1.02	338407.39	1580244.37	-0.3	0	10000	1.24	410508.49	1991327.1
Eraaning	Nongalbibra	50	62.6	0.1	0.4	13000	1.36	448582.58	2028826.95	-0.3	0	13000	1.66	548696.08	2540023.18
Total						63000		2028826.95		Total		63000		2540023.18	

Table 12- Minimum & Maximum depth of Class-I

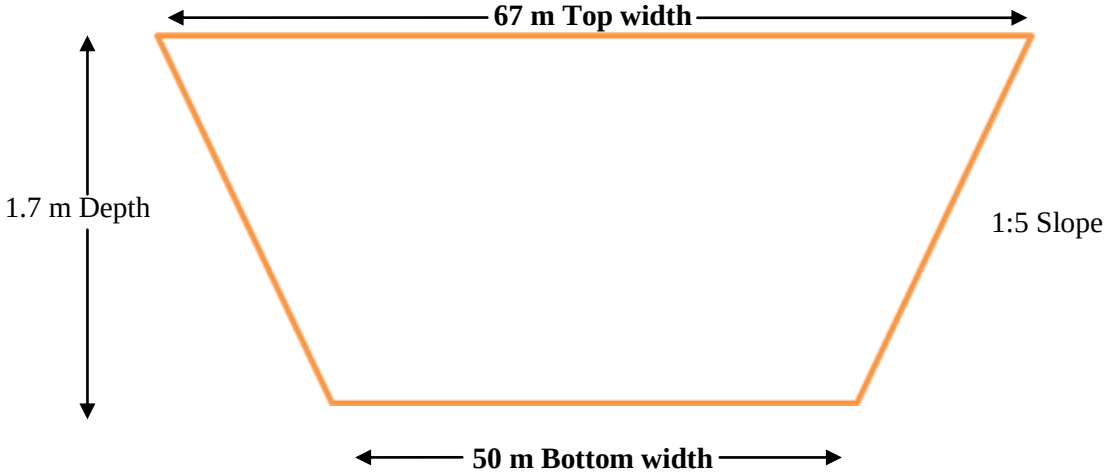
Class-II: - (Channel design: - Bottom width- 40 meter, Top width- 54 meter)



Location		Chainage (km)		As per Observed soundings						As per Reduced soundings					
From	To	From	To	Min. depth (m)	Max depth (m)	Length of Shoal (m)	Avg. Depth of Cut (m)	Dredging Qty. (Cubic Meter)	Cumulative Dredging Qty (Cubic Meter)	Min Depth (m)	Max Depth (m)	Length of Shoal (m)	Avg. Depth of Cut (m)	Dredging Qty. (Cubic Meter)	Cumulative Dredging Qty (Cubic Meter)
Vabanipur	Gitinggre	0	10	0.003	11.44	10000	0.91	401920.09	401920.09	-0.2	10.3	10000	1.22	539253.33	539253.33
Gitinggre	Gokapepchandal	10	20	0.097	10.23	10000	1.05	462149.38	864069.47	-0.3	10.11	10000	1.29	565760.75	1105014.08
Gokapepchandal	Jantagri	20	30	0.097	0.3	10000	1.26	555049.64	1419119.11	-0.3	0	10000	1.46	644903.01	1749917.09
Jantagri	Siju Rongmikgitti	30	40	0.097	0.3	10000	1.36	599494.65	2018613.76	-0.3	0	10000	1.64	723120.51	2473037.6
Siju Rongmikgitti	Eraaining	40	50	0.097	0.4	10000	1.24	547471.45	2566085.21	-0.3	0	10000	1.47	649026.12	3122063.72
Eraaning	Nongalbibra	50	62.6	0.091	0.4	13000	1.62	712669.13	3278754.34	-0.3	0	13000	1.93	851774.19	3973837.91
Total						63000		3278754.34		Total		63000		3973837.91	

Table 13- Minimum & Maximum depth of class-II

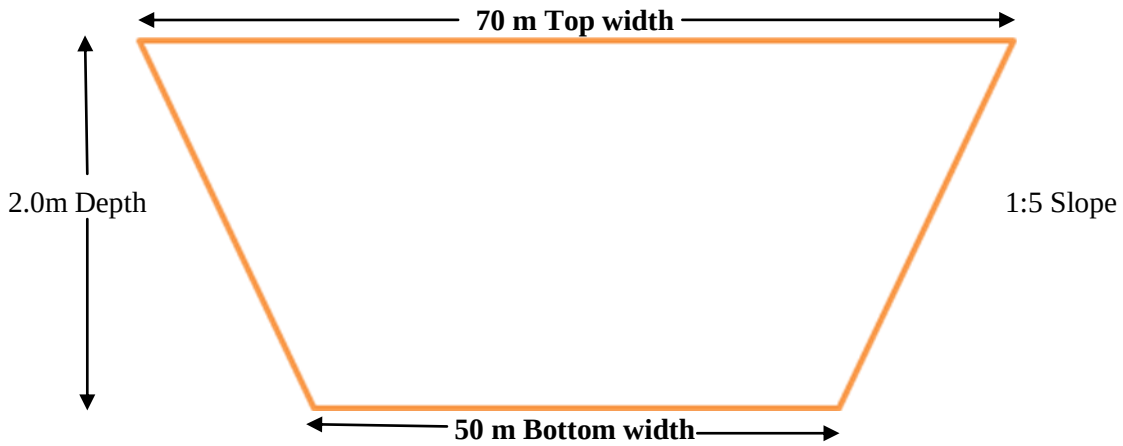
Class-III: - (Channel design: - Bottom width- 50 meter, Top width- 67 meter)



Location		Chainage (km)		As per Observed soundings						As per Reduced soundings					
From	To	From	To	Min. depth (m)	Max depth (m)	Length of Shoal (m)	Avg. Depth of Cut (m)	Dredging Qty. (Cubic Meter)	Cumulative Dredging Qty. (Cubic Meter)	Min. Depth (m)	Max Depth (m)	Length of Shoal (m)	Avg. Depth of Cut (m)	Dredging Qty. (Cubic Meter)	Cumulative Dredging Qty. (Cubic Meter)
Vabanipur	Gitinggre	0	10	0.002	11.44	10000	1.25	685683.64	685683.64	-0.2	10.3	10000	1.56	859653.53	859653.53
Gitinggre	Gokapepchan	10	20	0.094	10.23	10000	1.38	758911.28	1444594.92	-0.3	10.11	10000	1.63	896207.48	1755861.01
Gokapepc	Jantagri	20	30	0.094	0.3	10000	1.59	877041.2	2321636.12	-0.3	0	10000	1.81	995172.53	2751033.54
Jantagri	Siju Rongmikgitti	30	40	0.094	0.3	10000	1.68	924968.76	3246604.88	-0.3	0	10000	1.97	1082865.04	3833898.58
Siju Rongmikg	Eraaning	40	50	0.094	0.4	10000	1.58	868464.55	4115069.43	-0.3	0	10000	1.83	1005378.69	4839277.27
Eraaning	Nongalbibra	50	62.6	0.09	0.4	13000	2.03	1118976.17	5234045.6	-0.3	0	13000	2.37	1302747.1	6142024.37
Total						63000		5234045.6		Total		63000		6142024.37	

Table 14- Minimum & Maximum depth of class-III

Class-IV: - (Channel design: - Bottom width- 50 meter, Top width- 70 meter)



Location		Chainage (km)		As per Observed soundings						As per Reduced soundings					
From	To	From	To	Min. depth (m)	Max depth (m)	Length of Shoal (m)	Avg depth of Cut (m)	Dredging Qty. (Cubic Meter)	Cumulative Dredging Qty. (Cubic Meter)	Min. Depth (m)	Max Depth (m)	Length of Shoal (m)	Avg depth of Cut (m)	Dredging Qty. (Cubic Meter)	Cumulative Dredging Qty. (Cubic Meter)
Vabanipur	Gitinggre	0	10	0.002	11.45	10000	1.6	873490.98	873490.98	-0.2	10.3	10000	1.9	1054747.28	1054747.28
Gitinggre	Gokapepchan	10	20	0.091	10.23	10000	1.7	950664.58	1824155.56	-0.3	10.21	10000	2.0	1097408.72	2152156
Gokapepchandal	Jantagri	20	30	0.091	0.3	10000	2.0	1078765.11	2902920.67	-0.3	0	10000	2.2	1203784.52	3355940.52
Jantagri	Siju Rongmikgittim	30	40	0.091	0.3	10000	2.0	1127395.83	4030316.5	-0.3	0	10000	2.4	1294003.87	4649944.39
Siju Rongmikgittim	Eraaning	40	50	0.091	0.4	10000	1.9	1068817.66	5099134.16	-0.3	0	10000	2.2	1214578.55	5864522.94
Eraaning	Nongalbibra	50	62.6	0.08	0.4	13000	2.5	1371417.48	6470551.64	-0.3	0	13000	1.9	1564728.01	7429250.95
Total						63000		6470551.64		Total		63000		7429250.95	

Table 15- Minimum & Maximum depth of class-IV

Section 6: Conclusion

The surveyed stretch of Simsang River is 62.600 km in length and was not explored for any navigational possibility in earlier time. The River bank is mostly covered with dense forest, rocky islands, small hills etc. No Ferry Services are available in this zone of river. Garo, Khasi etc. communities are located in this zone who is hardly earning their lives by hunting, collecting honey in the woods. The right bank of the river is moderately connected with roads (RCC) and other infrastructures than the left bank. The settlements are thickly populated on the right bank where as the left bank is sparsely distributed. However, there is a good scope for developing tourism along the entire stretch of Simsang. The river bed of Simsang River is mainly sandy in nature with isolated incident of small scale and conventional sand/Gravel mining by the local peoples. The nature of the bed level is rocks and Boulders in some places. The river banks of entire stretch are covered with vegetation and beyond that cultivation is prominent. Encroachment was observed in many parts of the river banks. The water flow of the river is not obstructed from top to bottom of the entire stretch. The average water velocity during the survey period is around 0.80 m/s. The cargo transportation is connected with wooden bridge, RCC Bridge, Steel Bridge etc. No Railway line has been found in this zone of river. Nokrek national park, Siju Bird Sanctuary, Hoolock Gibon Reserve, Balpakram National Park, Katta Beel, Pelga falls, Ghasura Park, Rongdong Falls are famous wildlife sanctuary cum tourist spot in this zone of river. Baghmara, Siju, Nongalbibra are the important places situated in this zone of river.

The Cargo transportation is well connected with NH-62, NH-127B which is the strong cargo transportation system in this zone of river. Besides, SH- 1, SH- 4 and SH- 10 are also situated in this zone of river But there were lots of possibility to improve the cargo transportation by Rail, Ferry service and roads which are really very helpful for daily communication and transportation system.

6.1 Dredging Volume:-

Class Details	As per Observed Soundings (Cubic meter)	As per Reduced Soundings (Cubic meter)
Class I	2028826.95	2540023.18
Class II	3278754.34	3973837.91
Class III	5234045.6	6142024.37
Class IV	6470551.64	7429250.95

Annexure:-

Annexure-1: Source and type of data collected from various agencies:-

The Topography survey has been considered by GPS observation process. No established Chart Datum has been found in this zone of river.

Annexure-2: Min. / max. Depth, length of shoal per km-wise for different classification in the designed dredged channel:-

Class-I:-

Chainage (km)		As per Observed Soundings					As per Reduced Soundings				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cubic meter)	Cumulative Dredging Qty (cubic meter)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cubic meter)	Cumulative Dredging Qty (cubic meter)
0	1	0.1	1.75	1000	13359.76	13359.76	-0.2	1.44	1000	20112.44	20112.44
1	2	0.31	1.02	1000	19194.16	32553.92	0.1	0.88	1000	29835.33	49947.77
2	3	0.2	1.25	1000	27253.51	59807.43	0.2	0.88	1000	35727.2	85674.97
3	4	0.2	0.71	1000	37030.45	96837.88	0.15	0.5	1000	42010.87	127685.84
4	5	0.15	1.6	1000	34010.18	130848.06	0.15	1.08	1000	44856.81	172542.65
5	6	0.31	1.6	1000	26691.6	157539.66	0.2	1.08	1000	41084.48	213627.13
6	7	0.31	0.91	1000	25264.25	182803.91	0.31	0.62	1000	36824.26	250451.39
7	8	0.08	1.45	1000	14404.92	197208.83	0.15	1.05	1000	26827.38	277278.77
8	9	0.3	11.42	1000	12533.18	209742.01	0.15	10.2	1000	21712.32	298991.09
9	10	0.7	1.17	1000	21823.56	231565.57	0.2	0.77	1000	35054.89	334045.98
10	11	0.5	1.05	1000	24201.37	255766.94	0.3	0.9	1000	38457.05	372503.03
11	12	0.7	5.42	1000	24478.7	280245.64	0.2	5	1000	37296.31	409799.34
12	13	0.2	10.21	1000	2827.03	283072.67	-0.3	9.52	1000	6968.78	416768.12
13	14	0.2	0.4	1000	14193.76	297266.43	-0.3	0	1000	17593.53	434361.65
14	15	0.1	1.4	1000	32382.79	329649.22	-0.3	0	1000	39463.6	473825.25
15	16	0.1	1.4	1000	34656.76	364305.98	-0.3	0	1000	41183.56	515008.81
16	17	0.1	0.3	1000	42264.55	406570.53	-0.3	0	1000	51681.02	566689.83
17	18	0.1	0.3	1000	36758.78	443329.31	-0.3	0	1000	43398.54	610088.37
18	19	0.1	0.3	1000	36229.26	479558.57	-0.3	0	1000	42297.12	652385.49
19	20	0.1	0.3	1000	30208.23	509766.8	-0.3	0	1000	35575.81	687961.3
20	21	0.1	0.3	1000	34810.25	544577.05	-0.3	0	1000	42252.26	730213.56
21	22	0.1	0.3	1000	34939.45	579516.5	-0.3	0	1000	40982.96	771196.52
22	23	0.1	0.3	1000	34470.16	613986.66	-0.3	0	1000	41480.72	812677.24
23	24	0.1	0.3	1000	37365.17	651351.83	-0.3	0	1000	44941.57	857618.81
24	25	0.1	0.3	1000	34976.65	686328.48	-0.3	0	1000	41070.24	898689.05
25	26	0.1	0.3	1000	41813.62	728142.1	-0.3	0	1000	53817.67	952506.72
26	27	0.1	0.3	1000	34915.27	763057.37	-0.3	0	1000	39998.45	992505.17
27	28	0.1	0.3	1000	32238.63	795296	-0.3	0	1000	37500.27	1030005.44
28	29	0.1	0.3	1000	29843.88	825139.88	-0.3	0	1000	34971.97	1064977.41

