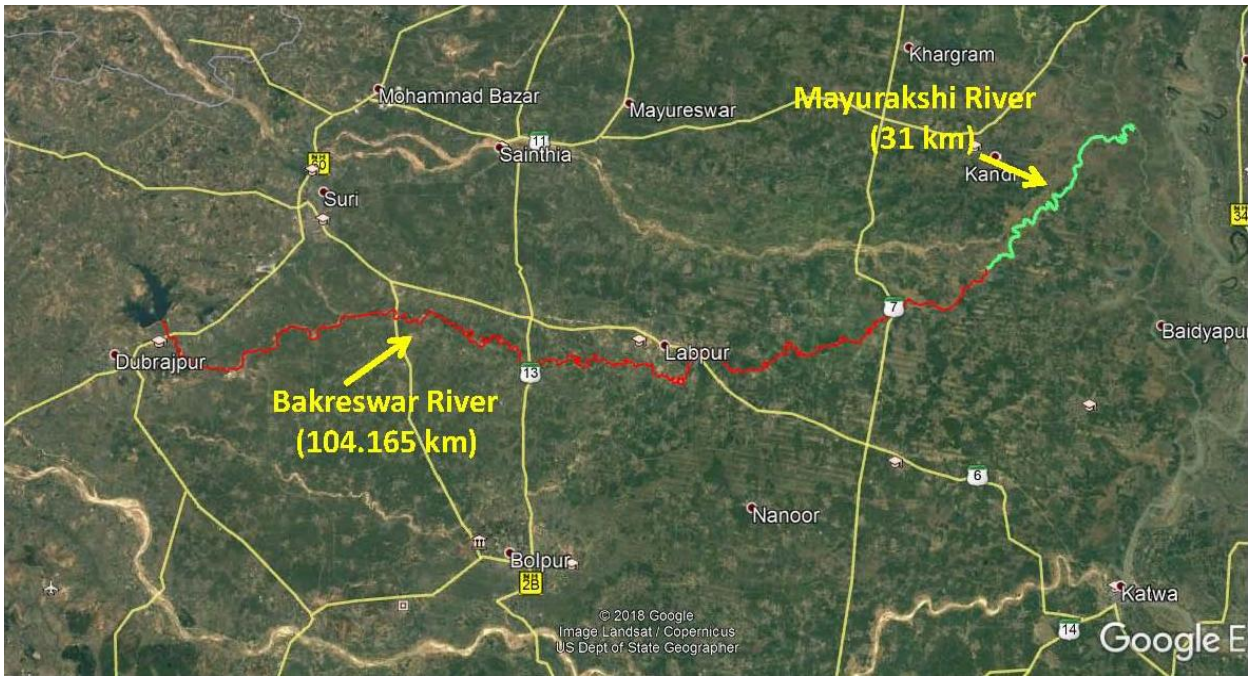
INLAND WATERWAYS AUTHORITY OF INDIA, A-13, SECTOR-1, NOIDA
DIST-GAUTAM BUDHA NAGAR, UTTAR PRADESH, PIN- 201 301(UP)

"FEASIBILITY REPORT ON HYDROGRAPHIC SURVEY OF BAKRESWAR-MAYURAKSHI RIVER (NW-15) (135.165KM)

STARTING "FROM THE CONFLUENCE WITH DWARKA RIVER NEAR DAKHIN HIJAL VILLAGE TO MEETING WITH BAKRESWAR-MAYURAKSHI RIVER AND UPTO THE NIL NIRJAN DAM"

SURVEY PERIOD 28.09.15 to 11.10.15



FINAL REPORT ON HYDROGRAPHICAL SURVEY OF BAKRESWAR-MAYURAKSHI RIVER, WEST BENGAL

REPORT SUBMISSION DATE- 29.03.2019

SUBMITTED BY:-

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Acknowledgement

B.S.Geotech PVT.Ltd, Konnagar, Hooghly 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-VIII (Bakreswar-Mayurakshi River) from Confluence with Dwarka River to meeting with Bakreswar-Mayurakshi River and upto the Nil Nirjan Dam (135.165 km).**

We would like to use this opportunity to pen down our profound gratitude and appreciations to **Shri Jalaj Srivastava, IAS, Chairman, IWAI** for spending their valuable time and guidance for compleing this project of " Detailed Hydrography and Topography survey in Bakreswar-Mayurakshi River." B.S.Geotech would also like to thanks **Shri Pravir Pandey, Vice-Chairman, IA&AS. 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

Table 1- List of Abbreviations

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Salient Features of Bakreswar-Mayurakshi River

Sl.	Particulars	Details
1.	Name of Consultant	B.S. Geotech PVT. LTD
2.	Region number & State(s)	Region -VIII, West Bengal
3.	a) Waterway name b) NW # c) Total Stretch and length of declared NW (from…. To….; total length) d) Survey Period (… to …)	a) Bakreswar-Mayurakshi River b) NW-15 c) From Confluence with Dwarka River near Dakhin Hijal village to meeting with Bakreswar-Mayurakshi river near Talgram village and upto the Nil Nirjan Dam (135.165 km). d) 28th September, 2015 to 11th October, 2015
4.	Tidal & non tidal portions (from… to, length, average tidal variation)	Non-Tidal River
5.	LAD status (Least Available Depth) i) < 1.2 m (km) ii) 1.2 m to 1.4 m (km) iii) 1.5 m to 1.7 m (km) iv) 1.8 m to 2.0 m (km) v) > 2.0 m (km)	**Observed Depth**

Sub Stretch-1 (0.00-10.00 km)	Sub Stretch-2 (10.00-20.00 km)	Sub Stretch-3 (20.00 – 30.00 km)	Sub Stretch-4 (30.00-40.00 km)
3.9	10	10	6.4
1.4	0	0	1.3
0	0	0	0
1.9	0	0	0
2.8	0	0	2.3
Total-10.0	Total- 10.0	Total- 10.00	Total- 10.00

Sub Stretch-5 (40.00-50.00 km)	Sub Stretch-6 (50.00-60.00 km)	Sub Stretch-7 (60.00-70.00 km)	Sub Stretch-8 (70.00-80.00km)
1.9	3.1	2.1	10.00
1.2	0	0	0
1.7	0	1.7	0
2.0	0	0	0
3.2	6.9	6.2	0
Total- 10.0	Total- 10.0	Total- 10.0	Total- 10.0

LAD status (Least Available Depth)

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

Sub Stretch-9 (80.00-90.00 km)	Sub Stretch-10 (90.00-100.00 km)	Sub Stretch-11 (100.00-110.00 km)	Sub Stretch-12 (110.00-120.00km)
10	10	10	10
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
Total- 10.0	Total- 10.0	Total-10.0	Total- 10.0

Sub Stretch-13 (120.00-130.00 km)	Sub Stretch-14 (130-135.165 km)	Total (km)
10	5.165	102.565
0	0	3.9
0	0	3.4
0	0	3.9
0	0	21.4
Total- 10.0	Total- 5.165	Total=135.165 km

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

Reduced Depth

Sub Stretch-1 (0.00-10.00 km)	Sub Stretch-2 (10.00-20.00 km)	Sub Stretch-3 (20.00 – 30.00 km)	Sub Stretch-4 (30.00-40.00 km)
7.0	10	10	8.0
1.2	0	0	0
0	0	0	0
1.8	0	0	0
0	0	0	2.0
Total-10.0	Total-10.0	Total- 10.0	Total- 10.0

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

Sub Stretch-5 (40.00-50.00 km)	Sub Stretch-6 (50.00-60.00 km)	Sub Stretch-7 (60.00-70.00 km)	Sub Stretch-8 (70.00-80.00 km)
4.1	5.8	5.4	10.00
1.3	0	1.2	0
0	0	0	0
2.0	0	0	0
2.6	4.2	3.4	0
Total- 10.0	Total- 10.00	Total-10.0	Total-10.0

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

Sub Stretch-9 (80.00-90.00 km)	Sub Stretch-10 (90.00-100.00 km)	Sub Stretch-11 (100.00-110.00 km)	Sub Stretch-12 (110.00-120.00 km)
10	10	10	10
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
Total- 10.0	Total- 10.0	Total-10.0	Total-10.0

Sub Stretch-13 (120.00-130.00 km)	Sub Stretch-14 (130.00-135.165 km)	Total (km)
10	5.165	115.465
0	0	3.7
0	0	0
0	0	3.8
0	0	12.2
Total- 10.0	Total- 5.165	Total=135.165 km

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) Check Dam- 4 (Four), Dam-1 (one) ii) RCC Bridge- 9 (Nine), Pipe Bridge- 1(one) iii) Steel Railway Bridge- 2 (Two), RCC Rail Bridge – 2 (Two) iv) Under-Construction Rail Bridge-1 (one)

Clearance w.r.t H.F.L	Min (m)	Max (m)
Horizontal Clearance (m)	4.538	37.22
Vertical Clearance w.r.t. H.F.L (m)	1.120	6.95

v) Electric Lines -44 (Forty Four)

Clearance w.r.t H.F.L	Min (m)	Max (m)
Horizontal Clearance (m)	49.05	184.5
Vertical Clearance w.r.t. H.F.L (m)	4.2	9.3

vi) High Tension Lines-17 (Seventeen)

Clearance w.r.t H.F.L	Min (m)	Max (m)
Horizontal Clearance (m)	88.69	725.79
Vertical Clearance w.r.t. H.F.L (m)	9.96	11.9

7.	Slope (m/km, cm/km)	

Reach		River Level Change (m)	Distance (km)	Slope (m/km)	Slope (cm/km)
From	To				
0.00	10.00	0.502	10.00	0.050	5.02
10.01	20.00	1.386	9.99	0.139	13.87
20.01	30.00	1.594	9.99	0.160	15.96
30.01	40.00	2.840	9.99	0.284	28.43
40.01	50.00	2.270	9.99	0.227	22.72
50.01	60.00	1.720	9.99	0.172	17.22
60.01	70.00	0.253	9.99	0.025	2.53
70.01	80.00	2.507	9.99	0.251	25.10
80.01	90.00	3.060	9.99	0.306	30.63
90.01	100.00	5.108	9.99	0.511	51.13
100.01	110.00	5.842	9.99	0.585	58.48
110.01	120.00	8.960	9.99	0.897	89.69
120.01	130.00	9.49	9.99	0.950	94.99
130.00	135.165	5.30	5.165	1.026	102.61
Avg. Slope				0.399	39.88

8.	i) Present IWT operations ii) Ferry services, tourism, cargo, if any	i) As follows ii) Three Passenger Ferry services named Sehalai ferry ghat (Ch.-13.600 km), Ramghati Ferry ghat (Ch.-56.540 km) and Sital gram Ferry ghat (Ch.-62.00 km) are available in this zone of river. The light cargo like vegetable, Cycle and motor cycle, light goods etc. are available in this zone of river. Bolpur is one of the famous tourist place located in this zone of river approximately 15.00 km far from the waterways.
9.	Approx Distance of Rail & Road from Industry	Nearest Railway station: i) Chinpai Railway station (Approx 1.51 km far from waterway) ii) Labpur Railway station (Approx 1.66 km far from waterway) iii) Maheshpur Railway station (Approx 1.08 km far from waterway) iv) Kanthaliya Road Railway station (2.64 km from the confluence of Dwarka river) Name of National highway close to the River- NH- 34, NH-2B, NH-60 Name of SH- SH-3, SH-6, SH-7, SH-11, SH-13
10.	Any other information/ comment	The Detailed project Report may develop in this zone of river. Three passenger ferry services with light cargo (vegetables, cycle and motor cycle, light goods) are available in this zone of river. The Bathymetry survey was not carried out the entire stretches of the river due to insufficient layer of water. The Bathymetry survey has been carried out approx 40.00 km in this stretches of river. Bakreswar Thermal power plant is located close to the Chinpai railway station. Chinpai, Labpur, Maheshpur etc. Railway stations are located in this zone of river. NH-34, NH-2B, NH-60 etc are also located in this zone of river for a better communication. SH-3, SH-6, SH-7, SH-11, SH-13 are also communicated through the states.

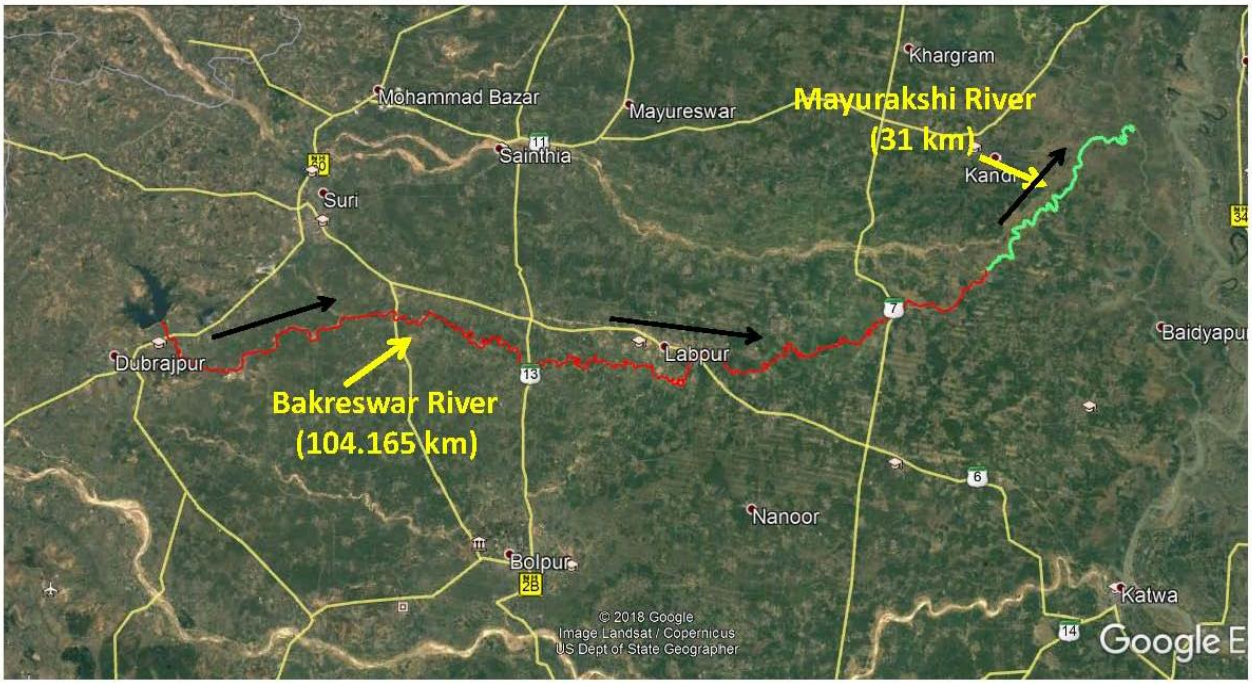
Section-1: Introductory Considerations

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

The River Bakreswar originates from Nil Nirjan Dam (lat. - 23°49'30.77"N, long. - 87°24'59.04"E) in West Bengal. The name Bakreswar is for its shape the word Bakra means the curve. It flows towards the east and after covering at a distance of 121km (lat.- 23°51'58.01"N, long.- 88° 2'21.04"E) it's called Mayurekshi river. The places which are situated in the bank of the river are Dubrajpur, Suri, Bolpur, Ahmadpur, Labpur, Kirnahar and so many small towns and villages. Bakreswar Tharmal Power Station is also situated on the bank of the river.

