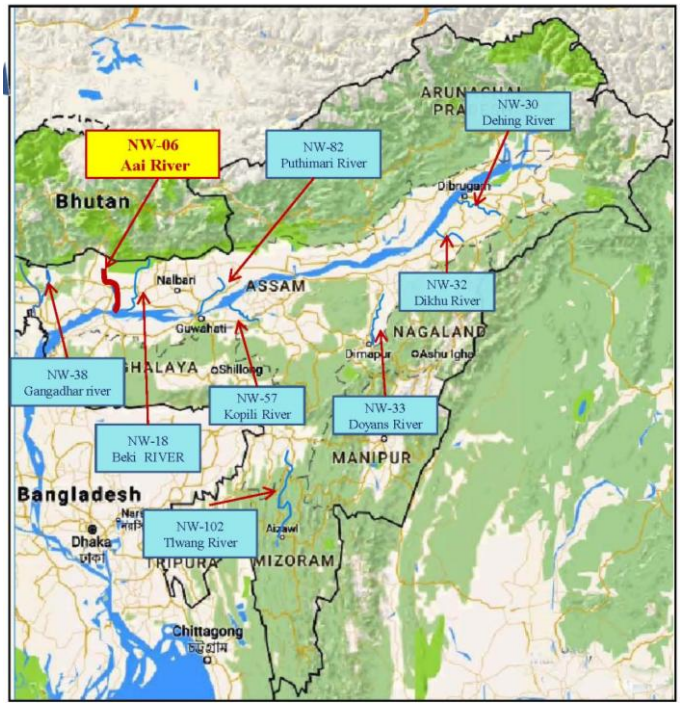
INLAND WATERWAYS AUTHORITY OF INDIA, A-13, SECTOR-1, NOIDA DIST-GAUTAM BUDHA NAGAR, UTTAR PRADESH, PIN- 201 301(UP)

"FINAL FEASIBILITY REPORT ON HYDROGRAPHIC SURVEY

AAI RIVER (NW-06) (68.484 km)

FROM "CONFLUENCE WITH BRAHMAPUTRA RIVER TO UPSTREAM AT ADALGURI BRIDGE"

Survey Period from 21.09.15 to 22.10.15



FINAL REPORT ON HYDROGRAPHICAL SURVEY OF AAI RIVER, ASSAM

REPORT SUBMISSION DATE- 03.10.2018

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-II-(Aai River)** from confluence with Brahmaputra river to Upstream of Bridge at Adalguri (68.484 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 Aai 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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<tr><td>10.00</td><td>10.00</td><td>10.00</td><td>10.00</td></tr>
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<tr><td>10</td><td>10</td><td>8.484</td><td>68.484</td></tr>
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	LAD (Least available depth) status 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 (0-10km)	Sub Stretch-2 (10-20km)	Sub Stretch-3 (20-30km)	Sub Stretch-4 (30-40km)
10.00	10.00	10.00	10.00
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

Sub Stretch-5 (40-50km)	Sub Stretch-6 (50-60km)	Sub Stretch-7 (60-68.484km)	Total (Km)
10	10	8.484	68.484
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
Total=10.00	Total=10.00	Total=8.484	Total=68.484km

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

6.	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]	i) There is no Dam, Barrage is found in this zone of River. ii) Total number of RCC Bridges – 05 (Five) iii) Total number of Rail Bridge – 01(one)

Clearance w.r.t H.F.L	Min (m)	Max (m)
Horizontal Clearance (m)	32.806	47.653
Vertical Clearance w.r.t. H.F.L (m)	2.413	5.195

iv) High Tension Lines -03 (Three)

Clearance w.r.t H.F.L	Min (m)	Max (m)
Horizontal Clearance (m)	250.39	306.56
Vertical Clearance w.r.t. H.F.L (m)	5.57	5.85

7. Slope

Reach		River / Canal Bed Level Change (m)	Distance (km)	Slope (m/km)	Slope (cm/km)
From (km)	To (km)				
0.000	6.320	2.397	6.32	0.379	37.9
6.321	11.791	2.01	5.47	0.367	36.7
11.792	18.204	2.426	6.412	0.378	37.8
18.205	25.645	2.788	7.44	0.375	37.5
25.646	30.500	1.819	4.854	0.375	37.5
30.501	36.359	2.176	5.858	0.371	37.1
36.360	55.789	7.297	19.429	0.376	37.6
55.790	68.484	4.748	12.694	0.374	37.4
Total			68.477	Avg-0.374	Avg-37.43

8. Discharge Report

Sl. No	Chainage (km)	Discharge (Cu.m/sec)	
1	11.791	146.77	**Dated 21.09.15 to 22.10.15**
2	36.359	110.90	
3	55.789	33.51	
Avg. Discharge		97.06	

9. i) Present IWT Operations

ii) Ferry services, tourism, cargo, if any

As Follows

The Passenger Ferry services are available near at Chainage of 5.577 km (Chalta Ferry Ghat), 12.387 km (Kushbari Ferry Ghat), 18.162 km (Mahanburi Ferry Ghat) and 35.43 km (Holdibari Ferry ghat) in this zone of river. There is no cargo available in this zone of river. Bongaigaon Refinery indian oil is located in this zone of river approx 6.75 km from the waterway.

10. Approx distance of Rail & Road from waterway

Nearest Railway station- Bijni Railway Station (0.36 km approx from NH-31)
Details of NH- NH - 31 , NH- 31B, NH- 31C, NH- 37
Details of SH- SH- 2, SH- 14

11. Any other information / comment

Section-I: Introductory Considerations:-

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

Aai is a sub river of the mighty Brahmaputra. Aai River originates or rises in the black mountains near the village of Bangpari. Its sandy bank is a very beautiful picnic point of the whole Assam. The border of Assam and Bhutan hill area is very amazing for the tourists. NH31,NH31B, NH31C, SH 2 connects Bongaigaon with the states like Bihar, Jharkhand and West Bengal. The National Highway-37 via Naranarayan Setu from Goalpara in Assam to Dimapur in Nagaland traverses the entire length of Assam and connects Bongaigaon with almost all the major cities of Assam including the cities of Jorhat and Dibrugarh and the other communication by Railways by North Frontier Railways.

Table 1- Aai River Site Map

1.2- Tributaries / Network of River/ Basin:-

The Three Streams create a river basin in this zone of river-

i) Aai

ii) Beki

iii) Manas

1.3- State / District through which river passes:-

The river passes through the district of Bongaigaon and Chairang of the state of Assam.

1.4- Project Site Location Map:-

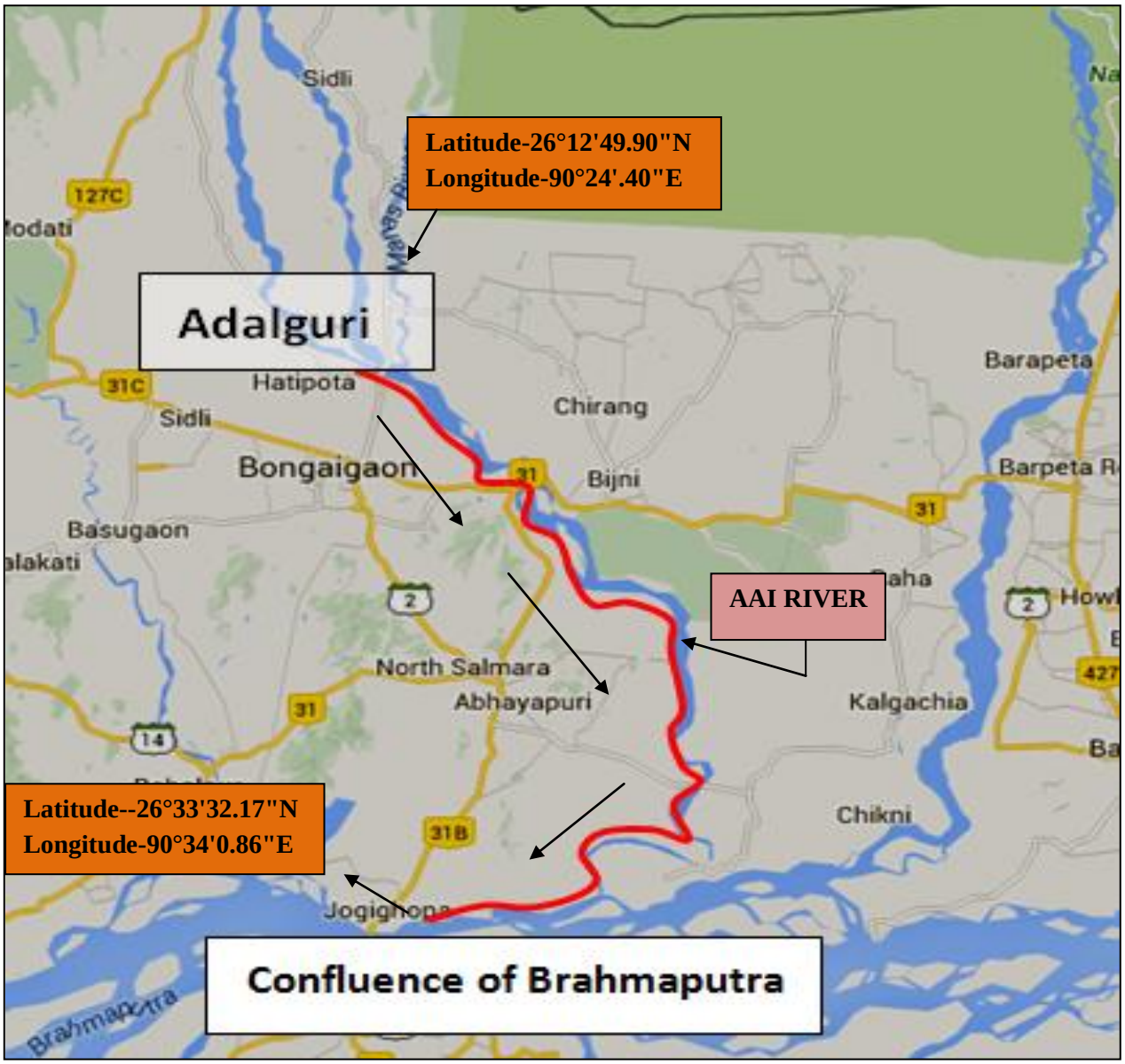

Figure 1- Project Site Location Map

1.5- River Key Map:-

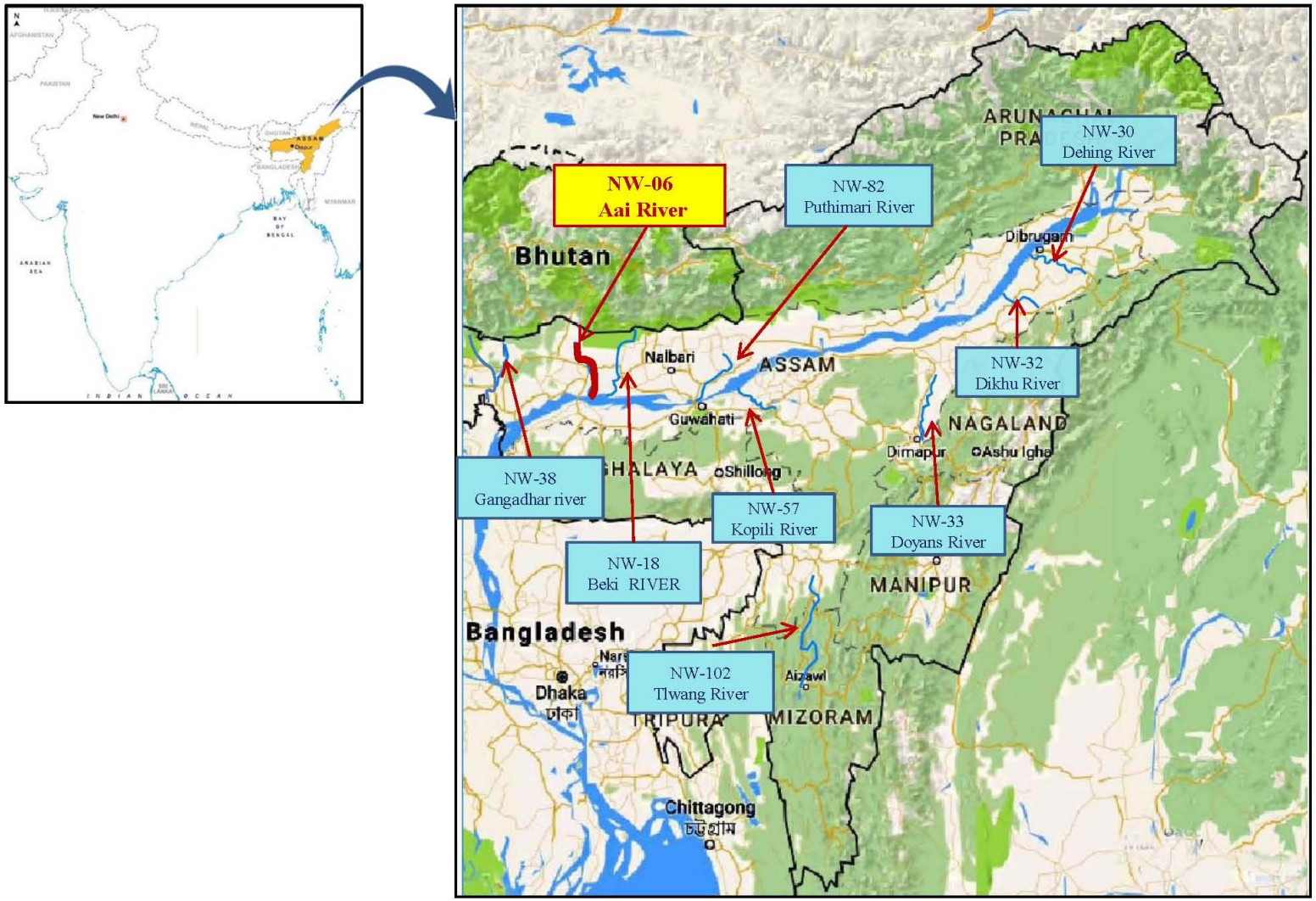

Figure 2- River Key Map

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 is to be 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 30cmX30cmX150cm.
- The pillar extends 60.cms above ground level. 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 Aai River waterway and to provide an appropriate economic and organizational framework for restoring trade and navigation (cargo and passengers) on the Aai with an aim to do as follows:
- Improve public and private investments into transport on the Aai 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 Aai 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:-

Following equipments are employed for the Topographic and Bathymetric survey tabulated below:-

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

- **Conduct of survey work**

  - **Topographic Survey:-**

    The Topography survey of Aai river has been carried out from "Confluence with Brahmaputra river at **(Lat 26°12'49.90"N, Long 90°36'24.40"E)** 4.7 km downstream of Naranarayan Setu at Jogighopa to Upstream of Bridge at Adalguri No.3 at **(Lat 26°33'32.17"N, Long 90°34'0.86"E)**".

    The Topography ssurvey has been carried out from Chainage 0.00 km to Chainage 68.484 km.

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 was not carried out in this zone of river due to insufficient layer of water.

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

For Topographic Survey, The Horizontal control / Vertical Control has been carried out from the CWC Gauge level; near the Bench mark no.-7, located form the RCC Bridge beside the NH-31. The value of CWC Gauge at Dawkijhar village is-

Location Name	Geographic position		UTM position		Elevation (m)
	Latitude (N)	Longitude (E)	Northing	Easting	
Dawkijhar Village	26°29'49.07"	90°39'18.31"	2932855.89	266283.13	59.276 mtre w.r.t. MSL

Figure 3- G.T.S Bench Mark Location of Aai River

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

There are no Tidal influences or Tidal variation found in this zone of river.

2.4- Methodology to fix Chart Datum / Sounding Datums in Tidal and Non-Tidal area:-

IWAI had provided Sounding Datum at Aai NH Crossing and at confluence with Brahmaputra River. The same was used to arrive the Sounding Datum values at BM Pillars and at tide gauges by interpolation method.

Sl. no	Place	Sounding Datum w.r.t MSL (Provided by IWAI)
1	Aai NH Crossing (Chainage-55.776 km)	50.372 meter
2	Brahmaputra Confluence (115) (Chainage-0.00 km)	29.466 meter

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

The CD level of Aai NH Crossing at Aai River is – 50.372 metre (Chainage-55.776 km)

The CD level of Brahmaputra Confluence point is – 29.466 metre (Chainage-0.00 km)

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, Barrages, weirs, Anicut, Locks and Aqueducts etc. found in this zone of river.

2.9- Description of erected Bench mark pillar:-

BM No	Location	Chainage (Km)	Latitude (N)	Longitude (E)	Easting	Northing	BM Height above MSL (m)	BM Height above SD (m)
BM 1	Tinkonia Village	6.320	26°14'22.22"	90°40'54.20"	268426.093	2904280.86	35.930	4.067
BM 2	Dubasorie Village	11.791	26°16'29.32"	90°41'44.73"	269898.610	2908167.931	38.436	4.563
BM 3	Deuldi Village	18.204	26°15'26.04"	90°45'14.29"	275679.333	2906117.095	38.780	2.491
BM 4	Bharalipara Village	25.645	26°18'30.48"	90°44'55.12"	275246.775	2911803.831	41.640	2.553
BM 5	Sanermukh Village	30.500	26°19'52.82"	90°43'55.91"	273648.036	2914366.506	44.052	3.146
BM 6	Chotobaregarh Village	36.359	26°22'51.98"	90°44'4.90"	273994.040	2919876.954	48.071	4.989
BM 7	Dawkijhar Village	55.789	26°29'49.07"	90°39'18.31"	266283.162	2932856.855	59.276	8.897
BM 8	Adalguri Village	68.484	26°33'20.67"	90°33'58.49"	257549.507	2939534.750	63.114	7.987

Table 2 – Bench Mark Details

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

Tide Gauge No	Location	Chainage (km)	Easting	Northing	Latitude (N)	Longitude (E)	W.L w.r.t M.S.L (m)	Period of Observation
GS (TP) - 1	Confluence point of Brahmaputra	6.395	268535.167	2904215.090	26°14'20.17"	90°40'58.17"	32.825	24 Hrs
GS (TP) - 2	Sikari Pt I	11.758	270005.316	2908125.147	26°16'28.02"	90°41'48.61"	34.738	24 Hrs
GS (TP) - 3	Hapachara Pathar	18.230	275724.666	2906163.623	26°15'27.56"	90°45'15.88"	37.841	24 Hrs
GS (TP) - 4	Bharalipara Pt-I	25.667	275421.985	2911832.468	26°18'31.52"	90°45'1.41"	40.160	24 Hrs
GS (TP) - 5	Parerchar Pt-I	30.522	273767.406	2914474.481	26°19'56.40"	90°44'0.13"	42.140	24 Hrs
GS (TP) - 6	Chilapara pt-I	36.326	274170.628	2919817.898	26°22'50.17"	90°44'11.28"	44.306	24 Hrs
GS (TP) - 7	Dawkijhar Village	55.795	266234.169	2932893.702	26°29'50.25"	90°39'16.51"	51.160	24 Hrs
GS (TP) - 8	Adalguri No-3	68.462	257959.789	2939838.915	26°33'30.79"	90°34'13.09"	55.690	24 Hrs

Table 3- Water Level at different Gauge Stations

2.11- Chart Datum / Sounding Datum and Reductions details:-

Sl no	CWC gauge / Dam / Barrage / Weir / Anicut / Bench Mark / Tide Gauges	Chainage (km)	Stretch for corrected soundings and Topo levels (km)	Established Sounding Datum w.r.t. M.S.L (m) at col. A.	Sounding Datum of Tide Gauge w.r.t. M.S.L (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 M.S.L)
1	GS (TP)-8	68.462	62.129-68.484		55.127	-0.563	
2	GS (TP)-7	55.795	46.061-62.129		50.379	-0.781	Topo Reduced Data of Aai river.xyz
3	Aai NH Crossing	55.776		50.372			**Submitted in Soft Copy**
4	GS (TP)-6	36.326	33.424-46.061		43.082	-1.224	
5	GS (TP)-5	30.522	28.095-33.424		40.906	-1.234	
6	GS (TP)-4	25.667	21.949-28.095		39.087	-1.073	
7	GS (TP)-3	18.230	14.994-21.949		36.299	-0.975	
8	GS (TP)-2	11.758	9.077-14.994		33.873	-0.865	
9	GS (TP)-1	6.395	0.00-9.077		31.863	-0.962	
10	Confluence with Brahmaputra (115)	0.000		29.466			

Table 4 - Chart Datum / Sounding Datum and 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		Aai NH Crossing		53.120	
2	Confluence of Brahmaputra (115)		0.00		
3		Railway Steel Bridge	56.156	58.85	

Table 5 - H.F.L Details

2.13- Average Bed Slope:-

Reach		River / Canal Bed Level Change (m)	Distance (km)	Slope (m/km)	Slope (cm/km)
From (km)	To (km)				
0.000	6.320	2.397	6.32	0.379	37.9
6.321	11.791	2.01	5.47	0.367	36.7
11.792	18.204	2.426	6.412	0.378	37.8
18.205	25.645	2.788	7.44	0.375	37.5
25.646	30.500	1.819	4.854	0.375	37.5
30.501	36.359	2.176	5.858	0.371	37.1
36.360	55.789	7.297	19.429	0.376	37.6
55.790	68.484	4.748	12.694	0.374	37.4
Total			68.477	Avg -0.374	Avg -37.43

Table 6 - Average Bed Slope

2.14 Details of Dam, Barrages, Weirs, Anicut, etc. w.r.t. MSL:-

There are no Dams, Barrages, weirs, Anicut found in this zone of River.

2.15 Details of Locks:-

There are no locks found in this zone of river.

2.16 Details of Aqueducts:-

There are no aqueducts found in this zone of River.

2.17 - Details of existing Bridges and Crossings 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)	Present Condition
				Latitude (N)	Longitude (E)	Easting	Northing						
1	RCC Bridge	25.645	Bharalipara Village	26°18'26.59"	90°45'5.94"	275543.96	2911678.07	405.56	11.85	8	45.700	5.052	Complete
2	Under Construction RCC Bridge	36.355	Bordhup Village	26°22'51.23"	90°44'10.65"	274153.11	2919850.00	474.24	11.39	9	47.653	4.992	Under-construction
3	RCC Bridge	55.789	Dawkijhar Bridge	26°29'48.92"	90°39'15.13"	266195.496	2932853.383	340.88	9.99	9	41.649	4.868	Complete
4	RCC Bridge	55.821	Dawkijhar Bridge	26°29'50.65"	90°39'7.59"	265987.763	2932910.675	340.89	8.17	8	40.117	5.195	Complete
5	Railway Steel Bridge	56.156	Donkinamari Village	26°30'1.46"	90°39'12.93"	266221.908	2933237.142	265.22	7.75	7	32.806	2.413	Complete
6	RCC Bridge	68.484	Adalguri Village	26°33'23.60"	90°33'59.26"	257572.950	2939624.446	1121.87	11.65	25	45.836	4.16	Complete

Table 7 Bridge Details

2.18-Details of Other Cross structures, pipe-lines, underwater cables:-

No other cross structures like Bamboo Bridge, wooden Bridge or underwater cables found in this zone of the River.