Chainage (km)		As per Observed Soundings					As per Reduced Soundings				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cubic meter)	Cumulative Dredging Qty (cubic meter)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cubic meter)	Cumulative Dredging Qty (cubic meter)
29	30	0.1	0.3	1000	32068.29	857208.17	-0.3	0	1000	37353.38	1102330.79
30	31	0.1	0.3	1000	32556.11	889764.28	-0.3	0	1000	38275.83	1140606.62
31	32	0.1	0.3	1000	32943.84	922708.12	-0.3	0	1000	39117.4	1179724.02
32	33	0.1	0.3	1000	41481.74	964189.86	-0.3	0	1000	52462.89	1232186.91
33	34	0.1	0.3	1000	45219.32	1009409.18	-0.3	0	1000	57667.51	1289854.42
34	35	0.1	0.3	1000	41937.03	1051346.21	-0.3	0	1000	54118.39	1343972.81
35	36	0.1	0.3	1000	40920.25	1092266.46	-0.3	0	1000	52285.83	1396258.64
36	37	0.1	0.3	1000	40392.56	1132659.02	-0.3	0	1000	49796.28	1446054.92
37	38	0.1	0.3	1000	33488.37	1166147.39	-0.3	0	1000	39362.3	1485417.22
38	39	0.1	0.3	1000	35250.46	1201397.85	-0.3	0	1000	43344.93	1528762.15
39	40	0.1	0.3	1000	40439.13	1241836.98	-0.3	0	1000	52056.46	1580818.61
40	41	0.1	0.3	1000	38003.16	1279840.14	-0.3	0	1000	45300.35	1626118.96
41	42	0.1	0.3	1000	31650.5	1311490.64	-0.3	0	1000	37350.43	1663469.39
42	43	0.1	0.3	1000	34925.15	1346415.79	-0.3	0	1000	41416.11	1704885.5
43	44	0.1	0.3	1000	36756.78	1383172.57	-0.3	0	1000	43806.55	1748692.05
44	45	0.1	0.3	1000	35666.57	1418839.14	-0.3	0	1000	43209.73	1791901.78
45	46	0.1	0.3	1000	41909.64	1460748.78	-0.3	0	1000	54124.15	1846025.93
46	47	0.1	0.4	1000	32467.59	1493216.37	-0.3	0	1000	38804.25	1884830.18
47	48	0.1	0.3	1000	37668.51	1530884.88	-0.3	0	1000	45654	1930484.18
48	49	0.1	0.3	1000	35423.11	1566307.99	-0.3	0	1000	43164.48	1973648.66
49	50	0.1	0.3	1000	13936.38	1580244.37	-0.3	0	1000	17678.44	1991327.1
50	51	0.1	0.4	1000	8885.64	1589130.01	-0.3	0	1000	9707.06	2001034.16
51	52	0.1	0.3	1000	22061.29	1611191.3	-0.3	0	1000	25369.22	2026403.38
52	53	0.1	0.4	1000	33354.54	1644545.84	-0.3	0	1000	40591.91	2066995.29
53	54	0.1	0.3	1000	31867.37	1676413.21	-0.3	0	1000	37917.43	2104912.72
54	55	0.1	0.3	1000	34202.95	1710616.16	-0.3	0	1000	40166.81	2145079.53
55	56	0.1	0.3	1000	42090.57	1752706.73	-0.3	0	1000	53623.94	2198703.47
56	57	0.1	0.3	1000	39031.35	1791738.08	-0.3	0	1000	47657.44	2246360.91
57	58	0.1	0.3	1000	36387.15	1828125.23	-0.3	0	1000	44367.75	2290728.66
58	59	0.1	0.3	1000	39145.76	1867270.99	-0.3	0	1000	48095.86	2338824.52
59	60	0.1	0.3	1000	36604.3	1903875.29	-0.3	0	1000	44346.59	2383171.11
60	61	0.1	0.3	1000	41932.33	1945807.62	-0.3	0	1000	54161.85	2437332.96
61	62	0.1	0.3	1000	43207.07	1989014.69	-0.3	0	1000	53569.21	2490902.17
62	62.6	0.1	0.3	1000	39812.26	2028826.95	-0.3	0	1000	49121.01	2540023.18
Total				63000	2028826.95		Total		63000	2540023.18	

Table 16-Dredging Calculation for Class-I

Class-II:-

Chainage (km)		As per Observed soundings					As per Reduced soundings				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cubic meter)	Cumulative Dredging Qty (cubic meter)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cubic meter)	Cumulative Dredging Qty (cubic meter)
0	1	0.098	1.8	1000	25576.58	25576.58	-0.2	1.5	1000	35187.26	35187.26
1	2	0.307	1.03	1000	35163.57	60740.15	0.1	0.9	1000	49026.92	84214.18
2	3	0.198	1.07	1000	45304.33	106044.48	0.1	0.9	1000	56597.83	140812.01
3	4	0.003	0.73	1000	57827.7	163872.18	0.001	0.7	1000	64391.82	205203.83
4	5	0.003	1.8	1000	53874.13	217746.31	0.001	0.6	1000	68171.27	273375.1
5	6	0.307	1.8	1000	46823.66	264569.97	0.1	1.6	1000	65510.55	338885.65
6	7	0.307	0.93	1000	43030.41	307600.38	0.2	0.7	1000	58578.76	397464.41
7	8	0.011	1.46	1000	29118.78	336719.16	0.011	1.05	1000	46205	443669.41
8	9	0.299	11.44	1000	25806.91	362526.07	0.011	10.3	1000	38857.28	482526.69
9	10	0.697	1.2	1000	39394.02	401920.09	0.2	7.3	1000	56726.64	539253.33
10	11	0.11	1.08	1000	43532.96	445453.05	0.011	0.9	1000	61868.39	601121.72
11	12	0.698	5.45	1000	45030.93	490483.98	0.3	0.5	1000	61603.69	662725.41
12	13	0.199	10.23	1000	9019.77	499503.75	-0.3	10.11	1000	16572.97	679298.38
13	14	0.197	0.4	1000	26995.04	526498.79	-0.3	0	1000	31993.5	711291.88
14	15	0.099	0.4	1000	52562.24	579061.03	-0.3	0	1000	62149.94	773441.82
15	16	0.097	0.4	1000	55223.58	634284.61	-0.3	0	1000	64196.49	837638.31
16	17	0.097	0.3	1000	65156.89	699441.5	-0.3	0	1000	77882.93	915521.24
17	18	0.098	0.3	1000	58048.9	757490.4	-0.3	0	1000	67101.99	982623.23
18	19	0.098	0.3	1000	56908.72	814399.12	-0.3	0	1000	65229.21	1047852.44
19	20	0.098	0.3	1000	49670.35	864069.47	-0.3	0	1000	57161.64	1105014.08
20	21	0.097	0.3	1000	55315.02	919384.49	-0.3	0	1000	65319.31	1170333.39
21	22	0.097	0.3	1000	55596.49	974980.98	-0.3	0	1000	63707.03	1234040.42
22	23	0.097	0.3	1000	55246.92	1030227.9	-0.3	0	1000	64849.95	1298890.37
23	24	0.097	0.3	1000	58744.33	1088972.23	-0.3	0	1000	68648.09	1367538.46
24	25	0.097	0.3	1000	55329.28	1144301.51	-0.3	0	1000	63486.4	1431024.86
25	26	0.098	0.3	1000	63700.7	1208002.21	-0.3	0	1000	79169.47	1510194.33
26	27	0.097	0.3	1000	55693.24	1263695.45	-0.3	0	1000	62465.21	1572659.54
27	28	0.098	0.3	1000	52520.75	1316216.2	-0.3	0	1000	59883.01	1632542.55
28	29	0.098	0.3	1000	49322.43	1365538.63	-0.3	0	1000	56312.52	1688855.07
29	30	0.097	0.3	1000	53580.48	1419119.11	-0.3	0	1000	61062.02	1749917.09
30	31	0.098	0.3	1000	52215.66	1471334.77	-0.3	0	1000	60073.61	1809990.7
31	32	0.097	0.3	1000	53241.15	1524575.92	-0.3	0	1000	61806.58	1871797.28
32	33	0.097	0.3	1000	63228.62	1587804.54	-0.3	0	1000	77382.43	1949179.71
33	34	0.098	0.3	1000	68882.65	1656687.19	-0.3	0	1000	85054.87	2034234.58
34	35	0.097	0.3	1000	63876.06	1720563.25	-0.3	0	1000	79464.13	2113698.71

Chainage (km)		As per Observed soundings					As per Reduced soundings				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cubic meter)	Cumulative Dredging Qty (cubic meter)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cubic meter)	Cumulative Dredging Qty (cubic meter)
35	36	0.097	0.3	1000	62377.02	1782940.27	-0.3	0	1000	77123.63	2190822.34
36	37	0.097	0.3	1000	63230.77	1846171.04	-0.3	0	1000	75766.87	2266589.21
37	38	0.097	0.3	1000	54496.41	1900667.45	-0.3	0	1000	62801.92	2329391.13
38	39	0.097	0.3	1000	55858.02	1956525.47	-0.3	0	1000	66624.17	2396015.3
39	40	0.097	0.3	1000	62088.29	2018613.76	-0.3	0	1000	77022.3	2473037.6
40	41	0.097	0.3	1000	60644.43	2079258.19	-0.3	0	1000	70722.57	2543760.17
41	42	0.097	0.3	1000	52680.86	2131939.05	-0.3	0	1000	60894	2604654.17
42	43	0.098	0.3	1000	56351.41	2188290.46	-0.3	0	1000	65793.17	2670447.34
43	44	0.097	0.3	1000	59919.09	2248209.55	-0.3	0	1000	70206.32	2740653.66
44	45	0.097	0.3	1000	57304.49	2305514.04	-0.3	0	1000	68091.15	2808744.81
45	46	0.097	0.3	1000	63834.04	2369348.08	-0.3	0	1000	79539.01	2888283.82
46	47	0.097	0.4	1000	53984.21	2423332.29	-0.3	0	1000	63445.75	2951729.57
47	48	0.097	0.3	1000	60478.96	2483811.25	-0.3	0	1000	72060.26	3023789.83
48	49	0.097	0.3	1000	56923.78	2540735.03	-0.3	0	1000	67922.2	3091712.03
49	50	0.097	0.3	1000	25350.18	2566085.21	-0.3	0	1000	30351.69	3122063.72
50	51	0.098	0.4	1000	16130.5	2582215.71	-0.3	0	1000	17929.71	3139993.43
51	52	0.097	0.3	1000	36844.88	2619060.59	-0.3	0	1000	41863.94	3181857.37
52	53	0.097	0.4	1000	53259.29	2672319.88	-0.3	0	1000	63073.61	3244930.98
53	54	0.098	0.3	1000	53172.82	2725492.7	-0.3	0	1000	62154.98	3307085.96
54	55	0.098	0.3	1000	56392.14	2781884.84	-0.3	0	1000	65069.34	3372155.3
55	56	0.097	0.3	1000	64155.84	2846040.68	-0.3	0	1000	79142.4	3451297.7
56	57	0.097	0.3	1000	60980.22	2907020.9	-0.3	0	1000	73086.79	3524384.49
57	58	0.098	0.3	1000	59902.54	2966923.44	-0.3	0	1000	71462.74	3595847.23
58	59	0.098	0.3	1000	61111.02	3028034.46	-0.3	0	1000	73513.2	3669360.43
59	60	0.097	0.3	1000	58620.2	3086654.66	-0.3	0	1000	69826.04	3739186.47
60	61	0.098	0.3	1000	63868.35	3150523.01	-0.3	0	1000	79592.13	3818778.6
61	62	0.097	0.3	1000	66540.34	3217063.35	-0.3	0	1000	80570.1	3899348.7
62	62.6	0.091	0.3	1000	61690.99	3278754.34	-0.3	0	1000	74489.21	3973837.91
Total				63000	3278754.34		Total		63000	3973837.91	

Table 17-Dredging Calculation for Class-II

Class-III:-

Chainage (km)		As per Observed soundings					As per Reduced soundings				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cubic meter)	Cumulative Dredging Qty (cubic meter)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cubic meter)	Cumulative Dredging Qty (cubic meter)
0	1	0.096	1.8	1000	48501.91	48501.91	-0.2	1.5	1000	60718.12	60718.12
1	2	0.304	1.03	1000	62473.34	110975.25	0.1	0.9	1000	79470.12	140188.24
2	3	0.196	1.27	1000	74372.09	185347.34	0.1	0.9	1000	88829.14	229017.38
3	4	0.002	0.73	1000	89694.17	275041.51	0.1	0.7	1000	98053.31	327070.69
4	5	0.002	1.8	1000	84636.79	359678.3	0.1	1.6	1000	102737.82	429808.51
5	6	0.304	1.8	1000	79383.97	439062.27	0.1	1.6	1000	102539.85	532348.36
6	7	0.304	0.93	1000	72620.76	511683.03	0.2	0.7	1000	92545.48	624893.84
7	8	0.011	1.46	1000	55733.1	567416.13	0.001	1.1	1000	77473.85	702367.69
8	9	0.298	11.44	1000	50215.26	617631.39	0.001	10.3	1000	67956.93	770324.62
9	10	0.694	1.2	1000	68052.25	685683.64	0.2	7.3	1000	89328.91	859653.53
10	11	0.11	1.08	1000	75018.48	760702.12	0.001	0.9	1000	97410.99	957064.52
11	12	0.696	5.45	1000	78223.47	838925.59	0.3	5	1000	98698.47	1055762.99
12	13	0.198	10.23	1000	24044.87	862970.46	-0.3	10.11	1000	36969.46	1092732.45
13	14	0.194	0.4	1000	51959.42	914929.88	-0.3	0	1000	58876.19	1151608.64
14	15	0.098	0.4	1000	83964.29	998894.17	-0.3	0	1000	96554.52	1248163.16
15	16	0.094	0.4	1000	86850.32	1085744.49	-0.3	0	1000	98866.36	1347029.52
16	17	0.094	0.3	1000	99315.66	1185060.15	-0.3	0	1000	115910.49	1462940.01
17	18	0.096	0.3	1000	90312.18	1275372.33	-0.3	0	1000	102463.54	1565403.55
18	19	0.096	0.3	1000	88485.99	1363858.32	-0.3	0	1000	99561.92	1664965.47
19	20	0.096	0.3	1000	80736.6	1444594.92	-0.3	0	1000	90895.54	1755861.01
20	21	0.094	0.3	1000	87035.69	1531630.61	-0.3	0	1000	100029.11	1855890.12
21	22	0.094	0.3	1000	87330.75	1618961.36	-0.3	0	1000	98137.92	1954028.04
22	23	0.094	0.3	1000	87279.13	1706240.49	-0.3	0	1000	100147.8	2054175.84
23	24	0.094	0.3	1000	91678.73	1797919.22	-0.3	0	1000	104278.35	2158454.19
24	25	0.094	0.3	1000	86905.7	1884824.92	-0.3	0	1000	97601.66	2256055.85
25	26	0.096	0.3	1000	96309.99	1981134.91	-0.3	0	1000	115528.24	2371584.09
26	27	0.094	0.3	1000	88021.03	2069155.94	-0.3	0	1000	96732.14	2468316.23
27	28	0.096	0.3	1000	84228.76	2153384.7	-0.3	0	1000	94481.33	2562797.56
28	29	0.096	0.3	1000	80413.53	2233798.23	-0.3	0	1000	89748.89	2652546.45
29	30	0.094	0.3	1000	87837.89	2321636.12	-0.3	0	1000	98487.09	2751033.54
30	31	0.096	0.3	1000	82783.78	2404419.9	-0.3	0	1000	93223.75	2844257.29
31	32	0.094	0.3	1000	84853.43	2489273.33	-0.3	0	1000	96507.48	2940764.77
32	33	0.094	0.3	1000	95635.62	2584908.95	-0.3	0	1000	113312.42	3054077.19
33	34	0.096	0.3	1000	104119.74	2689028.69	-0.3	0	1000	124353.41	3178430.6
34	35	0.094	0.3	1000	96541.46	2785570.15	-0.3	0	1000	115867.99	3294298.59