Mayurakshi River is originated from Massanjore Dam Reservoir at Trikut Hill, Deoghar in Jharkhand State. The Massanjore Power Station is also situated on river Mayurakshi it is located near Dumka in Jharkhand state. Massanjore Dam is about 38km. upstream from Siuri in West Bengal. The survey work took place from where the Mayurekshi river consisting with river kopai in the Talgram village at (lat. - 23°51'58.01"N, long. - 88° 2'21.04"E). The Mayurakshi is one of the important rivers in West Bengal. It flows from west to east through the eastern part of India with a considerable length through the State of West Bengal. The river is fairly deep and navigable. It receives on its bank such as the Bhandershol, Jaria, Pirijpur Konarpur, Kirnahar and so many small towns and villages on the right approx an avg. distance and Chinpai, Purandarpur, Ahamedpur, Labpur, Kandi and Tilgram village and so many towns and villages are situated on the left bank side of the Mayurakshi river . The Tributaries in the right side of the river are Kopai, Bramhani, Dwarka and Bakreswar.

Mayurakshi is a typical river system consisting through the River Dwarka out falls in the Bhagirathi River in West Bengal. Through the district of Birbhum and Murshidabad, the river is finally out falls near Maugram village in Birbhum.



1.2 - Tributaries / Network of River/ Basin:-

Brahmani, Dwaraka, Bakreshwar and Kopai are the tributaries of Mayurakshi River.

1.3 - State / District through which river passes:-

The River Bakreswar-Mayurakshi passes through the district of Birbhum and Murshidabad in the state of west Bengal.

1.4 – Project Site Location Map:-

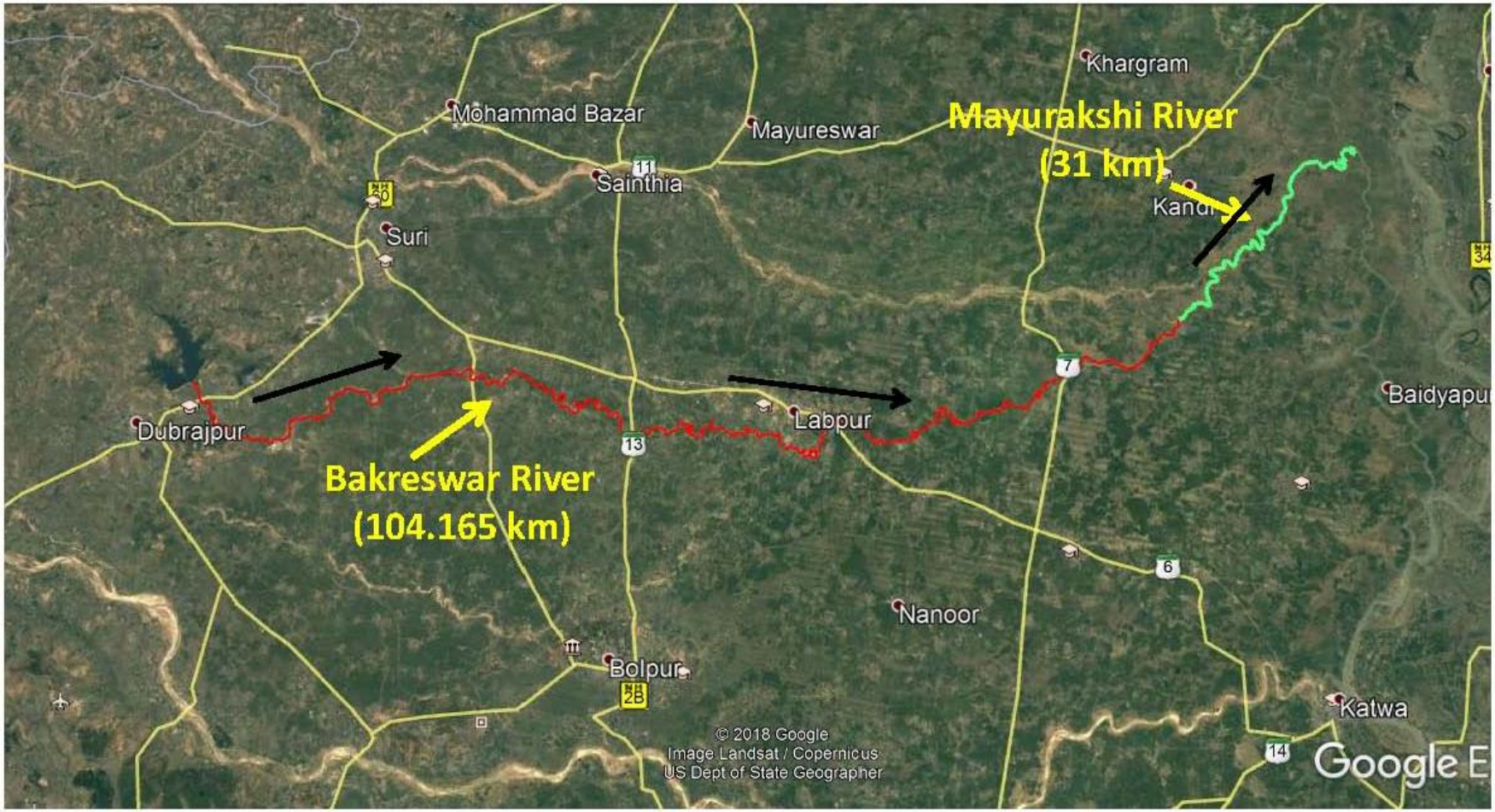


Figure 1- Project site location map of Bakreswar-Mayurakshi River

1.5 - 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", "B.S.Geotech" and BM No. can be seen on the face of the pillar.

Section-2: Methodology Adopted to undertake Study

2.1 - Methodology Adopted including Resources and equipment used and calibration: -

Equipment:-

Following equipments are 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 Receiver SPS 361	----------	1
Software	HYPACK data acquisition	Version 14	1
Software	AUTOCAD	2013	1
Software	Microsoft Office	2013	1

Table 2 - Equipments

- **Conduct of survey work**

- **Topographic Survey:-**

The Topography survey of Bakreswar-Mayurakshi river has been carried out from "Confluence with Dwarka River near Dakhin Hijal village (Lat: - 23°58'22.24"N, Long:- 88°09'21.19"E) to meeting with Bakreswar-Mayurakshi River near Talgram village (Lat:- 23°51'58.01"N, Long:- 88°2'21.04"E) and upto Nil Nirjan Dam (Lat:- 23°49'30.77"N, Long:- 87°24'59.04"E)".

The Topographic survey has been 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:-

Bathy 500 MF was used to obtain soundings onboard the survey boat. A working frequency of 210 KHz was used for sounding operations. The digital output from the echo sounder was automatically fed to the HYPACK data logging software on a real-time basis for the acquisition of survey data. No breakdown of equipment was reported and the performance of the equipment was found to be satisfactory during the entire duration of the survey.

The sound velocity was set to 1499 m/s on single beam echo sounder during acquisition. The Daily bar checks were done prior to the sounding operation and before the closing of the sounding operation for the day. Being very shallow depths, the echo sounder depths were also cross-checked in between by using demarcated sounding poles during the conduct of the survey. The sounding lines were run using Survey boat to identify the design line of the Bakreswar-Mayurakshi River for the possible stretch. The cross lines were run perpendicular to the orientation of river flow (i.e. perpendicular to the orientation of depth contours) in respective stretches. The spot sounding was also carried out in the area where the survey boat cannot be operated due to low depth. The hemisphere DGPS and Sounding Pole were used for Spot sounding at shallow locations in the Bakreswar-Mayurakshi River. The DGPS position along with water depths was recorded simultaneously and the tidal reduction was applied to the obtained depths.

Figure 2-Batymery Survey

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

For Topographic survey, the Horizontal control has been carried out from the Bench Mark no –NBM-C-27N, situated beside Bhagirathi river, right bank at Kalaynpur ghat. The BM position near Kalayanpur is:

	Geographic position		UTM position		
Location Name	**Latitude (N)**	**Longitude (E)**	**Northing (m)**	**Easting (m)**	**Elevation (m)**
Kalayanpur	23°43'27.21"	88°10'29.03"	2624188.88	619742.05	14.971 m.w.r.t M.S.L

Figure 3- G.T.S location of Bakreswar-Mayurakshi River

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

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

2.4 - Methodology to fix Chart Datum/ Sounding Datum:-

IWAI had provided Sounding Datum at the Confluence with Dwarka River near Dakshin Hijal (11.258 metre) which is the starting point (Chainage-0.00 km) of Bakreswar-Mayurakshi River. The Sounding Datum of Dakhin Hijal has been calculated w.r.t sounding Datum of confluence with Bhagirathi River (8.386 metre) and the sounding Datum of Bazarsaw (Seasonal) (10.143 metre). The same was used to arrive the Sounding Datum values at BM Pillars and at tide gauges. For dry patches, Lowest M.S.L value is used as Sounding Datum (S.D) at every km.

Sl. no	Place	Sounding Datum w.r.t MSL (Provided by IWAI)
1	Confluence with Dwarka River Near Dakhin Hijal (Chainage - 0.00 km)	11.258 metre

2.5 - Yearly minimum and maximum Water Levels Average of 06 years minimum Water Levels to arrive at Chart Datum (CD) / Sounding Datum (SD):-

This para is already discussed in the para no-2.4

2.6 -Transfer of Sounding Datum table for Tidal Rivers:-

There is no tidal influence found in this zone of river.

2.7 –Table indicataing tidal variation at different observation points (say at every 10 KM):-

There is no tidal influence found in this zone of river.

2.8 - Salient features of Dam, Barrages, Weirs, Anicut, Locks, Aqueducts etc.:-

There are four no's of Check Dam and one Dam named Bakreswar Dam found in this zone of river.

Sl No	Structure Name	Chainage (km)	Location	Latitude (N)	Longitude (E)	Northing (m)	Easting (m)	Length (m)	Width (m)	Height w.r.t. S.D (m)	Present Condition
1	RCC Check Dam	51.400	Khanpur	23°48'17.073"	87°53'49.344"	2632916.19	591379.18	66.30	17.10	8.642	Complete
2	Check Dam	98.950	Dakhin Amarpur	23°48'40.369"	87°39'14.196"	2633490.55	566630.77	67.839	4.200	4.040	Complete
3	Check Dam	119.200	Liara	23°49'13.517"	87°31'14.346"	2634451.98	553062.53	67.839	4.00	3.790	Complete
4	Check Dam	129.00	Bishalpur	23°47'35.534"	87°27'11.004"	2631393.76	546161.08	93.74	24.88	10.256	Complete
5	Bakreswar Dam	135.165	Chinpai	23°49'32.501"	87°24'58.263"	2634990.47	542398.86	67.11	55.13	21.000	Complete

Salient Features of Bakreswar Dam		
1	Name of Dam	Bakreshwar Dam
2	Nearest City	Siuri
3	District	Birbhum
4	State	West Bengal
5	Basin	Ganga
6	Dam as per Parliamentary Constituency	Birbhum
7	Seismic Zone	Seismic Zone-III
8	Location	Kadisala, P.S. Dubarajpur, Birbhum on the river Bakreswar
9	Catchment Area	142.45 sq. km.
10	Width Between Abutments	91.44 m
11	Linear Water Way	86.87 m
12	Optimum Pond Level	61.56 m
13	Total width between abutments	91.44mt
14	. Linear waterway	86.87mt
15	Number of under sluice	1 on the right bank
16	Number of under sluice bay	3
17	. Net irrigable area	87449 hectares by Bakreswar Kopai Main Canal
18	. Linear waterway	86.87mt
19	Canals from Bakreswar weir	Bakreswar Kopai Main Canal (with four regulators Location-Kandisala to Kultore).