2.19- High Tension Lines / Electric Lines:-

Sl. no	Line	Chainage (km)	Location	Position				No of piers	Horizontal clearance (m)	Vertical clearance w.r.t H.F. L (m)	Remarks
				Latitude (N)	Longitude (E)	Easting	Northing				
1.	High Tension Line	55.965	Dawkijhar Village	26°29'55.04"	90°39'7.50"	265987.160	2933045.785	8	306.56	5.70	Complete
2.	High Tension Line	56.113	Dawkijhar Village	26°29'59.87"	90°39'8.88"	266028.147	2933193.606	8	250.39	5.57	Complete
3.	High Tension Line	56.273	Dawkijhar Village	26°30'4.91"	90°39'9.39"	266045.324	2933348.614	8	251.45	5.85	Complete

Table 8 High Tension Lines

2.20 Current Meter and Discharge Details:-

The water level is too low in this zone of river and the bathymetry survey, current, discharge was not possible in this river. However, some portions of this river's discharge report are tabulated below:-

Stretch No	Chainage (km)	Easting (m)	Northing (m)	Latitude (N)	Longitude (E)	Observed Depth (m)	Velocity (m/sec) 0.5 D	Average velocity (m/sec)	X-Sectional area (sq.m.)	Discharge (Cu.m/s)
1	11.791	269955.2959	2908007.009	26°16'24.157"	90°41'46.894"	0.5	0.365	0.365	402.12	146.77
2	36.359	274502.0051	2919948.925	26°22'54.642"	90°44'23.169"	0.4	0.256	0.256	433.22	110.90
3	55.789	266138.944	2932845.276	26°29'48.64"	90°39'13.112"	0.4	0.256	0.256	130.91	33.51

Table 9- Current Meter Details

2.21 - (a) Soil Sample Locations:-

Sample No.	Chainage (km)	Easting (m)	Northing (m)	Latitude (N)	Longitude (E)	Depth (m)
1	6.320	268301.25	2904105.81	26°14'16.488"	90°40'49.823"	0.5
2	11.791	269955.2959	2908007.009	26°16'24.157"	90°41'46.894"	0.4
3	18.204	275642.1448	2906179.426	26°15'28.043"	90°45'12.92"	0.4
4	25.645	275410.7326	2911624.622	26°18'24.779"	90°45'01.172"	0.3
5	30.500	273859.1345	2914315.831	26°19'51.31"	90°44'03.554"	0.2
6	36.359	274502.0051	2919948.925	26°22'54.642"	90°44'23.169"	0.1
7	55.789	266138.944	2932845.276	26°29'48.64"	90°39'13.112"	0.3

Table 10 Soil Sample Locations

(b) Water Sample Locations:-

Sample No.	Chainage (km)	Easting (m)	Northing (m)	Latitude (N)	Longitude (E)	Total Depth (m)	Mid-Depth (0.5d) (m)
1	6.320	268301.25	2904105.81	26°14'16.488"	90°40'49.823"	0.5	0.25
2	11.791	269955.2959	2908007.009	26°16'24.157"	90°41'46.894"	0.4	0.20
3	18.204	275642.1448	2906179.426	26°15'28.043"	90°45'12.92"	0.4	0.20
4	25.645	275410.7326	2911624.622	26°18'24.779"	90°45'01.172"	0.3	0.15
5	30.500	273859.1345	2914315.831	26°19'51.31"	90°44'03.554"	0.2	0.10
6	36.359	274502.0051	2919948.925	26°22'54.642"	90°44'23.169"	0.1	0.05
7	55.789	266138.944	2932845.276	26°29'48.64"	90°39'13.112"	0.3	0.15

Table 11 Water Sample Locations

Section-3: Detailed Hydrographic Survey- Stretch Wise

3.1 From Chainage 0.00 Km to Chainage 10.00 Km. (Mahumpur Pt.II Village to Barjana Pt.I Village)

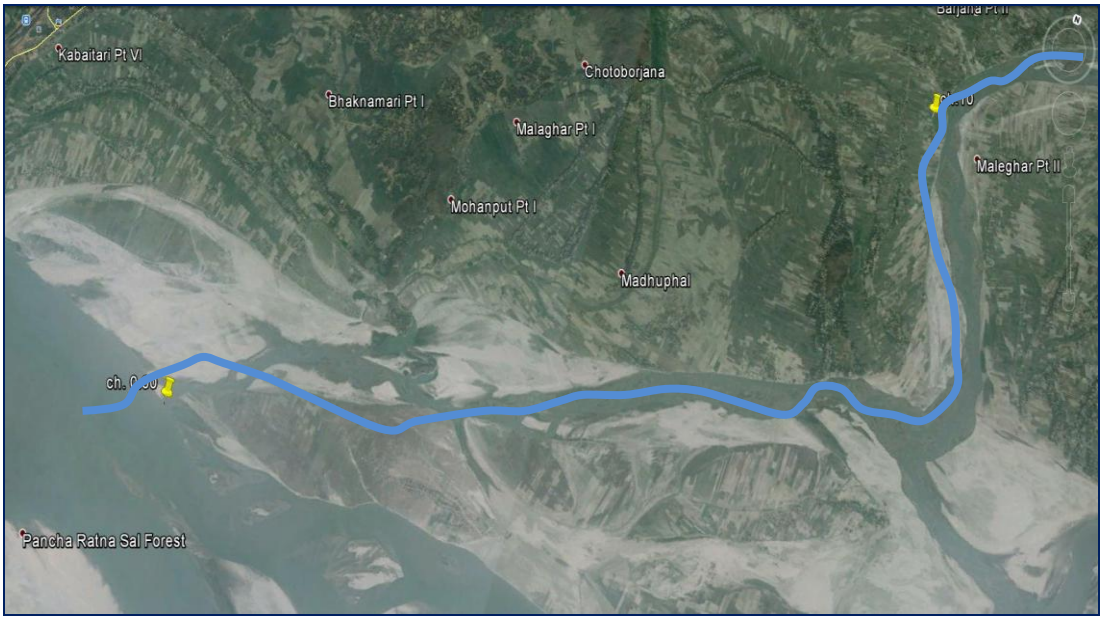

Figure 4 Chainage 0.00 km to Chainage 10.00 km

The River width of Aai River from Chainage 0.00 Km. to Chainage 10.00 Km is 349m to 658m approximate width. The average width portion of the river is 450 m.
At the Mahumpur Pt.II village, many sand char have been noticed. The Villages like Pachnumberchar, Pancania, Mohanput, Madhupal, Tinkonia Pt.III, Malaghar Pt.I, Dhaknamari Pt.II, Chotoborjana, Borjana Pt.III and Kikabari Pt.III have been situated on the left portion of the river at an avg. distance of 200m and the villages Mahumpure Pt II, No. 6 Char, Tinkonia Pt.I, Maleghar Pt.II have been situated on the right portion of the river at an avg. distance of 100m. BM 1 has been also located near at Chainage of 6.320km. Chatla Ferry Ghat service is available near the Chainage of 5.577 km. Patherchali ghat and Modhufal ghat have been also found near at Chainage of 5.640km and 9.460km respectively. Maleghar village is found at near the Chainage 7 to 8 km. NH31B has been situated on the left portion of the river at an avg. distance of 5 km from 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	0.01	0.3	10000	320874.12	-0.3	0	10000	381285.7
II	0.00	10.00	0.006	0.3	10000	510135.7	-0.3	0	10000	587858.58
III	0.00	10.00	0.002	0.3	10000	805181.21	-0.3	0	10000	901668.98
IV	0.00	10.00	0.001	0.3	10000	997242.19	-0.3	0	10000	1098100.2

Figure 5 - Chatla Ferry Ghat (Chainage - 5.577km) (Lat: 26°13'56.23"N Long: 90°40'35.996"E)

3.2From Chainage 10.00 Km to Chainage 20.00 Km (Maleghar Pt.II Village to Pathalia Para Village)

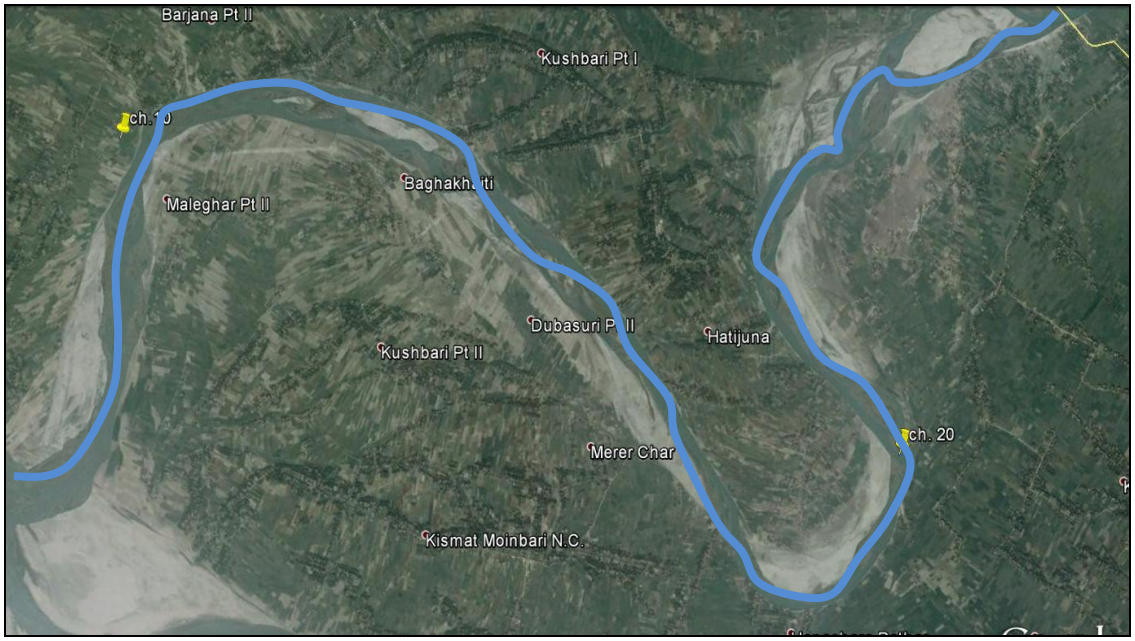

Figure 6 Chainage 10.00 km to Chainage 20.00 km

The River width of Aai River from Chainage 10.00 Km. to Chainage 20.00 Km is 120 m to 380 m approximate width. The average width portion of the river is 164 m.

The River has a very sharp bend between the Chainage of 10.000 km to 20.00 km. The villages like Khusbari Pt.III, Maleghar Pahar, Barjana Pt. III, Lotibari Pt.II, Modhubon village, Dhakali para, Hathsora village, Khusbari, Khusbari Pt.I, Pathalia Para have been situated at an avg. distance of 300 m on the left portion of the river and the villages Sikatari Pt.I, Sikatari Pt.II , Baghakhaiti, Dubasuri Pt.I, Dubasuri Pt.II, Merer Char, Khusbari Pt.II, Khandakar Para, Kismat Moinbari N.C, Tarakandi, Hapachara Pathar, Deuldi have been situated at an avg. distance of 200 m on the right portion of the river.

The SDO Office Road, NH-31B are situated on the left portion of the river at an avg. distance of 6 km and 7 km from the river edge and other villages inter connected roads are connected with this roads. The nearest railway station is Abhayapuri Railway Station, situated at an avg. distance of 10 km (approx) from the river edge. Two ferry services named Khusbari and Mahanburi Ferry Ghat are available near at Chainage of 12.387 km and 18.162 km. Dubasorie ghat and Hathsora ghat have been also located near at Chainage of 13 km and 18.378 km respectively. BM -2 and BM-3 have been also located near at Chainage of 11.791km and 18.204 km respectively.

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	0.01	0.3	10000	396985.08	-0.3	0	10000	482180.06
II	10.00	20.00	0.007	0.4	10000	611858.3	-0.3	0	10000	723662.52
III	10.00	20.00	0.004	0.4	10000	935566.09	-0.3	0	10000	1077104.12
IV	10.00	20.00	0.001	0.4	10000	1136949.11	-0.3	0	10000	1285625.3

Figure 7 - Khusbari Ferry Ghat (Chainage –12.387 km) (Lat: 26°16'25.847"N, Long: 90°42'24.165"E)

Figure 8- Mahanburi Ferry Ghat (Chainage -18.162 km) (Lat: 26°15'28.401"N, Long: 90°45'17.609"E)

3.3 From Chainage 20.00 Km to Chainage 30.00 Km (Pathalia Para village to Sanermukh Village)

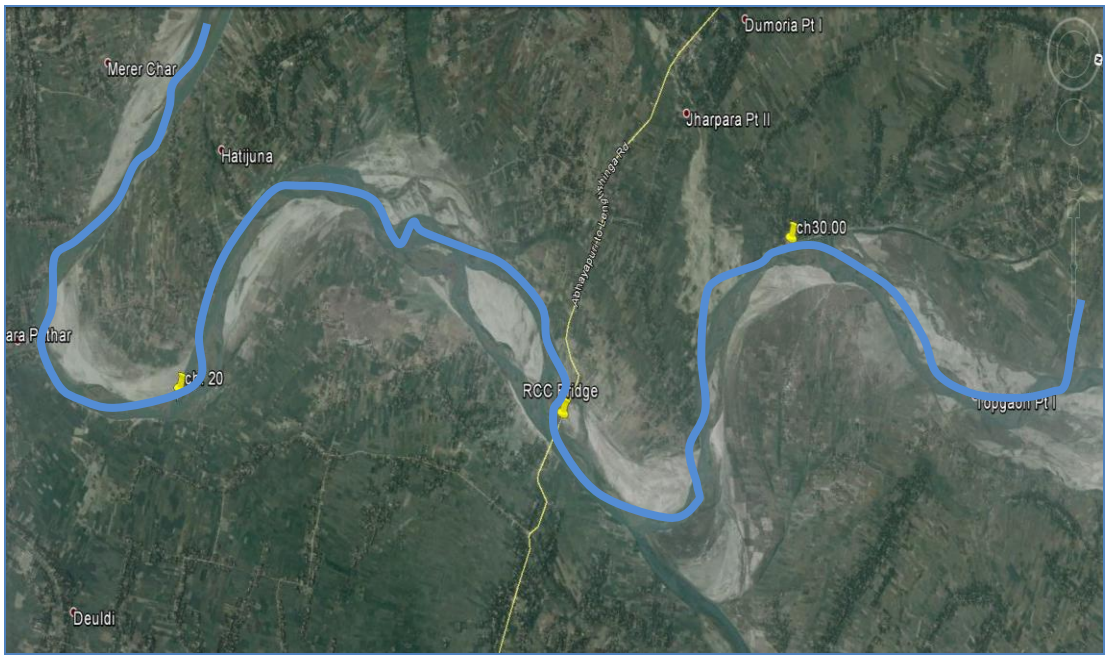

Figure 14 Chainage 20.00km to Chainage 30.00 km

The River width of Aai River from Chainage 20.00 Km. to Chainage 30.00 Km is 158 m to 592 m approximate width. The average width portion of the river is 190 m.

Between the Chainage of 20.00 km to 30.00 km, so many sand char appeared in the middle of the river way and for this reason the river is flowing through some channels and some sharp bends are located as well.

The villages like Hatijuna, Balargudam, Phakakhata, Santoshpur Pt.-III, Bharailpara Pt.-II, Bhadoipara, Jharpara Pt.- II, Bharailpara Pt.-I, Dumerguri Pt.-I, DUmoria Pt.-I have been situated at an avg. distance of 150m on the left portion of the river and Kaytakuchi Pathar, Barbitha, Balikuli Gaon, Manikpur, Khudrakhowa and Ghoramara Pt.-I have been situated at an avg. distance of 250m on the right portion of the river.

The Abhayapuri Lengtishinga RCC Bridge **(lat. - 26°18'26.59"N, long. - 90°45'5.94"E)** has been situated over the river near at Chainage of 25.645km which is connected through NH-31B and SH- 2 and other villages inter - connected roads. The nearest railway station is Abhayapuri which is 10 km (approx) far from the river edge on the left portion of the river. An irrigation canal is found at near the Chainage of 27 km. BM- 4 is also situated near at Chainage of 25.645 km.

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	0.01	0.3	10000	364257.9	-0.3	0	10000	438741.44
II	20.00	30.00	0.006	0.3	10000	568931	-0.3	0	10000	664742.9
III	20.00	30.00	0.002	0.3	10000	881652.4	-0.3	0	10000	1000932.9
IV	20.00	30.00	0.001	0.3	10000	1080504.8	-0.3	0	10000	1205029.5

Figure 9 - Abhayapuri Lengtishinga RCC Bridge (Chainage-25.645 km) (lat. - 26°18'26.59"N, long. - 90°45'5.94"E)

3.4 From Chainage 30.00 Km to Chainage 40.00 Km (Sanermukh Village to Amguri Village)

Figure 10 - Chainage 30.00 km to Chainage 40.00 km

The River width of Aai River from Chainage 30.00 Km. to Chainage 40.00 Km is 121 m to 434 m approximate width. The average width portion of the river is 190 m.

Between the cainage of 30.00 km to Chainage 40.00 km, many sand char are appeared on the river way and for this reason, the river is flowing by some channels. Rajaibari Khowabil, Dumurgiri Pt.III, Topgaon Pt.-I, Barigaon, Khudranarikala, Ravapara, Tilpara, Bareghar, Chilapara Pt.-I, Amguri villages are situated at an avg. distance of 300 m on the left portion of the river and the villages like Narar Vita Pt.I, Narar Vita Pt.-III, Langla are situated at an avg. distance of 500 m from the river edge on the right portion of the river.

An under construction RCC Bridge **(**Lat.- 26°22'52.01"N, Long.- 90°44'15.00"E**)** has been located near at Chainage of 36.355 km which is connected through NH-31 and the SH- 2. and The NH-31B, NH-31 are situated on the left portion of the river at an avg. distance of 10 km (approx) on the left portion of the river and the SH- 2, SH- 7, SH-8, SH- 9 are situated on the right portion of the river at an avg. distance of 20 km (approx) on the right portion of the river and other villages are inter-connected with this roads and the nearest Railway Station is Majgaon Railway Station which is 14 km (approx) far from the river edge situated on the left portion of the river. A Ferry Service named Holdibari Ferry Ghat is located near the Chainage of 35.43 km. BM-5 and BM-6 have been situated near at Chainage of 30.500 km and 36.359 km respectively.

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	0.01	0.3	10000	405035	-0.3	0	10000	501275.7
II	30.00	40.00	0.006	0.3	10000	622733	-0.3	0	10000	747016
III	30.00	40.00	0.002	0.3	10000	949913.4	-0.3	0	10000	1104824.4
IV	30.00	40.00	0.001	0.3	10000	1152346.8	-0.3	0	10000	1314385

Figure 11 - Under Construction RCC Bridge (Chainage- 36.355 km) (Lat. - 26°22'52.01"N, Long. - 90°44'15.00"E)

Figure 12 - Holdibari Ferry Ghat (Chainage – 35.43 km) (Lat: 26°22'41.166"N, Long: 90°44'32.15"E)

3.5 Chainage 40.00 Km to Chainage 50.00 Km. (Sastare village to Nachankuri Pt. II village)

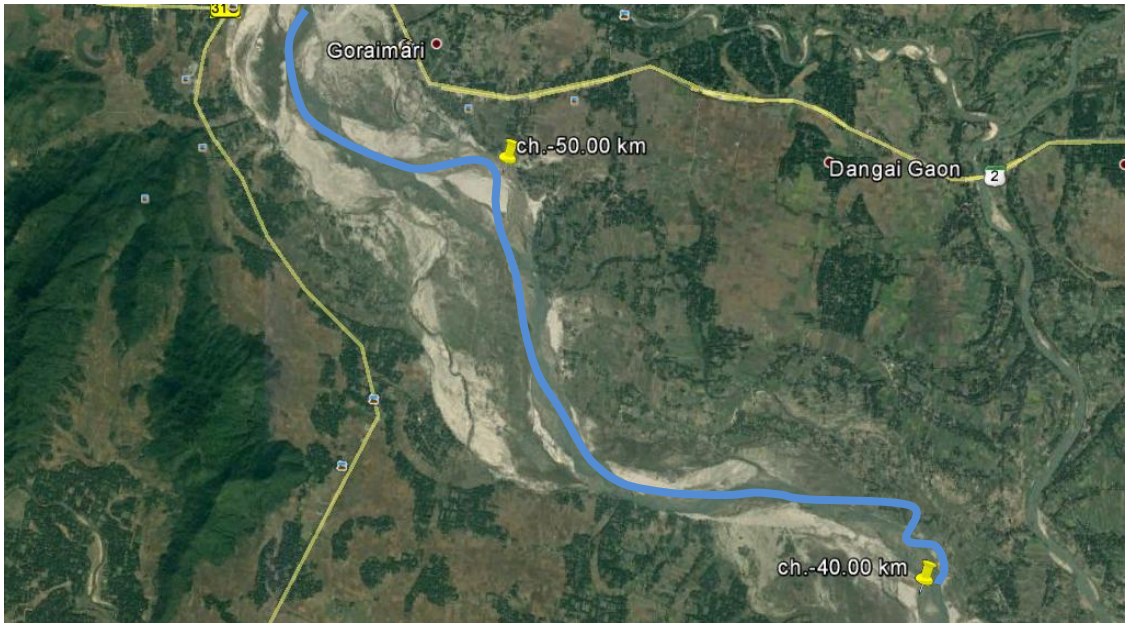

Figure 13 Chainage 40.00 km to Chainage 50.00 km

The River width of Aai River from Chainage 40.00 Km. to Chainage 50.00 Km is 305 m to 652 m approximate width. The average width portion of the river is 300 m.