Chainage (km)		As per Observed soundings					As per Reduced soundings				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cubic meter)	Cumulative Dredging Qty (cubic meter)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cubic meter)	Cumulative Dredging Qty (cubic meter)
35	36	0.094	0.3	1000	94328.32	2879898.47	-0.3	0	1000	112755.19	3407053.78
36	37	0.094	0.3	1000	97960.2	2977858.67	-0.3	0	1000	114222.63	3521276.41
37	38	0.094	0.3	1000	86958.17	3064816.84	-0.3	0	1000	98428.67	3619705.08
38	39	0.094	0.3	1000	87261.82	3152078.66	-0.3	0	1000	101089.92	3720795
39	40	0.094	0.3	1000	94526.22	3246604.88	-0.3	0	1000	113103.58	3833898.58
40	41	0.094	0.3	1000	95141.61	3341746.49	-0.3	0	1000	108769.32	3942667.9
41	42	0.094	0.3	1000	85130.61	3426877.1	-0.3	0	1000	96830.51	4039498.41
42	43	0.096	0.3	1000	89112.52	3515989.62	-0.3	0	1000	102150.66	4141649.07
43	44	0.094	0.3	1000	94904.91	3610894.53	-0.3	0	1000	109183.42	4250832.49
44	45	0.094	0.3	1000	89748.1	3700642.63	-0.3	0	1000	104312.14	4355144.63
45	46	0.094	0.3	1000	96477.96	3797120.59	-0.3	0	1000	115964.77	4471109.4
46	47	0.094	0.4	1000	86513.79	3883634.38	-0.3	0	1000	99700.06	4570809.46
47	48	0.094	0.3	1000	94511.39	3978145.77	-0.3	0	1000	109966.52	4680775.98
48	49	0.094	0.3	1000	89143.5	4067289.27	-0.3	0	1000	103829.91	4784605.89
49	50	0.094	0.3	1000	47780.16	4115069.43	-0.3	0	1000	54671.38	4839277.27
50	51	0.096	0.4	1000	30216.79	4145286.22	-0.3	0	1000	33243.31	4872520.58
51	52	0.094	0.3	1000	64420.21	4209706.43	-0.3	0	1000	71690.26	4944210.84
52	53	0.094	0.4	1000	84608.44	4294314.87	-0.3	0	1000	97455.73	5041666.57
53	54	0.096	0.3	1000	85582.71	4379897.58	-0.3	0	1000	98300.77	5139967.34
54	55	0.096	0.3	1000	91025.61	4470923.19	-0.3	0	1000	103310.55	5243277.89
55	56	0.094	0.3	1000	97015.29	4567938.48	-0.3	0	1000	115784.3	5359062.19
56	57	0.094	0.3	1000	93889.43	4661827.91	-0.3	0	1000	109818.98	5468881.17
57	58	0.096	0.3	1000	94989.6	4756817.51	-0.3	0	1000	110592.08	5579473.25
58	59	0.096	0.3	1000	93857.07	4850674.58	-0.3	0	1000	110074.63	5689547.88
59	60	0.094	0.3	1000	91386.14	4942060.72	-0.3	0	1000	106338.46	5795886.34
60	61	0.096	0.3	1000	96529.91	5038590.63	-0.3	0	1000	116039.38	5911925.72
61	62	0.094	0.3	1000	101176.51	5139767.14	-0.3	0	1000	119246.91	6031172.63
62	62.6	0.09	0.3	1000	94278.46	5234045.6	-0.3	0	1000	110851.74	6142024.37
Total				63000	5234045.6		Total		63000	6142024.37	

Table 18-Dredging Calculation for Class-III

Class-IV:-

Chainage (km)		As per Observed Soundings					As per Reduced Soundings				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Cumulative Dredging Qty. (cubic meter)	Cumulative Dredging Qty. (cubic meter)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cubic meter)	Cumulative Dredging Qty. (cubic meter)
0	1	0.094	1.9	1000	64606.33	64606.33	-0.2	1.5	1000	76028.03	76028.03
1	2	0.301	1.03	1000	82996.35	147602.68	0.1	0.9	1000	100500.71	176528.74
2	3	0.194	1.27	1000	90036.35	237639.03	0.1	0.9	1000	105954.38	282483.12
3	4	0.002	0.73	1000	109352.9	346991.93	0.001	0.7	1000	117543.54	400026.66
4	5	0.002	1.8	1000	107333.4	454325.33	0.001	1.6	1000	126248.66	526275.32
5	6	0.301	1.8	1000	98961.59	553286.92	0.1	1.6	1000	122954.88	649230.2
6	7	0.301	0.93	1000	94196.96	647483.88	0.2	0.7	1000	114963.7	764193.9
7	8	0.011	1.48	1000	72728.1	720211.98	0.001	1.1	1000	95727.37	859921.27
8	9	0.297	11.45	1000	72520.3	792732.28	0.001	10.3	1000	92939.59	952860.86
9	10	0.691	1.3	1000	80758.7	873490.98	0.2	7.3	1000	101886.42	1054747.28
10	11	0.13	1.09	1000	94625.07	968116.05	0.011	0.9	1000	118092.2	1172839.48
11	12	0.694	5.45	1000	101743.36	1069859.41	0.3	5.1	1000	123319.4	1296158.88
12	13	0.197	10.23	1000	38254.35	1108113.76	-0.3	10.21	1000	53697.88	1349856.76
13	14	0.191	0.6	1000	66112.79	1174226.55	-0.3	0	1000	73699.58	1423556.34
14	15	0.097	0.4	1000	105636.84	1279863.39	-0.3	0	1000	119657.78	1543214.12
15	16	0.091	0.4	1000	105992.09	1385855.48	-0.3	0	1000	118563.39	1661777.51
16	17	0.091	0.3	1000	119069.95	1504925.43	-0.3	0	1000	135799.84	1797577.35
17	18	0.094	0.3	1000	111936.47	1616861.9	-0.3	0	1000	125538.85	1923116.2
18	19	0.094	0.3	1000	107258.13	1724120.03	-0.3	0	1000	118127.29	2041243.49
19	20	0.094	0.3	1000	100035.53	1824155.56	-0.3	0	1000	110912.51	2152156
20	21	0.091	0.3	1000	107662	1931817.56	-0.3	0	1000	122170.61	2274326.61
21	22	0.091	0.3	1000	106920.22	2038737.78	-0.3	0	1000	118225.54	2392552.15
22	23	0.091	0.3	1000	108832.04	2147569.82	-0.3	0	1000	122986.66	2515538.81
23	24	0.091	0.3	1000	113504.17	2261073.99	-0.3	0	1000	126720.52	2642259.33
24	25	0.091	0.3	1000	103628.8	2364702.79	-0.3	0	1000	113979.69	2756239.02
25	26	0.094	0.3	1000	116096.06	2480798.85	-0.3	0	1000	135909.15	2892148.17
26	27	0.091	0.3	1000	108739.82	2589538.67	-0.3	0	1000	117904.05	3010052.22
27	28	0.094	0.3	1000	104126.59	2693665.26	-0.3	0	1000	115075.86	3125128.08
28	29	0.094	0.3	1000	100062.35	2793727.61	-0.3	0	1000	110082.26	3235210.34
29	30	0.091	0.3	1000	109193.06	2902920.67	-0.3	0	1000	120730.18	3355940.52
30	31	0.094	0.3	1000	102666.65	3005587.32	-0.3	0	1000	113806.7	3469747.22
31	32	0.091	0.3	1000	104325.77	3109913.09	-0.3	0	1000	116646.57	3586393.79
32	33	0.091	0.3	1000	115553.4	3225466.49	-0.3	0	1000	135060.16	3721453.95
33	34	0.094	0.3	1000	125507.91	3350974.4	-0.3	0	1000	145676.68	3867130.63
34	35	0.091	0.3	1000	116769.6	3467744	-0.3	0	1000	136988.33	4004118.96
35	36	0.091	0.3	1000	113668.29	3581412.29	-0.3	0	1000	133276.7	4137395.66

Chainage (km)		As per Observed Soundings					As per Reduced Soundings				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Cumulative Dredging Qty. (cubic meter)	Cumulative Dredging Qty. (cubic meter)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cubic meter)	Cumulative Dredging Qty. (cubic meter)
36	37	0.091	0.3	1000	119128.53	3700540.82	-0.3	0	1000	135862.19	4273257.85
37	38	0.091	0.3	1000	106834.15	3807374.97	-0.3	0	1000	119622.98	4392880.83
38	39	0.091	0.3	1000	106878.37	3914253.34	-0.3	0	1000	121124.97	4514005.8
39	40	0.091	0.3	1000	116063.16	4030316.5	-0.3	0	1000	135938.59	4649944.39
40	41	0.091	0.3	1000	114856.68	4145173.18	-0.3	0	1000	128652.46	4778596.85
41	42	0.091	0.3	1000	105175.07	4250348.25	-0.3	0	1000	118024.13	4896620.98
42	43	0.094	0.3	1000	109172.21	4359520.46	-0.3	0	1000	122872.98	5019493.96
43	44	0.091	0.3	1000	116111.21	4475631.67	-0.3	0	1000	131389.1	5150883.06
44	45	0.091	0.3	1000	109426.25	4585057.92	-0.3	0	1000	124668.44	5275551.5
45	46	0.091	0.3	1000	116720.51	4701778.43	-0.3	0	1000	137074.35	5412625.85
46	47	0.091	0.4	1000	106094.11	4807872.54	-0.3	0	1000	120240.47	5532866.32
47	48	0.091	0.3	1000	115289.86	4923162.4	-0.3	0	1000	131561.59	5664427.91
48	49	0.091	0.3	1000	108896.24	5032058.64	-0.3	0	1000	124431.61	5788859.52
49	50	0.091	0.3	1000	67075.52	5099134.16	-0.3	0	1000	75663.42	5864522.94
50	51	0.094	0.4	1000	44650.95	5143785.11	-0.3	0	1000	48373.78	5912896.72
51	52	0.091	0.3	1000	77673.58	5221458.69	-0.3	0	1000	84012.1	5996908.82
52	53	0.091	0.4	1000	104374.96	5325833.65	-0.3	0	1000	117999.7	6114908.52
53	54	0.094	0.3	1000	105432.07	5431265.72	-0.3	0	1000	119245.51	6234154.03
54	55	0.094	0.3	1000	112402.56	5543668.28	-0.3	0	1000	125341.34	6359495.37
55	56	0.091	0.3	1000	117036.33	5660704.61	-0.3	0	1000	136613.05	6496108.42
56	57	0.091	0.3	1000	114151.45	5774856.06	-0.3	0	1000	130968.02	6627076.44
57	58	0.094	0.3	1000	116450.45	5891306.51	-0.3	0	1000	132997.7	6760074.14
58	59	0.094	0.3	1000	113693.06	6004999.57	-0.3	0	1000	130811.01	6890885.15
59	60	0.091	0.3	1000	111511.8	6116511.37	-0.3	0	1000	127320.25	7018205.4
60	61	0.094	0.3	1000	116471.85	6232983.22	-0.3	0	1000	136852.32	7155057.72
61	62	0.091	0.3	1000	122418.06	6355401.28	-0.3	0	1000	141426.05	7296483.77
62	62.6	0.08	0.3	1000	115150.36	6470551.64	-0.3	0	1000	132767.18	7429250.95
Total				63000	6470551.64		Total		63000	7429250.95	