Table 3-Salient Features of Bakreswar Dam

2.9- Description of erected Bench mark Pillars:-

Sl. No	BM No	Location	Chainage (Km)	Latitude (N)	Longitude (E)	Easting (m)	Northing (m)	BM Height above MSL (m)	BM Height above SD (m)
1	BM 1	Dakhin Hijal	0.515	23°58'21.613"	88°9'17.148"	617482.380	2651681.840	14.846	3.465
2	BM 2	jayrampur	10.263	23°56'27.071"	88°6'52.224"	613414.263	2648125.816	20.16	8.40
3	BM 3	Ibrahimpur	18.921	23°54'6.649"	88°4'41.461"	609750.604	2643778.117	22.500	9.572
4	BM 4	Sherpur	29.611	23°51'20.166"	88°1'46.901"	604851.706	2638620.849	23.935	9.226
5	BM 5	Tarapur	38.056	23°50'24.434"	87°58'4.698"	598577.856	2636862.426	25.975	8.395
6	BM 6	Khanpur	51.380	23°48'19.046"	87°53'49.927"	591394.696	2632958.613	22.449	2.599
7	BM 7	Dangal	57.846	23°48'2.685"	87°52'11.943"	588625.034	2632438.156	24.59	3.02
8	BM 8	Paschim Kadipur	69.740	23°47'21.445"	87°48'25.454"	582222.955	2631131.969	26.564	4.764
9	BM 9	Gopalpur	74.657	23°47'54.878"	87°46'51.175"	579549.141	2632145.275	29.088	6.473
10	BM 10	Near SH-13(Bridge)	90.604	23°47'53.337"	87°41'36.007"	570630.598	2632051.591	33.915	6.424
11	BM 11	Dakshin Amarpur	98.935	23°48'40.369"	87°39'14.196"	566610.936	2633478.994	35.53	3.858
12	BM 12	Near Suri - Bolpur Bridge	109.094	23°49'41.818"	87°35'38.458"	560498.66	2635341.969	45.61	8.021
13	BM 13	Road Bridge near Dakhin Metegram	119.195	23°49'13.411"	87°31'15.336"	553057.784	2634439.077	49.502	3.612
14	BM 14	Check Dam near Bishalpur	128.949	23°47'34.733"	87°27'8.965"	546096.914	2631380.432	64.359	9.09
15	BM 15	Chinpai village	135.034	23°49'30.556"	87°25'3.559"	542537.625	2634931.86	72.671	9.924

Table 4 - Bench Mark Details

2.10- Description of erected Tide Gauges:-

Tide Gauge Name	Chainage (km)	Location	Easting (m)	Northing (m)	Latitude (N)	Longitude (E)	W.L w.r.t M.S.L	Period of observation
GS- (TP)-1	10.263	Jayrampur	613327.92	2648258.93	23° 56' 31.42"	88° 06' 49.21"	12.260	24 hrs
GS- (TP)-2	38.056	Tarapur	598669.2	2636806.78	23° 50' 22.60"	87° 58' 07.91"	17.580	24 hrs
GS- (TP)-3	51.380	Khanpur	591411.58	2632909.45	23° 48' 17.44"	87° 53' 50.51"	19.850	24 hrs
GS- (TP)-4	57.846	Dangal	588546.63	2632427.12	23° 48' 02.34"	87° 52' 09.17"	21.570	24 hrs
GS (TP)-5	69.740	Paschim Kadipur	582222.955	2631131.969	23° 47' 21.45"	87° 48' 25.45"	21.800	24 hrs

Table 5- Tide Gauge Details

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. MSL (m) at col. A.	Sounding Datum of Tide Gauge w.r.t. MSL (m)	Correction in WL data for Bathymetric survey (m)	Topo level data to be converted as depth for volume calculation w.r.t. SD (m)
	A	B	C (50% stretch is to be selected on both side of tide gauge)	D +ve indicates above MSL -ve indicates below MSL	E	F = (E- WL data in MSL)	G = (E- topo levels in M.S.L)
1	GS-5/Z-ZM	134.500	134-135.165		62.09	-0.300	Bakreswar/ Mayurakshi topo reduced.xyz
2	GS-5/Z-ZL	133.500	133-134		60.86	-0.300	**Submitted in a Soft Copy**
3	GS-5/Z-ZK	132.500	132-133		58.95	-0.300	
4	GS-5/Z-ZJ	131.500	131-132		57.75	-0.300	
5	GS-5/Z-ZI	130.500	130-131		57.61	-0.300	
6	GS-5/Z-ZH	129.500	129-130		56.79	-0.300	
7	GS-5/Z-ZG	128.500	128-129		54.03	-0.300	
8	GS-5/Z-ZF	127.500	127-128		53.98	-0.300	
9	GS-5/Z-ZE	126.500	126-127		51.68	-0.300	
10	GS-5/Z-ZD	125.500	125-126		50.86	-0.300	
11	GS-5/Z-ZC	124.500	124-125		50.24	-0.300	
12	GS-5/Z-ZB	123.500	123-124		49.87	-0.300	
13	GS-5/Z-ZA	122.500	122-123		48.38	-0.300	
14	GS-5/Z-Z	121.500	121-122		47.89	-0.300	
15	GS-5/Z-Y	120.500	120-121		47.3	-0.300	
16	GS-5/Z-X	119.500	119-120		45.96	-0.300	
17	GS-5/Z-W	118.500	118-119		45.73	-0.300	
18	GS-5/Z-V	117.500	117-118		44.68	-0.300	
19	GS-5/Z-U	116.500	116-117		43.826	-0.300	
20	GS-5/Z-T	115.500	115-116		43.34	-0.300	
21	GS-5/Z-S	114.500	114-115		42.65	-0.300	

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. MSL (m) at col. A.	Sounding Datum of Tide Gauge w.r.t. MSL (m)	Correction in WL data for Bathymetric survey (m)	Topo level data to be converted as depth for volume calculation w.r.t. SD (m)
	A	B	C (50% stretch is to be selected on both side of tide gauge)	D +ve indicates above MSL -ve indicates below MSL	E	F = (E- WL data in MSL)	G = (E- topo levels in M.S.L)
22	GS-5/Z-R	113.500	113-114		41.68	-0.300	Submitted in a Soft Copy
23	GS-5/Z-Q	112.500	112-113		40.34	-0.300	
24	GS-5/Z-P	111.500	111-112		39.85	-0.300	
25	GS-5/Z-O	110.500	110-111		38.34	-0.300	
26	GS-5/Z-N	109.500	109-110		38.21	-0.300	
27	GS-5/Z-M	108.500	108-109		36.68	-0.300	
28	GS-5/Z-L	107.500	107-108		36.251	-0.300	
29	GS-5/Z-K	106.500	106-107		35.96	-0.300	
30	GS-5/Z-J	105.500	105-106		35.38	-0.300	
31	GS-5/Z-I	104.500	104-105		35.3	-0.300	
32	GS-5/Z-H	103.500	103-104		35.08	-0.300	
33	GS-5/Z-G	102.500	102-103		32.82	-0.300	
34	GS-5/Z-F	101.500	101-102		32.69	-0.300	
35	GS-5/Z-E	100.500	100-101		32.498	-0.300	
36	GS-5/Z-D	99.500	99-100		31.817	-0.300	
37	GS-5/Z-C	98.500	98-99		31.56	-0.300	
38	GS-5/Z-B	97.500	97-98		31.29	-0.300	
39	GS-5/Z-A	96.500	96-97		31.265	-0.300	
40	GS-5/Z	95.500	95-96		31.1	-0.300	
41	GS-5/Y	94.500	94-95		30.25	-0.300	
42	GS-5/X	93.500	93-94		29.85	-0.300	
43	GS-5/W	92.500	92-93		29.18	-0.300	
44	GS-5/V	91.500	91-92		28.36	-0.300	
45	GS-5/U	90.500	90-91		27.39	-0.300	
46	GS-5/T	89.500	89-90		26.71	-0.300	
47	GS-5/S	88.500	88-89		26.691	-0.300	
48	GS-5/R	87.500	87-88		26.483	-0.300	
49	GS-5/Q	86.500	86-87		26	-0.300	
50	GS-5/P	85.500	85-86		25.993	-0.300	
51	GS-5/O	84.500	84-85		25.919	-0.300	
52	GS-5/N	83.500	83-84		25.81	-0.300	
53	GS-5/M	82.500	82-83		25.67	-0.300	
54	GS-5/L	81.500	81-82		24.66	-0.300	
55	GS-5/K	80.500	80-81		24.33	-0.300	
56	GS-5/J	79.500	79-80		24	-0.300	
57	GS-5/I	78.500	78-79		23.9	-0.300	

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. MSL (m) at col. A.	Sounding Datum of Tide Gauge w.r.t. MSL (m)	Correction in WL data for Bathymetric survey (m)	Topo level data to be converted as depth for volume calculation w.r.t. SD (m)
	A	B	C (50% stretch is to be selected on both side of tide gauge)	D +ve indicates above MSL -ve indicates below MSL	E	F = (E- WL data in MSL)	G = (E- topo levels in M.S.L)
58	GS-5/H	77.500	77-78		23.594	-0.300	Submitted in a Soft Copy
59	GS-5/G	76.500	76-77		23.08	-0.300	
60	GS-5/F	75.500	75-76		22.73	-0.300	
61	GS-5/E	74.500	74-75		22.593	-0.300	
62	GS-5/D	73.500	73-74		22.1	-0.300	
63	GS-5/C	72.500	72-73		21.953	-0.340	
64	GS-5/B	71.500	71-72		21.896	-0.875	
65	GS-5/A	70.500	70-71		21.823	-0.600	
66	GS-5	69.740	63.79-70.00		21.8	0.000	
67	GS-4	57.846	54.61-63.79		21.57	0.000	
68	GS-3	51.380	44.72-54.61		19.85	0.000	
69	GS-2	38.056	37.00-44.72		17.58	0.000	
70	GS-2/Z	36.500	36-37		17.38	-0.300	
71	GS-2/Y	35.500	35-36		17.076	-0.300	
72	GS-2/X	34.500	34-35		16.97	-0.300	
73	GS-2/W	33.500	33-34		15.973	-0.300	
74	GS-2/V	32.500	32-33		15.82	-0.300	
75	GS-2/U	31.500	31-32		15.19	-0.300	
76	GS-2/T	30.500	30-31		14.74	-0.300	
77	GS-2/S	29.500	29-30		14.705	-0.300	
78	GS-2/R	28.500	28-29		14.673	-0.300	
79	GS-2/Q	27.500	27-28		14.404	-0.300	
80	GS-2/P	26.500	26-27		14.17	-0.300	
81	GS-2/O	25.500	25-26		13.92	-0.300	
82	GS-2/N	24.500	24-25		13.86	-0.300	
83	GS-2/M	23.500	23-24		13.651	-0.300	
84	GS-2/L	22.500	22-23		13.57	-0.300	
85	GS-2/K	21.500	21-22		13.55	-0.300	
86	GS-2/J	20.500	20-21		13.146	-0.300	
87	GS-2/I	19.500	19-20		12.97	-0.300	
88	GS-2/H	18.500	18-19		12.897	-0.300	
89	GS-2/G	17.500	17-18		12.74	-0.300	
90	GS-2/F	16.500	16-17		12.58	-0.300	
91	GS-2/E	15.500	15-16		12.47	-0.300	
92	GS-2/D	14.500	14-15		12.25	-0.300	
93	GS-2/C	13.500	13-14		12.09	-0.300	

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. MSL (m) at col. A.	Sounding Datum of Tide Gauge w.r.t. MSL (m)	Correction in WL data for Bathymetric survey (m)	Topo level data to be converted as depth for volume calculation w.r.t. SD (m)
	A	B	C (50% stretch is to be selected on both side of tide gauge)	D +ve indicates above MSL -ve indicates below MSL	E	F = (E- WL data in MSL)	G = (E- topo levels in M.S.L)
94	GS-2/B	12.500	12-13		12.02	-0.300	Submitted in a Soft Copy
95	GS-2/A	11.500	11-12		11.97	-0.300	
96	GS-1	10.263	6-11		11.76	-0.500	
97	GS-1/A	5.500	5-6		11.6	-0.300	
98	GS-1/B	4.500	4-5		11.53	-0.300	
99	GS-1/C	3.500	3-4		11.5	-0.300	
100	GS-1/D	2.500	2-3		11.4901	-0.300	
101	GS-1/E	1.500	1-2		11.46	-0.300	
102	GS-1/F	0.500	0-1		11.38	-0.300	
103	CONFLUENCE WITH DWARAKA RIVER	0.000		11.258		-0.300	

Table 6 - Chart Datum / Sounding Datum & Reduction Details

2.12 - Average Slope:-

Reach		River Level Change (m)	Distance (km)	Slope (m/km)	Slope (cm/km)
From	To				
0.00	10.00	0.502	10.00	0.050	5.02
10.01	20.00	1.386	9.99	0.139	13.87
20.01	30.00	1.594	9.99	0.160	15.96
30.01	40.00	2.840	9.99	0.284	28.43
40.01	50.00	2.270	9.99	0.227	22.72
50.01	60.00	1.720	9.99	0.172	17.22
60.01	70.00	0.253	9.99	0.025	2.53
70.01	80.00	2.507	9.99	0.251	25.10
80.01	90.00	3.060	9.99	0.306	30.63
90.01	100.00	5.108	9.99	0.511	51.13
100.01	110.00	5.842	9.99	0.585	58.48
110.01	120.00	8.960	9.99	0.897	89.69
120.01	130.00	9.49	9.99	0.950	94.99
130.00	135.165	5.30	5.165	1.026	102.61
Avg. Slope				0.399	39.88

Table 7 - Average slope

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

There are four no's of Check Dams and one Dam found in this zone of River near Chainage of 51.400 km, 98.950 km, 119.200 km, 129 km and 135.165 km.

Sl. No	Structure Name	Chainage (km)	Location	Latitude (N)	Longitude (E)	Northing (m)	Easting (m)	Length (m)	Width (m)	Height w.r.t. S.D (m)	Present Condition
1	RCC Check Dam	51.400	Khanpur	23°48'17.073"	87°53'49.344"	2632916.19	591379.18	66.30	17.10	8.642	Complete
2	Check Dam	98.950	Dakhin Amarpur	23°48'40.369"	87°39'14.196"	2633490.55	566630.77	67.839	4.200	4.040	Complete
3	Check Dam	119.200	Liara	23°49'13.517"	87°31'14.346"	2634451.98	553062.53	67.839	4.00	3.790	Complete
4	Check Dam	129.00	Bishalpur	23°47'35.534"	87°27'11.004"	2631393.76	546161.08	93.74	24.88	10.256	Complete
5	Bakreswar Dam	135.165	Chinpai	23°49'32.501"	87°24'58.263"	2634990.47	542398.86	67.11	55.13	21.000	Complete

Table 8- Dam Details

2.14 - Details of Locks:-

There are no locks found in this zone of river.