Between the Chainage of 40.00 km to Chainage 50.00 km, many sand char are appeared on the river way and for this reason the river has been flown by some channels. The villages like Kaimari Lohra para, Thakurani Khora para, Sipansila Hill Block are situated at an avg. distance of 600 m situated on the left portion of the river and the villages like Balarpet, Bhandara No.4, Jamdoha No.-6, Jamdoha No.-2, Jamdoha No.-3 and Dangai Gaon are situated at an avg. distance of 500 m on the right portion of the river. NH-31 has been situated on the left portion of the river at an avg. distance of 2 km on the left portion of the river and SH-2 has been situated at an avg. distance of 5km (approx) on the right portion of the river. The nearest Railway Station is Majgaon Railway Station which is situated at a distance of 10 km (approx) on the left portion 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	0.01	1.8	9000	339077.6	-0.3	1.8	8000	396853
II	40.00	50.00	0.006	1.8	8000	472217	-0.3	1.8	8000	585038.4
III	40.00	50.00	0.002	1.8	9000	716926.5	-0.3	1.8	9000	856946.1
IV	40.00	50.00	0.001	2.1	9000	870645.1	-0.3	2.1	8000	1016928.2

3.6 From Chainage 50.00 Km to Chainage 60.00 Km (Garugaon No. 3 Village to Chaprakata Pt.1 village)

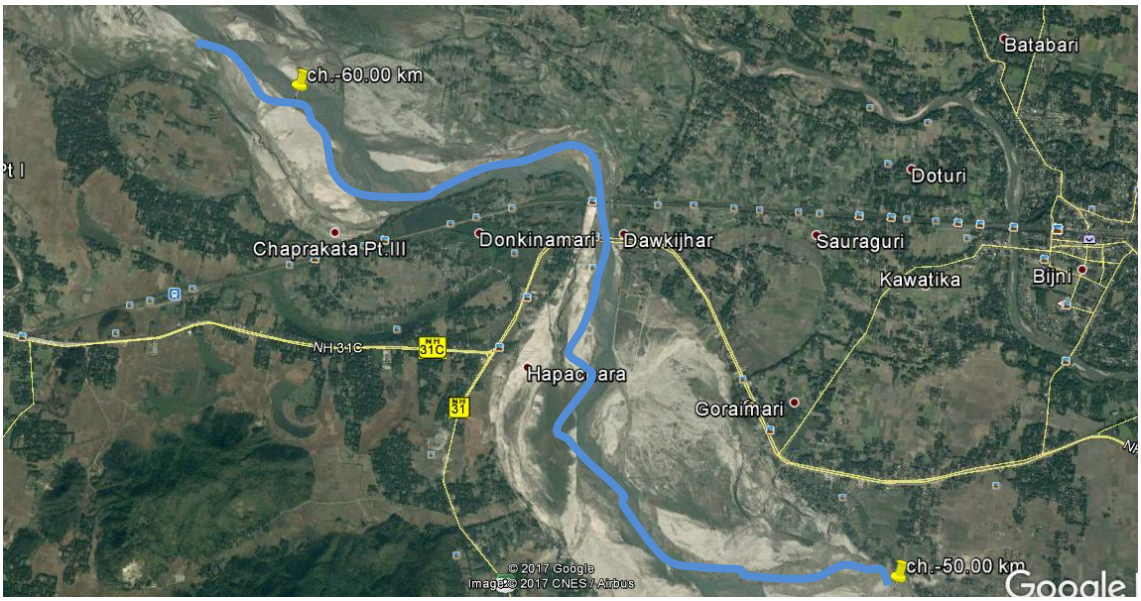

Figure 14 Chainage 50.00 km to Chainage 60.00km

The River width of Aai River from Chainage 50.00 Km. to Chainage 60.00 Km is 305 m to 652 m approximate width. The average width portion of the river is 300 m.
Between the Chainage of 50.00 km to 60.00 km, many sand char have been appeared on the river way. For this reason the river is flowing by some channels. The villages like Garugaon No.1, Garugaon No., Garugaon No.1, Kuchiakata, Hapachara, Chaprakata, Dokinamari, Nayapara Pt.II are situated at an avg. distance of 300m on the left portion of the river and villages like Monakocha, Nachankuri, Moutara, Sialmari, Garukabari, Goraimari, Kawatika, Sauraguri, Doturi, Majarabari No.II, Sisubari No.II, Khujuraguri are situated at an avg. distance of 500 m on the right portion of the river.
Two RCC Bridges are located near at Chainage of 55.789 km and 55.821 km respectively **(**Lat.-26°29'49.32"N, Long.-90°39'13.61"E**)** , **(**Lat.-26°29'50.07"N, Long.- 90°39'13.63"E**)** and a Railway Bridge (Lat.- 26°30'1.46"N, Long.- 90°39'12.93"E) has been also located near at Chainage of 56.156 km. The NH-31 is situated on the left portion of the river at an avg. distance of 1 km on the left portion of the river and the NH-31, SH- 2 and other villages inter connected roads are situated at an avg. distance of 5km (approx) on the right portion of the river. The nearest Railway Station is Chaprakata situated at a distance of 2 km (approx) on the left portion of the river. BM-7 is situated near at Chainage of 55.789 km. Three High tension lines are situated in this zone 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	50.00	60.00	0.01	0.3	10000	406168	-0.3	0	10000	485289.5
II	50.00	60.00	0.006	0.3	10000	604968	-0.3	0	10000	723925.1
III	50.00	60.00	0.002	0.3	10000	925790.4	-0.3	0	10000	1074357.6
IV	50.00	60.00	0.001	0.3	10000	1126205.5	-0.3	0	10000	1281789.3

Figure 15 - RCC Bridges (Chainage- 55.789 km and 55.821 km) (Lat.-26°29'49.32"N, Long.-90°39'13.61"E), (Lat.-26°29'50.07"N, Long. - 90°39'13.63"E)

Figure 16 - Railway Steel Bridge (Chainage – 56.156 km) (Lat. - 26°30'1.46"N, Long. - 90°39'12.93"E)

Figure 17- High Tension Lines- Chainage 55.965 km, 56.113 km and 56.273 km (Lat: - 26°29'55.04"N, Long: - 90°39'7.50"E), (Lat: - 26°29'59.87"N, Long: - 90°39'8.88"E), (Lat: - 26°30'4.91"N, Long: - 90°39'9.39"E)

3.7 From Chainage 60.000 Km to Chainage 68.484 Km (Karebari Village to Adlaguri Pt.III village)

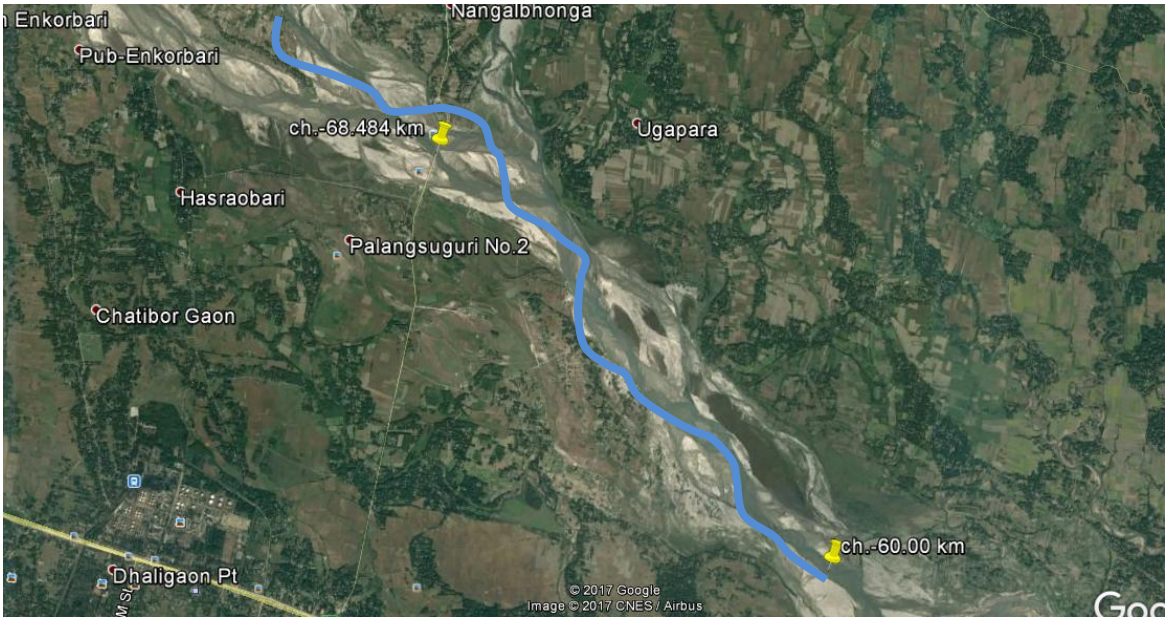

Figure 18 - Chainage - 60.00km to Chainage- 68.484km

The river width of Aai River from Chainage 60.00 Km. to Chainage 68.484 Km is 465 m to 1.2km approximate width. The average width portion of the river is 500 m.

Between the Chainage of 60.000 km to 68.484 km, many sand char has been appeared on the river way. For this reason the river is flowing by some channels. The villages like Nayapara Pt.-I, Karija Dolaigaon Pt.-II, Chapaguri, Bongaigaon, Birjhora T E,Daligaon Pt, Palagsuguri, Chatibor gaon, Adalguri are situated at an avg. distance of 2 km on the left portion of the river and the villages like Chirang, Borolougaon, Goalpara, Deotari, Chamugaon and Ugapara are situated at an avg. distance of 1.5 km on the right portion of the river. BM - 8 is situated near at Chainage of 68.484 km.

An RCC Bridge (Lat. -26°33'41.57"N, Long. - 90°34'6.75"E**)** is located near at Chainage of 68.484 km which is connected with the NH-31C and the Ballamguri Rd. NH-31and NH-31C are situated at an avg. distance of 2 km on the left portion of the river and Ballamguri road and other villages inter connected roads have been situated at an avg. distance of 3 km (approx) on the right portion of the river. The nearest Railway Station is Bogaigaon Railway Station which is situated at an avg. distance of 7 km (approx) on the left portion 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	60.00	68.484	0.01	2.2	9000	105534.8	-0.3	2.1	9000	156038
II	60.00	68.484	0.007	2.2	9000	228817.3	-0.3	2.1	9000	257754.5
III	60.00	68.484	0.004	2.2	9000	379913.5	-0.3	2.1	9000	416709.5
IV	60.00	68.484	0.001	2.2	9000	488211.7	-0.3	2.2	9000	526814.1

Figure 19- RCC Bridge (Chainage- 68.484 km) (Lat. -26°33'41.57"N, Long. - 90°34'6.75"E)

- **Bathymetry Survey:-**

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

The layer of water in the river Aai is not sufficient for carrying out the Bathymetric survey. So the Bathymetry survey was not possible in this zone of River. The water level of the Aai River was very low and for that reason the Bathymetry Survey was not possible in this zone of river.

- **Topographic Survey:-**

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

The Topography survey has been carried out from Brahmaputra Confluence to Adalguri RCC Bridge. The length of the Topography survey of the river is from the Chainage 0.00 km to Chainage 68.484 km.

a) Prominent Dams / Barrage:-

There are no Dams, Barrages 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 found in this zone of river.

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

Aai 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 right portion of the river near Rameswarpur village to Gantla village (Chainage- 63.100 km to Chainage- 67.280 km), Sankor ghat village (Chainage- 79.120 km to Chainage- 80.340 km) and (Chainage-80.780 km to Chainage-80.910 km), the Embankment and the Bolder pitching have been found for protecting the banks of the river and also prevent the soil erosion.

d) Navigational Hazards - Rocks, rapid waterfalls, steep gradient: -

During the period of survey, no navigational hazards like rocks, rapid waterfalls, and steep gradients were found.

e) Details of Protected Area- Wildlife Defence: -

The most part of the riverside area has been surrounded by dense forest. Manas National park has been located nearly 20 km far away from the river side. The area has been protected for wildlife defence.

f) NH/SH/MDR along and/or in vicinity:-

NH-31, NH-31C and NH-31B are three major communications way in this zone. Besides, SH-2, SH-14 is also very helpful to the native villagers for daily travels.

g) Railway Line and Stations in the vicinity:-

The North Frontier Railway is the main railway network in this region. Bongaigaon railway Station which is crossing over the river which is going towards the Goalpara District. The nearest Railway Station is Chaprakata which is situated on the right bank of the river. Kolkata- Assam Railway Bridge is situated near at Chainage of 56.156 km.

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

The major portion of the right bank of the river is occupied by agriculture. Major crops are rice, tea, mustard, sugarcane, black dhal, vegetables like, radish, cabbage, cauliflower, etc. The left bank mostly occupied with scattered forest area and agriculture. The most important forest products are timber, bamboo and firewood.

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

The Major crops along the river is Paddy, jute, Tea, Rice, Wheat, Maize, Sorghum, gram, Millets, Sugarcane and Spices are cultivated here.

j) Availability of Bulk / Construction Material: -

The availability of the construction materials are too easy for construction any kind of structure. There were so many cement factories and the brick fields are located and the sand is available from the river.

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

Bongaigaon Refinery indian oil is located in this zone of river approx 6.75 km from the waterway.

l) Existing Jetties and Terminals (with conditions and facilities): -

The Jetty services are available near at Chainage of 5.577 km (Chalta Ferry Ghat), 12.387 km (Kushbari Ferry Ghat), 18.162 km (Mahanburi Ghat) and 35.43 km (Holdibari Ferry ghat) in this zone of river.

Sl no	Name of Ferry ghat	Chainage (km)	Easting	Northing	Latitude (N)	Longitude (E)	Remarks
1	Chalta Ferry Ghat	5.577	267906.25	2903489.20	26°13'56.23"	90°40'35.996"	Temporary Jetty
2	Kushbari Ferry ghat	12.387	270990.43	2908040.65	26°16'25.847"	90°42'24.165"	
3	Mahanburi Ferry ghat	18.162	275772.44	2906188.16	26°15'28.401"	90°45'17.609"	
4	Holdibari Ferry ghat	35.43	274743.73	2919529.81	26°22'41.166"	90°44'32.15"	

m) Existing Cargo Movement: -

The cargo movement is processed through waterways. The Ferry services are available near at Chainage of 5.577 km (Chalta Ferry Ghat), 12.387 km (Kushbari Ferry Ghat), 18.162 km (Mahanburi Ghat) and 35.43 km (Holdibari Ferry ghat) in this zone of river. There is no cargo available in this zone of river.

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

The Prominent cities situated near the bank of river Aai are Goalpara, Abhayapuri, Bijni, Bongaigaon, Dawkijhar, Amguri etc. Kamakhya Temple is the chief historical and Tourist places for the natives and also for the Tourist. Shankardev Kalakshetra**,** Umananda Temple**,** Assam State Zoo**,** Shilpagram**.** Chandubi Lake**,** Sonapur**,** Madan Kamdev, Chandrapur and Manas National park, Jaintia Hill are also the famous Historical and Tourist places.

o) Availability of Passenger Ferry Services: -

The Ferry services are available near at Chainage of 5.577 km (Chalta Ferry Ghat), 12.387 km (Kushbari Ferry Ghat), 18.162 km (Mahanburi Ghat) and 35.43 km (Holdibari Ferry ghat) in this zone of river.

Sl no	Name of Ferry ghat	Chainage (km)	Easting	Northing	Latitude (N)	Longitude (E)	Remarks
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4	Holdibari Ferry ghat	35.43	274743.73	2919529.81	26°22'41.166"	90°44'32.15"	

p) Available and probable Water Sport Recreational Facilities: -

No water sports and other facilities available in this zone of river.

q) Fishing activities:-

Aai River is the lifeline of the people of Bongaigaon, Dawkijhar, Bijni etc. Aai provides diverse habitat in its downstream for living biota such as stream, riparian zones and wetlands etc. Aai 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 Assam. The wetlands are ecologically and economically important for the local people. Fishing in Aai is very famous among the people. The common fish at Aai is the Golden Mahseer and some small fishes. Aai is one of the only tributaries of Brahmaputra with a resident population of the endangered Gangetic Dolphin which is the National aquatic animal of India.

r) Sand mining:-

There is no sand mine found in this zone of river.

s) Tributaries:-

The Three streams create a river basin in this zone of river.

i)Aai

ii) Beki

iii) Manas

t) Details of Irrigation Canals and Outlets:-

The Irrigation Canal and outlets are found near at Chainage of 5.639 km, 6.662 km, 27 km, 37.712 km and 65.9 km right bank side of the river.

u) Details of Nalas, polluted water discharge in to the rivers and treatment plants:-

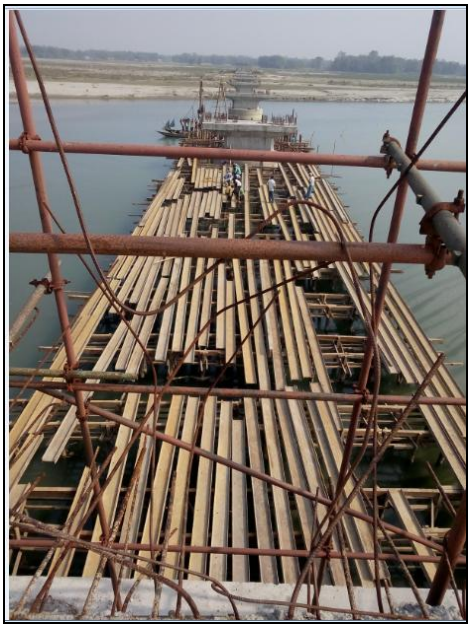
There are no nalas found in this zone of river.

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 also used in the industrial hubs. Ferry services are also navigable in this region of river. The water is used as irrigation purposes. With the help of the irrigation system, the cultivation can easily accessible. Irrigation Canals supply the sufficient water for the cultivation.

aa) Photographs of cross-structures in each stretch with description, location, Chainage, clearance

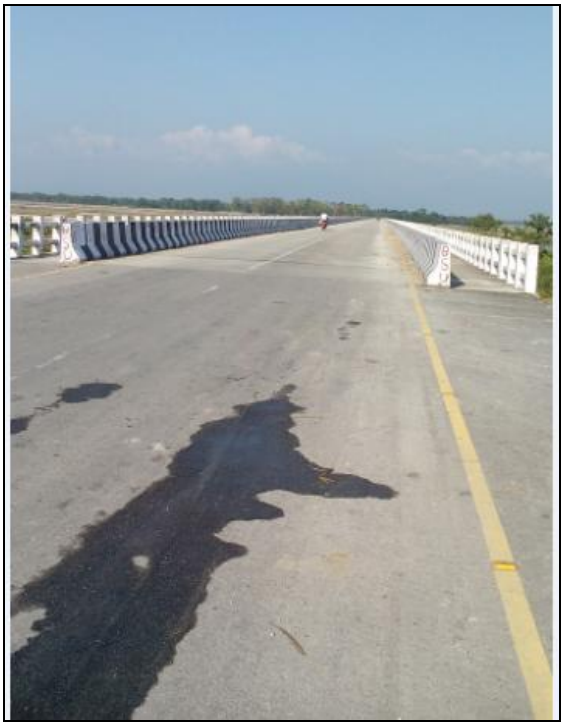
The RCC Bridge has been situated near Chainage of 25.645km at Bharalipara Village. The Bridge Position is (Lat- 26°18'26.59"N, Long- 90°45'5.94"E). The Bridge has a good horizontal and vertical clearance for the development of the waterways.



The Under-Construction RCC Bridge has been situated near Chainage of 36.355km at Bordhup Village. The Bridge Position is (Lat-26°22'51.23"N, Long- 90°44'10.65"E).

The Two RCC bridges have been situated near Chainage of 55.789km and 55.821km near Dawkijhar village respectively. The Bridges Position are (Lat-26°29'48.92"N, Long-90°39'15.13"E) and (Lat-26°29'50.65"N, Long-90°39'7.59"E).The Bridge has a good horizontal and vertical clearance for the development of the waterways.

The Railway Bridge has been situated near at Chainage of 56.156 km near at Donkinamari Village. The Bridge Position is (Lat-26°30'1.46"N, Long-90°39'12.93"E). The Bridge has a good horizontal and vertical clearance for the development of the waterways.



This RCC Bridge has been situated near Chainage of 68.484km near at Adalguri village. The Bridge Position is (Lat-26°33'23.60"N, Long-90°33'59.26"E). The Bridge has a good horizontal and vertical clearance for the development of the waterways.

Three High Tension lines are located near Chainage of 55.965 km, 56.113 km and 56.273 km in this zone of river. The position of three high tension lines are (Lat: - 26°29'55.04"N, Long: - 90°39'7.50"E), (Lat: - 26°29'59.87"N, Long: - 90°39'8.88"E), (Lat: - 26°30'4.91"N, Long: - 90°39'9.39"E) respectively.

Section 4: Terminals

There is no existing terminal found in this zone of river. But Daukijhar area may develop as a proposed terminal location. NH-31, NH-31C and SH-2 are linked with this site. The IWT operation also may develop in this site. Bijni Railway station is also located 0.36 km far from NH-31. The Railway and Road communication with SH-2 is available in this site.

Figure 20- Daukijhar Terminal site (proposed terminal location)

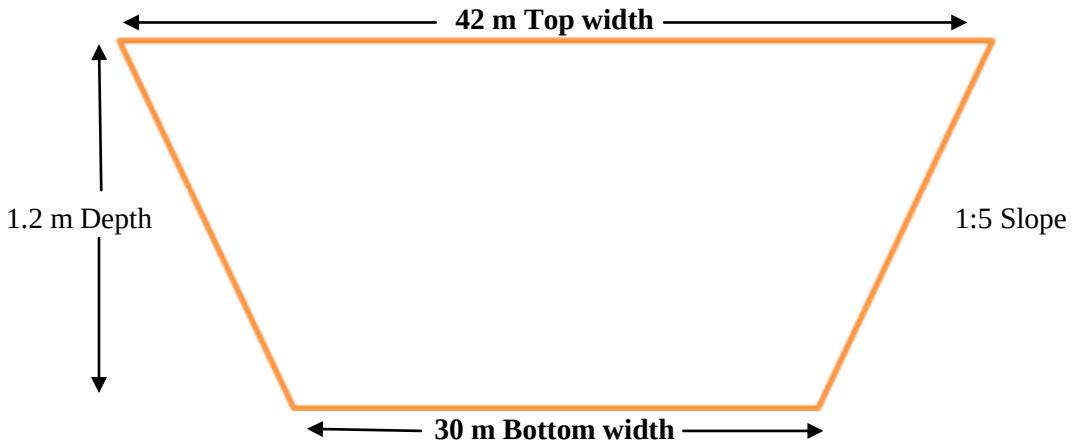
4.1 Details of Land use, owner etc.:-

The both side bank of the River Aai used for mainly in cultivation. The Farmers are cultivated their crops with using this fertile land and grows a huge amount of crops every year. Besides, some portions of the land are surrounded by small industries and Forests. Though bolder pitching is found in some places, But in Recent times, the bank of the river has been worn away in some places for lack of trees. Sometimes, the land of the river has been changed into a heap of garbage. As a result, the river side becomes polluted land. 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)

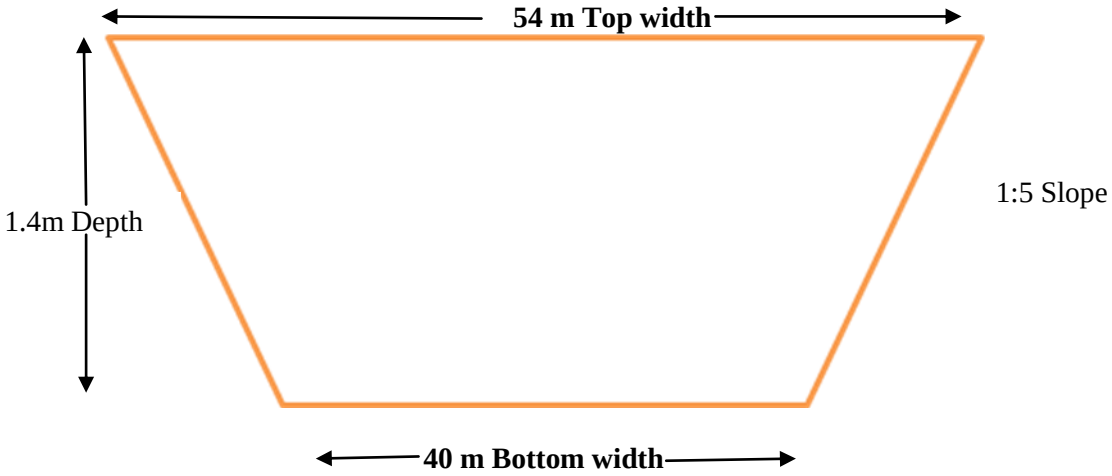
Class-I: - (Channel design: - Bottom width- 30 meter, Top width- 42 meter)



Location		Chainage (km)		As per Observed Soundings (Cubic meter)						As per Reduced Soundings (Cubic meter)					
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 Quantity (Cubic meter)	Min. Depth (m)	Max Depth (m)	Length of Shoal (m)	Avg. Depth of Cut (m)	Dredging Qty. (Cubic meter)	Cumulative Dredging Quantity (Cubic meter)
Mahumpur Pt II Village	Barjana Pt I Village	0	10	0.01	0.3	10000	0.97	320874.12	320874.12	-0.3	0	10000	1.15	381285.70	381285.70
Malegharr Pt II Village	Pathalia Para Village	10	20	0.01	0.3	10000	1.20	396985.08	717859.20	-0.3	0	10000	1.45	482180.06	863465.76
Pathalia Para Village	Sanermukh Village	20	30	0.01	0.3	10000	1.10	364257.90	1082117.10	-0.3	0	10000	1.32	438741.44	1302207.20
Sanermukh Village	Amguri Village	30	40	0.01	0.3	10000	1.22	405035.00	1487152.10	-0.3	0	10000	1.51	501275.70	1803482.90
Sastare Village	Nachankuri Village	40	50	0.01	1.8	9000	1.14	339077.60	1826229.70	-0.3	1.8	8000	1.50	396853.00	2200335.90
Garugaon No 3 Village	Chaprakata Pt-I Village	50	60	0.01	0.3	10000	1.22	406168.00	2232397.70	-0.3	0	10000	1.46	485289.50	2685625.40
Karebari Village	Adalguri Pt III Village	60	68.484	0.01	2.2	9000	0.35	105534.80	2337932.48	-0.3	2.1	9000	0.52	156038.00	2841663.40
Total						68000		2337932.48		Total		67000		2841663.40	

Table 12- Minimum and Maximum depth for Class-I

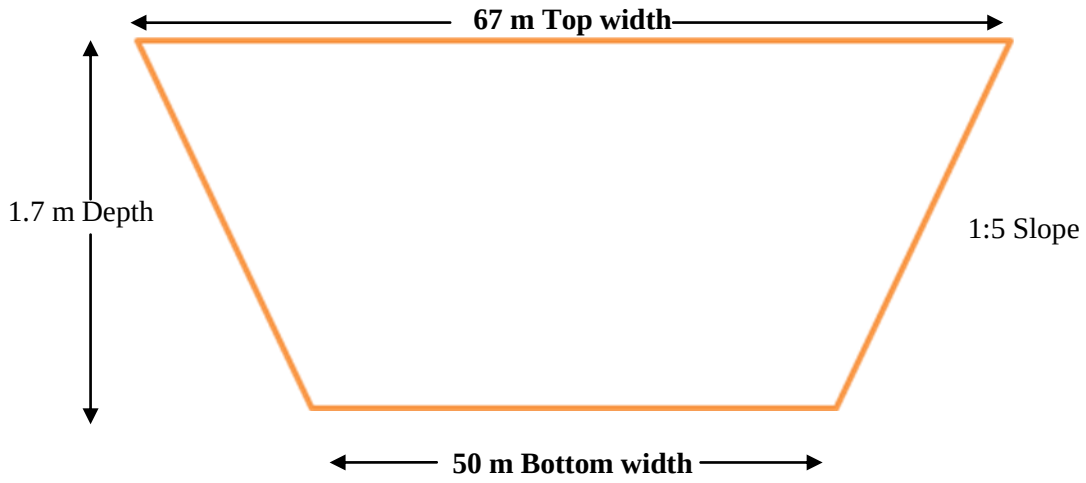
Class-II: - (Channel design: - Bottom width- 40 meter, Top width- 54 meter)