Table 19-Dredging Calculation for Class-IV

Annexure-3 Observed depth in 200 meter interval:-

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Observed		Observed		Observed		Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
0	0.1	0.3	0.098	0.3	0.096	0.3	0.094	0.3
200	0.85	1.35	0.847	1.36	0.844	1.36	0.841	1.37
400	1.51	1.75	1.509	1.8	1.508	1.8	1.507	1.9
600	0.71	0.82	0.708	0.82	0.706	0.82	0.704	0.82
800	0.71	0.97	0.707	0.99	0.704	0.99	0.701	0.99
1000	0.71	0.8	0.709	0.8	0.708	0.8	0.707	0.9
1200	0.71	0.79	0.708	0.81	0.706	0.81	0.704	0.81
1400	0.31	0.71	0.307	0.73	0.304	0.73	0.301	0.74
1600	0.71	0.74	0.709	0.76	0.708	0.76	0.707	0.76
1800	0.71	1.02	0.708	1.03	0.706	1.03	0.704	1.03
2000	0.71	0.94	0.707	0.97	0.704	0.97	0.701	0.97
2200	0.71	1.14	0.709	1.16	0.708	1.16	0.707	1.18
2400	0.71	0.82	0.708	0.85	0.706	0.85	0.704	0.85
2600	0.71	1.25	0.707	1.27	0.704	1.27	0.701	1.27
2800	0.71	0.82	0.709	0.82	0.708	0.82	0.707	0.82
3000	0.2	0.51	0.198	0.53	0.196	0.53	0.194	0.55
3200	0.3	0.71	0.297	0.73	0.294	0.73	0.291	0.73
3400	0.2	0.51	0.199	0.53	0.198	0.53	0.197	0.58
3600	0.55	0.71	0.548	0.73	0.546	0.73	0.544	0.73
3800	0.3	0.5	0.006	0.6	0.004	0.6	0.002	0.6
4000	0.2	0.4	0.003	0.5	0.002	0.5	0.002	0.6
4200	0.15	0.71	0.148	0.73	0.146	0.73	0.144	0.73
4400	0.71	1.51	0.707	1.53	0.704	1.53	0.701	1.53
4600	0.3	0.71	0.299	0.73	0.298	0.73	0.297	0.75
4800	0.71	0.77	0.708	0.78	0.706	0.78	0.704	0.78
5000	0.71	1.6	0.707	1.8	0.704	1.8	0.701	1.8
5200	0.45	0.71	0.449	0.73	0.448	0.73	0.447	0.74
5400	0.71	1	0.709	1.1	0.708	1.1	0.707	1.2
5600	0.31	0.71	0.308	0.73	0.306	0.73	0.304	0.75
5800	0.71	1.4	0.709	1.6	0.708	1.6	0.707	1.7
6000	0.31	0.91	0.307	0.92	0.304	0.92	0.301	0.92
6200	0.71	0.8	0.708	0.8	0.706	0.8	0.704	0.8
6400	0.51	0.75	0.509	0.77	0.508	0.77	0.507	0.78
6600	0.71	0.91	0.708	0.93	0.706	0.93	0.704	0.93
6800	0.71	0.8	0.709	0.9	0.708	0.9	0.707	0.9
7000	0.31	0.71	0.307	0.73	0.304	0.73	0.301	0.75
7200	0.71	0.08	0.708	0.011	0.706	0.011	0.704	0.011

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Observed		Observed		Observed		Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
7400	0.85	1.45	0.848	1.46	0.846	1.46	0.844	1.48
7600	0.31	1.05	0.309	1.07	0.308	1.07	0.307	1.07
7800	0.71	0.82	0.708	0.84	0.706	0.84	0.704	0.85
8000	0.55	0.71	0.547	0.73	0.544	0.73	0.541	0.75
8200	0.3	0.71	0.299	0.72	0.298	0.72	0.297	0.73
8400	0.71	1.06	0.707	1.08	0.704	1.08	0.701	1.08
8600	0.74	5.02	0.738	5.03	0.736	5.03	0.734	5.05
8800	1.85	11.42	1.849	11.44	1.848	11.44	1.847	11.45
9000	0.74	1.17	0.738	1.19	0.736	1.19	0.734	1.21
9200	0.71	1.15	0.709	1.17	0.708	1.17	0.707	1.19
9400	0.71	1	0.708	1.2	0.706	1.2	0.704	1.3
9600	0.7	0.88	0.697	0.91	0.694	0.91	0.691	0.92
9800	0.7	0.91	0.698	0.93	0.696	0.93	0.694	0.95
10000	0.71	0.8	0.707	0.85	0.704	0.85	0.701	0.85
10200	0.7	0.71	0.698	0.73	0.696	0.73	0.694	0.73
10400	0.5	0.74	0.499	0.76	0.498	0.76	0.497	0.78
10600	0.71	1.05	0.708	1.08	0.706	1.08	0.704	1.09
10800	0.7	0.8	0.697	0.11	0.694	0.11	0.691	0.13
11000	0.7	0.94	0.698	0.97	0.696	0.97	0.694	0.99
11200	0.7	1	0.699	1.2	0.698	1.2	0.697	1.2
11400	0.7	1.02	0.698	1.05	0.696	1.05	0.694	1.07
11600	0.9	2.31	0.898	2.32	0.896	2.32	0.894	2.33
11800	0.9	2.31	0.899	2.33	0.898	2.33	0.897	2.34
12000	3.02	5.42	3.018	5.45	3.016	5.45	3.014	5.45
12200	1.54	2.85	1.538	2.91	1.536	2.91	1.534	2.93
12400	0.85	10.21	0.849	10.23	0.848	10.23	0.847	10.23
12600	0.74	1.7	0.737	1.9	0.734	1.9	0.731	1.9
12800	0.7	0.85	0.698	0.91	0.696	0.91	0.694	0.93
13000	0.2	0.3	0.199	0.4	0.198	0.4	0.197	0.6
13200	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.4
13400	0.2	0.4	0.198	0.4	0.196	0.4	0.194	0.6
13600	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
13800	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
14000	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.4
14200	0.3	0.4	0.297	0.4	0.294	0.4	0.291	0.4
14400	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.3
14600	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
14800	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.4
15000	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.3

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Observed		Observed		Observed		Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
15200	0.3	0.4	0.298	0.4	0.296	0.4	0.294	0.4
15400	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
15600	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.3
15800	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
16000	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
16200	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
16400	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
16600	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
16800	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
17000	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
17200	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
17400	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
17600	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
17800	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
18000	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
18200	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
18400	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
18600	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
18800	0.1	0.3	0.098	0.3	0.096	0.3	0.094	0.3
19000	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
19200	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
19400	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
19600	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
19800	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
20000	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
20200	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
20400	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
20600	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
20800	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
21000	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
21200	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
21400	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
21600	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
21800	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
22000	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
22200	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
22400	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
22600	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
22800	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Observed		Observed		Observed		Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
23000	0.2	0.3	0.196	0.3	0.192	0.3	0.188	0.3
23200	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
23400	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
23600	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
23800	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
24000	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
24200	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
24400	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
24600	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
24800	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
25000	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
25200	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
25400	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
25600	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
25800	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
26000	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
26200	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
26400	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
26600	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
26800	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
27000	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
27200	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
27400	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
27600	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
27800	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
28000	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
28200	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
28400	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
28600	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
28800	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
29000	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
29200	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
29400	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
29600	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
29800	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
30000	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
30200	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
30400	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
30600	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Observed		Observed		Observed		Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
30800	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
31000	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
31200	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
31400	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
31600	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
31800	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
32000	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
32200	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
32400	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
32600	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
32800	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
33000	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
33200	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
33400	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
33600	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
33800	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
34000	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
34200	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
34400	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
34600	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
34800	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
35000	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
35200	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
35400	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
35600	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
35800	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
36000	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
36200	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
36400	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
36600	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
36800	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
37000	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
37200	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
37400	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
37600	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
37800	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
38000	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
38200	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
38400	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Observed		Observed		Observed		Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
38600	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
38800	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
39000	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
39200	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
39400	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
39600	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
39800	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
40000	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
40200	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
40400	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
40600	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
40800	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
41000	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
41200	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
41400	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
41600	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
41800	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
42000	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
42200	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
42400	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
42600	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
42800	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
43000	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
43200	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
43400	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
43600	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
43800	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
44000	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
44200	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
44400	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
44600	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
44800	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
45000	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
45200	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
45400	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
45600	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
45800	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
46000	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
46200	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Observed		Observed		Observed		Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
46400	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
46600	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
46800	0.3	0.4	0.298	0.4	0.296	0.4	0.294	0.4
47000	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
47200	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
47400	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
47600	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
47800	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
48000	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
48200	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
48400	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
48600	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
48800	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
49000	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
49200	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
49400	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
49600	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
49800	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
50000	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
50200	0.3	0.4	0.298	0.4	0.296	0.4	0.294	0.4
50400	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
50600	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
50800	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
51000	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
51200	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
51400	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
51600	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
51800	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
52000	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
52200	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
52400	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
52600	0.3	0.4	0.299	0.4	0.298	0.4	0.297	0.4
52800	0.3	0.4	0.299	0.4	0.298	0.4	0.297	0.4
53000	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
53200	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
53400	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
53600	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
53800	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
54000	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Observed		Observed		Observed		Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
54200	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
54400	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
54600	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
54800	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
55000	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
55200	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
55400	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
55600	0.1	0.3	0.099	0.3	0.098	0.3	0.097	0.3
55800	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
56000	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
56200	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
56400	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
56600	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
56800	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
57000	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
57200	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
57400	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
57600	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
57800	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
58000	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
58200	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
58400	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
58600	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
58800	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
59000	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
59200	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
59400	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
59600	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
59800	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
60000	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
60200	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
60400	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
60600	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
60800	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
61000	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
61200	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
61400	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
61600	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
61800	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Observed		Observed		Observed		Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
62000	0.2	0.3	0.099	0.3	0.098	0.3	0.097	0.3
62200	0.1	0.2	0.095	0.2	0.093	0.2	0.091	0.2
62400	0.2	0.3	0.1	0.3	0.095	0.3	0.094	0.3
62600	0.1	0.2	0.091	0.2	0.09	0.2	0.08	0.2

Table 20-Observed depth at 200 meter intervals

Annexure-4 Observed depth in 200 meter interval:-Reduced Depth in 200 meter interval:-

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Reduced		Reduced		Reduced		Reduced	
	Min	Max	Min	Max	Min	Max	Min	Max
0	-0.2	0.1	-0.2	0.1	-0.2	0.1	-0.2	0.1
200	0.66	1.44	0.3	1.5	0.3	1.5	0.3	1.5
400	0.51	1.35	0.3	1.4	0.3	1.4	0.3	1.4
600	0.2	0.31	0.1	0.7	0.1	0.7	0.1	0.7
800	0.31	0.42	0.3	0.6	0.3	0.6	0.3	0.7
1000	0.31	0.4	0.3	0.9	0.3	0.9	0.3	0.9
1200	0.31	0.7	0.3	0.7	0.2	0.7	0.2	0.7
1400	0.1	0.31	0.1	0.5	0.1	0.5	0.1	0.6
1600	0.2	0.31	0.2	0.6	0.2	0.6	0.2	0.6
1800	0.31	0.62	0.3	0.6	0.3	0.6	0.3	0.6
2000	0.31	0.88	0.3	0.9	0.3	0.9	0.3	0.9
2200	0.31	0.74	0.3	0.7	0.3	0.7	0.3	0.7
2400	0.31	0.74	0.3	0.7	0.3	0.7	0.3	0.7
2600	0.31	0.82	0.3	0.9	0.3	0.9	0.3	0.9
2800	0.31	0.4	0.2	0.9	0.2	0.9	0.2	0.9
3000	0.2	0.3	0.1	0.5	0.1	0.5	0.1	0.5
3200	0.2	0.5	0.2	0.6	0.2	0.7	0.2	0.7
3400	0.2	0.4	0.2	0.7	0.1	0.7	0.1	0.7
3600	0.15	0.31	0.001	0.4	0.001	0.4	0.001	0.4
3800	0.2	0.3	0.2	0.3	0.2	0.3	0.2	0.3
4000	0.2	0.3	0.2	0.4	0.2	0.4	0.2	0.4
4200	0.15	0.31	0.001	0.3	0.001	0.3	0.001	0.3
4400	0.31	1.08	0.3	1.1	0.3	1.1	0.3	1.1
4600	0.2	0.5	0.2	0.9	0.2	0.9	0.2	0.9
4800	0.31	0.34	0.3	0.5	0.3	0.5	0.3	0.5

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Reduced		Reduced		Reduced		Reduced	
	Min	Max	Min	Max	Min	Max	Min	Max
5000	0.31	1	0.3	1.6	0.3	1.6	0.3	1.6
5200	0.2	0.4	0.1	0.4	0.1	0.4	0.1	0.3
5400	0.31	0.51	0.3	0.6	0.3	0.6	0.3	0.6
5600	0.2	0.31	0.1	0.3	0.1	0.3	0.1	0.4
5800	0.31	1.08	0.3	1.2	0.3	1.2	0.3	1.2
6000	0.31	0.62	0.2	0.7	0.2	0.7	0.2	0.7
6200	0.31	0.4	0.3	0.4	0.3	0.5	0.3	0.5
6400	0.31	0.34	0.3	0.6	0.3	0.6	0.3	0.5
6600	0.31	0.54	0.3	0.4	0.3	0.7	0.3	0.6
6800	0.31	0.37	0.3	0.4	0.3	0.7	0.3	0.7
7000	0.31	0.54	0.3	0.6	0.3	0.6	0.3	0.6
7200	0.31	0.57	0.3	0.6	0.3	1.1	0.3	1.1
7400	0.61	1.05	0.4	1.05	0.4	1.05	0.3	1.05
7600	0.15	0.4	0.001	0.6	0.001	0.6	0.001	0.7
7800	0.31	0.45	0.3	0.6	0.3	0.6	0.3	0.6
8000	0.3	0.31	0.3	0.7	0.3	0.7	0.3	0.6
8200	0.3	0.31	0.3	1.7	0.3	1.7	0.3	1.7
8400	0.31	0.62	0.3	1.2	0.3	2.3	0.3	2.3
8600	0.15	4.85	0.001	5.4	0.001	5.4	0.001	5.4
8800	1.35	10.2	1.3	10.3	1.1	10.3	1.1	10.3
9000	0.34	0.77	0.3	7.3	0.3	7.3	0.3	7.3
9200	0.31	0.57	0.3	0.6	0.3	0.6	0.3	0.6
9400	0.3	0.6	0.3	0.6	0.3	0.6	0.3	0.7
9600	0.2	0.6	0.2	0.6	0.2	0.6	0.2	0.6
9800	0.2	0.7	0.2	0.8	0.2	0.8	0.2	0.8
10000	0.3	0.6	0.3	0.7	0.3	0.7	0.3	0.7
10200	0.3	0.5	0.3	0.5	0.3	0.5	0.3	0.5
10400	0.3	0.6	0.011	0.6	0.011	0.6	0.011	0.6
10600	0.3	0.6	0.3	0.7	0.3	0.7	0.3	0.7
10800	0.3	0.9	0.3	0.9	0.3	0.9	0.3	0.9
11000	0.3	0.4	0.3	0.4	0.3	0.6	0.3	0.6
11200	0.3	0.8	0.3	0.9	0.3	0.9	0.3	0.9
11400	0.3	0.6	0.3	0.6	0.3	0.6	0.3	0.6
11600	0.2	0.6	0.3	0.8	0.3	0.8	0.3	0.8
11800	0.5	1.9	0.5	1.9	0.3	1.9	0.3	1.9
12000	1.2	5	1.2	5	1	5	1	5.1
12200	0.4	4	0.4	5.4	0.4	5.4	0.4	5.4
12400	0.3	9.52	0.3	10.11	0.3	10.11	0.3	10.21
12600	0.3	1.6	0.3	1.6	0.3	1.6	0.3	1.6