2.15 - Details of Aqueducts:-

There are no aqueducts found in this zone of River.

2.16- Details of existing Bridges and Crossings over waterway:-

There are total four no's of Rail Bridges (Steel Rail Bridge-2, RCC Rail Bridge-2), one pipe Bridge, Nine RCC bridges are located in this zone of river.

Sl. No	Chainage (km)	Location	Cross-Structure details	Latitude (N)	Longitude (E)	Northing (m)	Easting (m)	Length (m)	Width (m)	No of Piers	Horizontal Clearance (m)	Vertical Clearance w.r.t H.F.L (m)	Present condition
1	18.855	Angarpur	Pipe Bridge	23°54'9.14"	88° 4'38.35"	2643854.00	609662.00	141.33	10.66	Pipeno-39	1.40	-	Complete
2	38.050	Mamudpur	RCC Bridge	23°50'21.12"	87°58'6.62"	2636761.69	598633.04	167.36	10.87	5	37.22	6.5	Complete
3	54.613	Bagsina	RCC Bridge	23°48'42.07"	87°53'6.10"	2633659.39	590150.58	38.68	2.86	4	7.39	1.120	Complete
4	65.650	Laghata	RCC Bridge	23°48'20.68"	87°49'10.38"	2632961.47	583484.06	103.66	8.51	4	16.72	2.4	Complete
5	74.650	Kendia	RCC Bridge	23°47'55.93"	87°46'52.84"	2632178.97	579596.90	59.21	5.45	10	5.243	3.5	Complete
6	90.630	Tekadyaha	RCC Bridge	23°47'55.17"	87°41'35.68"	2632108.31	570621.97	59.62	7.46	9	4.538	3.0	Complete
7	91.00	Tekadyaha	Bakreswar Bridge no-89(Steel Rail)	23°47'50.38"	87°41'24.20"E	2631959.52	570297.24	237.74	4.752	11	18.33	6.95	Complete
8	91.00	Tekadyaha	Bakreswar Bridge no-89 (RCC Rail)	23°47'49.83"	87°41'23.56"	2631942.71	570279.93	238.14	3.539	11	16.3	6.95	Complete
9	109.100	Beira Kalitala	RCC Bridge	23°49'44.39"	87°35'38.09"	2635421.43	560488.87	128.13	10.44	4	24.008	2.62	Complete
10	109.137	Beira Kalitala	RCC Bridge	23°49'43.55"	87°35'37.10"	2635395.52	560460.38	53.72	4.04	3	11.78	2.62	Complete
11	123.250	Dostabad	RCC Bridge	23°48'15.29"	87°29'41.04"	2632642.77	550396.15	65.39	4.98	19	3.04	0.620	Complete
12	133.800	Bandhersol	RCC Bridge	23°48'52.26"	87°25'18.44"	2633755.36	542962.98	85.15	8.67	4	16.88	4.980	Complete
13	134.310	Chinpai	Steel Rail Bridge	23°49'9.25"	87°25'13.33"	2634277.13	542816.00	83.34	4.74	5	10.58	4.02	Complete
14	134.325	Chinpai	RCC Rail Bridge	23°49'9.77"	87°25'13.23"	2634293.00	542813.00	84.88	7.23	5	12.63	7.850	Complete

Table 9 - Bridge Details

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

There is an under construction Rail Bridge situated in this zone of river.

Sl No	Chainage (km)	Location	Cross-Structure details	Latitude (N)	Longitude (E)	Northing (m)	Easting (m)	Length (m)	Width (m)	No of Piers	Horizontal Clearance (m)	Vertical Clearance w.r.t W.L (m)	Present condition
1	65.650	Laghata	Under-Construction Rail Bridge	23°48'16.26"	87°49'9.58"	2632824.96	583462.04	-	-	4	15.01	-	Under-construction

Table 10-Under-Construction Rail Bridge

2.18 - Electric lines:-

Sl. no	Line	Chainage (km)	Location	Latitude (N)	Longitude (E)	Easting (m)	Northing (m)	No of piers	Horizontal clearance (m)	Vertical clearance w.r.t H.F.L (m)	Remarks
1	Electric line	8.849	kandi	23°57'9.528"	88°6'55.57"	613498.52	2649432.4	4	120.27	5.5	Complete
2	Electric line	9.209	kandi	23°57'0.379"	88°6'55.57"	613317.61	2649149.6	4	121.65	5.8	Complete
3	Electric line	11.936	Jayrampur	23°55'51.753"	88°6'26.358"	612691.55	2647033.8	4	155.01	5.2	Complete
4	Electric line	12.745	Jayrampur	23°55'30.321"	88°6'15.752"	612396.85	2646372.2	4	170.57	4.8	Complete
5	Electric line	14.057	Jayrampur	23°55'14.796"	88°5'44.399"	611514.12	2645887.8	4	182.72	5.15	Complete
6	Electric line	18.828	Ibrahimpur	23°54'9.474"	88°4'41.276"	609744.7	2643865	4	152.87	5.0	Complete
7	Electric line	18.883	Ibrahimpur	23°54'7.51"	88°4'41.433"	609749.61	2643804.6	4	184.5	5.12	Complete
8	Electric line	22.958	Ibrahimpur	23°53'21.118"	88°3'38.27"	607989.97	2642364.3	4	166.31	5.0	Complete
9	Electric line	26.487	Monohorpur	23°25'20.305"	88°2'42.092"	606399.28	2640482	4	147.12	5.15	Complete
10	Electric line	29.302	Monohorpur	23°51'29.238"	88°1'47.986"	604880.37	2638900.1	4	124.9	4.95	Complete
11	Electric line	29.622	sherpur	23°51'23.293"	88°1'38.736"	604620.04	2638715.4	4	80.85	4.2	Complete
12	Electric line	38.378	Mamodpur	23°50'17.515"	88°57'55.773"	598326.83	2636647.9	4	97.74	4.8	Complete
13	Electric line	47.85	Belbuni	23°48'46.441"	87°55'15.222"	593802.88	2633816.6	4	66.8	4.2	Complete
14	Electric line	48.792	Belbuni	23°48'38.947"	87°54'47.993"	593033.88	2633581.2	4	65.411	5.1	Complete
15	Electric line	56.551	Dangal	23°48'17.309"	87°52'46.784"	589608.2	2632894	4	64.94	4.95	Complete
16	Electric line	64.772	Shitalgram	23°48'17.507"	87°49'37.8"	584260.38	2632867.9	4	62.59	5.2	Complete
17	Electric line	65.239	Shitalgram	23°48'20.838"	87°49'23.849"	583864.99	2632968.1	4	77.68	5.15	Complete
18	Electric line	65.415	Shitalgram	23°48'24.948"	87°49'17.741"	583691.42	2633093.5	4	82.09	6.1	Complete
19	Electric line	65.779	Shitalgram	23°48'15.566"	87°49'8.518"	583432.1	2632803.5	4	99.55	5.8	Complete
20	Electric line	65.791	Shitalgram	23°48'17.842"	87°49'5.637"	583350.19	2632873	4	107.46	5.4	Complete
21	Electric line	65.822	Shitalgram	23°48'14.471"	87°49'7.453"	583402.16	2632769.6	4	99.16	5.3	Complete

Sl. no	Line	Chainage (km)	Location	Latitude (N)	Longitude (E)	Easting (m)	Northing (m)	No of piers	Horizontal clearance (m)	Vertical clearance w.r.t H.F.L (m)	Remarks
22	Electric line	66.493	Shitalgram	23°48'4.908"	87°48'53.481"	583008.48	2632473.2	4	62.12	5.3	Complete
23	Electric line	67.501	Shitalgram	23°47'35.875"	87°48'45.937"	582800.1	2631579.1	4	51.08	5.1	Complete
24	Electric line	69.082	Paschim Kadipur	23°47'4.452"	87°48'30.43"	582366.77	2630610.1	4	90.09	4.87	Complete
25	Electric line	70.274	Paschim Kadipur	23°47'9.482"	87°48'15.332"	581938.57	2630762.4	4	53.01	5.05	Complete
26	Electric line	75.319	Milanpur	23°47'50.886"	87°46'29.63"	578940.12	2632019.2	4	84.62	5.12	Complete
27	Electric line	82.337	PanchaGanga	23°47'51.235"	87°44'18.89"	575240.28	2632010.2	4	49.83	5	Complete
28	Electric line	82.441	PanchaGanga	23°47'47.741"	87°44'17.913"	575213.18	2631902.6	4	55.53	5.9	Complete
29	Electric line	82.581	PanchaGanga	23°47'43.664"	87°44'14.991"	575131.15	2631776.8	4	52.11	5.8	Complete
30	Electric line	82.739	PanchaGanga	23°47'43.207"	87°44'8.711"	574953.51	2631761.8	4	76.87	5.8	Complete
31	Electric line	83.917	PanchaGanga	23°48'4.692"	87°43'51.761"	574470.44	2632420.1	4	128.61	5.02	Complete
32	Electric line	85.216	Byaspur	23°48'7.596"	87°43'42.212"	574199.75	2632508	4	49.05	7.98	Complete
33	Electric line	90.516	Tekadyaha	23°47'54.587"	87°41'39.12"	570718.52	2632090.5	4	60.86	7.1	Complete
34	Electric line	91.98	Tekadyaha	23°48'15.72"	87°41'13.647"	569994.53	2632736.9	4	62.77	7.1	Complete
35	Electric line	93.119	Tekadyaha	23°48'26.009"	87°40'51.314"	569361.04	2633050.3	4	89.14	7.8	Complete
36	Electric line	96.557	Tekadyaha	23°48'56.302"	87°39'52.074"	567680.42	2633974	4	67.54	7.3	Complete
37	Electric line	98.899	Dakhin Amarpur	23°48'39.069"	87°39'14.98"	566633.29	2633439.1	4	111.92	7.4	Complete
38	Electric line	121.221	Meherpur	23°48'59.828"	87°30'11.888"	551264.15	2634014.9	4	74.59	8.15	Complete
39	Electric line	121.51	Meherpur	23°48'51.463"	87°30'2.122"	551217.27	2633757.4	4	53.7	7.95	Complete
40	Electric line	122.971	Meherpur	23°48'17.769"	87°29'50.544"	550664.76	2632719.3	4	72.48	8.2	Complete
41	Electric line	123.474	Itekola	23°48'19.486"	87°29'32.969"	550167.28	2632770.3	4	111.11	8.65	Complete
42	Electric line	128.734	Bhadutia	23°47'32.824"	87°27'16.377"	546306.87	2631322.4	4	151.39	7.8	Complete
43	Electric line	133.741	Alalchak	23°48'52.4"	87°25'21.764"	543056.16	2633760	4	148.02	8.2	Complete
44	Electric line	135.074	Alalchak	23°48'31.801"	87°25'2.122"	542496.84	2634969.7	4	148.72	9.3	Complete

Table 11 – Details of Electric lines

2.18.1 - High Tension Lines –

Sl. no	Line	Chainage (km)	Location	Latitude (N)	Longitude (E)	Easting (m)	Northing (m)	No of piers	Horizontal clearance (m)	Vertical clearance w.r.t H.F.L (m)	Remarks
1	High Tension Line	20.792	Ibrahimpur	23°53'45.59"	88°4'8.783"	608831.45	2643123.4	8	725.79	10.2	Complete
2	High Tension Line	37.351	Mamodpur	23°50'16.832"	87°58'33.373"	599390.72	2636634.2	8	494.35	9.96	Complete
3	High Tension Line	107.221	Beharia	23°49'33.176"	87°36'29.014"	561930.1	2635082.3	8	411.63	11.2	Complete
4	High Tension Line	107.276	Beharia	23°49'32.787"	87°36'27.521"	561887.9	2635070.1	8	399.27	10.98	Complete
5	High Tension Line	109.065	Beharia	23°49'42.609"	87°35'39.929"	560540.16	2635366.5	8	178.11	10.42	Complete
6	High Tension Line	110.203	Beharia	23°50'2.934"	87°35'24.143"	560090.95	2635989.7	8	185.34	10.65	Complete
7	High Tension Line	110.296	Palshita	23°50'1.306"	87°35'21.564"	560018.2	2635939.3	8	140.48	10.88	Complete
8	High Tension Line	110.626	Gangie	23°49'54.482"	87°35'13.219"	559782.98	2635728.5	8	156.92	10.93	Complete
9	High Tension Line	110.877	Parbatpur	23°49'49.104"	87°35'2.534"	559481.4	2635561.8	8	364.99	10.75	Complete
10	High Tension Line	118.779	Dakhin Metegram	23°49'20.32"	87°31'35.56"	553629.19	2634653.7	8	423.33	10.83	Complete
11	High Tension Line	119.265	Meherpur	23°49'13.468"	87°31'13.063"	552993.48	2634440.6	8	88.69	10.785	Complete
12	High Tension Line	119.524	Meherpur	23°49'21.21"	87°31'6.622"	552810.36	2634676.2	8	244.48	10.9	Complete
13	High Tension Line	126.17	Bishalpur	23°47'41.432"	87°28'31.386"	548428.63	2631594.1	8	429.73	11.9	Complete
14	High Tension Line	126.548	Bishalpur	23°47'34.626"	87°28'24.463"	650762.29	2631384.1	8	389.11	11.7	Complete
15	High Tension Line	127.543	Bhadutia	23°47'31.037"	87°27'55.046"	547401.32	2631271	8	380.21	11.3	Complete
16	High Tension Line	129.141	Bhadutia	23°47'31.775"	87°27'1.25"	545878.92	2631280.6	8	375.9	11.5	Complete
17	High Tension Line	129.203	Bhadutia	23°47'31.775"	87°26'59.258"	545822.51	2631288.6	8	307.33	11.5	Complete

Table 12- Details of High tension lines

2.19 - Current Meter and Discharge details:-

The Bathymetry survey was not carried out the entire stretches of the river due to insufficient layer of water. So the current meter was not taken each km of the river stretches.