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 Quantity (Cubic meter)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Avg. Depth of Cut (m)	Dredging Qty. (Cubic meter)	Cumulative Dredging Quantity (Cubic meter)
Mahumpur Pt II Village	Barjana Pt I Village	0	10	0.006	0.3	10000	1.15	510135.70	510135.70	-0.3	0	10000	1.33	587858.58	587858.58
Malegharr Pt II Village	Pathalia Para Village	10	20	0.007	0.4	10000	1.38	611858.30	1121994.00	-0.3	0	10000	1.64	723662.52	1311521.10
Pathalia Para Village	Sanermukh Village	20	30	0.006	0.3	10000	1.29	568931.00	1690925.00	-0.3	0	10000	1.50	664742.90	1976264.00
Sanermukh Village	Amguri Village	30	40	0.006	0.3	10000	1.41	622733.00	2313658.00	-0.3	0	10000	1.69	747016.00	2723280.00
Sastare Village	Nachankuri Village	40	50	0.006	1.8	8000	1.34	472217.00	2785875.00	-0.3	1.8	8000	1.66	585038.40	3308318.40
Garugaon No 3 Village	Chaprakata Pt-I Village	50	60	0.006	0.3	10000	1.37	604968.00	3390843.00	-0.3	0	10000	1.64	723925.10	4032243.50
Karebari Village	Adalguri Pt III Village	60	68.484	0.007	2.2	9000	0.57	228817.30	3619660.30	-0.3	2.1	9000	0.65	257754.50	4289998.00
Total						67000		3619660.30		Total		67000		4289998.00	

Table 13-Minimum and Maximum depth for Class-II

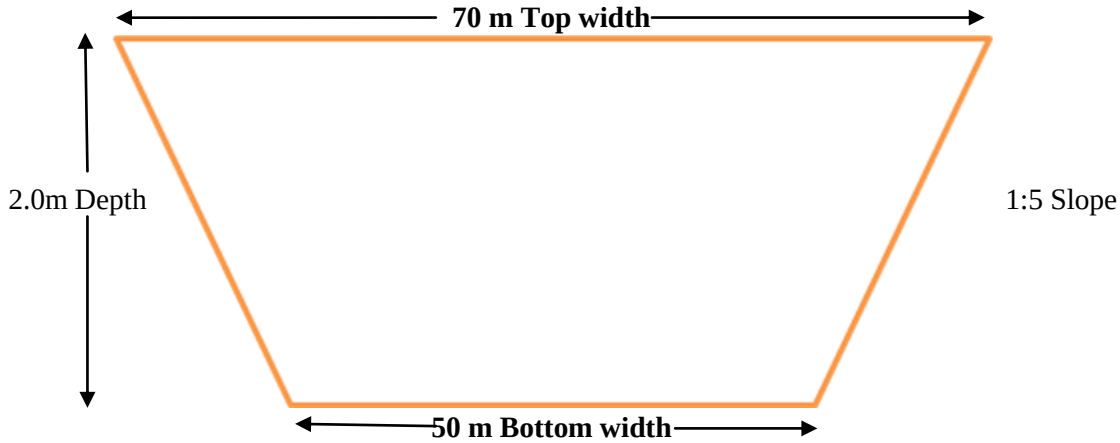
Class-III: - (Channel design: - Bottom width- 50 meter, Top width- 67 meter)



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 Quantity (Cubic meter)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Avg. depth of cut (m)	Dredging Qty. (Cubic meter)	Cumulative Dredging Quantity (Cubic meter)
Mahumpur Pt II Village	Barjana Pt I Village	0	10	0.002	0.3	10000	1.46	805181.21	805181.21	-0.3	0	10000	1.63	901668.98	901668.98
Malegh ar Pt II Village	Pathalia Para Village	10	20	0.004	0.4	10000	1.70	935566.09	1740747.30	-0.3	0	10000	1.95	1077104.12	1978773.10
Pathalia Para Village	Sanermukh Village	20	30	0.002	0.3	10000	1.60	881652.40	2622399.70	-0.3	0	10000	1.81	1000932.90	2979706.00
Sanermukh Village	Amguri Village	30	40	0.002	0.3	10000	1.72	949913.40	3572313.10	-0.3	0	10000	2.00	1104824.40	4084530.40
Sastare Village	Nachankuri Village	40	50	0.002	1.8	9100	1.43	716926.50	4289239.60	-0.3	1.8	9100	1.71	856946.10	4941476.50
Garuga on No 3 Village	Chaprakata Pt-I Village	50	60	0.002	0.3	10000	1.68	925790.40	5215030.00	-0.3	0	10000	1.95	1074357.60	6015834.10
Karebari Village	Adalguri Pt III Village	60	68.484	0.004	2.2	9000	0.76	379913.50	5594943.50	-0.3	2.1	9000	0.84	416709.50	6432543.60
Total						68000		5594943.50		Total		68000		6432543.60	

Table 14- Minimum and Maximum depth for 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 Quantity (Cubic meter)	Min. Depth (m)	Max Depth (m)	Length of Shoal (m)	Avg Depth of Cut (m)	Dredging Qty. (Cubic meter)	Cumulative Dredging Quantity (Cubic meter)
Mahumpur Pt II Village	Barjana Pt I Village	0	10	0.001	0.3	10000	1.81	997242.19	997242.19	-0.3	0	10000	1.99	1098100.20	1098100.20
Malegh ar Pt II Village	Pathalia Para Village	10	20	0.001	0.4	10000	2.07	1136949.11	2134191.30	-0.3	0	10000	2.33	1285625.30	2383725.50
Pathalia Para Village	Sanermukh Village	20	30	0.001	0.3	10000	1.97	1080504.80	3214696.10	-0.3	0	10000	2.19	1205029.50	3588755.00
Sanermukh Village	Amguri Village	30	40	0.001	0.3	10000	2.09	1152346.80	4367042.90	-0.3	0	10000	2.39	1314385.00	4903140.00
Sastare Village	Nachankuri Village	40	50	0.001	2.1	9000	1.76	870645.10	5237688.00	-0.3	2.1	8000	2.31	1016928.20	5920068.20
Garugaon No 3 Village	Chapra kata Pt-I Village	50	60	0.001	0.3	10000	2.05	1126205.50	6363893.50	-0.3	0	10000	2.33	1281789.30	7201857.50
Karebari Village	Adalguri Pt III Village	60	68.484	0.001	2.2	9000	0.98	488211.70	6852105.20	-0.3	2.2	9000	1.06	526814.10	7728671.60
Total						68000		6852105.20		Total		67000		7728671.60	

Table 15-Minimum and Maximum depth for Class-IV

Section 6: Conclusion:

The surveyed stretch of Aai River is 68.484 km in length and was not explored for any navigational possibility in earlier time. As much as four major Ferry Services like Chalta, Khusbari, Holdibari, Mahanburi etc. Ferry Ghats are located in this zone of river. The right bank of the river is moderately connected with roads and Railways and other infrastructures than the left bank.

Total 08 nos. of Bench mark were established throughout the survey Period. The River has a steel Rail Bridge and five RCC Bridges which are very communicative in this zone of river. Kolkata-Assam Railway communication is taken a major role for transportation and communication system. With the help of this rail bridge, tourist can easily reach their destination. The bridges have a good Vertical and Horizontal clearance for the development of the water ways. There is no Dam, Barrages, weirs, Anicut, Locks, Aqueduct found in this zone of river. RCC and Railway communication have been really very favorable for this region and also for the tourist. The historical and Tourist place like Manas National Park has been located in this region of River. Both side plants are also protected the bank of the river side. Bongaigaon, Bijni, Abhayapuri etc. villages are located in this zone of river.

NH-31C, NH-31B, NH-31 are the important communication system in this zone of river. Besides, SH- 4, SH-5 are also helpful for the local villagers. Chaprakata, New Bongaigaon, Bijni etc. Railway stations are located in this zone of river. There is no Ro Ro facility available in this zone of river.

6.1 Dredging Summery

Class Details	As per Observed Soundings (Cubic meter)	As per Reduced Soundings (Cubic meter)
Class I	2337932.48	2841663.40
Class II	3619660.30	4289998
Class III	5594943.50	6432543.60
Class IV	6852105.20	7728671.60

Annexure:-

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

The Chart Datum value of Aai NH Road Crossing and Confluence with Brahmaputra River has been provided by IWAI office.

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. (cu.m.)	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	0.01	0.3	1000	34546.67	34546.67	-0.3	0	1000	39674.89	39674.89
1	2	0.01	0.3	1000	43087.93	77634.60	-0.3	0	1000	55597.50	95272.39
2	3	0.01	0.3	1000	42840.06	120474.66	-0.3	0	1000	55334.96	150607.35
3	4	0.01	0.3	1000	14802.42	135277.08	-0.3	0	1000	18668.31	169275.66
4	5	0.01	0.2	1000	12719.73	147996.81	-0.3	0	1000	12719.74	181995.40
5	6	0.01	0.2	1000	25366.55	173363.36	-0.3	0	1000	25629.94	207625.34
6	7	0.01	0.3	1000	37945.14	211308.50	-0.3	0	1000	38735.61	246360.95
7	8	0.03	0.3	1000	41905.76	253214.26	-0.3	0	1000	52184.82	298545.77
8	9	0.02	0.3	1000	43169.58	296383.84	-0.3	0	1000	55760.73	354306.50
9	10	0.01	0.2	1000	24490.28	320874.12	-0.3	0	1000	26979.20	381285.70
10	11	0.01	0.2	1000	35562.76	356436.88	-0.3	0	1000	37971.53	419257.23
11	12	0.01	0.3	1000	42574.40	399011.28	-0.3	0	1000	48573.88	467831.11
12	13	0.01	0.3	1000	42726.22	441737.50	-0.3	0	1000	55104.34	522935.45
13	14	0.01	0.3	1000	42795.84	484533.34	-0.3	0	1000	55278.03	578213.48
14	15	0.01	0.3	1000	42981.77	527515.11	-0.3	0	1000	55517.13	633730.61
15	16	0.01	0.2	1000	30561.94	558077.05	-0.3	0	1000	33216.66	666947.27
16	17	0.01	0.2	1000	33210.76	591287.81	-0.3	0	1000	35699.28	702646.55
17	18	0.01	0.3	1000	42203.56	633491.37	-0.3	0	1000	51844.06	754490.61
18	19	0.02	0.3	1000	42121.73	675613.10	-0.3	0	1000	54406.96	808897.57
19	20	0.1	0.3	1000	42246.10	717859.20	-0.3	0	1000	54568.19	863465.76
20	21	0.02	0.3	1000	42577.66	760436.86	-0.3	0	1000	54996.30	918462.06
21	22	0.1	0.3	1000	41032.16	801469.02	-0.3	0	1000	52683.43	971145.49
22	23	0.02	0.3	1000	18620.72	820089.74	-0.3	0	1000	19073.30	990218.79
23	24	0.01	0.3	1000	19481.08	839570.82	-0.3	0	1000	19481.08	1009699.90
24	25	0.02	0.3	1000	40206.95	879777.77	-0.3	0	1000	49151.68	1058851.60
25	26	0.01	0.3	1000	43113.80	922891.57	-0.3	0	1000	54733.49	1113585.00
26	27	0.01	0.3	1000	43004.06	965895.63	-0.3	0	1000	55546.44	1169131.50
27	28	0.01	0.3	1000	41424.83	1007320.50	-0.3	0	1000	52894.50	1222026.00
28	29	0.01	0.2	1000	33216.60	1040537.10	-0.3	0	1000	34063.55	1256089.50
29	30	0.01	0.3	1000	41580.01	1082117.10	-0.3	0	1000	46117.62	1302207.20
30	31	0.1	0.3	1000	41728.28	1123845.40	-0.3	0	1000	53784.96	1355992.10
31	32	0.1	0.3	1000	43027.81	1166873.20	-0.3	0	1000	55577.70	1411569.80
32	33	0.01	0.2	1000	42861.38	1209734.50	-0.3	0	1000	55362.70	1466932.50

Chainage (km)		As per Observed Soundings					As per Reduced Soundings				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (Cubic meter)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (Cubic meter)	Cumulative Dredging Qty. (Cubic meter)
33	34	0.01	0.3	1000	30583.99	1240318.50	-0.3	0	1000	35441.21	1502373.70
34	35	0.01	0.2	1000	32781.50	1273100.00	-0.3	0	1000	34187.43	1536561.20
35	36	0.01	0.2	1000	41861.00	1314961.00	-0.3	0	1000	45129.10	1581690.30
36	37	0.01	0.3	1000	42909.32	1357870.40	-0.3	0	1000	54803.93	1636494.20
37	38	0.01	0.3	1000	43050.68	1400921.00	-0.3	0	1000	55606.91	1692101.10
38	39	0.01	0.3	1000	43182.06	1444103.10	-0.3	0	1000	55776.80	1747877.90
39	40	0.01	0.3	1000	43048.99	1487152.10	-0.3	0	1000	55605.03	1803482.90
40	41	0.01	0.3	1000	42873.58	1530025.70	-0.3	0	1000	55378.55	1858861.50
41	42	0.01	0.3	1000	43047.92	1573073.60	-0.3	0	1000	55602.75	1914464.20
42	43	0.01	0.2	1000	42739.78	1615813.40	-0.3	0	1000	55205.29	1969669.50
43	44	0.01	0.2	1000	42944.12	1658757.50	-0.3	0	1000	55469.51	2025139.00
44	45	0.01	0.2	1000	42948.97	1701706.50	-0.3	0	1000	55474.15	2080613.20
45	46	0.01	1.7	1000	29519.30	1731225.80	-0.3	0	1000	38186.43	2118799.60
46	47	1.4	1.8	0	0.00	1731225.80	1.4	1.8	0	0.00	2118799.60
47	48	1.1	1.8	1000	21988.25	1753214.00	1.2	1.8	0	0.00	2118799.60
48	49	0.01	1.7	1000	43008.68	1796222.70	-0.3	0	1000	25983.34	2144782.90
49	50	0.03	0.2	1000	30007.00	1826229.70	-0.3	0	1000	55552.95	2200335.90
50	51	0.01	0.2	1000	41224.46	1867454.10	-0.3	0	1000	37970.25	2238306.10
51	52	0.01	0.2	1000	35518.88	1902973.00	-0.3	0	1000	50888.90	2289195.00
52	53	0.01	0.3	1000	35627.48	1938600.50	-0.3	0	1000	43730.75	2332925.80
53	54	0.1	0.3	1000	39026.26	1977626.80	-0.3	0	1000	41560.09	2374485.90
54	55	0.01	0.3	1000	41091.48	2018718.20	-0.3	0	1000	40766.36	2415252.20
55	56	0.01	0.2	1000	42943.48	2061661.70	-0.3	0	1000	49632.20	2464884.40
56	57	0.01	0.3	1000	43107.87	2104769.60	-0.3	0	1000	55468.47	2520352.90
57	58	0.01	0.3	1000	42400.13	2147169.70	-0.3	0	1000	55680.65	2576033.60
58	59	0.01	0.3	1000	42446.24	2189616.00	-0.3	0	1000	54765.99	2630799.60
59	60	0.03	0.3	1000	42781.78	2232397.70	-0.3	0	1000	54825.84	2685625.40
60	61	0.03	1.5	1000	10703.17	2243100.90	-0.3	0	1000	55259.88	2740885.30
61	62	1.2	2.1	0	0.00	2243100.90	1.2	2.1	0	0.00	2740885.30
62	63	1.1	2.2	1000	14917.32	2258018.20	-0.3	0	1000	19055.72	2759941.00
63	64	0.01	2.2	1000	17085.48	2275103.70	-0.3	0	1000	17658.61	2777599.60
64	65	0.01	0.3	1000	17903.73	2293007.40	-0.3	0	1000	19138.77	2796738.40
65	66	0.01	0.3	1000	22462.52	2315470.00	-0.3	0	1000	22462.51	2819200.90
66	67	0.01	0.2	1000	10685.83	2326155.80	-0.3	0	1000	10364.29	2829565.20
67	68.484	0.03	0.3	1000	11776.69	2337932.48	-0.3	0	1000	12098.22	2841663.40
Total				66000	2337932.48		Total		65000	2841663.40	

Table 16- Dredging Calculation per km 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	0.009	0.3	1000	52619.77	52619.77	-0.3	0	1000	59250.81	59250.81
1	2	0.006	0.3	1000	65628.77	118248.5	-0.3	0	1000	81729.16	140979.97
2	3	0.006	0.3	1000	65252.86	183501.4	-0.3	0	1000	81317.97	222297.94
3	4	0.007	0.3	1000	28034.54	211535.9	-0.3	0	1000	33001.48	255299.42
4	5	0.007	0.3	1000	25716.42	237252.4	-0.3	0	1000	25716.42	281015.84
5	6	0.007	0.2	1000	42585.08	279837.4	-0.3	0	1000	42929.39	323945.23
6	7	0.008	0.3	1000	58821.19	338658.6	-0.3	0	1000	59840.04	383785.27
7	8	0.027	0.3	1000	63829.76	402488.4	-0.3	0	1000	77003.59	460788.86
8	9	0.017	0.3	1000	65753.63	468242	-0.3	0	1000	81942.25	542731.11
9	10	0.009	0.3	1000	41893.71	510135.7	-0.3	0	1000	45127.47	587858.58
10	11	0.007	0.3	1000	56158.05	566293.8	-0.3	0	1000	59468.99	647327.57
11	12	0.009	0.3	1000	65051.45	631345.2	-0.3	0	1000	73734.23	721061.8
12	13	0.008	0.3	1000	65077.53	696422.8	-0.3	0	1000	80968.77	802030.57
13	14	0.008	0.3	1000	65184.44	761607.2	-0.3	0	1000	81232.92	883263.49
14	15	0.007	0.3	1000	65468	827075.2	-0.3	0	1000	81579.75	964843.24
15	16	0.008	0.3	1000	49058.55	876133.8	-0.3	0	1000	53025.56	1017868.8
16	17	0.007	0.3	1000	52868.81	929002.6	-0.3	0	1000	56282.48	1074151.3
17	18	0.008	0.3	1000	64483.8	993486.4	-0.3	0	1000	77224.92	1151376.2
18	19	0.019	0.3	1000	64158.97	1057645	-0.3	0	1000	79954.57	1231330.8
19	20	0.097	0.4	1000	64348.42	1121994	-0.3	0	1000	80190.34	1311521.1
20	21	0.018	0.3	1000	64852.38	1186846	-0.3	0	1000	80818.57	1392339.7
21	22	0.096	0.3	1000	62873.89	1249720	-0.3	0	1000	77884.04	1470223.7
22	23	0.018	0.3	1000	33559.5	1283280	-0.3	0	1000	34172.18	1504395.9
23	24	0.007	0.3	1000	34807.97	1318087	-0.3	0	1000	34808.07	1539204
24	25	0.016	0.3	1000	61899.74	1379987	-0.3	0	1000	73131.4	1612335.4
25	26	0.007	0.3	1000	65668.67	1445656	-0.3	0	1000	80590.3	1692925.7
26	27	0.007	0.3	1000	65501.6	1511158	-0.3	0	1000	81627.9	1774553.6
27	28	0.006	0.3	1000	63150.95	1574308	-0.3	0	1000	77946.62	1852500.2
28	29	0.008	0.3	1000	52972.08	1627281	-0.3	0	1000	54176.48	1906676.7
29	30	0.007	0.3	1000	63644.36	1690925	-0.3	0	1000	69587.3	1976264
30	31	0.096	0.3	1000	63557.84	1754483	-0.3	0	1000	79071.75	2055335.7
31	32	0.097	0.3	1000	65537.95	1820021	-0.3	0	1000	81673.5	2137009.2
32	33	0.007	0.3	1000	65284.05	1885305	-0.3	0	1000	81356.48	2218365.7
33	34	0.006	0.3	1000	49340.91	1934646	-0.3	0	1000	55600.53	2273966.2
34	35	0.006	0.3	1000	52642.3	1987288	-0.3	0	1000	54575.09	2328541.3
35	36	0.007	0.3	1000	64096.61	2051385	-0.3	0	1000	68691.34	2397232.7
36	37	0.007	0.3	1000	65357.88	2116742	-0.3	0	1000	80651.64	2477884.3

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)
37	38	0.009	0.3	1000	65572.49	2182315	-0.3	0	1000	81716.53	2559600.8
38	39	0.009	0.3	1000	65772.64	2248088	-0.3	0	1000	81965.3	2641566.1
39	40	0.009	0.3	1000	65570.34	2313658	-0.3	0	1000	81713.84	2723280
40	41	0.006	0.3	1000	65303.48	2378961	-0.3	0	1000	81380.74	2804660.7
41	42	0.007	0.3	1000	65568.33	2444530	-0.3	0	1000	81710.46	2886371.2
42	43	0.007	0.3	1000	65099.34	2509629	-0.3	0	1000	81126.57	2967497.7
43	44	0.007	0.3	1000	65410.12	2575039	-0.3	0	1000	81513.55	3049011.3
44	45	0.006	0.3	1000	65417.54	2640457	-0.3	0	1000	81523.28	3130534.6
45	46	0.008	1.7	1000	45058.31	2685515	-0.3	0	1000	56180.78	3186715.4
46	47	1.4	1.8	0	0	2685515	1.4	1.8	0	0	3186715.4
47	48	1.4	1.8	0	0	2685515	1.4	1.8	0	0	3186715.4
48	49	0.006	1.7	1000	34851.94	2720367	-0.3	0	1000	39966.22	3226681.6
49	50	0.027	0.3	1000	65508.52	2785875	-0.3	0	1000	81636.81	3308318.4
50	51	0.008	0.3	1000	46677.16	2832553	-0.3	0	1000	56935.74	3365254.1
51	52	0.008	0.3	1000	63187.76	2895740	-0.3	0	1000	75576.98	3440831.1
52	53	0.006	0.3	1000	55533.86	2951274	-0.3	0	1000	66121.07	3506952.2
53	54	0.098	0.3	1000	56161.03	3007435	-0.3	0	1000	63831.99	3570784.2
54	55	0.009	0.3	1000	60496.44	3067932	-0.3	0	1000	63143.14	3633927.3
55	56	0.007	0.3	1000	62608.36	3130540	-0.3	0	1000	73928	3707855.3
56	57	0.007	0.3	1000	65410	3195950	-0.3	0	1000	81514.04	3789369.3
57	58	0.008	0.3	1000	65659.19	3261609	-0.3	0	1000	81824.48	3871193.8
58	59	0.008	0.3	1000	64581.43	3326191	-0.3	0	1000	80481.24	3951675.1
59	60	0.027	0.3	1000	64652.16	3390843	-0.3	0	1000	80568.41	4032243.5
60	61	0.029	1.4	1000	65163.06	3456006	-0.3	0	1000	81206.3	4113449.8
61	62	1	1.5	1000	16814.78	3472821	-0.3	0	1000	21222.9	4134672.7
62	63	1.7	2.2	0	0	3472821	1.7	2.1	0	0	4134672.7
63	64	0.007	2	1000	25170.26	3497991	-0.3	0	1000	30280.98	4164953.7
64	65	0.007	0.3	1000	30593.35	3528584	-0.3	0	1000	31957.84	4196911.5
65	66	0.009	0.3	1000	33119.49	3561704	-0.3	0	1000	34714.5	4231626
66	67	0.008	0.3	1000	38784.67	3600488	-0.3	0	1000	38784.67	4270410.7
67	68.48	0.029	0.3	1000	19171.78	3619660.3	-0.3	0	1000	19587.3	4289998
Total				65000	3619660.3		Total		65000	4289998	