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Reduced		Reduced		Reduced		Reduced	
	Min	Max	Min	Max	Min	Max	Min	Max
12800	0.3	0.6	0.3	0.6	0.3	0.6	0.3	0.6
13000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
13200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
13400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
13600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
13800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
14000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
14200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
14400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
14600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
14800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
15000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
15200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
15400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
15600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
15800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
16000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
16200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
16400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
16600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
16800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
17000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
17200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
17400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
17600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
17800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
18000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
18200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
18400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
18600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
18800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
19000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
19200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
19400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
19600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
19800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
20000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
20200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
20400	-0.3	0	-0.3	0	-0.3	0	-0.3	0

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Reduced		Reduced		Reduced		Reduced	
	Min	Max	Min	Max	Min	Max	Min	Max
20600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
20800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
21000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
21200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
21400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
21600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
21800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
22000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
22200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
22400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
22600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
22800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
23000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
23200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
23400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
23600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
23800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
24000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
24200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
24400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
24600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
24800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
25000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
25200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
25400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
25600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
25800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
26000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
26200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
26400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
26600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
26800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
27000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
27200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
27400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
27600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
27800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
28000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
28200	-0.3	0	-0.3	0	-0.3	0	-0.3	0

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Reduced		Reduced		Reduced		Reduced	
	Min	Max	Min	Max	Min	Max	Min	Max
28400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
28600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
28800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
29000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
29200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
29400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
29600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
29800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
30000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
30200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
30400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
30600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
30800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
31000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
31200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
31400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
31600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
31800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
32000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
32200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
32400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
32600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
32800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
33000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
33200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
33400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
33600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
33800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
34000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
34200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
34400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
34600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
34800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
35000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
35200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
35400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
35600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
35800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
36000	-0.3	0	-0.3	0	-0.3	0	-0.3	0

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Reduced		Reduced		Reduced		Reduced	
	Min	Max	Min	Max	Min	Max	Min	Max
36200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
36400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
36600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
36800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
37000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
37200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
37400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
37600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
37800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
38000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
38200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
38400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
38600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
38800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
39000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
39200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
39400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
39600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
39800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
40000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
40200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
40400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
40600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
40800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
41000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
41200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
41400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
41600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
41800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
42000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
42200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
42400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
42600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
42800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
43000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
43200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
43400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
43600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
43800	-0.3	0	-0.3	0	-0.3	0	-0.3	0

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Reduced		Reduced		Reduced		Reduced	
	Min	Max	Min	Max	Min	Max	Min	Max
44000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
44200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
44400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
44600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
44800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
45000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
45200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
45400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
45600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
45800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
46000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
46200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
46400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
46600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
46800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
47000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
47200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
47400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
47600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
47800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
48000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
48200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
48400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
48600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
48800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
49000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
49200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
49400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
49600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
49800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
50000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
50200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
50400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
50600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
50800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
51000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
51200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
51400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
51600	-0.3	0	-0.3	0	-0.3	0	-0.3	0

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Reduced		Reduced		Reduced		Reduced	
	Min	Max	Min	Max	Min	Max	Min	Max
51800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
52000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
52200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
52400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
52600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
52800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
53000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
53200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
53400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
53600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
53800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
54000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
54200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
54400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
54600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
54800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
55000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
55200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
55400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
55600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
55800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
56000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
56200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
56400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
56600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
56800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
57000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
57200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
57400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
57600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
57800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
58000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
58200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
58400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
58600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
58800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
59000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
59200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
59400	-0.3	0	-0.3	0	-0.3	0	-0.3	0

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Reduced		Reduced		Reduced		Reduced	
	Min	Max	Min	Max	Min	Max	Min	Max
59600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
59800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
60000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
60200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
60400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
60600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
60800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
61000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
61200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
61400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
61600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
61800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
62000	-0.3	0	-0.3	0	-0.3	0	-0.3	0

Table 21-Reduced depth at 200 mtre intervals

Annexure-5 Details of collected Water level of different gauge stations w.r.t. MSL (CWC, Irrigation, Ports, Maritime Boards, Observed stations during survey etc.) – Table indicating Chainage (zero at downstream) and following:-

Tide Pole name	Chainage (km)	Time	T. Reading (m)	Zero of TP w.r.t. MSL (m)	W.L w.r.t. MSL (m)	SD value w.r.t. MSL (m)	Corrected Tide (m)
			A	B	C = A+B	D	E = D-C
GS (TP) -1	2.402	24 hrs	0.28	15.903	16.183	15.783	-0.4
GS (TP) -2	3.552	24 hrs	0.32	16.398	16.718	16.318	-0.4
GS (TP) -3	8.75	24 hrs	0.35	16.765	17.115	16.715	-0.4
GS (TP) -4	12.4	24 hrs	0.37	17.35	17.72	17.32	-0.4
GS(TP) -4a	13.5	24 hrs	0.37	19.13	19.5	19.1	-0.4
GS (TP) -4b	14.5	24 hrs	0.37	21.63	22	21.6	-0.4
GS (TP) -4c	15.5	24 hrs	0.37	23.73	24.1	23.7	-0.4
GS (TP) -5	16.5	24 hrs	0.41	25.99	26.4	26	-0.4
GS (TP) -5a	17.5	24 hrs	0.41	28.29	28.7	28.3	-0.4
GS (TP) -5b	18.5	24 hrs	0.41	30.89	31.3	30.9	-0.4
GS (TP) -5c	19.5	24 hrs	0.41	32.99	33.4	33	-0.4
GS (TP) -5d	20.5	24 hrs	0.41	35.19	35.6	35.2	-0.4
GS (TP) -5f	21.5	24 hrs	0.41	37.69	38.1	37.7	-0.4
GS (TP) -5g	22.5	24 hrs	0.41	39.99	40.4	40	-0.4
GS (TP) -6	23	24 hrs	0.46	41.04	41.5	41.1	-0.4
GS (TP) -6a	24.5	24 hrs	0.46	44.44	44.9	44.5	-0.4
GS (TP) -6b	25.5	24 hrs	0.46	46.84	47.3	46.9	-0.4
GS (TP) -6c	26.5	24 hrs	0.46	49.24	49.7	49.3	-0.4
GS (TP) -7	27.705	24 hrs	0.51	51.695	52.205	51.805	-0.4
GS (TP) -7a	28.5	24 hrs	0.51	53.69	54.2	53.8	-0.4
GS (TP) -7b	29.5	24 hrs	0.51	55.99	56.5	56.1	-0.4
GS (TP) -7c	30.5	24 hrs	0.51	58.69	59.2	58.8	-0.4
GS (TP) -7d	31.5	24 hrs	0.51	60.79	61.3	60.9	-0.4
GS (TP) -7e	32.5	24 hrs	0.51	62.99	63.5	63.1	-0.4
GS (TP) -8	33.51	24 hrs	0.53	65.45	65.98	65.58	-0.4
GS (TP) -8a	34.5	24 hrs	0.53	67.37	67.9	67.5	-0.4
GS (TP) -8b	35.5	24 hrs	0.53	69.87	70.4	70	-0.4
GS (TP) -8c	36.5	24 hrs	0.53	72.17	72.7	72.3	-0.4
GS (TP) -9	38	24 hrs	0.56	75.54	76.1	75.7	-0.4
GS (TP) -9a	39.5	24 hrs	0.56	79.14	79.7	79.3	-0.4
GS (TP) -9b	40.5	24 hrs	0.56	81.24	81.8	81.4	-0.4
GS (TP) -9c	41.5	24 hrs	0.56	83.74	84.3	83.9	-0.4

Tide Pole name	Chainage (km)	Time	T. Reading (m)	Zero of TP w.r.t. MSL (m)	W.L w.r.t. MSL (m)	SD value w.r.t. MSL (m)	Corrected Tide (m)
GS (TP) -9d	42.5	24 hrs	0.56	86.04	86.6	86.2	-0.4
GS (TP) -10	43	24 hrs	0.61	87.29	87.9	87.5	-0.4
GS (TP) -10a	44.5	24 hrs	0.61	90.79	91.4	91	-0.4
GS (TP) -10b	45.5	24 hrs	0.61	93.19	93.8	93.4	-0.4
GS (TP) -10c	46.5	24 hrs	0.61	95.39	96	95.6	-0.4
GS (TP) -11	48	24 hrs	0.65	99.15	99.8	99.4	-0.4
GS (TP) -11a	49.5	24 hrs	0.65	102.45	103.1	102.7	-0.4
GS (TP) -11b	50.5	24 hrs	0.65	104.75	105.4	105	-0.4
GS (TP) -11c	51.5	24 hrs	0.65	107.25	107.9	107.5	-0.4
GS (TP) -11d	52.5	24 hrs	0.65	109.45	110.1	109.7	-0.4
GS (TP) -12	53	24 hrs	0.69	110.81	111.5	111.1	-0.4
GS (TP) -12a	54.5	24 hrs	0.69	113.91	114.6	114.2	-0.4
GS (TP) -12b	55.5	24 hrs	0.69	116.41	117.1	116.7	-0.4
GS (TP) -12c	56.5	24 hrs	0.69	118.51	119.2	118.8	-0.4
GS (TP) -12d	57.5	24 hrs	0.69	120.91	121.6	121.2	-0.4
GS (TP) -13	58	24 hrs	0.71	121.89	122.6	122.2	-0.4
GS (TP) -13a	59.5	24 hrs	0.71	125.49	126.2	125.8	-0.4
GS (TP) -13b	60.5	24 hrs	0.71	127.69	128.4	128	-0.4
GS (TP) -14	62.57	24 hrs	0.73	132.37	133.1	132.7	-0.4

Table 22- Details of Collected water level of Different gauge stations

Annexure-6 Details of Bathymetric surveys carried out:-

The layer of water in the river Simsang is not sufficient for carrying out the Bathymetry survey. The Total stretch of Bathymetry Survey is 0.00 km to 12.750 km.

Annexure-7 Bank Protection along the Bank:-

The bank of the river is generally protected by embankment and Boulder pitching. Boulder pitching and embankment have been protected both side in this river side. Rock and Boulders, dense forests are deeply situated in this zone of river. Besides, Nokrek National Park, Balpakram National park, Siju Bird sanctuary, Selbagre Hoolock Gibbon reserve at chandigre and dense forest side are also protected the bank of the river. However, in the rainy season, flood damages the crops (paddy field), RCC, Wooden Bridge etc. Due to this, the State Government has to incur heavy non plan expenditure for repairing of roads and bridges every year. To counteract the flood menace, permanent measures for protecting paddy fields, cultivation lands and habitats are necessary. As such, enhanced allocation is required for flood control projects.

Annexure-8 Details of Features across the Bank:-

The bank of the river includes with villages, agricultural field, Ferry ghat, Irrigation canals and outlets, Wooden Bridge, Bamboo Bridges, Electric lines, Forest etc. The both side river bank are highly protected by embankment and bolder pitching due to flood, erosion etc. The villagers are also situated near the bank side of the river. Recently different kinds of industries are also located near the bank side of the river. West Garo Hills, Tura peak, Nokrek National park have been situated in this zone of river and protected the river side. Baghmara, Siju, Nongalbibra etc. villages have been located in this zone of river.

Annexure-9 Detailed methodology adopted for carrying out survey. Horizontal Control and Vertical Details Control:-

- **Establishment of Horizontal Control:-**

  The Horizontal control for Topography surveys: - High precision RTK DGPS in fix mode is using UHF Radio Modem with IHO accuracy standards, with minimum 24 hours observations at some permanent platform/base.

  The Horizontal control for Bathymetry surveys: - DGPS is receiving corrections from Beacons.

Establishment of Vertical Control:-

Vertical control has been carried out using GPS observation, fixed as GPS-1 situated near the Baghmara Village is used for the entire Survey work. Its value is 134.195m w.r.t. MSL has been considered for calculating the vertical levels. Total 7 no. of GPS have been established along the 62 kms stretch of the Simsang River with the reference of GPS-1 Level, which was fixed near at Baghmara village.

Topography Survey:-

The survey was commenced on 10th March, 2017 and completed on 25 th March, 2017. Then the days was Summer season and the climate become sunny which reached about 32◦ C. Mostly day weather was sunny and was very favorable for the conduct of survey and the weather condition remains same for the entire duration of the survey.

The survey was undertaken as per the line plan provided and the spot level points in the cross line were spaced at 40 m interval. The plotting of the chart was done on UTM Projection at Zone 46 R as directed in the contract specifications. The spot levels along the river were obtained by using Trimble DGPS. The data was post processed using Trimble Business Center to get the precise position and MSL height values of the rover locations. The topographic survey for the entire survey stretch was conducted to collect the following data:-

- Spot levels
-Delineation of Islands
-Fixing of bridges and marks
-Assess the type of river bank
-Extending the vertical and horizontal control throughout the survey area
-Collection of local information along the river Banks

Topographic survey Equipments: South (S86T) GNSS RTK, Total Station was used for conducting the topographic survey.

South RTK (S86T) satellite navigation is a technique used in land survey and in hydrographic survey based on the use of carrier phase measurements of the GPS, GLONASS and / or Galileo signals where a single reference station provides the real-time corrections, providing up to centimeter-level accuracy. When referring to GPS in particular, the system is also commonly referred to as Carrier-Phase Enhancement, CPGPS. RTK systems use a single base station receiver and a number of mobile units. The base station re-broadcasts the phase of the carrier that it measured, and the mobile units compare their own phase measurements with the ones received from the base station. There are several ways to transmit a correction signal from base station to mobile station. The most popular way to achieve real-time, low-cost signal transmission is to use a radio modem, typically in the UHF band. This allows the units to calculate their relative position to millimeters, although their absolute position is accurate only to the same accuracy as the position of the base station.

RTK systems are available in dual-frequency and single-frequency versions. Dual-frequency systems deliver greater precision, faster and over longer baselines than single-frequency systems. Leica GS09 & GS12 GNSS RTK that used for the survey contains dual-frequency requires antenna and controller to suit any surveying task with a wide range of functionality. Leica GS09 & GS12 GNSS RTK Rover is extremely light-weight and cable free rover is comfortable to use and with stand even for rough use and topple over. It uses a single base station receiver and a number of mobile units. The base station re-broadcasts the phase of the carrier that it measured, and the mobile units compare their own phase measurements with the ones received from the base station. So, that centimeter level accuracy can be achieved from latitude, longitude and altitude. RTK technique in terms of general navigation, it is perfectly suited to roles like surveying. In this case, the base station is located at a known surveyed location, often a benchmark, and the mobile units can then produce a highly accurate map by taking fixes relative to that point. RTK has also found uses in auto drive/autopilot systems, precision farming and similar roles.