Stretch No.	Chainage (km)	Position				Observed Depth (m) (D)	Velocity (m/sec.)	Average Velocity (m/sec.)	X-Sectional area (sq. m.)	Discharge (m3/sec)
		Latitude (N)	Longitude (E)	Easting (m)	Northing (m)		0.5 D			
1	40.00	23°49'43.353"	87°57'15.826"	597203.76	2635589.56	1.5	0.825	0.825	39.44	32.538
2	50.00	23°48'27.501"	87°54'24.124"	592360.73	2633224.81	2.3	0.890	0.890	101.10	89.979
3	80.00	23°48'01.02"	87°44'49.034"	576091.74	2632315.58	0.5	0.421	0.421	72.08	30.345
4	110.00	23°50'04.114"	87°35'29.558"	560244.00	2636026.60	0.5	0.421	0.421	61.47	25.878
5	130.00	23°47'45.736"	87°26'38.404"	545231.04	2631716.09	0.3	0.321	0.321	37.55	12.053

Table 13 - Current Meter Details

2.20 - (a) Soil Sample Locations:-

Sample No.	Chainage (km)	Latitude (N)	Longitude (E)	Easting (m)	Northing (m)	Depth (m)
1	40.00	23°49'43.353"	87°57'15.826"	597203.76	2635589.56	1.5
2	50.00	23°48'27.501"	87°54'24.124"	592360.73	2633224.81	2.3
3	80.00	23°48'01.02"	87°44'49.034"	576091.74	2632315.58	0.5
4	110.00	23°50'04.114"	87°35'29.558"	560244.00	2636026.60	0.5
5	130.00	23°47'45.736"	87°26'38.404"	545231.04	2631716.09	0.3

Table 14 - Soil Sample Locations

(b) Water Sample Locations:-

The Bathymetry survey was not carried out the entire stretches of the river due to insufficient layer of water. So the water sampler was not taken each km of the river stretches.

Sample No.	Chainage (km)	Latitude (N)	Longitude (E)	Easting (m)	Northing (m)	Total Depth (d) (m)	Mid-Depth (0.5d) (m)
1	40.00	23°49'43.353"	87°57'15.826"	597203.76	2635589.56	1.5	0.75
2	50.00	23°48'27.501"	87°54'24.124"	592360.73	2633224.81	2.3	1.15
3	80.00	23°48'01.02"	87°44'49.034"	576091.74	2632315.58	0.5	0.25
4	110.00	23°50'04.114"	87°35'29.558"	560244.00	2636026.60	0.5	0.25
5	130.00	23°47'45.736"	87°26'38.404"	545231.04	2631716.09	0.3	0.15

Table 15 - Water Sample Locations

Note: - The soil and water sample report has been shown in Annexure no-11 & 12

Section-3: Description of waterway

3.1- From Chainage 0.00 Km to Chainage 10.00 Km. (Dwarka Confluence to Jayrampur village):-

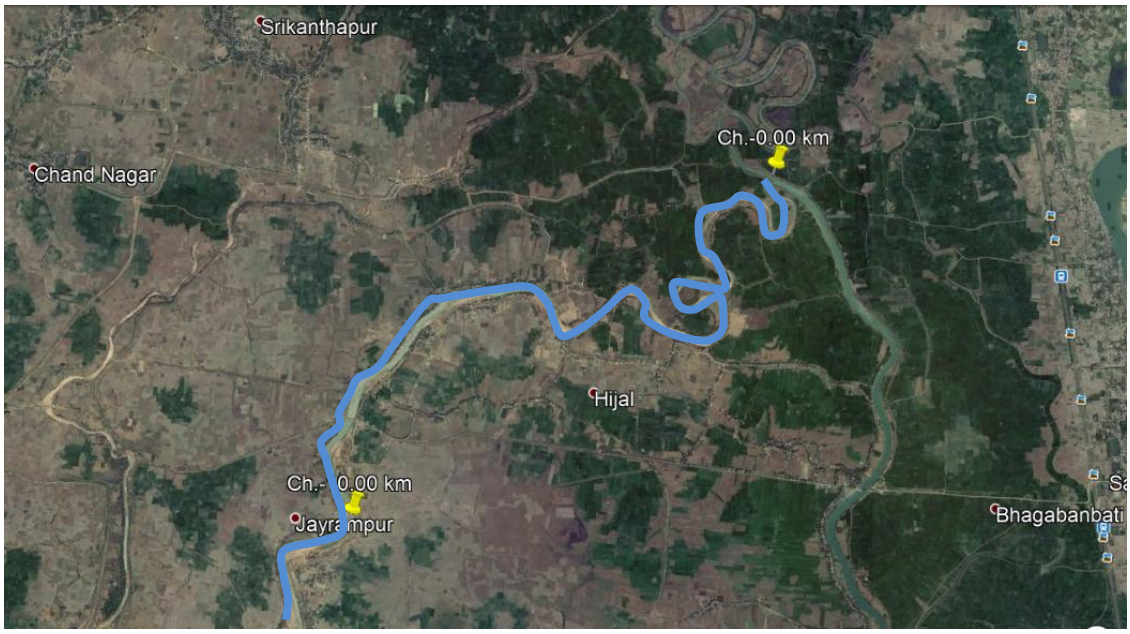


Figure 4- Chainage 0.00 km to Chainage 10.00 km

The width of Bakreswar-Mayurakshi River from Chainage 0.00 Km. to Chainage 10.00 Km is approximately 50.37m. to 54.44 m. The average width portion of the river is approximately 52.41 m.

BM-1 is situated near Chainage of 0.515 km right bank side of the river. Two electric lines are located in this zone of river near Chainage of 8.849 km and 9.209 km. Dakshin Hijal,Jayram pur, Bhabanandapur,Chak Ballabpur, Sehalai, Sank Palisa, Sankarmarui,Mandalpur, Sirpatipur, Rasora, Baje Chuator villages are situated on the right portion of the river and only Hijal village is situated left bank of the river. Most of the portions of the both bank sides of the river are covered with agricultural land. A Mud way is located on the right bank of the river.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	0.00	10.00	0.1	2.8	9200	279068.11	-0.3	1.8	10000	457197.42
II	0.00	10.00	0.1	2.9	10000	450336.13	-0.3	2.0	10000	693274.42
III	0.00	10.00	0.1	3.2	10000	735194.42	-0.3	2.1	10000	1040262.5
IV	0.00	10.00	0.1	3.2	10000	921291.2	-0.3	2.2	10000	1242604.9

3.2 - From Chainage 10.00 Km to Chainage 20.00 Km (Jayrampur village to Ibrahimpur village):-

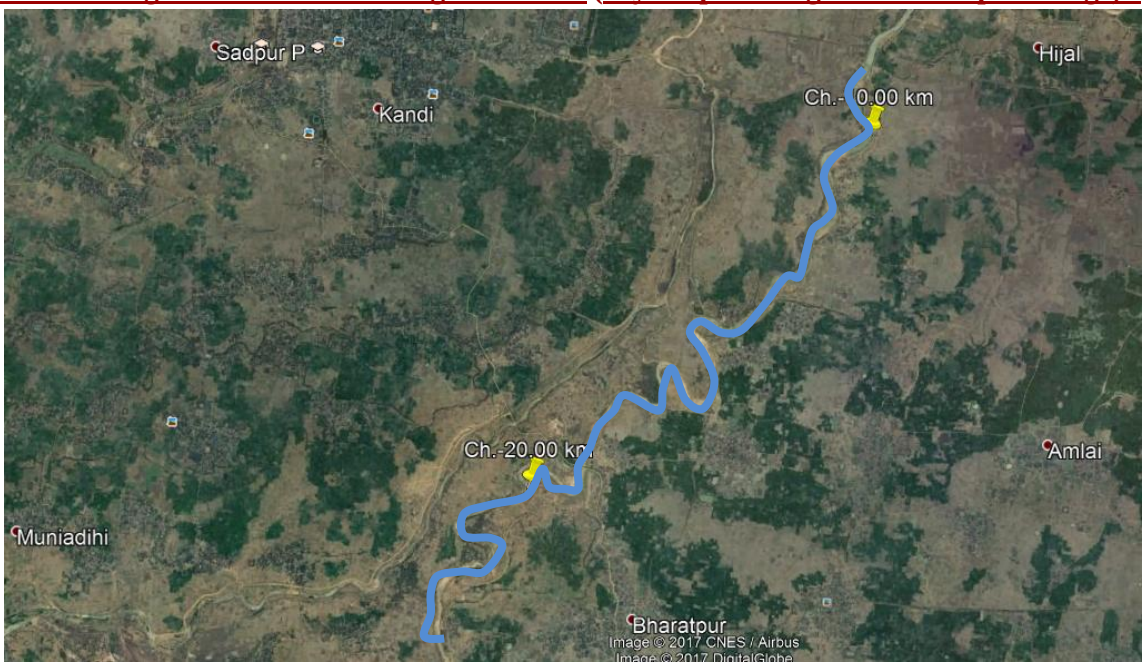


Figure 5 – Chainage 10.00 km to Chainage 20.00 km

The width of Bakreswar-Mayurakshi River from Chainage 10.00 Km. to Chainage 20.00 Km is approximately 54.44 m to 70 m. The average width portion of the river is approximately 62.22 m.

BM-2 and BM-3 is situated near Chainage of 10.263 km and 18.921 km in this stretches of river. Angarpur Pipe Bridge is situated near Chainage of 18.855 km. The Bridge is communicated with Kandi and Bharatpur village. The position of the pipe Bridge is- (Lat: - 23°54'9.14"N, Long: - 88° 4'38.35"E). Five electric lines are situated in this stretches of river near Chainage of 11.936 km, 12.745 km, 14.057 km, 18.883 km and 18.828 km. Jayrampur, Rajarampur, Simulgachi, Kamalakantapur, Chak Ballabpur, Mandalpur, Chamardani, Sripatipur, Hamidpur etc. villages are located right bank side of the river and Angarpur, Ranipur, Gobindopur, Madanpur, Mallickpur, Alugram etc. villages are located left bank sides of the river. Sehalai ferry ghat is located in this stretches near Chainage of 13.6 km. The position of this ferry ghat is (Lat- 23°55'13.814N, Long- 88°05'55.589E).

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	10.00	20.00	0.1	3.0	10000	390472.97	-0.3	2.1	10000	512239.25
II	10.00	20.00	0.1	3.1	10000	602967.07	-0.3	2.1	10000	762848.44
III	10.00	20.00	0.1	3.1	10000	925903.14	-0.3	2.1	10000	1126813.9
IV	10.00	20.00	0.1	3.2	10000	1124185.3	-0.3	2.2	10000	1335669.9

Figure 6-Pipe Bridge (Chainage- 18.855 km)

Figure 7- Electric line (Chainage-11.936 km)

Figure 8-Sehalai ferry ghat (Chainage-13.6 km)

3.3- From Chainage 20.00 Km to Chainage 30.00 Km (Ibrahimpur village to Sherpur village):-

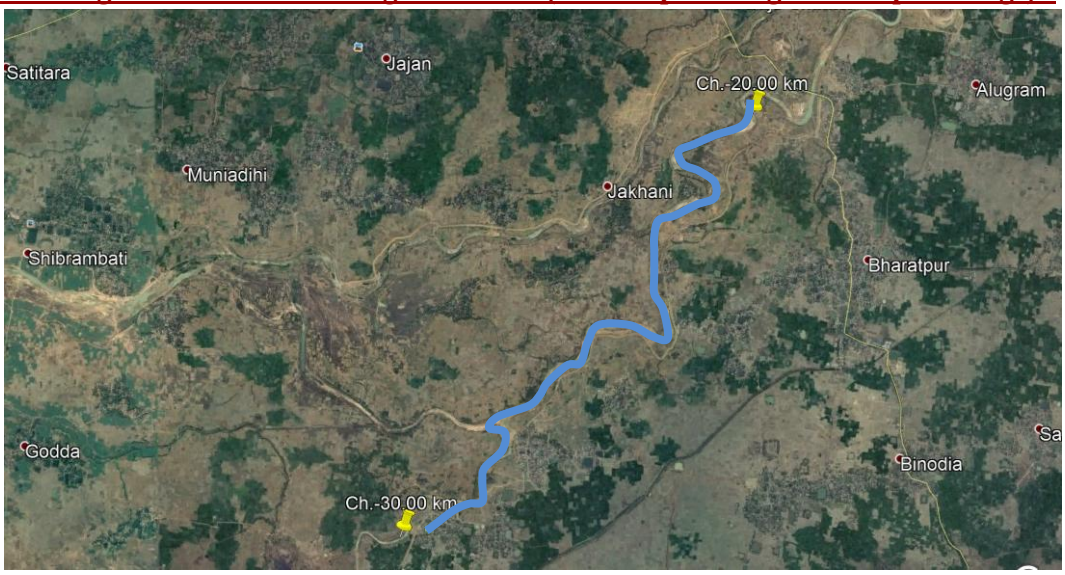


Figure 9 - Chainage 20.00 to Chainage 30.00 km

The width of Bakreswar-Mayurakshi River from Chainage 20.00 Km. to Chainage 30.00 Km is approximately 70 m to 42 m. The average width portion of the river is approximately 56.00 m.