Table 17- Dredging Calculation per km 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	0.008	0.3	1000	79525.3	79525.3	-0.3	0	1000	87799.75	87799.75
1	2	0.002	0.3	1000	99191.19	178716.49	-0.3	0	1000	119175.2	206974.95
2	3	0.002	0.3	1000	98623.16	277339.65	-0.3	0	1000	118556.12	325531.07
3	4	0.004	0.3	1000	51541.86	328881.51	-0.3	0	1000	57696.8	383227.87
4	5	0.004	0.3	1000	49051.22	377932.73	-0.3	0	1000	49051.22	432279.09
5	6	0.004	0.2	1000	70387.07	448319.8	-0.3	0	1000	70832.18	503111.27
6	7	0.006	0.3	1000	90433.48	538753.28	-0.3	0	1000	91710.23	594821.5
7	8	0.024	0.3	1000	96473.3	635226.58	-0.3	0	1000	112811.58	707633.08
8	9	0.014	0.3	1000	99379.93	734606.51	-0.3	0	1000	119465.78	827098.86
9	10	0.008	0.3	1000	70574.7	805181.21	-0.3	0	1000	74570.12	901668.98
10	11	0.004	0.3	1000	87872.15	893053.36	-0.3	0	1000	92185.13	993854.11
11	12	0.008	0.3	1000	98553.38	991606.74	-0.3	0	1000	110586.37	1104440.5
12	13	0.006	0.3	1000	98358.37	1089965.1	-0.3	0	1000	118073.24	1222513.7
13	14	0.006	0.3	1000	98519.56	1188484.7	-0.3	0	1000	118430.92	1340944.6
14	15	0.004	0.3	1000	98946.93	1287431.6	-0.3	0	1000	118930.42	1459875.1
15	16	0.006	0.3	1000	78079.38	1365511	-0.3	0	1000	83615.28	1543490.3
16	17	0.004	0.3	1000	83249.36	1448760.3	-0.3	0	1000	87821.8	1631312.1
17	18	0.006	0.3	1000	97760.61	1546521	-0.3	0	1000	113979.25	1745291.4
18	19	0.018	0.3	1000	96970.52	1643491.5	-0.3	0	1000	116569.21	1861860.6
19	20	0.094	0.4	1000	97255.8	1740747.3	-0.3	0	1000	116912.45	1978773.1
20	21	0.016	0.3	1000	98018.84	1838766.1	-0.3	0	1000	117829.65	2096602.7
21	22	0.092	0.3	1000	95637.58	1934403.7	-0.3	0	1000	114282.99	2210885.7
22	23	0.016	0.3	1000	58917.94	1993321.6	-0.3	0	1000	59700.49	2270586.2
23	24	0.004	0.3	1000	60655.39	2053977	-0.3	0	1000	60655.51	2331241.7
24	25	0.012	0.3	1000	94434.6	2148411.6	-0.3	0	1000	108243.1	2439484.8
25	26	0.004	0.3	1000	99251.4	2247663	-0.3	0	1000	117857.36	2557342.2
26	27	0.004	0.3	1000	98999.43	2346662.5	-0.3	0	1000	119007.51	2676349.7
27	28	0.002	0.3	1000	95515.96	2442178.4	-0.3	0	1000	113956.66	2790306.3
28	29	0.006	0.3	1000	83560.84	2525739.3	-0.3	0	1000	85221.8	2875528.1
29	30	0.004	0.3	1000	96660.44	2622399.7	-0.3	0	1000	104177.85	2979706
30	31	0.092	0.3	1000	96061.12	2718460.8	-0.3	0	1000	115296.39	3095002.4
31	32	0.094	0.3	1000	99054.04	2817514.9	-0.3	0	1000	119074.06	3214076.4
32	33	0.004	0.3	1000	98671.19	2916186	-0.3	0	1000	118612.6	3332689
33	34	0.002	0.3	1000	78856.46	2995042.5	-0.3	0	1000	86619.7	3419308.7
34	35	0.002	0.3	1000	83521.82	3078564.3	-0.3	0	1000	86190.34	3505499.1
35	36	0.004	0.3	1000	97349.71	3175914	-0.3	0	1000	103508.31	3609007.4

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)
36	37	0.004	0.3	1000	98781.35	3274695.4	-0.3	0	1000	117756.28	3726763.7
37	38	0.008	0.3	1000	99106.85	3373802.2	-0.3	0	1000	119137.52	3845901.2
38	39	0.008	0.3	1000	99408.15	3473210.4	-0.3	0	1000	119498.78	3965400
39	40	0.008	0.3	1000	99102.69	3572313.1	-0.3	0	1000	119130.42	4084530.4
40	41	0.002	0.3	1000	98699.61	3671012.7	-0.3	0	1000	118647.41	4203177.8
41	42	0.004	0.3	1000	99100.47	3770113.2	-0.3	0	1000	119128.97	4322306.8
42	43	0.004	0.3	1000	98390.75	3868503.9	-0.3	0	1000	118275.83	4440582.6
43	44	0.004	0.3	1000	98860.89	3967364.8	-0.3	0	1000	118841.54	4559424.1
44	45	0.002	0.3	1000	98871.49	4066236.3	-0.3	0	1000	118853.63	4678277.8
45	46	0.006	1.7	1000	68226.92	4134463.2	-0.3	0	1000	82054.67	4760332.4
46	47	1.3	1.8	100	0.29	4134463.5	1.2	1.7	100	0.29	4760332.7
47	48	1.3	1.8	1000	267.4	4134730.9	1.2	1.7	1000	267.4	4760600.1
48	49	0.002	1.7	1000	55498.56	4190229.5	-0.3	0	1000	61855.17	4822455.3
49	50	0.024	0.3	1000	99010.11	4289239.6	-0.3	0	1000	119021.24	4941476.5
50	51	0.006	0.3	1000	74659.47	4363899	-0.3	0	1000	87413.66	5028890.2
51	52	0.006	0.3	1000	96083.88	4459982.9	-0.3	0	1000	111364.16	5140254.3
52	53	0.002	0.3	1000	86165.95	4546148.9	-0.3	0	1000	99311.23	5239565.6
53	54	0.096	0.3	1000	87689.57	4633838.4	-0.3	0	1000	97264.44	5336830
54	55	0.008	0.3	1000	93113.43	4726951.9	-0.3	0	1000	96959.56	5433789.6
55	56	0.004	0.3	1000	94656.76	4821608.6	-0.3	0	1000	109108.73	5542898.3
56	57	0.004	0.3	1000	98860.61	4920469.2	-0.3	0	1000	118841.53	5661739.8
57	58	0.006	0.3	1000	99237.43	5019706.7	-0.3	0	1000	119294.43	5781034.3
58	59	0.006	0.3	1000	97608.01	5117314.7	-0.3	0	1000	117335.04	5898369.3
59	60	0.024	0.3	1000	97715.37	5215030	-0.3	0	1000	117464.8	6015834.1
60	61	0.028	1.4	1000	98488.74	5313518.8	-0.3	0	1000	118393.9	6134228
61	62	1	2.2	1000	26172.02	5339690.8	1	1.7	1000	31653.87	6165881.9
62	63	1.7	2.2	0	0	5339690.8	1.7	2.1	0	0	6165881.9
63	64	0.004	2	1000	44011	5383701.8	-0.3	0	1000	50393.98	6216275.9
64	65	0.004	0.3	1000	55424.24	5439126	-0.3	0	1000	57926	6274201.9
65	66	0.008	0.3	1000	59231.86	5498357.9	-0.3	0	1000	61217.73	6335419.6
66	67	0.006	0.3	1000	65700.6	5564058.5	-0.3	0	1000	65700.6	6401120.2
67	68.48	0.028	0.3	1000	30885.01	5594943.5	-0.3	0	1000	31423.46	6432543.6
Total				66100	5594943.5		Total		66100	6432543.6	

Table 18- Dredging Calculation per km 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)	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	0.007	0.3	1000	95961.17	95961.17	-0.3	0	1000	104623.92	104623.92
1	2	0.002	0.3	1000	119688.36	215649.53	-0.3	0	1000	140560.7	245184.62
2	3	0.002	0.3	1000	119001.93	334651.46	-0.3	0	1000	139827.27	385011.89
3	4	0.001	0.3	1000	69644.88	404296.34	-0.3	0	1000	76092.46	461104.35
4	5	0.001	0.3	1000	67023.12	471319.46	-0.3	0	1000	67023.12	528127.47
5	6	0.001	0.2	1000	89444.79	560764.25	-0.3	0	1000	89910.68	618038.15
6	7	0.004	0.3	1000	110261.09	671025.34	-0.3	0	1000	111581.38	729619.53
7	8	0.021	0.3	1000	116407.82	787433.16	-0.3	0	1000	133472.7	863092.23
8	9	0.011	0.3	1000	119915.69	907348.85	-0.3	0	1000	140900.33	1003992.6
9	10	0.007	0.3	1000	89893.34	997242.19	-0.3	0	1000	94107.61	1098100.2
10	11	0.001	0.3	1000	107885.37	1105127.6	-0.3	0	1000	112486.79	1210587
11	12	0.007	0.3	1000	119053.69	1224181.3	-0.3	0	1000	131893.88	1342480.8
12	13	0.004	0.3	1000	118681.26	1342862.5	-0.3	0	1000	139292.13	1481773
13	14	0.004	0.3	1000	118878.33	1461740.8	-0.3	0	1000	139681.42	1621454.4
14	15	0.001	0.3	1000	119394.17	1581135	-0.3	0	1000	140275.61	1761730
15	16	0.004	0.3	1000	97580.8	1678715.8	-0.3	0	1000	103534.18	1865264.2
16	17	0.001	0.3	1000	102980.64	1781696.5	-0.3	0	1000	107944.9	1973209.1
17	18	0.004	0.3	1000	118132.18	1899828.6	-0.3	0	1000	135140.88	2108350
18	19	0.017	0.3	1000	117009.44	2016838.1	-0.3	0	1000	137485.48	2245835.4
19	20	0.091	0.4	1000	117353.23	2134191.3	-0.3	0	1000	137890.04	2383725.5
20	21	0.014	0.3	1000	118273.4	2252464.7	-0.3	0	1000	138970.63	2522696.1
21	22	0.088	0.3	1000	115850.41	2368315.1	-0.3	0	1000	135320.7	2658016.8
22	23	0.014	0.3	1000	77410.5	2445725.6	-0.3	0	1000	78217.46	2736234.3
23	24	0.001	0.3	1000	79384.63	2525110.2	-0.3	0	1000	79384.76	2815619
24	25	0.008	0.3	1000	114694.85	2639805.1	-0.3	0	1000	129086.97	2944706
25	26	0.001	0.3	1000	119761.16	2759566.3	-0.3	0	1000	139094.74	3083800.7
26	27	0.001	0.3	1000	119455.85	2879022.1	-0.3	0	1000	140360.32	3224161.1
27	28	0.002	0.3	1000	115307.13	2994329.2	-0.3	0	1000	134582.32	3358743.4
28	29	0.004	0.3	1000	103386.86	3097716.1	-0.3	0	1000	105168.6	3463912
29	30	0.001	0.3	1000	116980.02	3214696.1	-0.3	0	1000	124843	3588755
30	31	0.088	0.3	1000	115909.28	3330605.4	-0.3	0	1000	135983.31	3724738.3
31	32	0.091	0.3	1000	119522.18	3450127.6	-0.3	0	1000	140438.56	3865176.9
32	33	0.001	0.3	1000	119059.55	3569187.1	-0.3	0	1000	139894.97	4005071.8
33	34	0.002	0.3	1000	98393.41	3667580.5	-0.3	0	1000	106498.14	4111570
34	35	0.001	0.3	1000	103409.68	3770990.2	-0.3	0	1000	106275.77	4217845.7
35	36	0.001	0.3	1000	117742.65	3888732.9	-0.3	0	1000	124318.97	4342164.7

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)
36	37	0.001	0.3	1000	119192.91	4007925.8	-0.3	0	1000	139015.04	4481179.7
37	38	0.007	0.3	1000	119586.07	4127511.8	-0.3	0	1000	140513.04	4621692.8
38	39	0.007	0.3	1000	119949.5	4247461.3	-0.3	0	1000	140939.76	4762632.5
39	40	0.007	0.3	1000	119581.54	4367042.9	-0.3	0	1000	140507.41	4903140
40	41	0.002	0.3	1000	119094.66	4486137.5	-0.3	0	1000	139935.02	5043075
41	42	0.001	0.3	1000	119577.86	4605715.4	-0.3	0	1000	140503.39	5183578.4
42	43	0.001	0.3	1000	118722	4724437.4	-0.3	0	1000	139498.35	5323076.7
43	44	0.001	0.3	1000	119288.75	4843726.2	-0.3	0	1000	140163.67	5463240.4
44	45	0.001	0.3	1000	119301.58	4963027.7	-0.3	0	1000	140178.19	5603418.6
45	46	0.004	1.7	1000	82439.48	5045467.2	-0.3	0	1000	96877.38	5700296
46	47	1.3	2.1	1000	481.83	5045949	1.2	2.1	1000	481.84	5700777.8
47	48	1.3	1.8	1000	2154.34	5048103.4	1.2	1.7	1000	2154.34	5702932.1
48	49	0.001	1.7	1000	70115.34	5118218.7	-0.3	0	1000	76760.04	5779692.2
49	50	0.021	0.3	1000	119469.25	5237688	-0.3	0	1000	140376.07	5920068.2
50	51	0.004	0.3	1000	93868.37	5331556.3	-0.3	0	1000	107214.79	6027283
51	52	0.004	0.3	1000	116424.24	5447980.6	-0.3	0	1000	132414.59	6159697.6
52	53	0.001	0.3	1000	105629.61	5553610.2	-0.3	0	1000	119386.11	6279083.7
53	54	0.094	0.3	1000	107760.63	5661370.8	-0.3	0	1000	117791.94	6396875.7
54	55	0.007	0.3	1000	113564.53	5774935.4	-0.3	0	1000	117730.5	6514606.2
55	56	0.001	0.3	1000	114242.98	5889178.3	-0.3	0	1000	129462.53	6644068.7
56	57	0.001	0.3	1000	119289.31	6008467.6	-0.3	0	1000	140164.63	6784233.3
57	58	0.004	0.3	1000	119743.92	6128211.6	-0.3	0	1000	140698.83	6924932.2
58	59	0.004	0.3	1000	117776.13	6245987.7	-0.3	0	1000	138386.94	7063319.1
59	60	0.021	0.3	1000	117905.81	6363893.5	-0.3	0	1000	138538.42	7201857.5
60	61	0.027	1.4	1000	118840.13	6482733.6	-0.3	0	1000	139636.85	7341494.4
61	62	1	2.2	1000	32149.15	6514882.8	1	2.1	1000	37893	7379387.4
62	63	1.5	2.2	1000	1132.69	6516015.5	1.4	2.2	1000	1132.69	7380520.1
63	64	0.001	2	1000	60672.61	6576688.1	-0.3	0	1000	67317.42	7447837.5
64	65	0.001	0.3	1000	74121.87	6650810	-0.3	0	1000	76932.01	7524769.5
65	66	0.007	0.3	1000	77921.14	6728731.1	-0.3	0	1000	79956.53	7604726
66	67	0.004	0.3	1000	84683.66	6813414.8	-0.3	0	1000	84683.67	7689409.7
67	68.484	0.027	0.3	1000	38690.42	6852105.2	-0.3	0	1000	39261.86	7728671.6
Total				68000	6852105.2		Total		68000	7728671.6	