Figure 15-Topography Survey Instrument

- **Bathymetry Survey:-**

The bathymetry survey was carried out using Bathy 500 portable shallow water Echo sounder supported by DGPS Beacon Receiver and HYPACK Data collection and processing software. The survey equipment was installed as per the standard procedure the survey vessel equipped with safety gears.

Bathy- 500MF Echo sounder: The Bathy- 500MF Echo sounder is an electronic hydrographic survey instrument used for measuring depths with precision chart recordings and digital data output manufactured by Syqwest Incorporated, USA. The Bathy-500 echo sounding systems are based on the principle that when a sound signal is sent into the water it will be reflected back when it strikes an object. The Bathy-500 is technologically sophisticated, utilizing modern, micro processor based electronics and a thermal chart recorder mechanism. Digital processing enables the instrument to offer fully automatic digitizing capabilities. When interfaced to a NMEA 0183 compatible position sensor, it provides user with a complete, integrated hydrographic survey environment. The instrument front panel consists of a high contrast, backlit four line LCD displays and a fully sealed input keypad. The front panel encompassing system data, status and setup parameters with RS232/RS422 output format. All operating functions are set via the front panel interface. Setup selections are stored within internal, non-volatile memory for instant availability upon power-up. The instrument decodes and processes the NMEA 0183 formatted sentence GGA or GLL from GPS/DGPS using variable Baud rates for communication.

Figure 16- Bathymetry Survey Instrument

Annexure-10 Photographs of Equipment:-

Following equipments were employed for the Bathymetry and Topography survey:-

Equipment	Make	Version	Qty Employed
Echo sounder	Bathy MF 500	……	1
Current Meter	AEM 213-D	……	1
Tide Gauge	Manual (Pole type)	-	4
RTK	South S86T		3
GPS Sets	Trimble –Becon Rover SPS 361		1
Software	HYPACK data acquisition	Version 14	1
Software	AUTOCAD	2013	1
Software	Microsoft Office	2013	1

Survey Vessel:-

The bathymetric survey was conducted using one motorized boat. This boat was also used to collect water sample, current velocity, soil sample etc.

Figure 17 Survey Boat

- **Positioning System:-**

- **1 no Trimble DGPS system (SPS361)**

Figure 18 DGPS System Instrument

- **Navigation & Data Logging System:-**

  To provide on-line route guidance, log navigation data, provide QC of navigation data, etc. The system comprises the following equipment:

  - **1 no. DELL Laptop**
  - **1 no. Hypack version 2014 Navigation & Data Logging Software**
  - **1 no. Positioning & sensor interfaces**
  - **Sufficient Paper Rolls**

- **Single Beam Echo Sounder System:-**

  - **1 no. Bathy 500MF multi frequency Echo sounder**
  - **1 no. transducer 210 kHz + mounting bracket & base plate**

Figure 19 Echo Sounder Instrument

- **Current Meter:-**
  - **1 no. current meter (**AEM 213-D**) was used during water velocity**
  - **observation**

- **Calibration**

The equipments used for the survey were calibrated by the equipment supplier. The equipment calibration certificates are placed at ***Annexure*** to this report.

Annexure-11 Bench Mark Forms:-

BM Name	Easting (m)	Northing (m)	Latitude (N)	Longitude (E)	RL (m)
GPS-S-1	262202.680	2788982.668	25°11'53.58"	90°38'24.31"	134.195
Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal Date of Establishment – 15.03.17					
Station Description :-					
Benchmark is located near Baghmara village. The BM is denoted by a "." Mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm. The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar.					
Life of Station : 15 Yrs	**Datum: - WGS 84**			**ZONE : 46 R**	

Figure 20 - Google image view of GPS-S-1

BM Name	Easting (m)	Northing (m)	Latitude (N)	Longitude (E)	RL (m)
GPS- S-2	262187.818	2788967.728	25°11'53.05"	90°38'23.75"	139.327
Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal Date of Establishment – 17.03.17					
Station Description :-					
Benchmark is located near Baghmara village,. The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm. The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No.can be seen on the face of the pillar.					
Life of Station : 15Yrs	**Datum: - WGS 84**			**ZONE : 46 R**	

Figure 21- Google image view of GPS-S-2

BM Name	Easting (m)	Northing (m)	Latitude (N)	Longitude (E)	RL (m)
GPS- S-3	261256.844	2790189.169	25°12'32.21"	90°37'49.74"	27.534
Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal Date of Establishment – 18.03.17					
Station Description :-					
Benchmark is located near at Arapara village. The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5 cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm. The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar.					
Life of Station : 15Yrs	**Datum: - WGS 84**			**ZONE : 46 R**	

Figure 22- Google image view of GPS-S-3

BM Name	Easting (m)	Northing (m)	Latitude (N)	Longitude (E)	RL (m)
GPS-S-4	262260.343	2795201.115	25°15'15.59"	90°38'22.48"	160.910

Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal
Date of Establishment – 20.03.17

Station Description :-

Benchmark is located near Rongbatgittim village.

The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.

The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar.

Life of Station : 15Yrs	Datum: - WGS 84	ZONE : 46 R

Figure 23- Google image view of GPS-S-4

BM Name	Easting (m)	Northing (m)	Latitude (N)	Longitude (E)	RL (m)
GPS-S-5	263981.299	2802658.467	25°19'18.80"	90°39'19.26"	172.367

Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal
Date of Establishment – 21.03.17

Station Description :-

Benchmark is located near at Jantagri village.

The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.

The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar.

Life of Station : 15Yrs	Datum: - WGS 84	ZONE : 46 R

Figure 24- Google image view of GPS-S-5

BM Name	Easting (m)	Northing (m)	Latitude (N)	Longitude (E)	RL (m)
GPS-S-6	267437.451	2806942.458	25°21'39.88"	90°41'20.13"	381.847
Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal Date of Establishment – 22.03.17					
Station Description :-					
Benchmark is located near at Siju village. The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm. The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar.					
Life of Station : 15Yrs	**Datum: - WGS 84**			**ZONE : 46 R**	

Figure 25- Google image view of GPS-S- 6

BM Name	Easting (m)	Northing (m)	Latitude (N)	Longitude (E)	RL (m)
GPS-S-7	269249.114	2817353.036	25°27'19.15"	90°42'18.54"	154.519

Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal
Date of Establishment – 22.03.17

Station Description :-

Benchmark is located near at Nongalbibra village.

The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.

The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar.

Life of Station : 15Yrs	Datum: - WGS 84	ZONE : 46 R

Figure 26- BM Form & Google image view of GPS-S-7

Annexure-12 Levelling Calculation:

Leveling from GS-1 to GPS-S-3

BS	IS	FS	RISE (+)	FALL (-)	RL	REMARKS
0.488					27.534	GPS S3
0.347		2.925		2.437	25.097	
0.582		2.457		2.110	22.987	
0.325		2.348		1.766	21.221	
0.458		2.489		2.164	19.057	
		3.332		2.874	16.183	GS-1

Table 23- Leveling Calculation of Simsang River

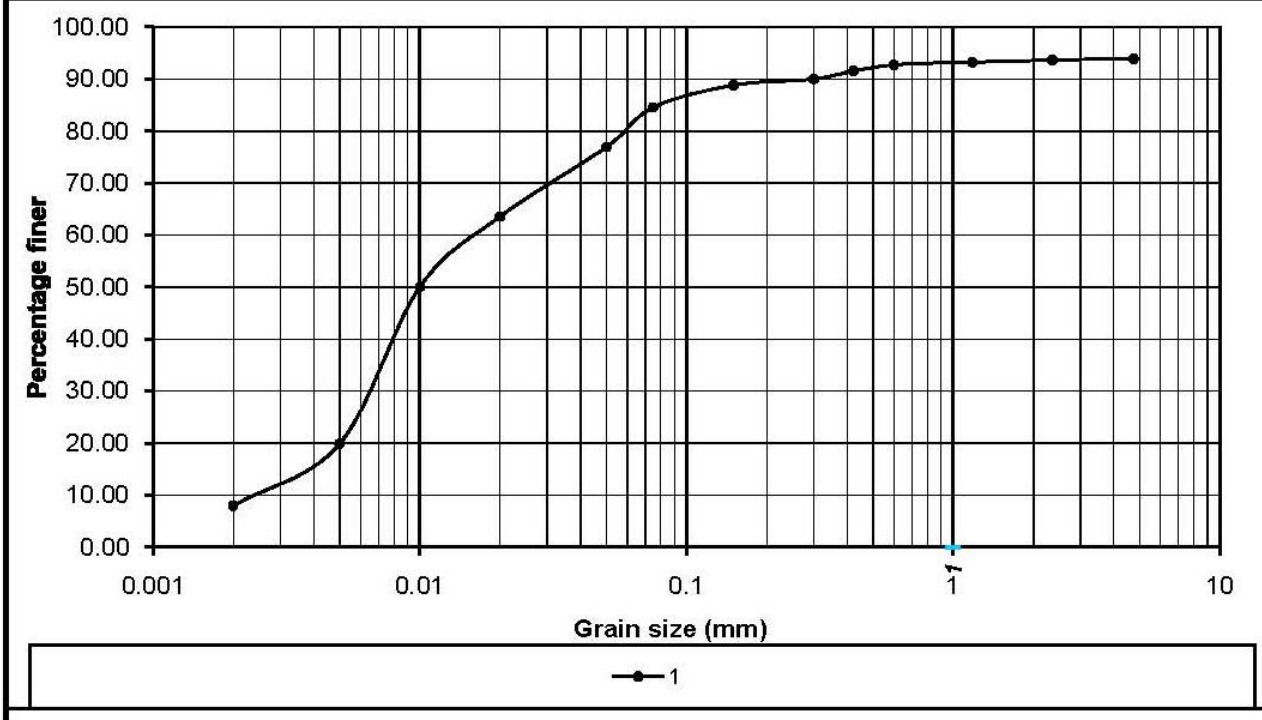
Annexure-13 Soil Sample:-

RESULT OF TEST OF SOIL SAMPLES

SITE: SIMSANG RIVER

RESULTS OF TEST OF SOIL SAMPLES										
SITE-SIMSANG RIVER										
PHYSICAL ANALYSIS OF SOIL										
SL. NO	B.M	GRAVEL (%)	SAND (%)	SILT+CLAY (%)	SPECIFIC GRAVITY	PH VALUE	SILT (%)	CLAY (%)	Cu	Cc
1	1	6.10	29.92	63.98	2.66	7.30	56.00	7.98	6.72	1.01
2	2	12.68	23.10	64.22	2.65	7.40	55.12	9.10	7.83	1.51
3	3	22.98	14.20	62.82	2.64	7.50	54.24	8.58	8.44	1.35
4	4	17.42	20.01	62.57	2.63	7.60	53.36	9.21	5.86	1.72
5	5	13.98	26.86	59.16	2.62	7.70	52.48	6.68	5.99	1.15
6	6	19.90	18.65	61.45	2.61	7.80	51.60	9.85	5.67	1.45

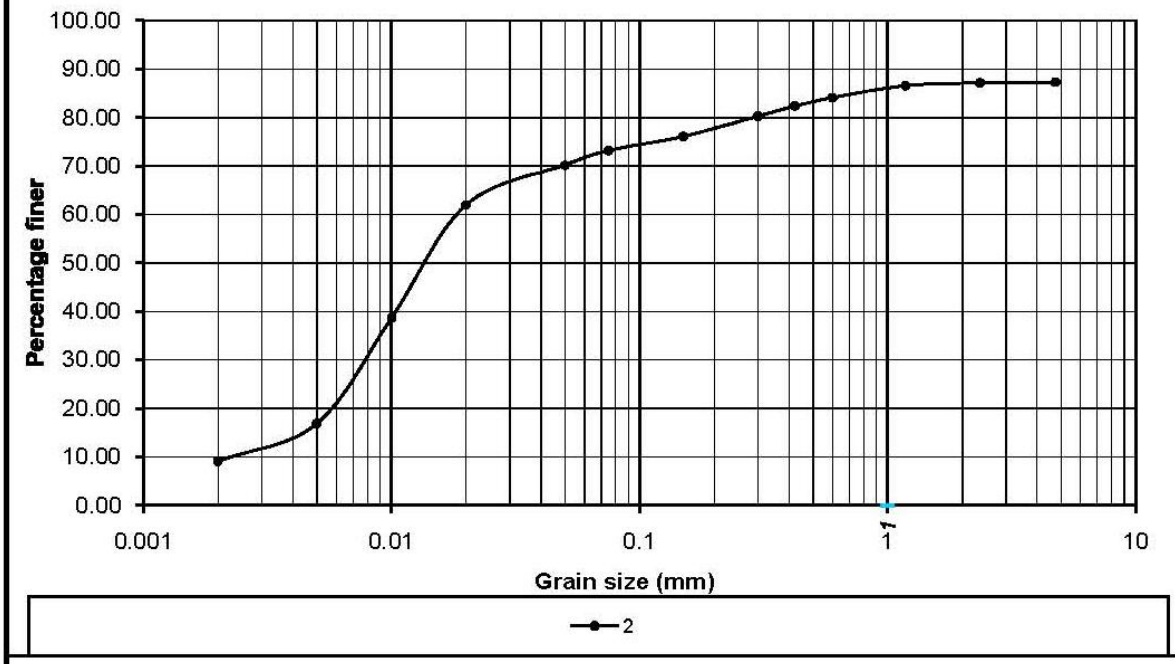
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
1	7.98	56.00	29.92	6.10