BM-4 is situated near Chainage of 29.611 km in this stretches of river. One high tension line and four electric lines are located in this stretches of river near Chainage of 20.792 km, 22.958 km, 26.487 km, 29.302 km and 29.622 km respectively. Jakhani, Chhatrapur, Chak Chandpur, Kolia, Ruha Palisa, Kharchandpur etc. villages are located right bank side of the river and Bharatpur, Jhikra, Santoshpur, Monohorpur, Talgram, Sherpur, Gaisabad etc. villages are located left bank side of the river.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	20.00	30.00	0.1	0.4	10000	403636.92	-0.3	0	10000	523758.95
II	20.00	30.00	0.1	0.4	10000	618489.39	-0.3	0	10000	773345.72
III	20.00	30.00	0.1	0.4	10000	939941.52	-0.3	0	10000	1132169.2
IV	20.00	30.00	0.1	0.4	10000	1136457.2	-0.3	0	10000	1337296.7

3.4- From Chainage 30.00 Km to Chainage 40.00 Km (Sherpur village to Majilishpur village):-

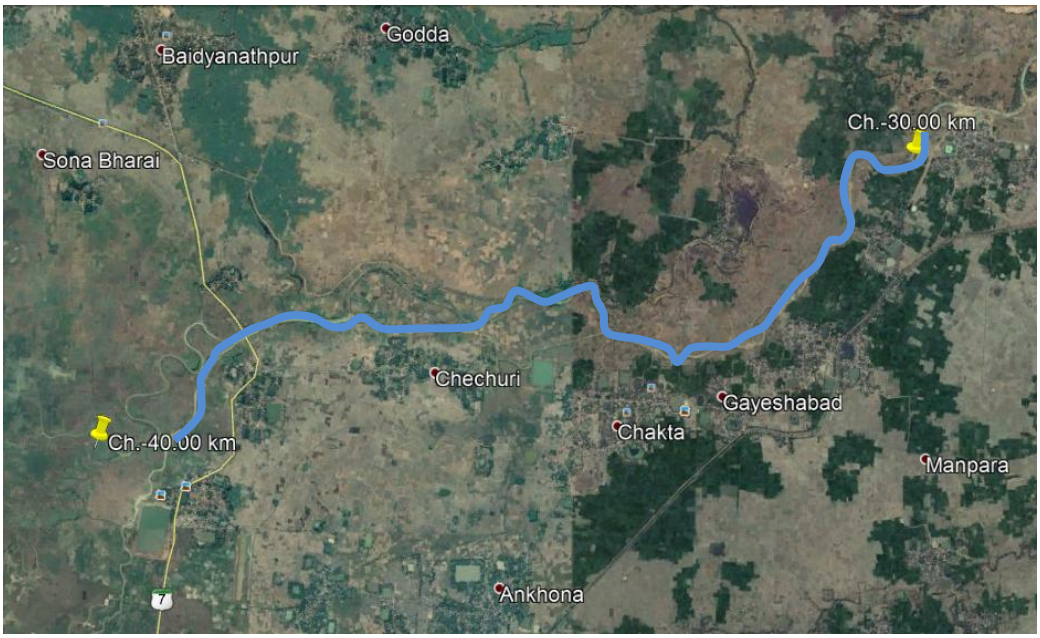


Figure 10 - Chainage 30.00 km to Chainage 40.00 km

The width of Bakreswar-Mayurakshi River from Chainage 30.00 Km. to Chainage 40.00 Km is approximately 42 m to 20 m. The average width portion of the river is approximately 31.00 m.

BM-5 is situated near Chainage of 38.056 km. Mamudpur RCC Bridge is situated near Chainage of 38.050 km. The Bridge is passing through Santha Road and Mamudpur village. The position of the RCC bridge is (Lat: - 23°50'21.12"N, Long: - 87°58'6.62"E). Kasipur, Shyampur, Balichuna, Tarapur, Sinhari etc. villages are located right bank side of the river and Bharadanga Serpur, Sahabajpur, Geetgram, Gidgram, Manpara, Chakta, Majhina etc. villages are located left bank side of the river.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	30.00	40.00	0.1	2.3	10000	382292.45	-0.3	2.0	10000	489200.18
II	30.00	40.00	0.1	2.3	10000	599029.97	-0.3	2.0	10000	739895.28
III	30.00	40.00	0.1	2.3	10000	925873.99	-0.3	2.1	10000	1104255.1
IV	30.00	40.00	0.1	2.4	10000	1126372.9	-0.3	2.3	10000	1313477.6

Figure 11- RCC Bridge (Chainage- 38.050 km)

3.5- From Chainage 40.00 Km to Chainage 50.00 Km. (Majilishpur village to Belbuni village):-

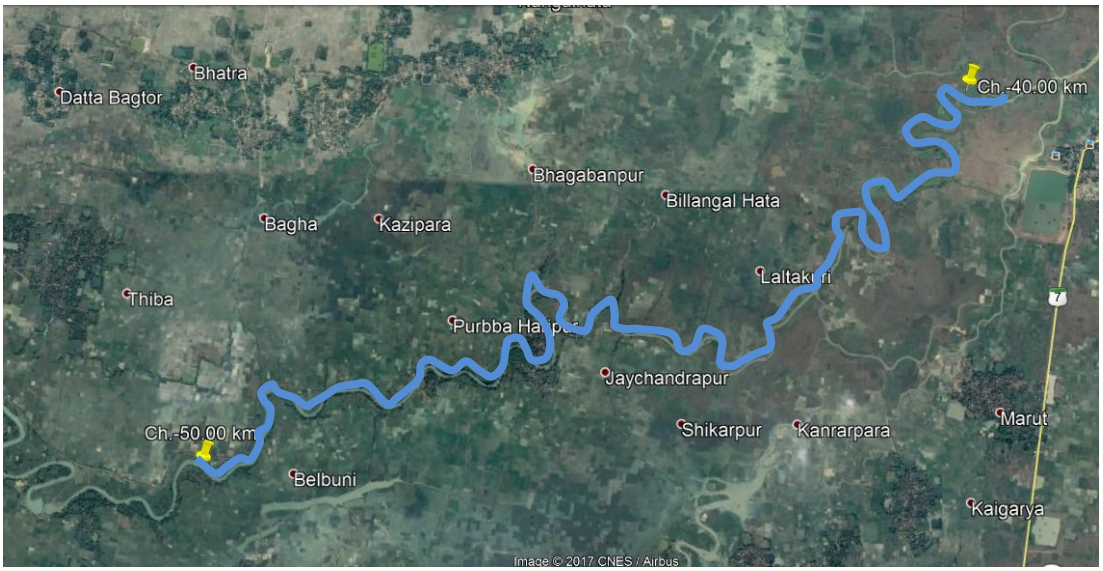


Figure 12- Chainage 40.00 km to Chainage 50.00 km

The width of Bakreswar-Mayurakshi River from Chainage 40.00 Km. to Chainage 50.00 Km is approximately 20.00 m to 32.30 m. The average width portion of the river is approximately 26.15 m.

Two electric lines are located near Chainage of 47.85 km and 48.792 km in this stretches of river. Majlishpur, Joychandrapur, Shikarpur, Kanrarpara, Kaigarya, Marut, Belbuni etc. villages are located left bank side of the river and Laltakuri, Purba Haripur, Kazipara, Bagha, Bhagabanpur, Thiba etc. villages are located right bank sides 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	0.5	3.2	9700	127297.75	0.1	2.6	10000	171219.78
II	40.00	50.00	0.5	3.2	10000	272810.96	0.1	2.6	10000	345631.85
III	40.00	50.00	0.4	3.2	10000	529773.5	0.1	2.6	10000	635445.02
IV	40.00	50.00	0.3	3.3	10000	695990.6	0.1	2.7	10000	809373.67

3.6- From Chainage 50.00 Km to Chainage 60.00 Km (Belbuni village to Gokulbati village):-

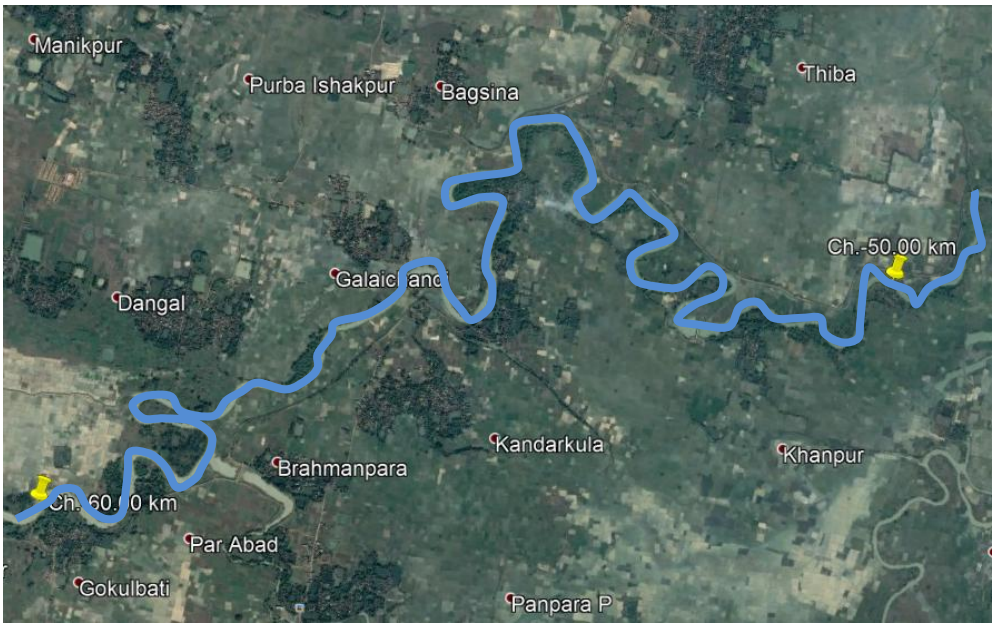


Figure 13- Chainage 50.00 km to Chainage 60.00 km

The width of Bakreswar-Mayurakshi River from Chainage 50.00 Km. to Chainage 60.00 Km is approximately 32.30 m to 46.78 m. The average width portion of the river is approximately 39.54.m.

BM-6 and BM-7 is situated near Chainage of 51.380 km and 57.846 km in this stretches of river. Bagsina RCC Bridge is situated near Chainage of 54.613 km. The Bridge is communicated through Bagsina and Thiba. The position of the Bridge is (Lat: - 23°48'42.07"N, Long: - 87°53'6.10"E). Khanpur, Kandarkula, Panpara, Brahmanpara, Kempur, Par Abad etc. villages are situated left bank side of the river and Bagsina, Galaichandi, Dangal, Manikpur etc. villages are situated right bank side of the river. An electric line is also located near Chainage of 56.551 km in this zone of river. A Check Dam is situated in this zone of river near Chainage of 51.400 km. The position of the Dam is (Lat: - 23°48'17.073"N, Long: - 87°53'49.344"E). Ramghati ferry ghat is situated in this stretches near Chainage of 56.54 km. The position of this ferry service is (Lat- 23°48'24.829N, Long- 87°52'57.453E).

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	0.4	6.9	6510	52333.15	-0.3	4.2	7400	74822.63
II	50.00	60.00	0.4	6.9	10000	147113.79	-0.3	4.2	10000	193954.11
III	50.00	60.00	0.3	6.9	10000	355375.49	-0.3	4.3	10000	435104.14
IV	50.00	60.00	0.3	6.9	10000	495026.55	-0.3	4.3	10000	584111.46

Figure 14- Check Dam (Chainage-51.400 km)

Figure 15- RCC Bridge (Chainage- 54.613 km)

Figure 16-Ramghati ferry ghat – (Chainage-56.540 km)

3.7- From Chainage 60.00 Km to Chainage 70.00 Km (Gokulbati village to Paschim Kadipur village):-

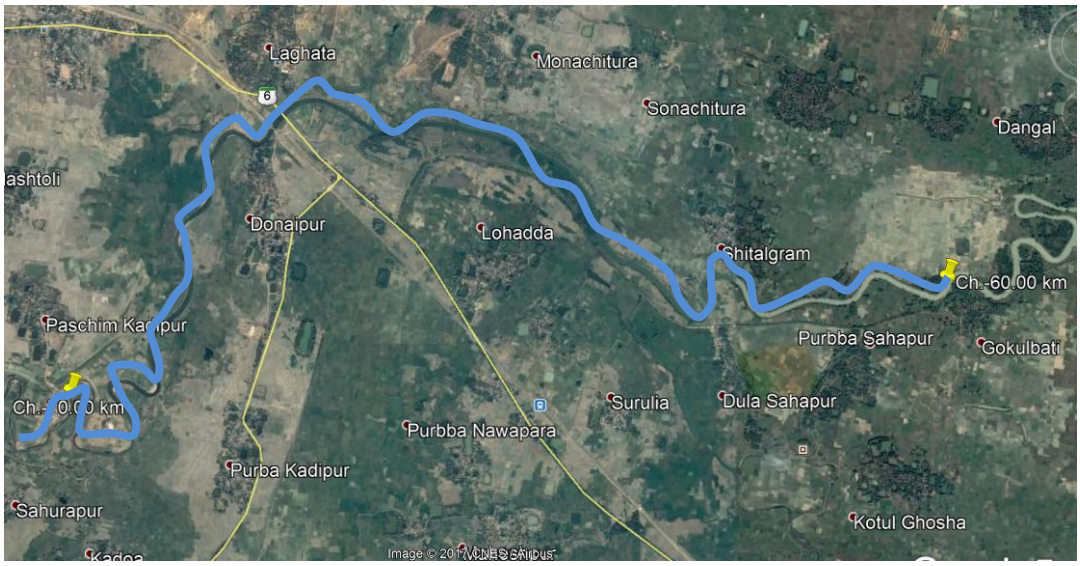


Figure 17- Chainage 60.00 km to Chainage 70.00 km

The width of Bakreswar-Mayurakshi River from Chainage 60.00 Km. to Chainage 70.00 Km is approximately 46.78 m to 25.40 m. The average width portion of the river is approximately 36.09 m.

BM-8 is situated near Chainage of 69.740 km. An under construction Rail Bridge is situated near Chainage of 65.755 km in this zone of river. The position of the under-construction Rail bridge is (Lat: - 23°48'16.26"N, Long: - 87°49'9.58"E). Another RCC Bridge is situated near Chainage of 65.650 km. This bridge is linked with SH-13. The Bridge is also connected with Badshahi Road. The position of the RCC Bridge is (Lat: - 23°48'20.68"N, Long: - 87°49'10.38"E). Purba sahapur, Gokulbati, Purnia, Dula Sahapur, Lohadda, Donaipur, Maheshpur, Surulia, Purba Kadipur etc. villages are situated left bank side of the river and Sitalgram, Chitura, Laghata, Mashtoli, Paschim kadipur etc. villages are situated right bank side of the river. Nine electric lines are located in this zone of river near Chainage of 64.772 km, 65.239 km, 65.415 km, 65.779 km, 65.791, 65.822 km, 66.493 km, 67.501 km and 69.082 km respectively. Sital Gram ferry ghat is available in this stretches of river near Chainage of 62.00 km. The position of this ferry service is (Lat- 23°47'44.116N, Long- 87°50'53.039E).