Table 19- Dredging Calculation per km for Class-IV

Annexure-3- Observed depth at 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	0.01	0.1	0.009	0.2	0.008	0.2	0.007	0.2
200	0.02	0.1	0.018	0.1	0.016	0.1	0.014	0.1
400	0.05	0.1	0.047	0.2	0.044	0.2	0.041	0.2
600	0.04	0.2	0.038	0.2	0.036	0.2	0.034	0.2
800	0.03	0.1	0.027	0.3	0.024	0.3	0.021	0.3
1000	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
1200	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
1400	0.01	0.1	0.009	0.2	0.008	0.2	0.007	0.2
1600	0.1	0.2	0.097	0.3	0.094	0.3	0.091	0.3
1800	0.02	0.2	0.016	0.2	0.012	0.2	0.008	0.2
2000	0.01	0.1	0.006	0.2	0.002	0.2	0.002	0.2
2200	0.03	0.1	0.028	0.2	0.026	0.2	0.024	0.2
2400	0.01	0.3	0.009	0.3	0.008	0.3	0.007	0.3
2600	0.03	0.2	0.027	0.3	0.024	0.3	0.021	0.3
2800	0.04	0.1	0.039	0.2	0.038	0.2	0.037	0.2
3000	0.03	0.2	0.028	0.2	0.026	0.2	0.024	0.2
3200	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
3400	0.02	0.3	0.018	0.3	0.016	0.3	0.014	0.3
3600	0.01	0.2	0.007	0.3	0.004	0.3	0.001	0.3
3800	0.1	0.3	0.098	0.3	0.096	0.3	0.094	0.3
4000	0.01	0.1	0.007	0.2	0.004	0.2	0.001	0.2
4200	0.03	0.2	0.028	0.2	0.026	0.2	0.024	0.2
4400	0.05	0.1	0.048	0.2	0.046	0.2	0.044	0.2
4600	0.03	0.2	0.029	0.3	0.028	0.3	0.027	0.3
4800	0.02	0.1	0.017	0.2	0.014	0.2	0.011	0.2
5000	0.03	0.2	0.026	0.2	0.022	0.2	0.018	0.2
5200	0.05	0.1	0.046	0.2	0.042	0.2	0.038	0.2
5400	0.03	0.1	0.028	0.2	0.026	0.2	0.024	0.2
5600	0.06	0.2	0.059	0.2	0.058	0.2	0.057	0.2
5800	0.01	0.1	0.007	0.2	0.004	0.2	0.001	0.2
6000	0.03	0.2	0.029	0.2	0.028	0.2	0.027	0.2
6200	0.02	0.1	0.018	0.2	0.016	0.2	0.014	0.2
6400	0.03	0.2	0.029	0.2	0.028	0.2	0.027	0.2
6600	0.01	0.3	0.008	0.3	0.006	0.3	0.004	0.3
6800	0.02	0.1	0.017	0.2	0.014	0.2	0.011	0.2
7000	0.05	0.1	0.048	0.2	0.046	0.2	0.044	0.2
7200	0.03	0.2	0.027	0.3	0.024	0.3	0.021	0.3
7400	0.04	0.1	0.038	0.2	0.036	0.2	0.034	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
7600	0.05	0.1	0.048	0.1	0.046	0.1	0.044	0.1
7800	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
8000	0.1	0.3	0.097	0.3	0.094	0.3	0.091	0.3
8200	0.03	0.1	0.026	0.2	0.022	0.2	0.018	0.2
8400	0.04	0.2	0.036	0.2	0.032	0.2	0.028	0.2
8600	0.05	0.2	0.048	0.2	0.046	0.2	0.044	0.2
8800	0.1	0.2	0.099	0.3	0.098	0.3	0.097	0.3
9000	0.02	0.1	0.017	0.2	0.014	0.2	0.011	0.2
9200	0.01	0.2	0.009	0.2	0.008	0.2	0.007	0.2
9400	0.03	0.1	0.028	0.2	0.026	0.2	0.024	0.2
9600	0.02	0.1	0.019	0.2	0.018	0.2	0.017	0.2
9800	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
10000	0.02	0.2	0.017	0.3	0.014	0.3	0.011	0.3
10200	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
10400	0.01	0.1	0.007	0.2	0.004	0.2	0.001	0.2
10600	0.01	0.1	0.008	0.2	0.006	0.2	0.004	0.2
10800	0.01	0.2	0.008	0.3	0.006	0.3	0.004	0.3
11000	0.01	0.1	0.009	0.2	0.008	0.2	0.007	0.2
11200	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
11400	0.2	0.3	0.196	0.3	0.192	0.3	0.188	0.3
11600	0.1	0.2	0.096	0.2	0.092	0.2	0.088	0.2
11800	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
12000	0.1	0.2	0.099	0.3	0.098	0.3	0.097	0.3
12200	0.1	0.2	0.097	0.3	0.094	0.3	0.091	0.3
12400	0.01	0.1	0.009	0.2	0.008	0.2	0.007	0.2
12600	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
12800	0.1	0.2	0.099	0.3	0.098	0.3	0.097	0.3
13000	0.01	0.1	0.008	0.2	0.006	0.2	0.004	0.2
13200	0.02	0.2	0.017	0.3	0.014	0.3	0.011	0.3
13400	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
13600	0.1	0.3	0.097	0.3	0.094	0.3	0.091	0.3
13800	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
14000	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
14200	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
14400	0.01	0.1	0.007	0.2	0.004	0.2	0.001	0.2
14600	0.03	0.2	0.026	0.3	0.022	0.3	0.018	0.3
14800	0.02	0.2	0.016	0.3	0.012	0.3	0.008	0.3
15000	0.01	0.1	0.008	0.2	0.006	0.2	0.004	0.2
15200	0.1	0.2	0.099	0.3	0.098	0.3	0.097	0.3
15400	0.02	0.1	0.017	0.2	0.014	0.2	0.011	0.2
15600	0.01	0.2	0.009	0.3	0.008	0.3	0.007	0.3
15800	0.04	0.1	0.038	0.2	0.036	0.2	0.034	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
16000	0.1	0.2	0.099	0.3	0.098	0.3	0.097	0.3
16200	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
16400	0.01	0.1	0.007	0.2	0.004	0.2	0.001	0.2
16600	0.01	0.1	0.008	0.2	0.006	0.2	0.004	0.2
16800	0.1	0.2	0.097	0.3	0.094	0.3	0.091	0.3
17000	0.01	0.1	0.008	0.2	0.006	0.2	0.004	0.2
17200	0.01	0.2	0.008	0.3	0.006	0.3	0.004	0.3
17400	0.01	0.2	0.009	0.3	0.008	0.3	0.007	0.3
17600	0.1	0.2	0.097	0.3	0.094	0.3	0.091	0.3
17800	0.2	0.3	0.196	0.3	0.192	0.3	0.188	0.3
18000	0.1	0.2	0.096	0.3	0.092	0.3	0.088	0.3
18200	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
18400	0.02	0.1	0.019	0.2	0.018	0.2	0.017	0.2
18600	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
18800	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
19000	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
19200	0.1	0.2	0.099	0.3	0.098	0.3	0.097	0.3
19400	0.2	0.3	0.198	0.4	0.196	0.4	0.194	0.4
19600	0.1	0.2	0.097	0.3	0.094	0.3	0.091	0.3
19800	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
20000	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
20200	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
20400	0.02	0.1	0.018	0.2	0.016	0.2	0.014	0.2
20600	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
20800	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
21000	0.2	0.3	0.196	0.3	0.192	0.3	0.188	0.3
21200	0.1	0.2	0.096	0.3	0.092	0.3	0.088	0.3
21400	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
21600	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
21800	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
22000	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
22200	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
22400	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
22600	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
22800	0.1	0.2	0.097	0.3	0.094	0.3	0.091	0.3
23000	0.02	0.1	0.018	0.2	0.016	0.2	0.014	0.2
23200	0.01	0.1	0.007	0.2	0.004	0.2	0.001	0.2
23400	0.03	0.1	0.028	0.2	0.026	0.2	0.024	0.2
23600	0.01	0.1	0.008	0.2	0.006	0.2	0.004	0.2
23800	0.1	0.2	0.099	0.3	0.098	0.3	0.097	0.3
24000	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
24200	0.1	0.2	0.096	0.3	0.092	0.3	0.088	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
24400	0.02	0.1	0.016	0.2	0.012	0.2	0.008	0.2
24600	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
24800	0.1	0.3	0.099	0.3	0.098	0.3	0.097	0.3
25000	0.1	0.2	0.097	0.3	0.094	0.3	0.091	0.3
25200	0.1	0.2	0.099	0.3	0.098	0.3	0.097	0.3
25400	0.01	0.1	0.008	0.2	0.006	0.2	0.004	0.2
25600	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
25800	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
26000	0.01	0.1	0.007	0.2	0.004	0.2	0.001	0.2
26200	0.02	0.1	0.018	0.2	0.016	0.2	0.014	0.2
26400	0.1	0.2	0.097	0.2	0.094	0.2	0.091	0.2
26600	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
26800	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
27000	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
27200	0.1	0.2	0.097	0.3	0.094	0.3	0.091	0.3
27400	0.01	0.1	0.006	0.2	0.002	0.2	0.002	0.2
27600	0.03	0.2	0.026	0.3	0.022	0.3	0.018	0.3
27800	0.02	0.1	0.018	0.2	0.016	0.2	0.014	0.2
28000	0.01	0.1	0.009	0.2	0.008	0.2	0.007	0.2
28200	0.1	0.2	0.097	0.3	0.094	0.3	0.091	0.3
28400	0.02	0.2	0.019	0.3	0.018	0.3	0.017	0.3
28600	0.01	0.1	0.008	0.2	0.006	0.2	0.004	0.2
28800	0.04	0.1	0.039	0.2	0.038	0.2	0.037	0.2
29000	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
29200	0.1	0.2	0.097	0.3	0.094	0.3	0.091	0.3
29400	0.01	0.1	0.008	0.2	0.006	0.2	0.004	0.2
29600	0.01	0.2	0.007	0.3	0.004	0.3	0.001	0.3
29800	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
30000	0.3	0.3	0.298	0.3	0.296	0.3	0.294	0.3
30200	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
30400	0.1	0.2	0.097	0.3	0.094	0.3	0.091	0.3
30600	0.1	0.2	0.096	0.3	0.092	0.3	0.088	0.3
30800	0.2	0.3	0.196	0.3	0.192	0.3	0.188	0.3
31000	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
31200	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
31400	0.1	0.2	0.097	0.3	0.094	0.3	0.091	0.3
31600	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
31800	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
32000	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
32200	0.02	0.1	0.018	0.2	0.016	0.2	0.014	0.2
32400	0.01	0.1	0.007	0.2	0.004	0.2	0.001	0.2
32600	0.03	0.1	0.028	0.3	0.026	0.3	0.024	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
32800	0.01	0.1	0.007	0.2	0.004	0.2	0.001	0.2
33000	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
33200	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
33400	0.1	0.2	0.099	0.3	0.098	0.3	0.097	0.3
33600	0.02	0.1	0.017	0.2	0.014	0.2	0.011	0.2
33800	0.2	0.3	0.196	0.3	0.192	0.3	0.188	0.3
34000	0.01	0.2	0.006	0.3	0.002	0.3	0.002	0.3
34200	0.03	0.1	0.028	0.2	0.026	0.2	0.024	0.2
34400	0.02	0.1	0.019	0.2	0.018	0.2	0.017	0.2
34600	0.01	0.2	0.007	0.3	0.004	0.3	0.001	0.3
34800	0.1	0.2	0.099	0.3	0.098	0.3	0.097	0.3
35000	0.02	0.1	0.018	0.2	0.016	0.2	0.014	0.2
35200	0.01	0.1	0.009	0.2	0.008	0.2	0.007	0.2
35400	0.04	0.2	0.038	0.3	0.036	0.3	0.034	0.3
35600	0.1	0.2	0.097	0.3	0.094	0.3	0.091	0.3
35800	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
36000	0.01	0.1	0.007	0.2	0.004	0.2	0.001	0.2
36200	0.01	0.1	0.008	0.2	0.006	0.2	0.004	0.2
36400	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
36600	0.1	0.2	0.099	0.3	0.098	0.3	0.097	0.3
36800	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
37000	0.1	0.2	0.096	0.3	0.092	0.3	0.088	0.3
37200	0.1	0.2	0.096	0.3	0.092	0.3	0.088	0.3
37400	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
37600	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
37800	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
38000	0.01	0.1	0.009	0.2	0.008	0.2	0.007	0.2
38200	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
38400	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
38600	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
38800	0.02	0.1	0.017	0.2	0.014	0.2	0.011	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	0.3	0.096	0.3	0.094	0.3
39600	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
39800	0.01	0.1	0.009	0.2	0.008	0.2	0.007	0.2
40000	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
40200	0.1	0.2	0.096	0.3	0.092	0.3	0.088	0.3
40400	0.01	0.1	0.006	0.2	0.002	0.2	0.002	0.2
40600	0.02	0.1	0.018	0.2	0.016	0.2	0.014	0.2
40800	0.1	0.2	0.099	0.3	0.098	0.3	0.097	0.3
41000	0.1	0.2	0.097	0.3	0.094	0.3	0.091	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
41200	0.1	0.2	0.099	0.3	0.098	0.3	0.097	0.3
41400	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
41600	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
41800	0.01	0.1	0.007	0.2	0.004	0.2	0.001	0.2
42000	0.03	0.1	0.029	0.2	0.028	0.2	0.027	0.2
42200	0.02	0.1	0.018	0.2	0.016	0.2	0.014	0.2
42400	0.01	0.1	0.009	0.3	0.008	0.3	0.007	0.3
42600	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
42800	0.02	0.1	0.018	0.2	0.016	0.2	0.014	0.2
43000	0.01	0.1	0.007	0.2	0.004	0.2	0.001	0.2
43200	0.04	0.1	0.038	0.2	0.036	0.2	0.034	0.2
43400	0.03	0.1	0.027	0.2	0.024	0.2	0.021	0.2
43600	0.04	0.1	0.038	0.2	0.036	0.2	0.034	0.2
43800	0.05	0.2	0.048	0.3	0.046	0.3	0.044	0.3
44000	0.1	0.2	0.099	0.3	0.098	0.3	0.097	0.3
44200	0.02	0.2	0.017	0.3	0.014	0.3	0.011	0.3
44400	0.01	0.2	0.006	0.3	0.002	0.3	0.001	0.3
44600	0.03	0.1	0.026	0.2	0.022	0.2	0.018	0.2
44800	0.02	0.1	0.018	0.2	0.016	0.2	0.014	0.2
45000	0.1	0.2	0.099	0.3	0.098	0.3	0.097	0.3
45200	0.02	0.2	0.017	0.3	0.014	0.3	0.011	0.3
45400	0.1	0.2	0.099	0.3	0.098	0.3	0.097	0.3
45600	0.01	0.1	0.008	0.2	0.006	0.2	0.004	0.2
45800	0.01	0.2	0.009	0.3	0.008	0.3	0.007	0.3
46000	1.4	1.7	1.4	1.7	1.4	1.7	1.4	1.7
46200	1.5	1.8	1.5	1.8	1.5	1.8	1.5	1.8
46400	1.4	1.7	1.4	1.7	1.3	1.8	1.3	1.7
46600	1.5	1.8	1.5	1.8	1.5	1.8	1.5	2.1
46800	1.4	1.7	1.4	1.7	1.3	1.7	1.3	1.7
47000	1.4	1.8	1.4	1.8	1.4	1.8	1.4	1.8
47200	1.4	1.7	1.4	1.7	1.3	1.7	1.3	1.7
47400	1.5	1.8	1.5	1.8	1.5	1.8	1.5	1.8
47600	1.4	1.7	1.4	1.7	1.4	1.7	1.4	1.7
47800	1.5	1.8	1.5	1.8	1.5	1.8	1.5	1.8
48000	1.4	1.7	1.4	1.7	1.3	1.7	1.3	1.7
48200	0.01	0.2	0.027	0.2	0.024	0.2	0.021	0.2
48400	0.01	0.1	0.006	0.2	0.002	0.2	0.001	0.2
48600	0.02	0.2	0.016	0.2	0.012	0.2	0.008	0.2
48800	0.05	0.2	0.048	0.3	0.046	0.3	0.044	0.3
49000	0.03	0.1	0.029	0.2	0.028	0.2	0.027	0.2
49200	0.04	0.1	0.037	0.2	0.034	0.2	0.031	0.2
49400	0.05	0.2	0.049	0.3	0.048	0.3	0.047	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
49600	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
49800	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
50000	0.03	0.1	0.027	0.2	0.024	0.2	0.021	0.2
50200	0.04	0.2	0.039	0.3	0.038	0.3	0.037	0.3
50400	0.05	0.2	0.048	0.2	0.046	0.2	0.044	0.2
50600	0.1	0.2	0.099	0.3	0.098	0.3	0.097	0.3
50800	0.02	0.2	0.019	0.3	0.018	0.3	0.017	0.3
51000	0.01	0.2	0.008	0.3	0.006	0.3	0.004	0.3
51200	0.03	0.1	0.028	0.2	0.026	0.2	0.024	0.2
51400	0.02	0.2	0.018	0.3	0.016	0.3	0.014	0.3
51600	0.1	0.2	0.099	0.3	0.098	0.3	0.097	0.3
51800	0.02	0.1	0.017	0.2	0.014	0.2	0.011	0.2
52000	0.1	0.2	0.096	0.3	0.092	0.3	0.088	0.3
52200	0.01	0.1	0.006	0.2	0.002	0.2	0.002	0.2
52400	0.01	0.2	0.008	0.3	0.006	0.3	0.004	0.3
52600	0.01	0.1	0.009	0.2	0.008	0.2	0.007	0.2
52800	0.01	0.2	0.007	0.3	0.004	0.3	0.001	0.3
53000	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
53200	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
53400	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
53600	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
53800	0.1	0.2	0.099	0.3	0.098	0.3	0.097	0.3
54000	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
54200	0.01	0.2	0.009	0.3	0.008	0.3	0.007	0.3
54400	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
54600	0.03	0.1	0.028	0.2	0.026	0.2	0.024	0.2
54800	0.02	0.1	0.019	0.2	0.018	0.2	0.017	0.2
55000	0.1	0.2	0.097	0.3	0.094	0.3	0.091	0.3
55200	0.02	0.1	0.019	0.2	0.018	0.2	0.017	0.2
55400	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
55600	0.01	0.1	0.009	0.2	0.008	0.2	0.007	0.2
55800	0.01	0.2	0.008	0.3	0.006	0.3	0.004	0.3
56000	0.01	0.2	0.007	0.3	0.004	0.3	0.001	0.3
56200	0.01	0.2	0.008	0.3	0.006	0.3	0.004	0.3
56400	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
56600	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
56800	0.1	0.2	0.098	0.2	0.096	0.2	0.094	0.2
57000	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
57200	0.1	0.2	0.097	0.3	0.094	0.3	0.091	0.3
57400	0.1	0.2	0.096	0.3	0.092	0.3	0.088	0.3
57600	0.1	0.2	0.096	0.3	0.092	0.3	0.088	0.3
57800	0.01	0.1	0.008	0.2	0.006	0.2	0.004	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
58000	0.2	0.3	0.199	0.3	0.198	0.3	0.197	0.3
58200	0.02	0.1	0.017	0.2	0.014	0.2	0.011	0.2
58400	0.03	0.2	0.029	0.3	0.028	0.3	0.027	0.3
58600	0.01	0.1	0.008	0.2	0.006	0.2	0.004	0.2
58800	0.02	0.2	0.019	0.3	0.018	0.3	0.017	0.3
59000	0.05	0.2	0.048	0.3	0.046	0.3	0.044	0.3
59200	0.03	0.2	0.027	0.3	0.024	0.3	0.021	0.3
59400	0.04	0.2	0.038	0.3	0.036	0.3	0.034	0.3
59600	0.05	0.2	0.046	0.3	0.042	0.3	0.038	0.3
59800	0.1	0.3	0.096	0.3	0.092	0.3	0.088	0.3
60000	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
60200	0.03	0.1	0.029	0.2	0.028	0.2	0.027	0.2
60400	0.04	0.2	0.037	0.3	0.034	0.3	0.031	0.3
60600	0.05	0.2	0.049	0.3	0.048	0.3	0.047	0.3
60800	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
61000	1.3	1.5	1.2	1.4	1	1.4	1	1.4
61200	1.2	1.4	1	1.3	1	1.3	1	1.4
61400	1.3	1.5	1.1	1.4	1.1	1.5	1.1	1.5
61600	1.2	1.5	1	1.5	1	1.5	1	1.5
61800	1.3	1.5	1.1	1.4	1	1.5	1	1.5
62000	1.7	2.1	1.7	2.2	1.7	2.2	1.5	2.2
62200	1.7	1.9	1.7	2	1.7	2	1.7	2
62400	1.8	2	1.8	2.1	1.8	2.1	1.8	2.1
62600	2	2.1	2	2.2	2	2.2	2	2.2
62800	1.7	2.1	1.7	2.1	1.7	2.1	1.7	2.1
63000	1.8	2.2	1.8	2	1.8	2	1.8	2
63200	0.02	0.2	0.016	0.2	0.012	0.2	0.008	0.2
63400	0.1	0.2	0.096	0.3	0.092	0.3	0.088	0.3
63600	0.01	0.2	0.008	0.2	0.006	0.2	0.004	0.2
63800	0.01	0.1	0.009	0.2	0.008	0.2	0.007	0.2
64000	0.01	0.1	0.007	0.2	0.004	0.2	0.001	0.2
64200	0.01	0.2	0.009	0.2	0.008	0.2	0.007	0.2
64400	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
64600	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
64800	0.2	0.3	0.197	0.3	0.194	0.3	0.191	0.3
65000	0.1	0.2	0.099	0.3	0.098	0.3	0.097	0.3
65200	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
65400	0.1	0.2	0.099	0.2	0.098	0.2	0.097	0.2
65600	0.01	0.1	0.009	0.2	0.008	0.2	0.007	0.2
65800	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3
66000	0.02	0.1	0.019	0.2	0.018	0.2	0.017	0.2
66200	0.03	0.2	0.029	0.3	0.028	0.3	0.027	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
66400	0.01	0.1	0.008	0.2	0.006	0.2	0.004	0.2
66600	0.02	0.2	0.018	0.3	0.016	0.3	0.014	0.3
66800	0.05	0.1	0.047	0.2	0.044	0.2	0.041	0.2
67000	0.03	0.1	0.029	0.2	0.028	0.2	0.027	0.2
67200	0.04	0.2	0.038	0.3	0.036	0.3	0.034	0.3
67400	0.05	0.1	0.049	0.2	0.048	0.2	0.047	0.2
67600	0.1	0.2	0.099	0.3	0.098	0.3	0.097	0.3
67800	0.1	0.2	0.098	0.3	0.096	0.3	0.094	0.3
68000	0.03	0.1	0.029	0.2	0.028	0.2	0.027	0.2
68200	0.04	0.1	0.038	0.2	0.036	0.2	0.034	0.2
68484	0.2	0.3	0.198	0.3	0.196	0.3	0.194	0.3

Table 20-Observed depth at 200 meter interval

Annexure-4 Reduced depth at 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	-0.3	0	-0.3	0	-0.3	0	-0.3	0
200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
1000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
1200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
1400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
1600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
1800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
2000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
2200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
2400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
2600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
2800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
3000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
3200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
3400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
3600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
3800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
4000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
4200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
4400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
4600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
4800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
5000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
5200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
5400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
5600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
5800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
6000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
6200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
6400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
6600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
6800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
7000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
7200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
7400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
7600	-0.3	0	-0.3	0	-0.3	0	-0.3	0

Chainage (in meter.)	Class-I		Class-II		Class-III		Class-IV	
	Observed		Observed		Observed		Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
7800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
8000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
8200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
8400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
8600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
8800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
9000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
9200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
9400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
9600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
9800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
10000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
10200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
10400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
10600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
10800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
11000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
11200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
11400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
11600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
11800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
12000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
12200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
12400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
12600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
12800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
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

Chainage (in meter.)	Class-I		Class-II		Class-III		Class-IV	
	Observed		Observed		Observed		Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
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
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

Chainage (in meter.)	Class-I		Class-II		Class-III		Class-IV	
	Observed		Observed		Observed		Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
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
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

Chainage (in meter.)	Class-I		Class-II		Class-III		Class-IV	
	Observed		Observed		Observed		Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
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
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

Chainage (in meter.)	Class-I		Class-II		Class-III		Class-IV	
	Observed		Observed		Observed		Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
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
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	1.4	1.7	1.4	2.1	1.3	2.1	1.3	2.1
46200	1.4	1.8	1.4	2	1.3	2	1.3	2
46400	1.4	1.7	1.4	1.9	1.2	1.9	1.2	1.9
46600	1.4	1.8	1.4	2.1	1.3	2.1	1.3	2.1
46800	1.4	1.6	1.4	1.8	1.2	1.8	1.2	1.8
47000	1.4	1.6	1.4	1.7	1.2	1.7	1.2	1.7
47200	1.4	1.7	1.4	1.9	1.2	1.9	1.2	1.9
47400	1.4	1.8	1.4	2.1	1.2	2.1	1.2	2.1
47600	1.4	1.7	1.4	1.8	1.3	1.8	1.3	1.8
47800	1.4	1.7	1.4	1.9	1.2	1.9	1.2	1.9
48000	1.4	1.6	1.4	1.8	1.2	1.8	1.2	1.8
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

Chainage (in meter.)	Class-I		Class-II		Class-III		Class-IV	
	Observed		Observed		Observed		Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
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
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

Chainage (in meter.)	Class-I		Class-II		Class-III		Class-IV	
	Observed		Observed		Observed		Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
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
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	1.2	1.4	1.2	1.4	1.1	1.4	1.1	1.5
61200	1.2	1.3	1.1	1.4	1.1	1.4	1.1	1.5
61400	1.3	1.5	1.2	1.6	1.2	1.6	1.1	1.6
61600	1.2	1.4	1.1	1.5	1.1	1.5	1	1.4
61800	1.2	1.4	1.1	1.5	1.1	1.5	1	1.5
62000	1.7	2.1	1.7	2.3	1.7	2.3	1.5	2.3
62200	1.7	2	1.7	2.1	1.7	2.1	1.4	2.1
62400	1.7	1.9	1.7	2	1.7	2	1.5	2.1
62600	1.7	2.1	1.7	2.2	1.7	2.2	1.6	2.2
62800	1.7	2	1.7	2.1	1.7	2.1	1.5	2.1
63000	1.7	1.9	1.7	2.1	1.7	2.1	1.5	2.1
63200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
63400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
63600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
63800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
64000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
64200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
64400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
64600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
64800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
65000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
65200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
65400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
65600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
65800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
66000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
66200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
66400	-0.3	0	-0.3	0	-0.3	0	-0.3	0

Chainage (in meter.)	Class-I Observed		Class-II Observed		Class-III Observed		Class-IV Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
66600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
66800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
67000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
67200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
67400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
67600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
67800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
68000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
68200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
68484	-0.3	0	-0.3	0	-0.3	0	-0.3	0

Table 21- Reduced depth at 200 meter interval

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):-

Date	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
24.09.15	GS-(TP)-1	6.395	24 Hrs	0.25	32.575	32.825	31.863	-0.962
24.09.15	GS-(TP)-2	11.758	24 Hrs	0.28	34.458	34.738	33.873	-0.865
26.09.15	GS-(TP)-3	18.230	24 Hrs	0.35	37.491	37.841	36.299	-0.975
26.09.15	GS-(TP)-4	25.667	24 Hrs	0.43	39.73	40.160	39.087	-1.073
02.10.15	GS-(TP)-5	30.522	24 Hrs	0.51	41.63	42.140	40.906	-1.234
04.10.15	GS-(TP)-6	36.326	24 Hrs	0.56	43.746	44.306	43.082	-1.224
04.10.15	GS-(TP)-7	55.795	24 Hrs	0.65	50.51	51.160	50.379	-0.781
06.10.15	GS-(TP)-8	68.462	24 Hrs	0.69	55.00	55.690	55.127	-0.563

Table 22 Water level at different Gauge station

Annexure- 6: - Details of Bathymetric surveys carried out:-

Due to insufficient layer of water in the river Aai, the Bathymetry survey was not carried out in this zone of river.

Annexure- 7: - Bank Protection along the Bank:-

Manas National park is located in this zone of river. Boulder pitching and embankment is protected both sides bank of the river. Though the Bathymetry survey was not carried out in this zone of river due to lack of water, the bank of the river is protected by boulder pitching and embankment. In the rainy season, the bank of the river is sometimes eroded.

Annexure- 8: - Details of Features across the Bank:-

The bank of the river includes villages, Ferry Ghats, Irrigation canals and outlets, Rail Bridge, RCC Bridges, H.T.Lines and Forest etc. The both side river bank are highly protected by embankment and bolder pitching. The villages like Bongaigaon, Bijni, Chaprakata are also situated near the bank side of the river. Recently different kinds of industries like oil, Cement, Petro-Chemicals have been noticed in this zone of river. Manas National park is situated 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 survey: - 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 survey: - DGPS is receiving corrections from Beacons.

Establishment of Vertical Control:-

Vertical control from C.W.C Gauge Level, located near Aai NH Crossing (NH-31C) is used for the entire Survey work. Its value is 59.276 m w.r.t. MSL has been considered for calculating the vertical levels. Total 8 no. of BM have been established along the 68.484 kms stretch of the Aai River with the reference of G.T.S Level, which was fixed near at Aai NH Crossing (NH-31C).

Topography Survey:-

The survey was commenced on 21st September, 2015 and completed on 22th October, 2015. Then the time was autumn season and the climate become normal which reached approximately 25◦ 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 withstand 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 21- 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 echosounder 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 22 Bathymetry Survey Instrument

Annexure- 10: - Photograph of Equipment:-

Following equipment was employed for the bathymetric and topographic 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 Bathymetry survey was conducted using one motorized boat. This boat was also used to collect water sample, current velocity, soil sample etc.

- **Positioning System:-**

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

Figure 23- 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 24 Echo Sounder Instrument

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

Topographic Survey Instruments:-

➢3 sets south RTK (Real Time Kinematic) were used during topographical/spot level survey.