*Silt & Clay

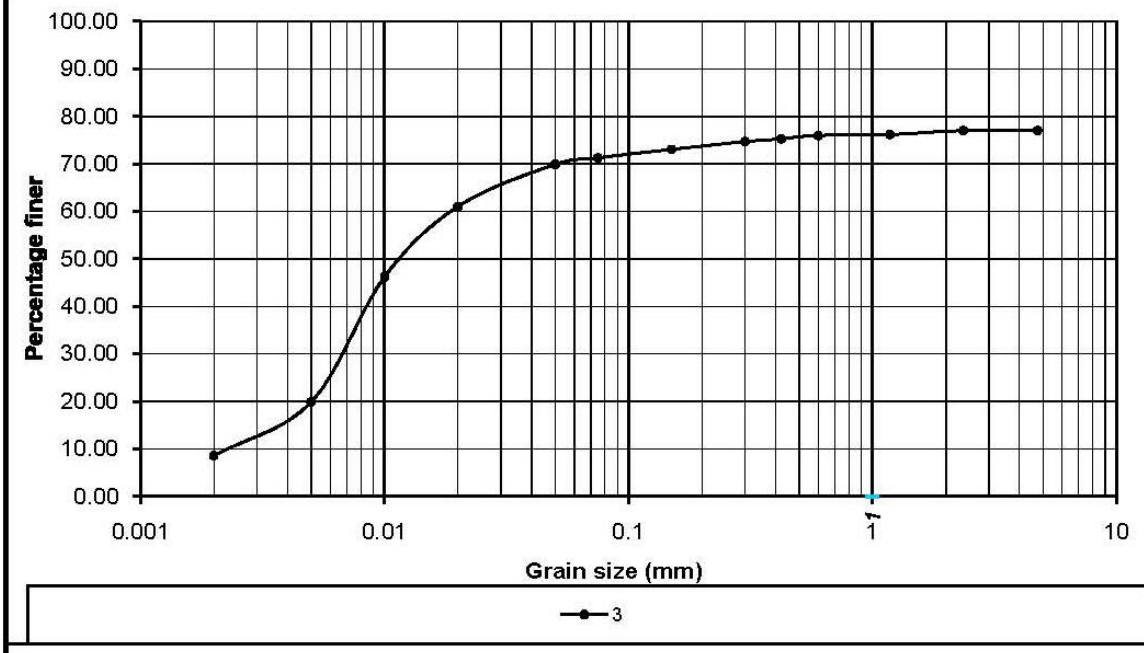
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
2	9.10	55.12	23.10	12.68

*Silt & Clay

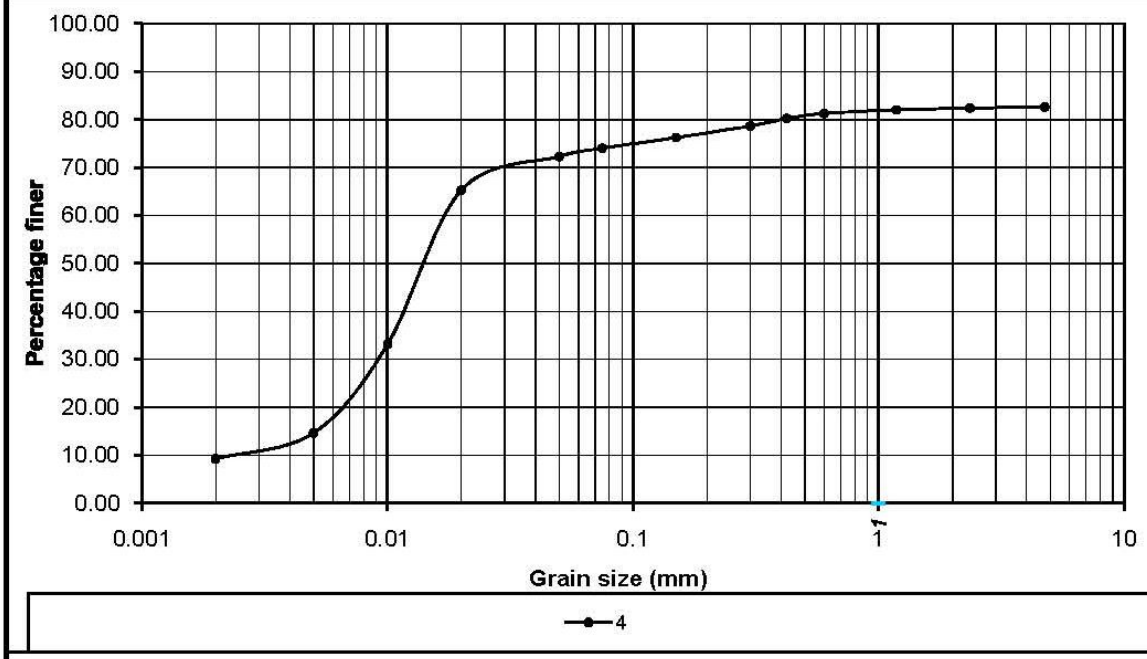
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
3	8.58	54.24	14.20	22.98

*Silt & Clay

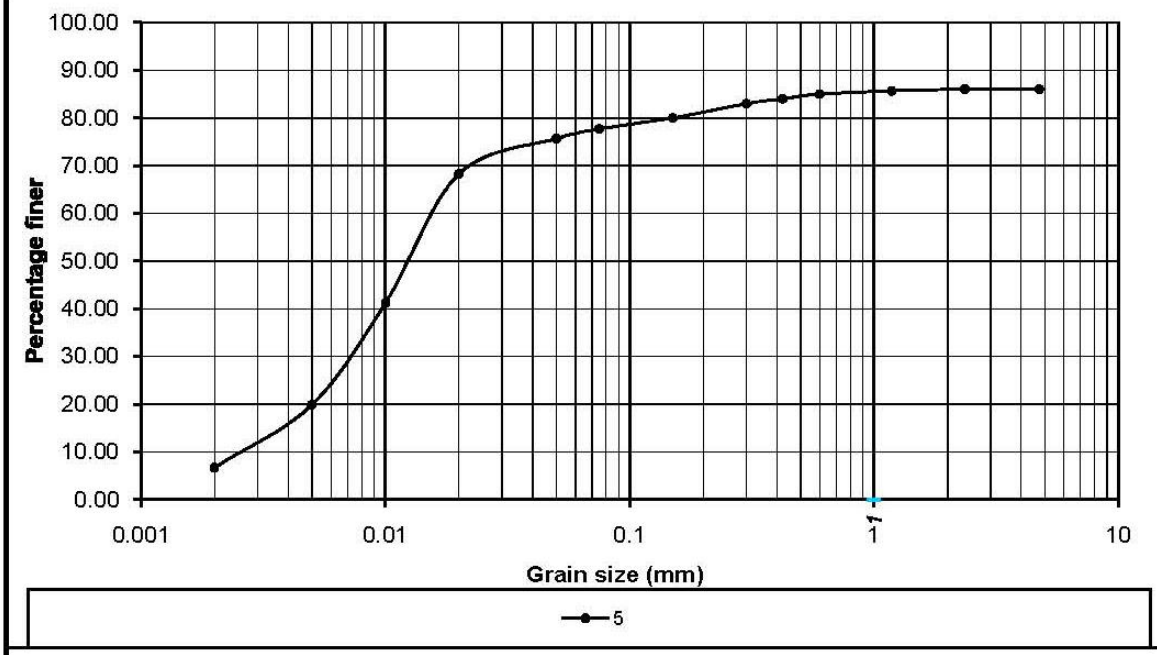
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
4	9.21	53.36	20.01	17.42

*Silt & Clay

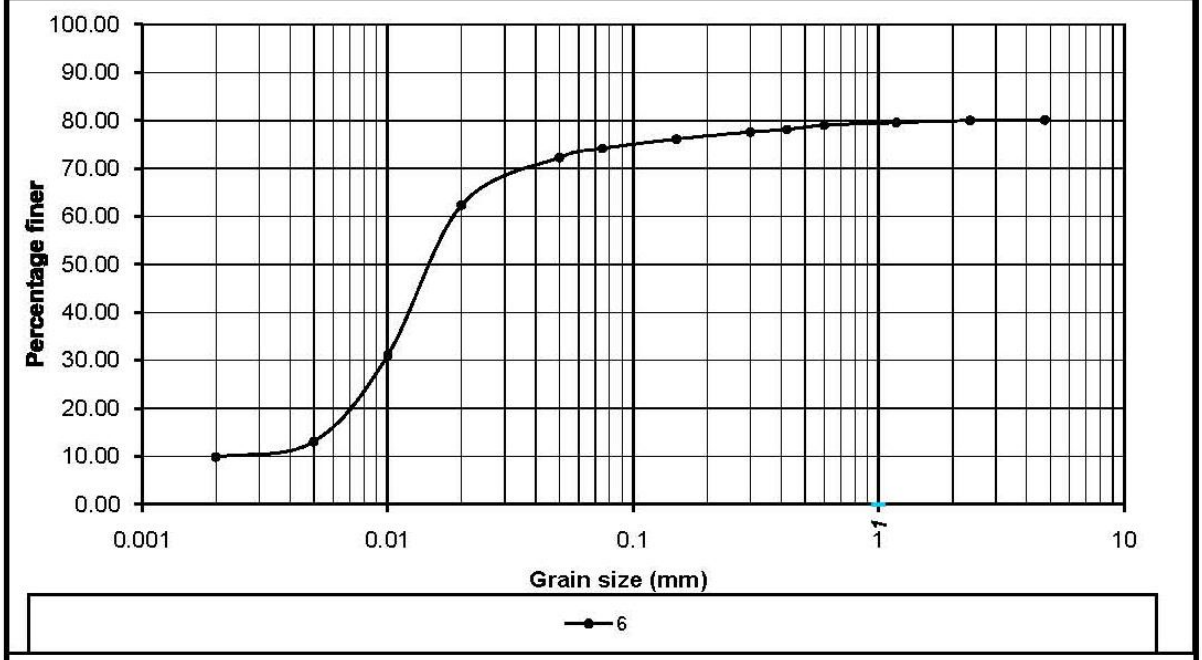
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
5	6.68	52.48	26.86	13.98

*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
6	9.85	51.60	18.65	19.90

*Silt & Clay

Annexure-14 Water Sample:-

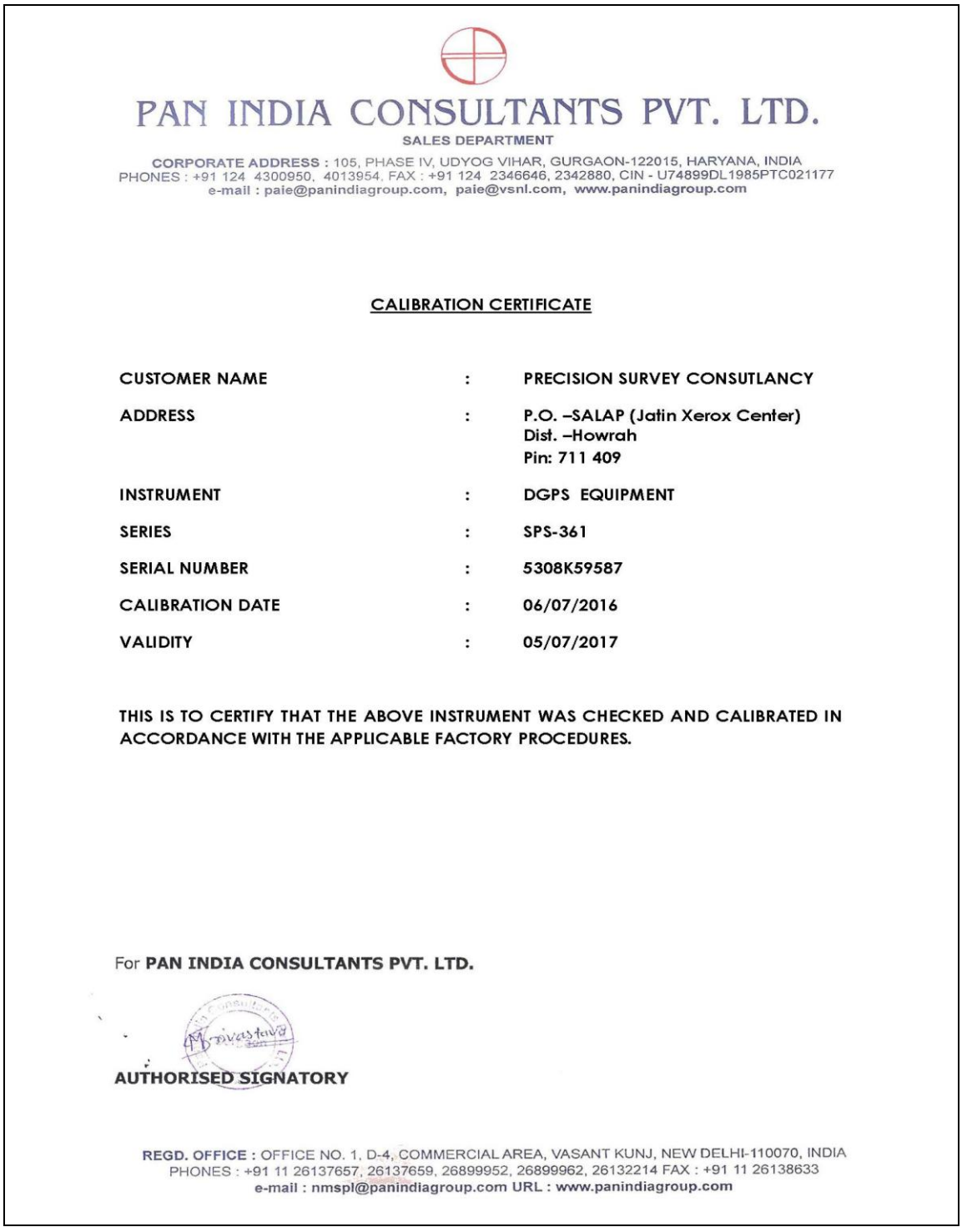
RESULTS OF EXAMINATION OF SAMPLES OF WATER					
SITE-SIMSANG RIVER					
PARAMETER-Ph value at 25^0C					
SL. NO	B.M	LOCATION	PARAMETER	WATER SAMPLE RESULTS	PERMISSIBLE LIMIT IS:456-2000
1	1	UPPER	pH value at 25^0C	6.9	6.5-8.5
2		MIDDLE		6.7	
3		LOWER		6.2	
4	2	UPPER		6.8	
5		MIDDLE		6.7	
6		LOWER		6.3	

SITE-SIMSANG RIVER					
PARAMETER-Chloride as Cl (mg/l)					
SL. NO	B.M	LOCATION	PARAMETER	WATER SAMPLE RESULTS	PERMISSIBLE LIMIT IS:456-2000
1	1	UPPER	Chloride as Cl (mg/l)	3	2000mg/l for concrete not containing embedded steel and 500 mg/l for reinforced concrete work
2		MIDDLE		2	
3		LOWER		3	
4	2	UPPER		2	
5		MIDDLE		2	
6		LOWER		3	

SITE-SIMSANG RIVER					
PARAMETER-Sulphate as SO_4 (mg/l)					
SL. NO	**B.M**	**LOCATION**	**PARAMETER**	**WATER SAMPLE RESULTS**	**PERMISSIBLE LIMIT IS:456-2000**
1	1	UPPER	Sulphate as SO_4	94	400 (mg/l)
2		MIDDLE		94	
3		LOWER		92	
4	2	UPPER		95	
5		MIDDLE		94	
6		LOWER		93	

SITE-SIMSANG RIVER					
PARAMETER-Sediment Concentration as(mg/l)					
SL. NO	**B.M**	**LOCATION**	**PARAMETER**	**WATER SAMPLE RESULTS**	**PERMISSIBLE LIMIT IS:456-2000**
1	1	UPPER	Sediment concentration (mg/l)	55	2000 (mg/l)
2		MIDDLE		20	
3		LOWER		38	
4	2	UPPER		52	
5		MIDDLE		22	
6		LOWER		39	

Annexure-15 Calibration Certificate:-



PAN INDIA CONSULTANTS PVT. LTD.