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	70.00	0.3	3.6	8200	110259.22	-0.3	3.4	8800	134013.36
II	60.00	70.00	0.3	3.7	10000	250725.37	-0.3	3.4	10000	298120.92
III	60.00	70.00	0.3	3.8	10000	521042.55	-0.3	3.4	10000	602382.47
IV	60.00	70.00	0.3	3.9	10000	702265.46	-0.3	3.4	10000	792144.70

Figure 18- Under-construction Rail Bridge (Chainage- 65.755 km)

Figure 19- RCC Bridge (Chainage- 65.650 km)

Figure 20-Sital gram ferry ghat (Chainage-62.00 km)

3.8- From Chainage 70.00 Km to Chainage 80.00 Km (Paschim Kadipur village to Pancha Ganga Village):-

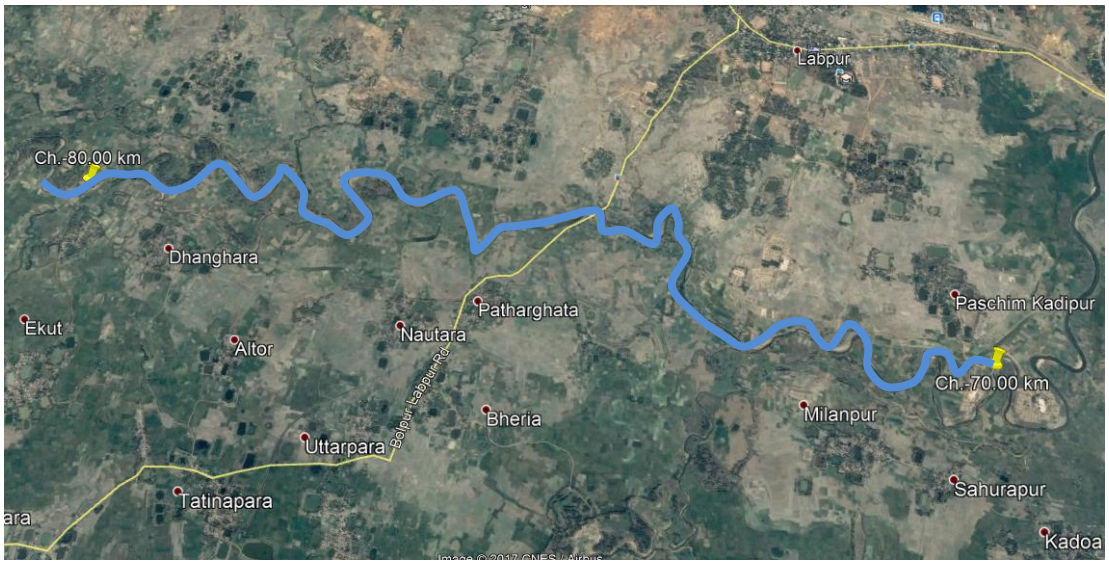


Figure 21- Chainage 70.00 km to Chainage 80.00 km

The width of Bakreswar-Mayurakshi River from Chainage70.00 Km. to Chainage 80.00 Km is approximately 25.40 m to 31.60 m wide. The average width portion of the river is approximately 28.50 m.

BM-9 is situated near Chainage of 74.657 km in this stretches of river. Kendia RCC Bridge is situated near Chainage of 74.650 km in this zone of river. The Bridge is linked with SH-6 and SH-13 which connect Bolpur-Labpur road. The position of the RCC Bridge is (Lat: - 23°47'55.93"N, Long: - 87°46'52.84"E). Two electric lines are located near Chainage of 70.274 km and 75.319 km. Sahurapur, Nautara, Milanpur, Kendia, Patharghata, Dhanghara etc villages are situated left bank side of the river and Gopalpur, Paschim Gobindapur, Dakshin Kanaipur, Tushkunda etc. villages are situated right bank side of the river.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	70.00	80.00	0.1	0.6	10000	378451.8	-0.3	0	10000	490220.08
II	70.00	80.00	0.1	0.6	10000	578435.05	-0.3	0	10000	722093.44
III	70.00	80.00	0.1	0.6	10000	876399.31	-0.3	0	10000	1054591.5
IV	70.00	80.00	0.1	0.6	10000	1058583.8	-0.3	0	10000	1244752.8

Figure 22- RCC Bridge (Chainage- 74.650 km)

3.9- From Chainage 80.00 Km to Chainage 90.00 Km (Pancha Ganga Village to Byaspur village):-

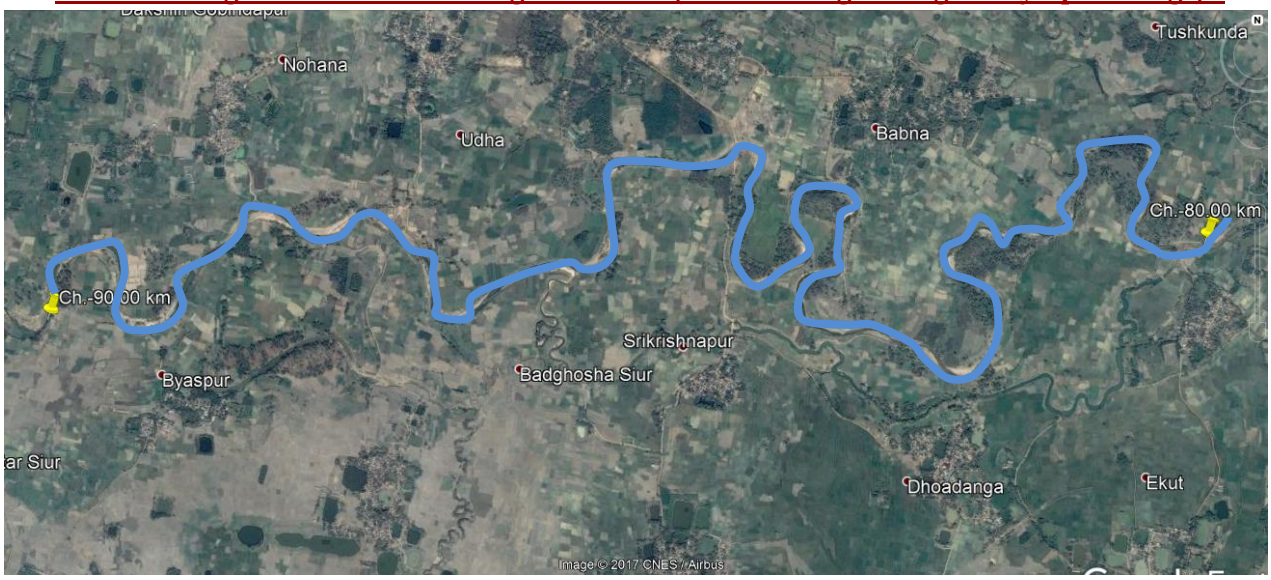


Figure 23- Chainage 80.00 km to Chainage 90.00 km

The width of Bakreswar-Mayurakshi River from Chainage 80.00 Km. to Chainage 90.00 Km is approximately 31.60 m to 60.42m wide. The average width portion of the river is approximately 46.01m.

Six electric lines are located near Chainage of 82.337 km, 82.441 km, 82.581 km, 82.739 km, 83.917 km and 85.916 km respectively. No cross structures are found in this zone of river. Ekut, Dhoadanga, Srikrishnapur, Byaspur, Badghosha Siur etc. villages are situated left bank side of the river and Pancha Ganga, Babna, Nohana, Udha etc. villages are situated right bank side of the river.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	80.00	90.00	0.1	0.5	10000	387703.27	-0.3	0	10000	502387.05
II	80.00	90.00	0.1	0.5	10000	593320.64	-0.3	0	10000	740781.18
III	80.00	90.00	0.1	0.5	10000	899588.95	-0.3	0	10000	1082486.9
IV	80.00	90.00	0.1	0.5	10000	1086559.6	-0.3	0	10000	1277601

3.10- From Chainage 90.00 Km to Chainage 100.00 Km (Byaspur village to Ikra village):-

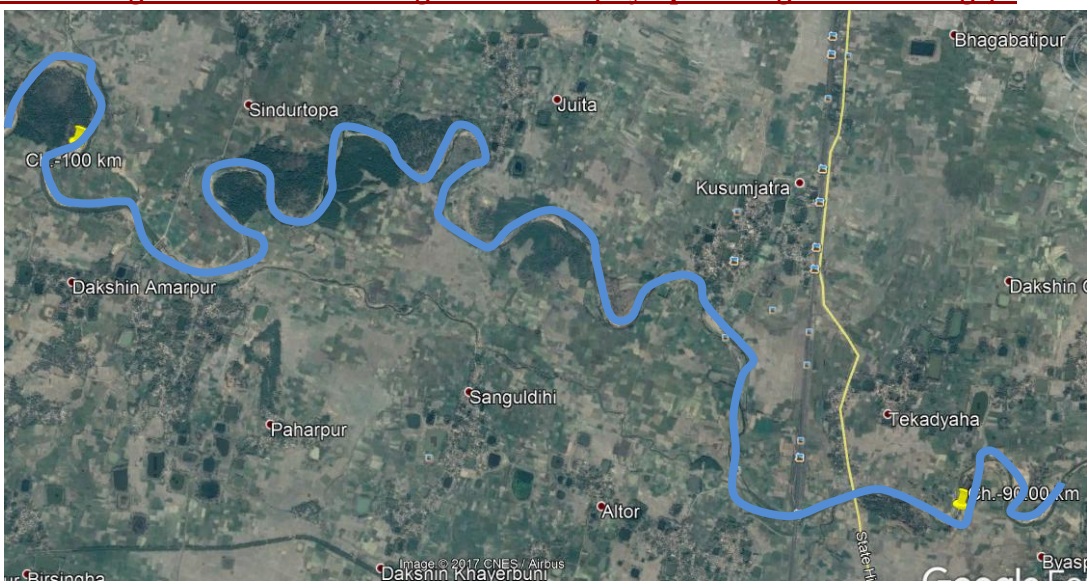


Figure 24-Chainage 90.00 km to Chainage 100.00 km

The width of Bakreswar-Mayurakshi River from Chainage 90.00 Km. to Chainage 100.00 Km is approximately 60.42 m to 57.09 m wide. The average width portion of the river is approximately 58.76 m.

BM-10 and BM-11 is situated near Chainage of 90.604 km and 98.935 km in this stretches of river. One RCC Bridge is situated in this zone of river near Chainage of 90.630 km. The RCC Bridge is linked with NH-2B and SH-6. The position of this Bridge is (Lat: - 23°47'55.17"N, Long: - 87°41'35.68"E). Two Railway Bridges (Bakreswar Steel and Bakreswar RCC) are located in this zone of river near Chainage of 91.00 km. The position of the Railway Bridges are (Lat: - 23°47'50.38"N, Long: - 87°41'24.20"E), (Lat: - 23°47'49.83"N, Long: - 87°41'23.56"E). These bridges are communicated through Ahmadpur and Kopai. Five electric lines are located near Chainage of 90.516 km, 91.98 km, 93.119 km, 96.557 km and 98.899 km in this zone of river. Tekadyaha, Juita, Sindurtopa etc. villages are situated right bank side of the river and Altor, Sanguldihi, paharpur, Dakhin Amarpur etc. villages are located left bank side of the river. A Check Dam is also located in this zone of river near Chainage of 98.950 km. The position of the Check Dam is (Lat:- 23°48'40.369"N, Long:- 87°39'14.196"E).

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	90.00	100.00	0.1	0.4	10000	408177.66	-0.3	0	10000	527665.11
II	90.00	100.00	0.1	0.4	10000	622437.94	-0.3	0	10000	776103.76
III	90.00	100.00	0.1	0.4	10000	941628.81	-0.3	0	10000	1132288.6
IV	90.00	100.00	0.1	0.4	10000	1136561.1	-0.3	0	10000	1335756.9

Figure 25- Railway Bridges (Chainage- 91.00 km)

Figure 26- RCC Bridge (Chainage- 90.630 km)

Figure 27- Check Dam (Chainage- 98.950 km)

3.11- From Chainage 100.00 Km to Chainage 110.00 Km (Ikra village to Beira kalitala village):-

Figure 28-Chainage 100 km to Chainage 110.00 km

The width of Bakreswar-Mayurakshi River from Chainage100.00 Km. to Chainage 110.00 Km is approximately 57.09 m to 77.37m width. The average width portion of the river is approximately 67.23 m.