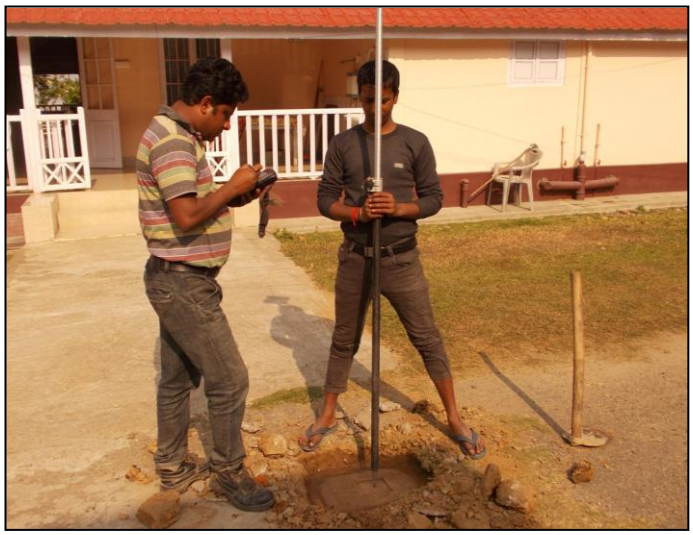



Figure 25 Topographic Survey Instrument

- **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: - Soil Samples

RESULT OF TEST OF SOIL SAMPLES

SITE: AAI RIVER

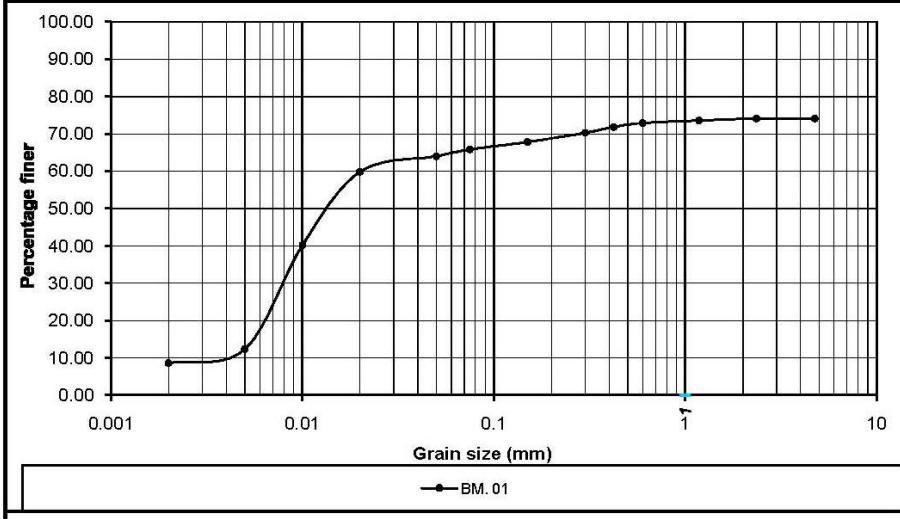
RESULTS OF TEST OF SOIL SAMPLES

SITE – AAI RIVER

PHYSICAL ANALYSIS OF SOIL

Sl.No.	BM.	GRAVEL (%)	SAND (%)	SILT+CLAY (%)	SPECIFIC GRAVITY	pH VALUE	SILT (%)	CLAY (%)	Cu	Cc
1	1.00	25.87	21.05	53.08	2.62	7.10	44.50	8.58	4.60	0.74
2	2.00	19.71	23.78	56.51	2.62	7.20	50.20	6.31	5.09	1.10
3	3.00	21.04	17.86	61.10	2.61	7.20	51.30	9.80	13.68	0.51
4	4.00	16.42	12.35	71.23	2.63	7.20	65.00	6.23	4.65	1.16
5	5.00	9.87	21.20	68.93	2.64	7.30	61.50	7.43	4.74	0.89
6	6.00	14.97	52.76	32.27	2.65	7.20	22.30	9.97	7.01	2.45
7	7.00	17.86	48.60	33.54	2.65	7.40	24.80	8.74	7.02	1.48

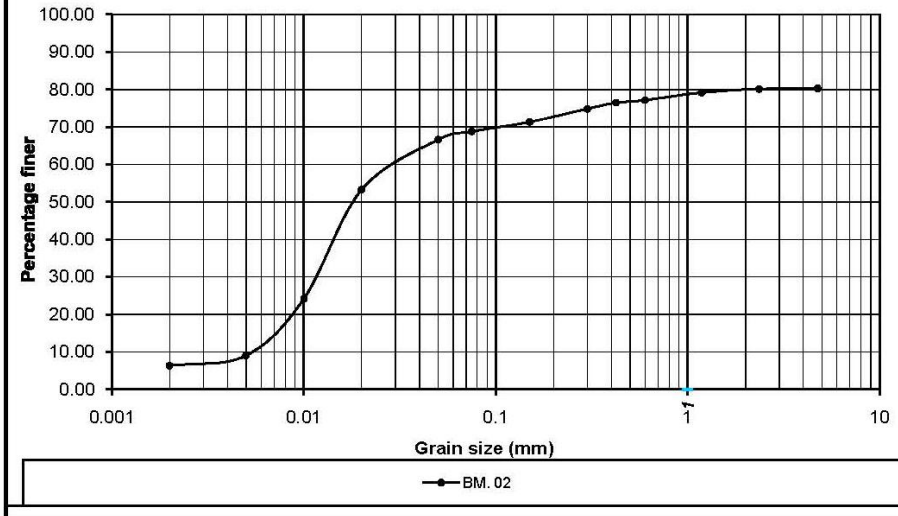
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	Clay (%)	Silt (%)	Sand (%)	Gravel (%)
BM. 01	8.58	44.50	21.05	25.87

*Silt & Clay

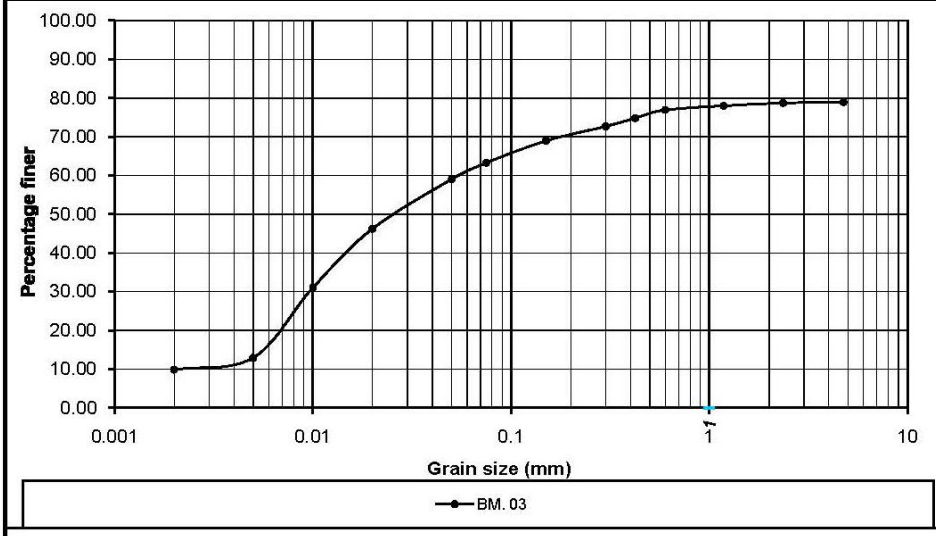
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	Clay (%)	Silt (%)	Sand (%)	Gravel (%)
BM. 02	6.31	50.20	23.78	19.71

*Silt & Clay

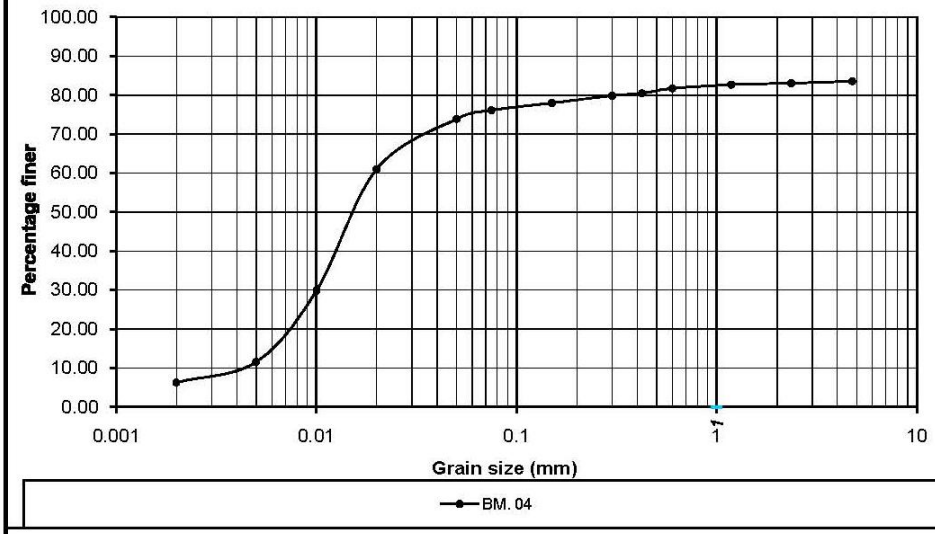
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BM. 03	9.80	51.30	17.86	21.04

*Silt & Clay

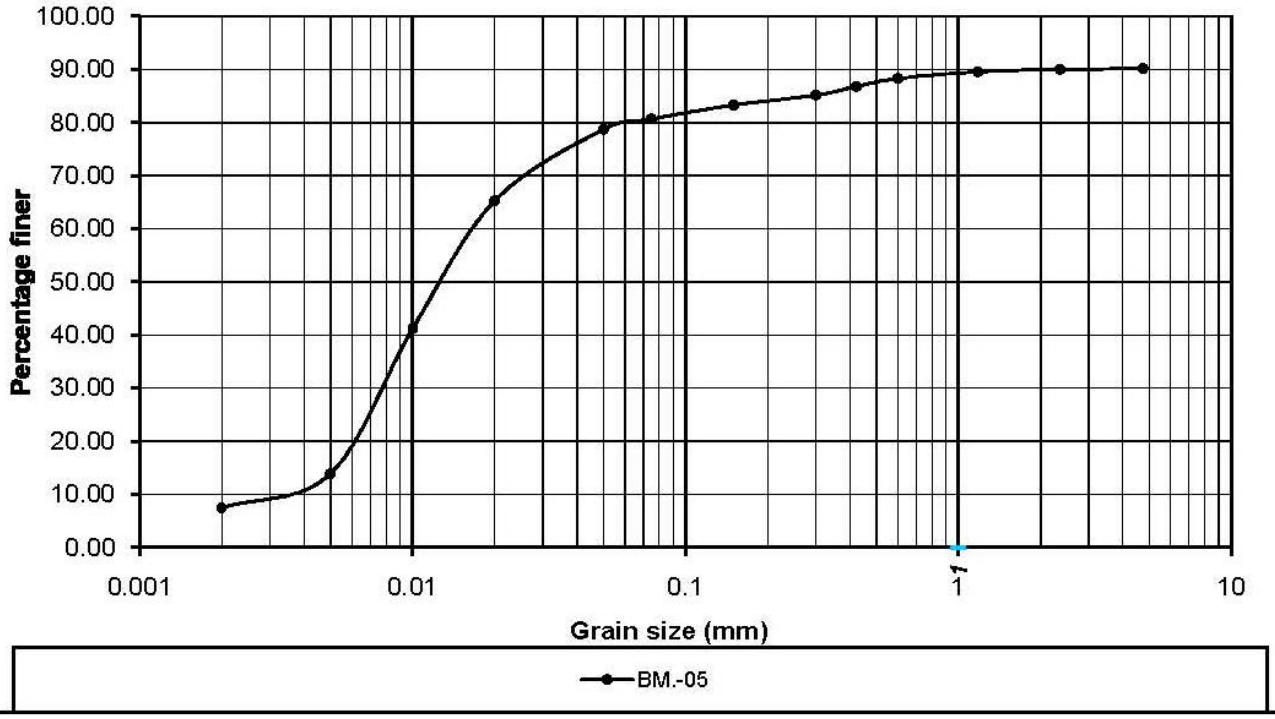
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BM. 04	6.23	65.00	12.35	16.42

*Silt & Clay

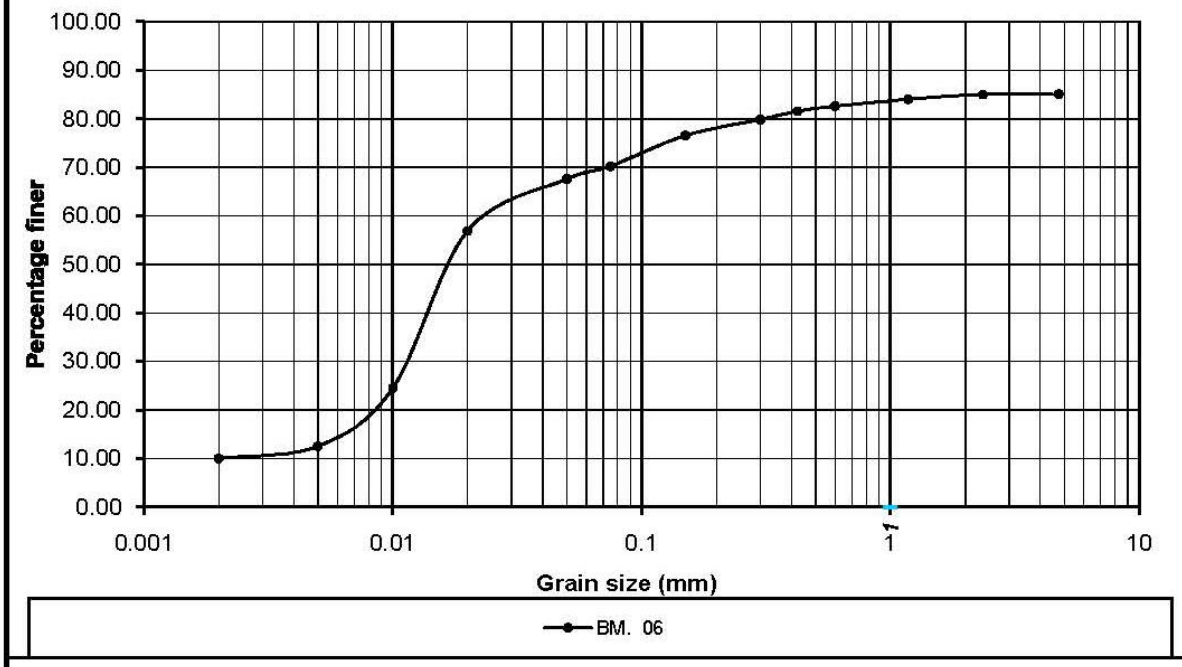
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BM.-05	7.43	61.50	21.20	9.87

*Silt & Clay

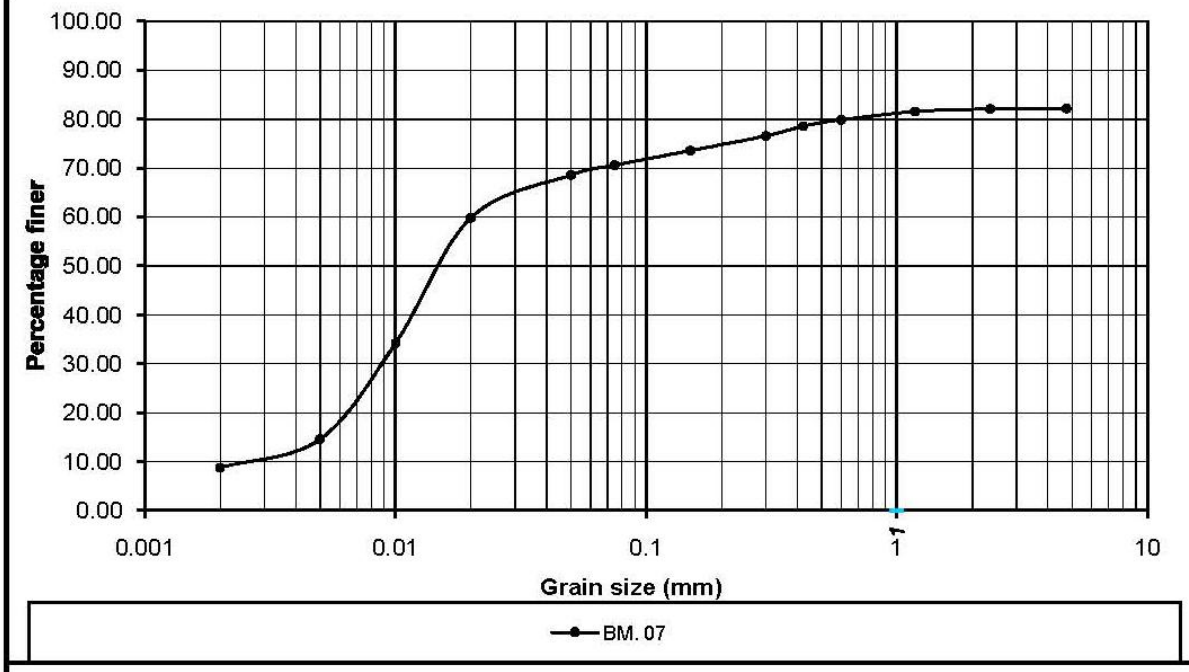
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BM. 06	9.97	22.30	52.76	14.97

*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 (%)**
BM. 07	8.74	24.80	48.60	17.86

*Silt & Clay

Annexure-12: - Water Samples

RESULTS OF EXAMINATION OF SAMPLES OF WATER					
SITE-AAI 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	7.3	6.5-8.5
2		MIDDLLE		7.4	
3		LOWER		7.5	
4	2	UPPER		7.4	
5		MIDDLLE		7.4	
6		LOWER		7.6	
7	3	UPPER		7.3	
8		MIDDLLE		7.5	
9		LOWER		7.6	
10	4	UPPER		7.5	
11		MIDDLLE		7.4	
12		LOWER		7.4	
13	5	UPPER		7.3	
14		MIDDLLE		7.4	
15		LOWER		7.5	
16	6	UPPER		7.4	
17		MIDDLLE		7.3	
18		LOWER		7.5	
19	7	UPPER		7.4	
20		MIDDLLE		7.5	
21		LOWER		7.3	

PARAMETER-Chloride as Cl (mg/l)					
SITE-RIVER AAI					
SL. NO	B.M	LOCATION	PARAMETER	WATER SAMPLE RESULTS	PERMISSIBLE LIMIT IS:456-2000
1	1	UPPER	Chloride as Cl (mg/l)	39	2000 mg/l for concrete not containing embedded steel and 500 mg/l for reinforced concrete work
2		MIDDLLE		23	
3		LOWER		49	
4	2	UPPER		38	
5		MIDDLLE		24	
6		LOWER		48	
7	3	UPPER		38	
8		MIDDLLE		24	
9		LOWER		50	
10	4	UPPER		38	
11		MIDDLLE		25	
12		LOWER		51	
13	5	UPPER		49	
14		MIDDLLE		24	
15		LOWER		39	
16	6	UPPER		48	
17		MIDDLLE		23	
18		LOWER		38	
19	7	UPPER		50	
20		MIDDLLE		25	
21		LOWER		39	

PARAMETER-Sulphates as So_4 (mg/l)					
SITE-RIVER AAI					
SL. NO	B.M	LOCATION	PARAMETER	WATER SAMPLE RESULTS	PERMISSIBLE LIMIT IS:456-2000
1	1	UPPER	Sulphates as So_4	162	400 (mg/l)
2		MIDDLLE		97	
3		LOWER		176	
4	2	UPPER		161	
5		MIDDLLE		98	
6		LOWER		177	
7	3	UPPER		160	
8		MIDDLLE		97	
9		LOWER		161	
10	4	UPPER		163	
11		MIDDLLE		98	
12		LOWER		176	
13	5	UPPER		164	
14		MIDDLLE		98	
15		LOWER		176	
16	6	UPPER		163	
17		MIDDLLE		98	
18		LOWER		177	
19	7	UPPER		163	
20		MIDDLLE		98	
21		LOWER		178	

PARAMETER-Sediment Concentration (mg/l)					
SITE-RIVER AAI					
SL. NO	B.M	LOCATION	PARAMETER	WATER SAMPLE RESULTS	PERMISSIBLE LIMIT IS:456-2000
1	1	UPPER	Sediment Concentration (mg/l)	25	2000 (mg/l)
2		MIDDLLE		32	
3		LOWER		60	
4	2	UPPER		27	
5		MIDDLLE		30	
6		LOWER		31	
7	3	UPPER		27	
8		MIDDLLE		33	
9		LOWER		59	
10	4	UPPER		24	
11		MIDDLLE		31	
12		LOWER		62	
13	5	UPPER		27	
14		MIDDLLE		33	
15		LOWER		61	
16	6	UPPER		33	
17		MIDDLLE		32	
18		LOWER		54	
19	7	UPPER		26	
20		MIDDLLE		31	
21		LOWER		62	

Annexure- 13: - Bench Mark Forms

BM Name	Northing	Easting	Latitude (N)	Longitude (E)	RL (m)
BM1	2904280.86	268426.093	26°14'22.22"	90°40'54.20"	35.93
Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debashis Mondal; Date of Establishment – 28.09.2015					
Station Description :-					
Benchmark is located near Tinkonia Pt.II Village. The Bench mark is on the South portion of the mud road at the end of the 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. The measurements of the bench mark pillar from notable locations / edges as follows: West from Road - 33m East From Pather chali Ghat–112m					
Life of Station : 15Yrs		Datum: - WGS 84		**ZONE :** 46 R	

Figure 26- Bench Mark Form & Google Image view of BM-1

BM Name	Northing	Easting	Latitude (N)	Longitude (E)	RL (m)
BM 2	2908167.931	269898.61	26°16'29.32"	90°41'44.73"	38.436
Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debashis Mondal; Date of Establishment – 28.09.2015					
Station Description :-					
Benchmark is located near Sikatari Pt.I. The Bench mark is on the south portion of the road and north portion of the river. 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. The measurements of the bench mark pillar from notable locations / edges as follows: South from Road - 2 m North From River–53m					
Life of Station : 15Yrs	Datum: - WGS 84		**ZONE :** 46 R		

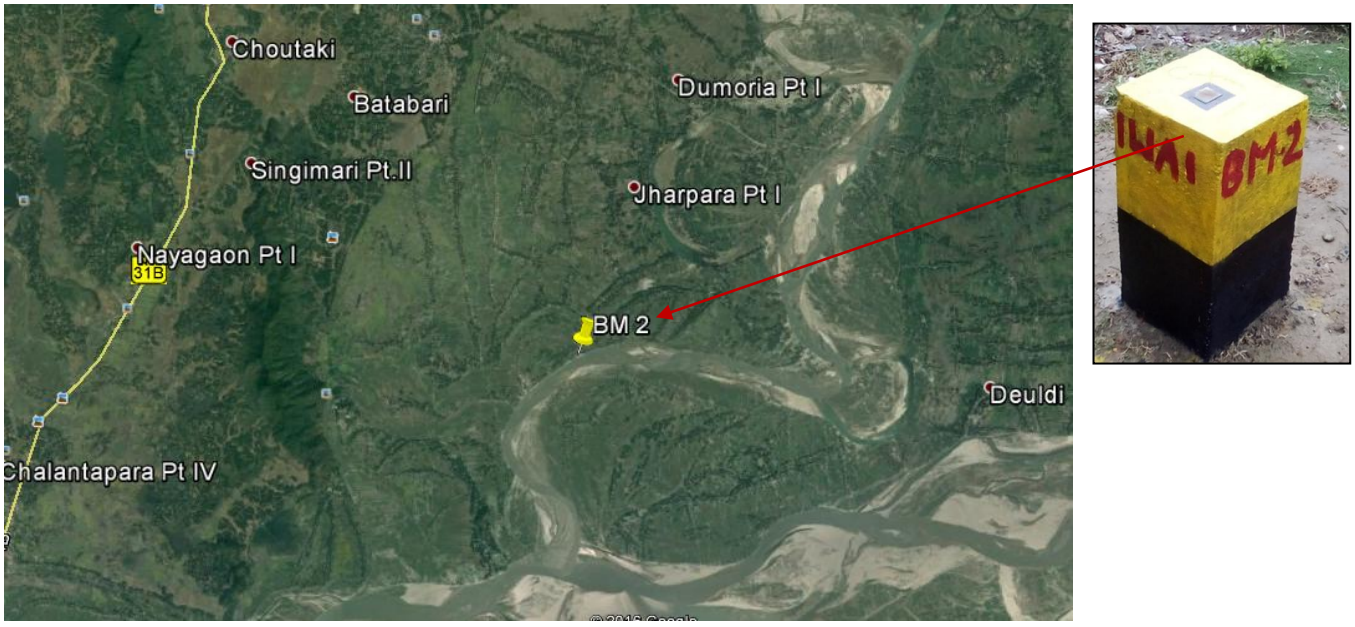


Figure 27- Bench Mark Form & Google Image view of BM-2

BM Name	Northing	Easting	Latitude (N)	Longitude (E)	RL (m)
BM 3	2906117.095	275679.333	26°15'26.04"	90°45'14.29"	38.780
Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debashis Mondal; Date of Establishment – 3.10.2015					
Station Description :-					
Benchmark is located at North side of Hapachara Pathar and south portion of the river. 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. The measurements of the bench mark pillar from notable locations / edges as follows: East from Village Road - 12 m South From River–90 m.					
Life of Station : 15Yrs	Datum: - WGS 84		**ZONE :** 46 R		

Figure 28-Bench Mark Form & Google Image view of BM-3

BM Name	Northing	Easting	Latitude (N)	Longitude (E)	RL (m)
BM 4	2911803.831	275246.775	26°18'30.48"	90°44'55.12"	41.64

Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debashis Mondal;
Date of Establishment – 3.10.2015

Station Description :-

Benchmark is located near Bharailpara Pt.I village beside Abhayapuri-Lengtishinga Rd. RCC Bridge Road. 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.
The measurements of the bench mark pillar from notable locations / edges as follows:
North West corner from RCC Bridge - 7.0m
North West corner from River –80.0m.