SALES DEPARTMENT

CORPORATE ADDRESS : 105, PHASE IV, UDYOG VIHAR, GURGAON-122015, HARYANA, INDIA
PHONES : +91 124 4300950, 4013954, FAX : +91 124 2346646, 2342880, CIN - U74899DL1985PTC021177
e-mail : paie@panindiagroup.com, paie@vsnl.com, www.panindiagroup.com

CALIBRATION CERTIFICATE

CUSTOMER NAME	:	PRECISION SURVEY CONSUTLANCY
ADDRESS	:	P.O. –SALAP (Jatin Xerox Center) Dist. –Howrah Pin: 711 409
INSTRUMENT	:	DGPS EQUIPMENT
SERIES	:	SPS-361
SERIAL NUMBER	:	5308K59587
CALIBRATION DATE	:	06/07/2016
VALIDITY	:	05/07/2017

THIS IS TO CERTIFY THAT THE ABOVE INSTRUMENT WAS CHECKED AND CALIBRATED IN ACCORDANCE WITH THE APPLICABLE FACTORY PROCEDURES.

For PAN INDIA CONSULTANTS PVT. LTD.

AUTHORISED SIGNATORY

REGD. OFFICE : OFFICE NO. 1, D-4, COMMERCIAL AREA, VASANT KUNJ, NEW DELHI-110070, INDIA
PHONES : +91 11 26137657, 26137659, 26899952, 26899962, 26132214 FAX : +91 11 26138633
e-mail : nmspl@panindiagroup.com URL : www.panindiagroup.com

Figure 27- Calibration Certificate of DGPS

PAN INDIA CONSULTANTS PVT. LTD.

SALES DEPARTMENT

CORPORATE ADDRESS : 105, PHASE IV, UDYOG VIHAR, GURGAON-122015, HARYANA, INDIA
PHONES : +91 124 4300950, 4013954, FAX : +91 124 2346646, 2342880, CIN - U74899DL1985PTC021177
e-mail : paie@panindiagroup.com, paie@vsnl.com, www.panindiagroup.com

CALIBRATION CERTIFICATE

CUSTOMER NAME	:	PRECISION SURVEY CONSUTLANCY
ADDRESS	:	P.O. –SALAP, P.S.-Vichitra SP-45,KWIC NH-6, Dist. –Howrah Pin: 711 403 W.B
INSTRUMENT	:	Echo Sounder
SERIES	:	Bathy 500 MF
SERIAL NO.	:	B5MF0560
CALIBRATION DATE	:	23/08/2016
VALIDITY	:	22/08/2017

THIS IS TO CERTIFY THAT THE ABOVE INSTRUMENT WAS CHECKED AND CALIBRATED IN ACCORDANCE WITH THE APPLICABLE FACTORY PROCEDURES.

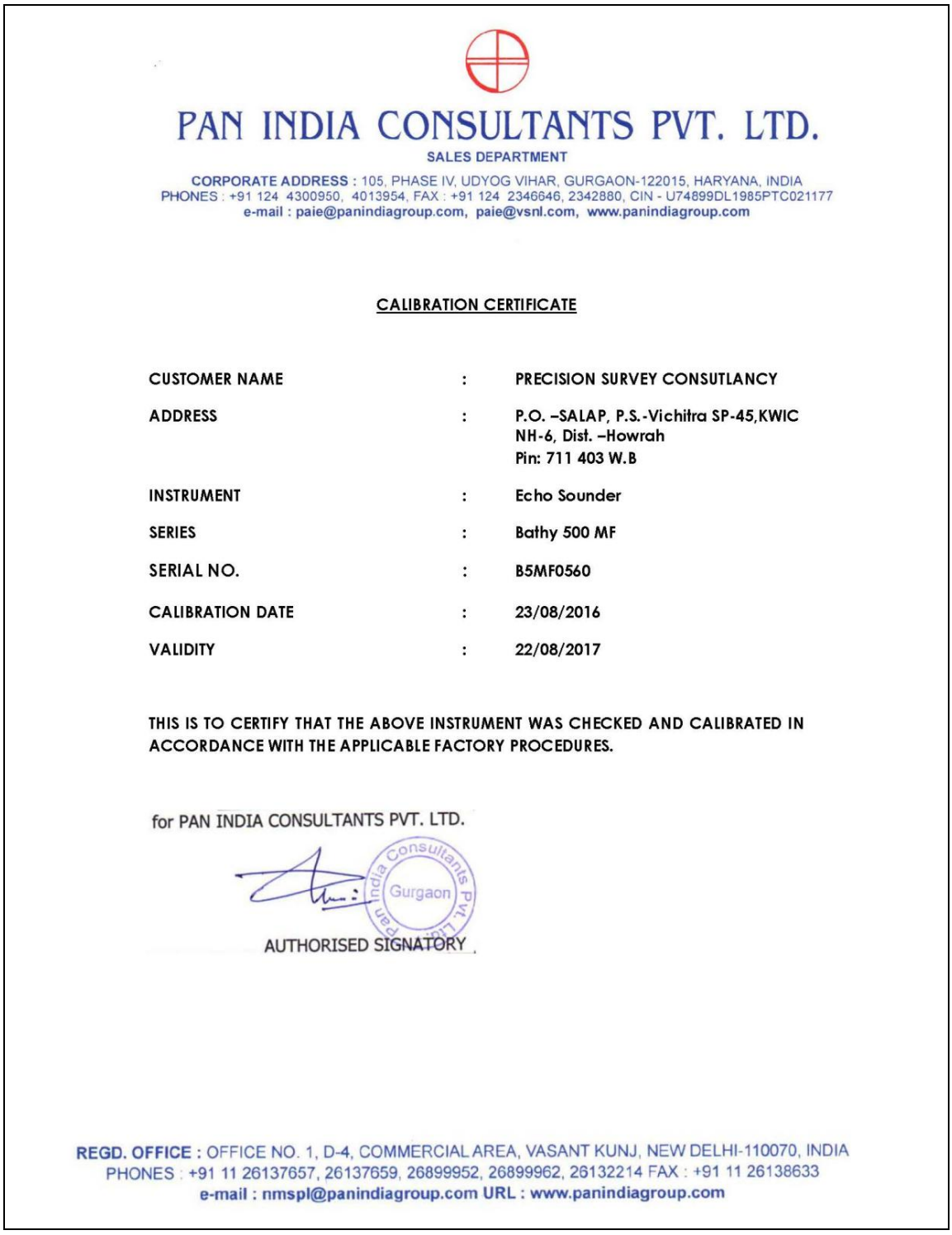
for PAN INDIA CONSULTANTS PVT. LTD.

Pan India Consultants Pvt. Ltd. Gurgaon

AUTHORISED SIGNATORY

REGD. OFFICE : OFFICE NO. 1, D-4, COMMERCIAL AREA, VASANT KUNJ, NEW DELHI-110070, INDIA
PHONES : +91 11 26137657, 26137659, 26899952, 26899962, 26132214 FAX : +91 11 26138633
e-mail : nmspl@panindiagroup.com URL : www.panindiagroup.com

Figure 28- Calibration Certificate of Echo Sounder



PAN INDIA CONSULTANTS PVT. LTD.

SALES DEPARTMENT

CORPORATE ADDRESS : 105, PHASE IV, UDYOG VIHAR, GURGAON-122015, HARYANA, INDIA
PHONES : +91 124 4300950, 4013954, FAX : +91 124 2346646, 2342880, CIN - U74899DL1985PTC021177
e-mail : paie@panindiagroup.com, paie@vsnl.com, www.panindiagroup.com

CALIBRATION CERTIFICATE

CUSTOMER NAME	:	PRECISION SURVEY CONSUTLANCY
ADDRESS	:	P.O. –SALAP, P.S.-Vichitra SP-45,KWIC NH-6, Dist. –Howrah Pin: 711 403 W.B
INSTRUMENT	:	Echo Sounder
SERIES	:	Bathy 500 MF
SERIAL NO.	:	B5MF0560
CALIBRATION DATE	:	23/08/2016
VALIDITY	:	22/08/2017

THIS IS TO CERTIFY THAT THE ABOVE INSTRUMENT WAS CHECKED AND CALIBRATED IN ACCORDANCE WITH THE APPLICABLE FACTORY PROCEDURES.

for PAN INDIA CONSULTANTS PVT. LTD.

Pan India Consultants Pvt. Ltd. Gurgaon

AUTHORISED SIGNATORY

REGD. OFFICE : OFFICE NO. 1, D-4, COMMERCIAL AREA, VASANT KUNJ, NEW DELHI-110070, INDIA
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e-mail : nmspl@panindiagroup.com URL : www.panindiagroup.com

Figure 29- Calibration Certificate of GPS-RTK

Annexure-16 Site Picture:-

Figure 30 Site Picture of RTK

Annexure-17 Survey Charts:-

LIST OF SURVEY CHARTS OF SIMSANG RIVER (NW-93)_MEGHALAYA								
Sl. No.	Chart No.	Location	Chainage (Form…….km. To…...km.)	Chart Datum And Water Level (m.) w.r.t. MSL			Value of Reduction	Remarks
				Chainage (km.)	CD (m.)	WL (m.)		
1	P_01	Baghmara to Netri	0.00 km to 3.300 km	2.402	15.783	16.183	-0.400	GS-1
2	P_02	Netri to Asokgre	3.300 km to 7.539 km	3.552	16.318	16.718	-0.400	GS-2
3	P_03	Asokgre to Agronggiri	7.539 km to 11.00 km	8.750	16.715	17.115	-0.400	GS-3
4	P_04	Agronggiri to Gokapepchandal	11.00 km to 19.00 km	12.400	17.320	17.720	-0.400	GS-4
5	P_05	Gokapepchandal to Kharukol Adinggre	19.00 km to 24.00 km	13.500	19.100	19.500	-0.400	GS-4a
				14.500	21.600	22.000	-0.400	GS-4b
				15.500	23.700	24.100	-0.400	GS-4c
				16.500	26.000	26.400	-0.400	GS-5
				17.500	28.300	28.700	-0.400	GS-5a
				18.500	30.900	31.300	-0.400	GS-5b
				19.500	33.000	33.400	-0.400	GS-5c
				20.500	35.200	35.600	-0.400	GS-5d
				21.500	37.700	38.100	-0.400	GS-5f
				22.500	40.000	40.400	-0.400	GS-5g
				23.000	41.100	41.500	-0.400	GS-6
6	P_06	Kharukol Adinggre to Jantagri Bari	24.00 km to 28.538 km	24.500	44.500	44.900	-0.400	GS-6a
				25.500	46.900	47.300	-0.400	GS-6b
				26.500	49.300	49.700	-0.400	GS-6c
				27.705	51.805	52.205	-0.400	GS-7
				28.500	53.800	54.200	-0.400	GS-7a
7	P_07	Jantagri to Siju Dobakolgittim	28.538 km to 33.420 km	29.500	56.100	56.500	-0.400	GS-7b
				30.500	58.800	59.200	-0.400	GS-7c
				31.500	60.900	61.300	-0.400	GS-7d
				32.500	63.100	63.500	-0.400	GS-7e
8	P_08	Siju Dobakolgittim to Siju Songmong	33.420 km to 38.000 km	33.510	65.580	65.980	-0.400	GS-8
				34.500	67.500	67.900	-0.400	GS-8a
				35.500	70.000	70.400	-0.400	GS-8b
				36.500	72.300	72.700	-0.400	GS-8c
9	P_09	Siju Songmong to Badri Rongdimgittim	38.000 km to 42.450 km	38.000	75.700	76.100	-0.400	GS-9
				39.500	79.300	79.700	-0.400	GS-9a
				40.500	81.400	81.800	-0.400	GS-9b
				41.500	83.900	84.300	-0.400	GS-9c
				42.500	86.200	86.600	-0.400	GS-9d

LIST OF SURVEY CHARTS OF SIMSANG RIVER (NW-93)_MEGHALAYA								
Sl. No.	Chart No.	Location	Chainage (Form…….km. To…...km.)	Chart Datum And Water Level (m.) w.r.t. MSL			Value of Reduction	Remarks
				Chainage (km.)	CD (m.)	WL (m.)		
10	P_10	Badri Rongdimgittim to Rongsa Awe	42.450 km to 47.500 km	42.500	86.200	86.600	-0.400	GS-9d
				43.000	87.500	87.900	-0.400	GS-10
				44.500	91.000	91.400	-0.400	GS-10a
				45.500	93.400	93.800	-0.400	GS-10b
				46.500	95.600	96.000	-0.400	GS-10c
				48.000	99.400	99.800	-0.400	GS-11
11	P_11	Rongsa Awe to Darang Chiga	47.500 km to 52.870 km	48.000	99.400	99.800	-0.400	GS-11
				49.500	102.700	103.100	-0.400	GS-11a
				50.500	105.000	105.400	-0.400	GS-11b
				51.500	107.500	107.900	-0.400	GS-11c
				52.500	109.700	110.100	-0.400	GS-11d
12	P_12	Pattal Gittim to Darang Chiga	52.870 km to 57.570 km	52.500	109.700	110.100	-0.400	GS-11d
				53.000	111.100	111.500	-0.400	GS-12
				54.500	114.200	114.600	-0.400	GS-12a
				55.500	116.700	117.100	-0.400	GS-12b
				56.500	118.800	119.200	-0.400	GS-12c
				57.500	121.200	121.600	-0.400	GS-12d
13	P_13	Darang Chiga to Nongalbibra	57.570 km	57.500	121.200	121.600	-0.400	GS-12d
				58.000	122.200	122.600	-0.400	GS-13
				59.500	125.800	126.200	-0.400	GS-13a
				60.500	128.000	128.400	-0.400	GS-13b
				62.570	132.700	133.100	-0.400	GS-14

Table 24- Survey Charts

Note: Scale: - 1:5000 in each survey Charts

Survey period: - 10th March, 2017 to 25th March, 2017

G.S:- Gauge Station