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

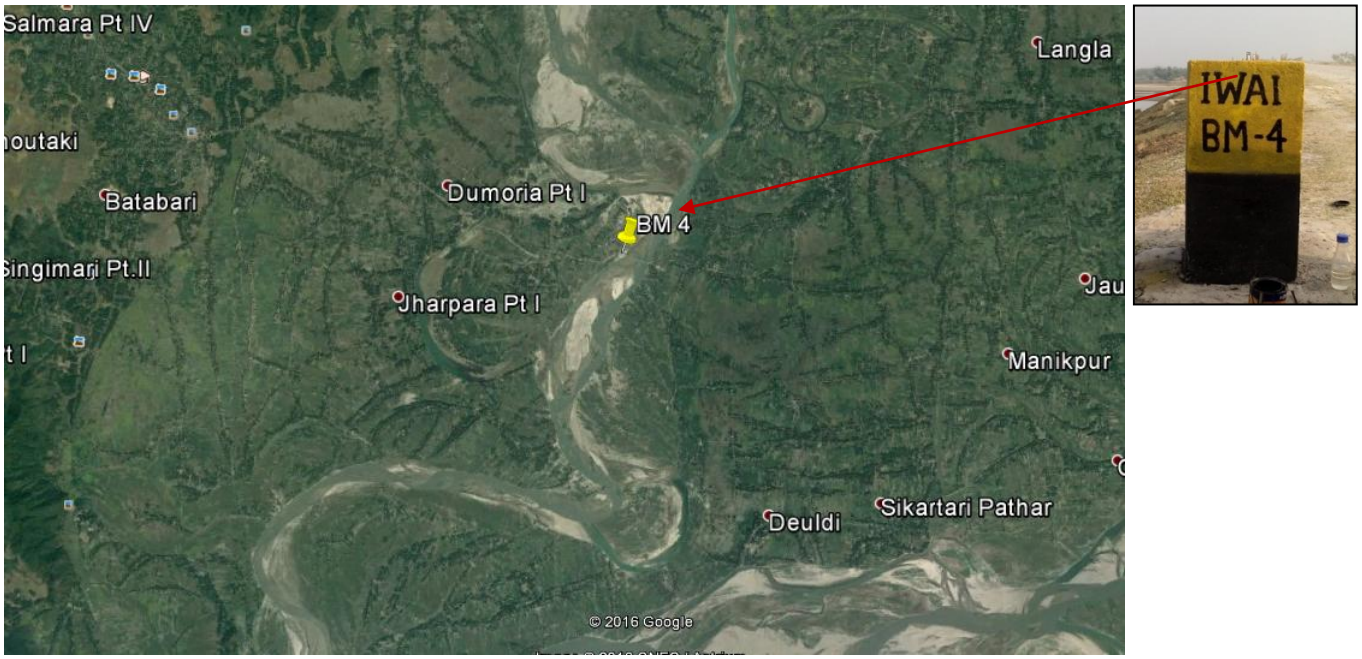


Figure 29-Bench Mark Form & Google Image view of BM-4

BM Name	Northing	Easting	Latitude (N)	Longitude (E)	RL (m)
BM 5	2914366.506	273648.036	26°19'52.82"	90°43'55.91"	44.052

Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debashis Mondal;
Date of Establishment – 5.10.2015

Station Description :-

Benchmark is located near Sanermukh 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.

The measurements of the bench mark pillar from notable locations / edges as follows:

Westside from NH-31-10.19 km

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

Figure 30-Bench Mark Form & Google Image view of BM-5

BM Name	Northing	Easting	Latitude (N)	Longitude (E)	RL (m)
BM 6	2919876.954	273994.04	26°22'51.98"	90°44'4.90"	48.071

Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debashis Mondal;
Date of Establishment – 5.10.2015

Station Description :-

Benchmark is located Chilapara Pt.I village south east portion of the 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.

The measurements of the bench mark pillar from notable locations / edges as follows:

North portion of the RCC Bridge –3.8 m.

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

Figure 31-Bench Mark Form & Google Image view of BM-6

BM Name	Northing	Easting	Latitude (N)	Longitude (E)	RL (m)
BM 7	2932856.855	266283.162	26°29'49.07"	90°39'18.31"	59.276

Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debashis Mondal;
Date of Establishment – 6.10.2015

Station Description :-

Benchmark is located Near Dawkijhar village, middle portion of the two RCC Bridges.

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.

The measurements of the bench mark pillar from notable locations / edges as follows:

Middle of two RCC Bridge on the east portion of the river at 31.12m distance.

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

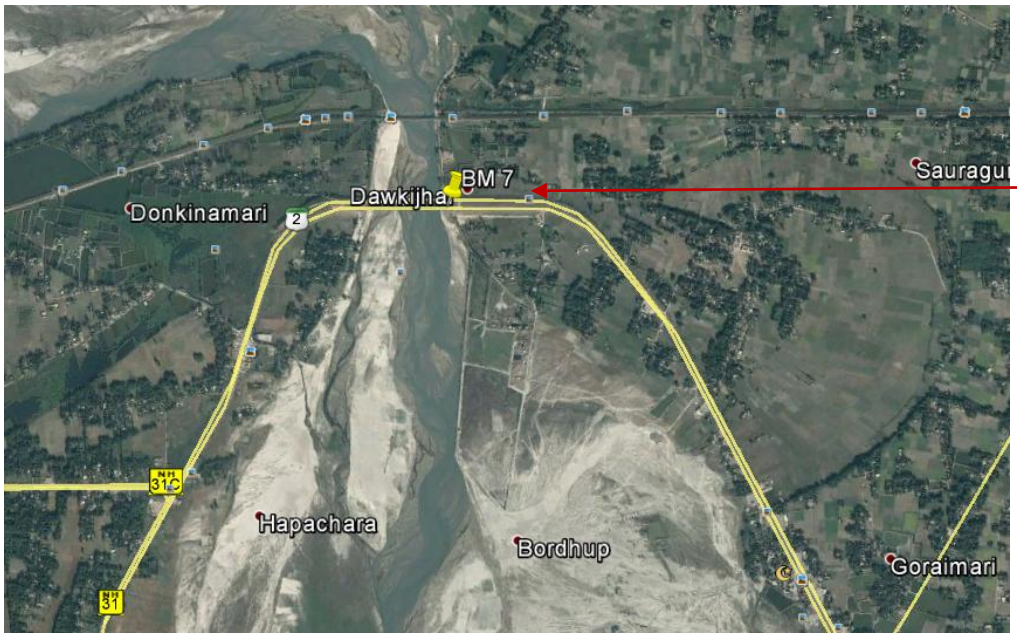


Figure 32- Bench Mark Form & Google Image view of BM-7

BM Name	Northing	Easting	Latitude (N)	Longitude (E)	RL (m)
BM 8	2939534.75	257549.507	26°33'20.67"N	90°33'58.49"	63.114

Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debashis Mondal;
Date of Establishment – 6.10.2015

Station Description :-

Benchmark is located near Adalguri No. - 3 beside the RCC Bridge in south portion.

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.

The measurements of the bench mark pillar from notable locations / edges as follows:

South from RCC Bridge – 2.7 m.

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

Figure 33-Bench Mark Form & Google Image view of BM-8

Annexure- 14: - Levelling Calculation:-

Leveling from BM-1 to GS-1

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.615					35.930	BM-1
0.344		1.382		0.767	35.163	
0.492		1.557		1.213	33.950	
		1.617		1.125	32.825	GS-1

Leveling from BM-2 to GS-2

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.588					38.436	BM-2
0.455		1.622		1.034	37.402	
0.746		1.388		0.933	36.469	
0.857		1.885		1.139	35.330	
		1.449		0.592	34.738	GS-2

Leveling from BM-3 to GS-3

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.925					38.780	BM-3
0.883		1.752		0.827	37.953	
		1.495		0.612	37.341	GS-3

Leveling from BM-4 to GS-4

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.548					41.640	BM-4
0.831		1.254		0.706	40.934	
		1.605		0.774	40.160	GS-4

Leveling from BM-5 to GS-5

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.485					44.052	BM-5
0.677		1.388		0.903	43.149	
		1.686		1.009	42.140	GS-5

Leveling from BM-6 to GS-6

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.635					48.071	BM-6
0.542		1.870		1.235	46.836	
0.413		1.987		1.445	45.391	
		1.498		1.085	44.306	GS-6

Leveling from BM-7 to GS-7

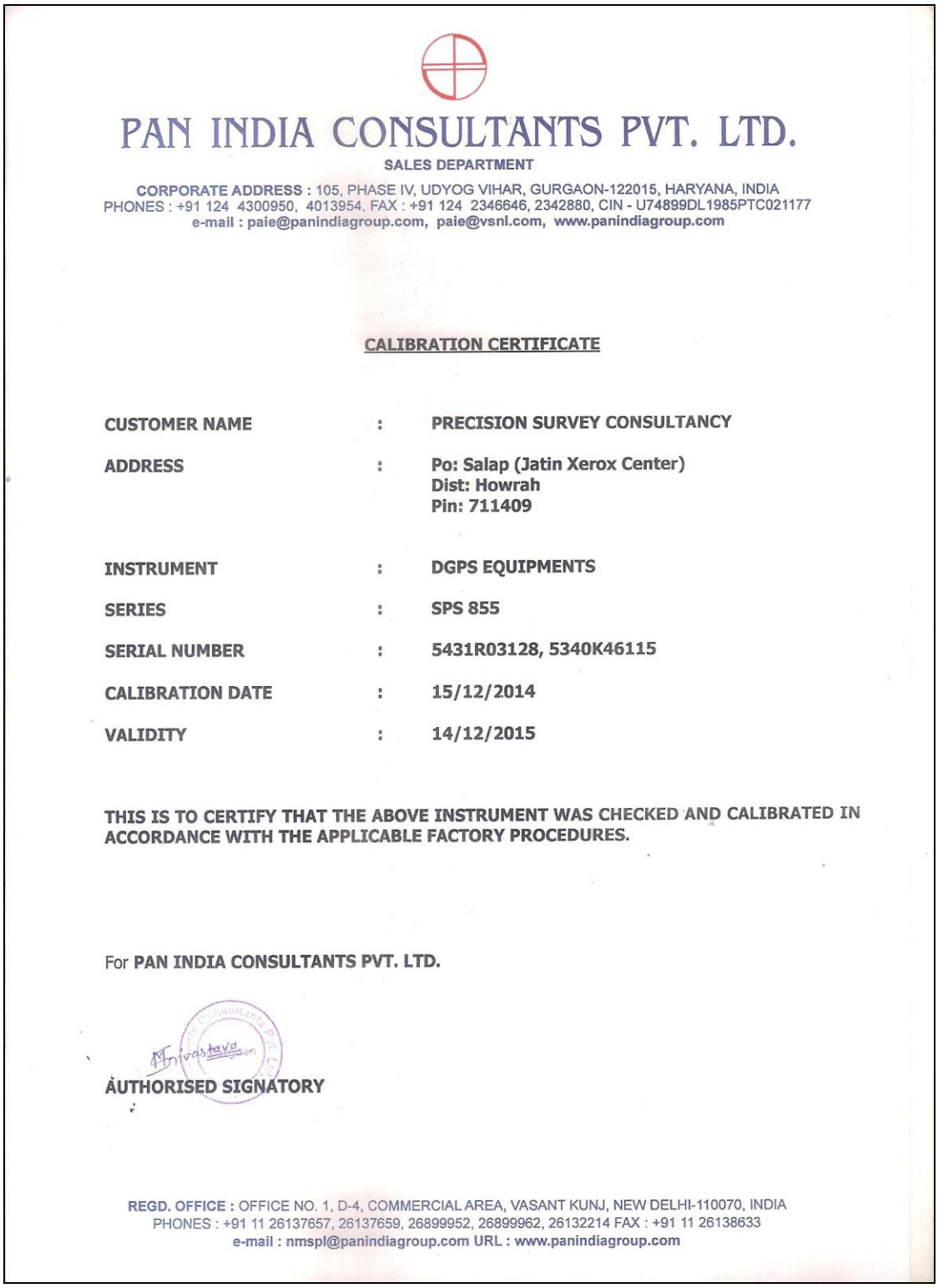
BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.564					59.276	BM-7
0.457		2.133		1.569	57.707	
0.672		1.938		1.481	56.226	
0.439		2.013		1.341	54.885	
0.318		2.388		1.949	52.936	
		2.094		1.776	51.160	GS-7

Leveling from BM-8 to GS-8

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.687					63.114	BM-8
0.528		2.465		1.778	61.336	
0.341		2.164		1.636	59.700	
0.736		1.998		1.657	58.043	
0.573		2.312		1.576	56.467	
		1.350		0.777	55.690	GS-8

Table 23- Leveling Calculation of Aai River

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 CONSULTANCY
ADDRESS	:	Po: Salap (Jatin Xerox Center) Dist: Howrah Pin: 711409
INSTRUMENT	:	DGPS EQUIPMENTS
SERIES	:	SPS 855
SERIAL NUMBER	:	5431R03128, 5340K46115
CALIBRATION DATE	:	15/12/2014
VALIDITY	:	14/12/2015

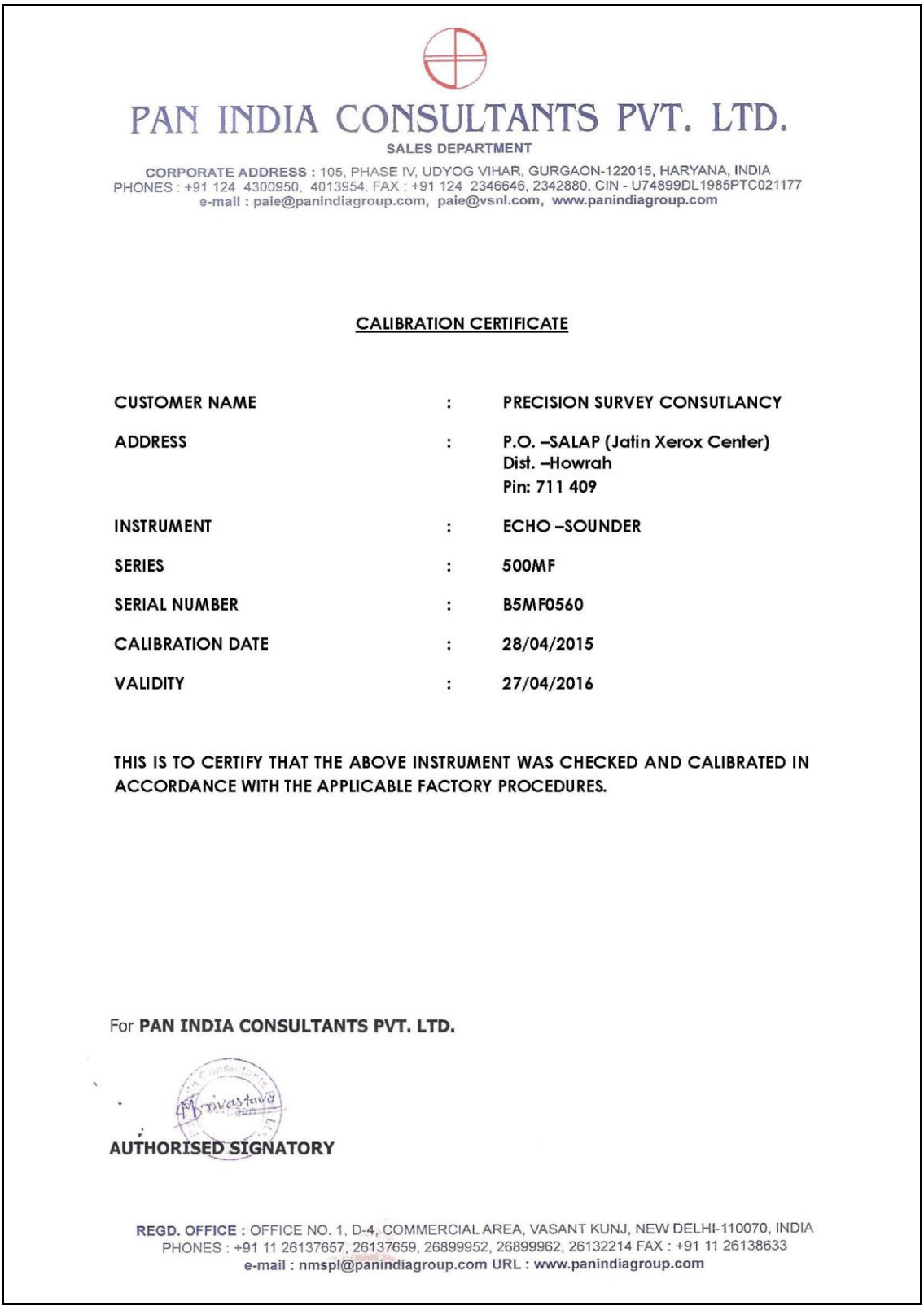
THIS IS TO CERTIFY THAT THE ABOVE INSTRUMENT WAS CHECKED AND CALIBRATED IN ACCORDANCE WITH THE APPLICABLE FACTORY PROCEDURES.

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 34- 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 (Jatin Xerox Center) Dist. –Howrah Pin: 711 409
INSTRUMENT	:	ECHO –SOUNDER
SERIES	:	500MF
SERIAL NUMBER	:	B5MF0560
CALIBRATION DATE	:	28/04/2015
VALIDITY	:	27/04/2016

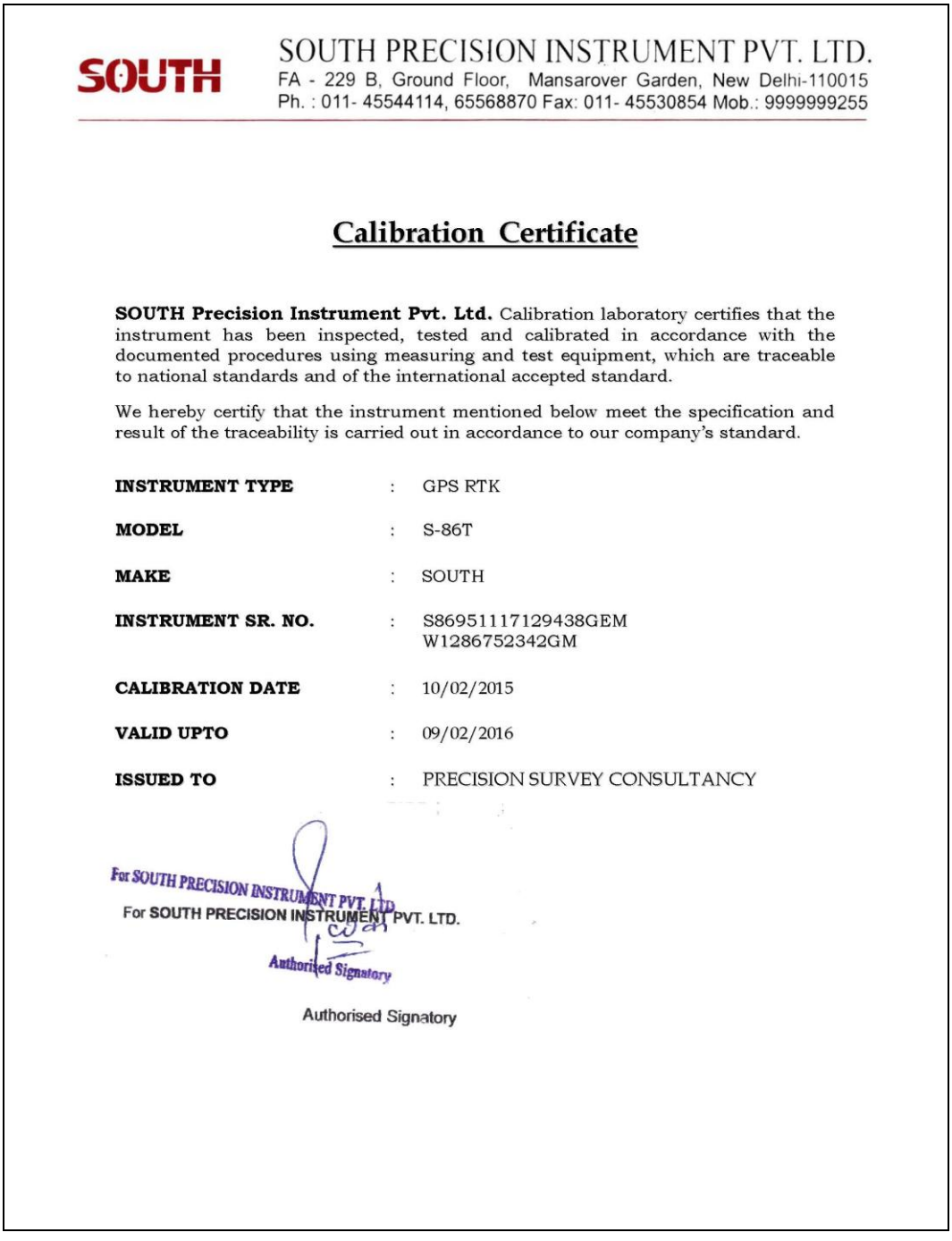
THIS IS TO CERTIFY THAT THE ABOVE INSTRUMENT WAS CHECKED AND CALIBRATED IN ACCORDANCE WITH THE APPLICABLE FACTORY PROCEDURES.

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 35- Calibration Certificate of Echo Sounder



SOUTH PRECISION INSTRUMENT PVT. LTD.
FA - 229 B, Ground Floor, Mansarover Garden, New Delhi-110015
Ph. : 011- 45544114, 65568870 Fax: 011- 45530854 Mob.: 9999999255

Calibration Certificate

SOUTH Precision Instrument Pvt. Ltd. Calibration laboratory certifies that the instrument has been inspected, tested and calibrated in accordance with the documented procedures using measuring and test equipment, which are traceable to national standards and of the international accepted standard.

We hereby certify that the instrument mentioned below meet the specification and result of the traceability is carried out in accordance to our company's standard.

INSTRUMENT TYPE	:	GPS RTK
MODEL	:	S-86T
MAKE	:	SOUTH
INSTRUMENT SR. NO.	:	S86951117129438GEM W1286752342GM
CALIBRATION DATE	:	10/02/2015
VALID UPTO	:	09/02/2016
ISSUED TO	:	PRECISION SURVEY CONSULTANCY

For SOUTH PRECISION INSTRUMENT PVT. LTD.
For SOUTH PRECISION INSTRUMENT PVT. LTD.
Authorised Signatory
Authorised Signatory

Figure 36- Calibration Certificate of South RTK

Annexure- 16: - Field Photographs

Figure 37- Topographical Survey area near at Chainage 12.00 km

Figure 38-RCC Bridges with Bench Mark-7 near at Chainage 55.789 km

Figure 39- Char land area near at Chainage 20.00 km

Figure 40- Establish BM pillar-4 near at Chainage- 25.645 km

Figure 41-BM establishment near the river bank side

Figure 42- Embankment at River bank side

Annexure- 17: - Survey Charts

LIST OF SURVEY CHARTS OF AII RIVER FINAL DWG (NW-06)								
Sl. No.	Chart No.	Location	Chainage (Form…….km. To…...km.)	Chart Datum And Water Level w.r.t. MSL			Value of Reduction	Remarks
				Chainage (km.)	CD (m.)	WL (m.)		
1	P_01	Mahumpur Pt-II to Barjana Pt.I	0.00 km to 6.753 km	6.395	31.863	32.825	-0.962	GS-1
2	P_02	Barjana Pt.I to Hatijuna	6.753 km to21.841 km	6.395	31.863	32.825	-0.962	GS-1
				11.758	33.873	34.738	-0.865	GS-2
				18.230	36.299	37.341	-1.042	GS-3
3	P_03	Hatijuna to Lengtisiniga	21.841 km to 29.570 km	18.230	36.299	37.341	-1.042	GS-3
				25.667	39.087	40.160	-1.073	GS-4
4	P_04	Lengtisiniga to Chillapara Pt-II	29.570 km to 36.942 km	30.522	40.906	42.140	-1.234	GS-5
				36.326	43.082	44.306	-1.224	GS-6
5	P_05	Chillapara Pt-II to Hura Mara Pt-II	36.942 km to 46.313 km	36.326	43.082	44.306	-1.224	GS-6
6	P_06	Hura Mara Pt to Hapachara	46.313 km to 53.603 km	55.795	50.379	51.160	-0.781	GS-7
7	P_07	Hapachara to Popragaon Pt-I	53.603 km to 61.881 km	55.795	50.379	51.160	-0.781	GS-7
8	P_08	Popragaon Pt-I to Adalguri Pt-3	61.881 km to 68.484 km	68.462	55.127	55.690	-0.563	GS-8

Table 24-Survey Charts

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

Survey period: - 21st September, 2015 to 22nd October, 2015

✧ **G.S:-** Gauge Station