BM-12 is situated near Chainage of 109.094 km in this stretches of river. Two RCC Bridges are situated near Beiri Kalitala area near Chainage of 109.100 km and 109.137 km. These Bridges are linked with NH-2B. The position of the Bridges are (Lat: - 23°49'44.39"N, Long:- 87°35'38.09"E), (Lat:- 23°49'43.55"N, Long:- 87°35'37.10"E). Three high tension lines are located in this stretches of river near Chainage of 107.221 km, 107.276 km and 109.065 km. Pashoa, Layekpur, Patharghata, Nijuri, Beharia etc. villages are located right sides bank of the river and Gadadharpur, Ikra, Jinaipur, Keora, Hatikra etc. villages are located left bank side of the river.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	100.00	110.00	0.1	0.5	10000	407201.2	-0.3	0	10000	526532.46
II	100.00	110.00	0.1	0.5	10000	621188.44	-0.3	0	10000	775207.84
III	100.00	110.00	0.1	0.5	10000	940938.96	-0.3	0	10000	1132248.6
IV	100.00	110.00	0.1	0.5	10000	1136505.9	-0.3	0	10000	1336407.5

3.12- From Chainage 110.00 Km to Chainage 120.00 Km (Beira kalitala village to Meherpur village):-

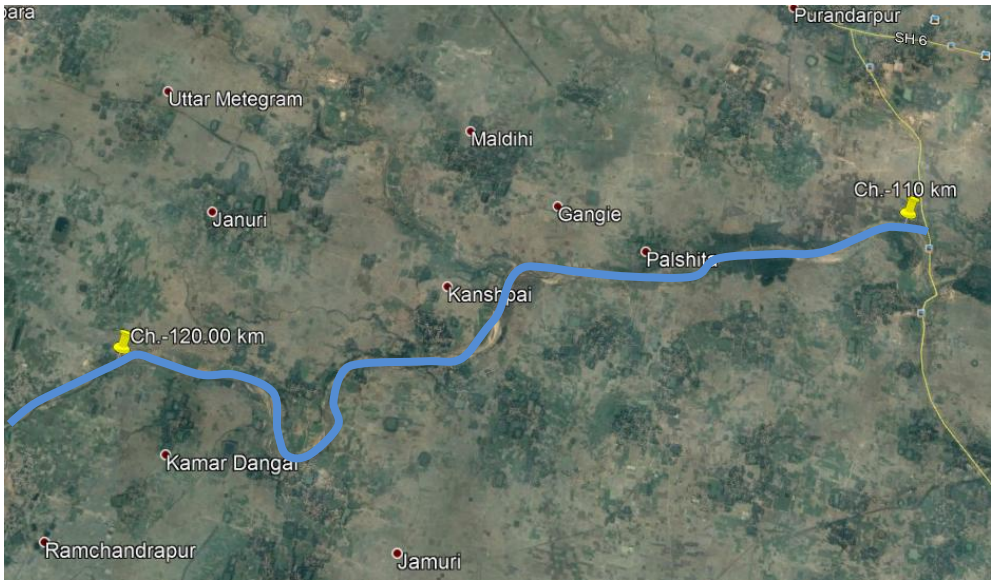


Figure 29- Chainage 110.00 km to Chainage 120.00 km

The width of Bakreswar-Mayurakshi River from Chainage110.00 Km. to Chainage 120.00 Km is approximately 77.37m to 90.00m width. The average width portion of the river is approximately 83.69 m.

BM-13 is situated near Chainage of 119.195 km in this zone of river. A Check Dam is situated in this zone of river near Chainage of 119.200 km. The position of the Check Dam is (Lat: - 23°49'13.517"N, Long: - 87°31'14.346"E). Seven High tension lines are situated in this zone of river near Chainage of 110.203 km, 110.296 km, 110.626 km, 110.877km, 118.779 km, 119.265 km, 119.524 km respectively. Palshita, Gangie, Maldihi, Kanshpai, Januri, Uttar Metegram etc. villages are located right bank side of the river and Srikantapur, porbotpur, Bholaipur, Harishpur, Kendua, Alipur etc. villages are located left bank side of the river.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	110.00	120.00	0.1	0.5	10000	421816.48	-0.3	0	10000	545548.86
II	110.00	120.00	0.1	0.5	10000	643500.79	-0.3	0	10000	803106.91
III	110.00	120.00	0.1	0.5	10000	974705.14	-0.3	0	10000	1172864.6
IV	110.00	120.00	0.1	0.5	10000	1177279.4	-0.3	0	10000	1384325.2

Figure 30- Check Dam (Chainage- 119.200 km)

3.13- From Chainage 120.00 Km to Chainage 130.00 Km (Meherpur village to Bhadutia village):-

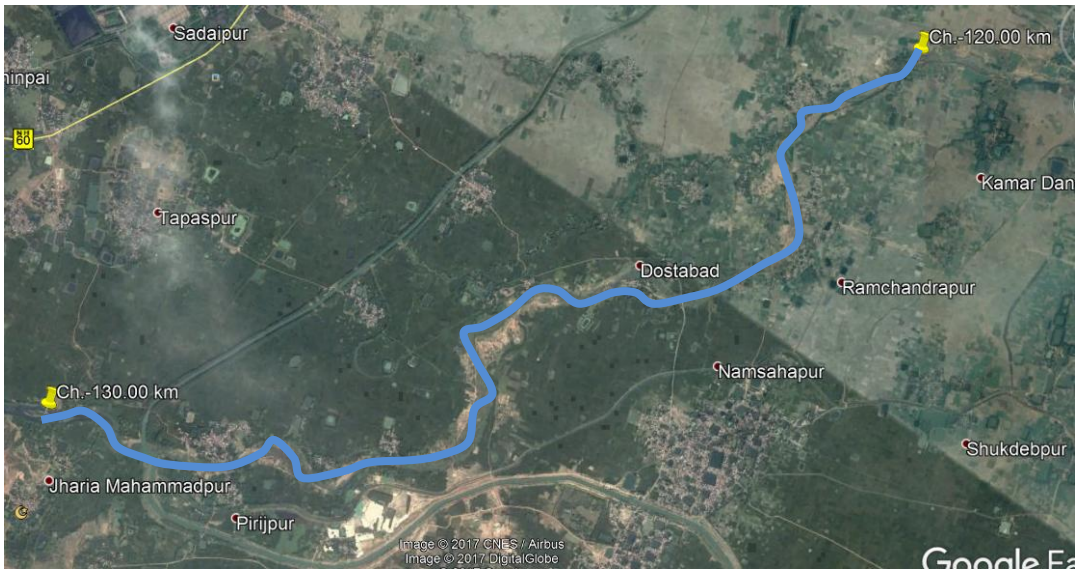


Figure 31- Chainage 120.00 km to Chainage 130.00 km

The width of Bakreswar-Mayurakshi River from Chainage 120.00 Km. to Chainage 130.00 Km is approximately 90 m to 114.52 m width. The average width portion of the river is approximately 102.26 m.

BM-14 is situated near Chainage of 128.949 km in this zone of river. One RCC Bridge is located near Chainage of 123.250 km. The Position of the RCC bridge is- (Lat: - 23°48'15.29"N, Long: - 87°29'41.04"E). The Bridge is linked with Selarpur and SH-6. One Check Dam is also situated near Chainage of 129 km. The position of the Dam is (Lat: - 23°47'35.534"N, Long: - 87°27'11.004"E). Five electric lines and five high tension lines are located in this stretches of river near Chainage of 121.221km, 121.51km, 122.971km, 123.474 km, 128.734 km, 126.17km, 126.548km, 127.543km, 129.141km, 129.203km 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	120.00	130.00	0.1	0.5	10000	411521.29	-0.3	0	10000	532498.84
II	120.00	130.00	0.1	0.5	10000	629954.86	-0.3	0	10000	786165.95
III	120.00	130.00	0.1	0.5	10000	955534.59	-0.3	0	10000	1150128.7
IV	120.00	130.00	0.1	0.5	10000	1154500.7	-0.3	0	10000	1358126.2

Figure 32- Check Dam (Chainage- 129.00 km)

Figure 33- RCC Bridge (Chainage- 123.250 km)

3.14- From Chainage 130.00 Km to Chainage 135.165 Km (Bhadutia village to Nil Nirjan Dam area):-

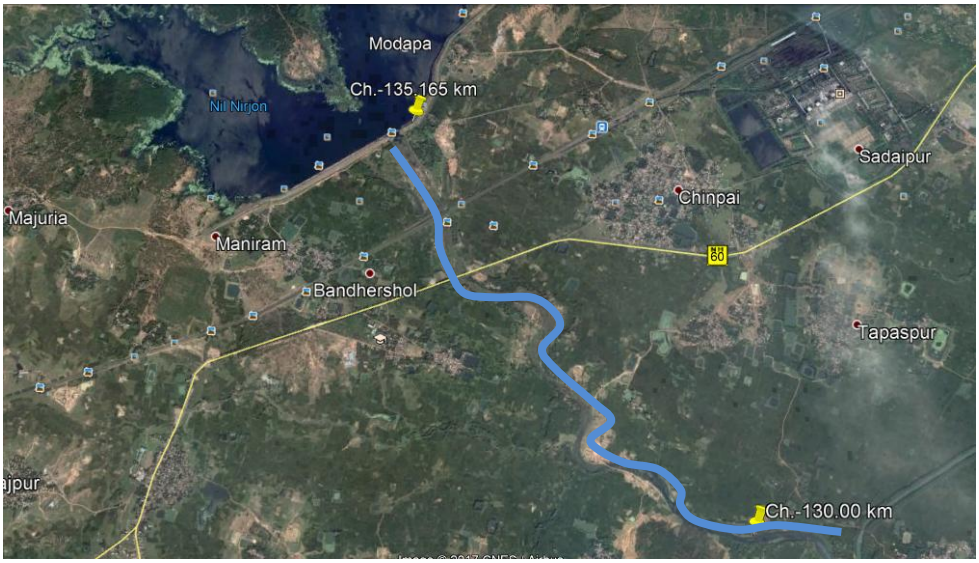


Figure 34- Chainage 130.00 km to 135.165 km

The width of Bakreswar-Mayurakshi River from Chainage 130.00 Km. to Chainage 135.165 Km is approximately 114.52 m to 116.72 m width. The average width portion of the river is approximately 115.62 m.

Two electric lines are located near Chainage of 133.741 km and 135.074 km. One RCC Bridge and two Rail Bridges are located near Chainage of 133.800 km, 134.310 km and 134.325 km respectively in this zone of river. The position of the RCC Bridge is (Lat:- 23°48'52.26"N, Long:- 87°25'18.44"E). The RCC Bridge is linked with SH-14 and SH-6. The position of the Railway Bridges are (Lat:- 23°49'9.25"N, Long:- 87°25'13.33"E) , (Lat:- 23°49'9.77"N, Long:- 87°25'13.23"E) respectively. Alalchak, Elema, Narayanpur, Chinpai etc. villages are located right bank side of the river and Bodakuri, Sagar, Bandersole etc. villages are located left bank side of the river.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	130.00	135.165	0.1	0.4	5000	212029.95	-0.3	0	5000	273870.91
II	130.00	135.165	0.1	0.4	5000	322954.82	-0.3	0	5000	402465.41
III	130.00	135.165	0.1	0.4	5000	488107.68	-0.3	0	5000	586759.01
IV	130.00	135.165	0.1	0.4	5000	588972.47	-0.3	0	5000	692042.11

Figure 35-Rail Bridges (Chainage- 133.800 km and 134.310 km)

Figure 36-Nil Nirjan Dam (Chainage-135.165 km)

- **Bathymetry Survey:-**

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

The Bathymetry survey of the Bakreswar-Mayurakshi River has been carried out from the Chainage of 6.350 km to 10.300 km, 37.00 km to 45.180 km, 45.180 km to 61.680 km and 61.680 km to 70.00km. The rest of the waterway stretches was not carried out the Bathymetry survey due to insufficient layer of water.

Date of Survey	Type of survey	Chainage	
		From (km)	To (km)
08.11.15	Bathymetry Survey	6.350	10.300
24.01.16	Bathymetry Survey	37.00	45.180
23.01.16	Bathymetry Survey	45.180	61.680
22.01.16	Bathymetry Survey	61.680	70.00

- **Topographic Survey:-**

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

The Topographic survey has been carried out from Chainage of 0.00 km to 135.165 km from Dakhin Hijal village to Nil Nirjan Dam area.

a) Prominent Dams / Barrage:-

There are four Check Dams and one dam found in this zone of River near Chainage of 51.400 km, 98.950 km, 119.200km, 129 km and 135.165 km.

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

The bank of the river includes with villages, Roads, Ferry Ghats, Jetty, electric lines, check Dams, RCC and Rail Bridges etc. RCC, Rail and check Dam area are highly protected by concrete pitching. Most of the river stretches are protected by long embankments and Boulder pitching.The Bank of the River Bakreswar-Mayurakshi has been affected by floods, sometimes it become dangerous during the monsoon. As a result, the lower portion or the bank side villages are flooded. The embankment are found near Chainage 4.00 km to 27.00 km, 34.00km to 37.00 km, 47.00 km to 564.00 km. Moram road has been found near Chainage 60.00km to SH-6. Bituminus road has been found near Chainage of 126.00 km to 129.00 km. As much as six check Dams are situated in this river channel. The dams are over flooded during the monsoon.

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

There are four no's of Check dam and one check dam located in this zone of river near the Chainage of 51.400 km, 98.950 km, 119.200km, 129 km and 135.165 km. These Check dams are hindrance for the navigation in this waterway.

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

Bakreswar thermal power plant is located in this zone of river. The RCC Bridge, Rail Bridge and Check Dam area are highly protected by concrete. Some forest areas are also located near the bank side of the river. No wildlife or sanctuaries are found in this zone of river.

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

NH- 2B, NH-34 and NH-60 is the major national highways located in this zone of river. Besides, SH-7, SH-11 and SH-13 are also located in this zone of river. So the communication system runs very easily in this zone of river.

f) Railway Line and Stations in the vicinity:-

Total 4 nos of Railway bridges are located in this zone of river. Bakreswar Steel and RCC Railway Bridges are located near Chainage of 91.00 km. The Railway Bridge is communicated between kopai to Ahmadpur station. Another two Railway bridges are located near Chainage of 134.310 km and 134.325 km. Chinpai is the nearest railway station in this zone of river.

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

During the period of the survey it was noticed that the maximum land on the both bank of the river is used as an agricultural land.

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

West Bengal is the major state for all aspect in agriculture. The major crops Paddy, jute, Tea, Rice, Wheat, Maize, Sorghum, gram, Millets, Sugarcane and Spices are cultivated in this region.

i) Availability of Bulk / Construction Material:-

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

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

There is no large scale industry in this district. Only four medium scale industries are operating at Ahmt~dpur (Sugar Mill), Bakrewar Thermal plant, Panchra (Cotton Mill), Afdarpur (Mini Steel) and Chinpai (Explosive Industry). Besides this there are 5442(88- 89) registered small scale industries out of which 2862 s.s.I. units were installed during DIC set up in this district. Hence this district is industrially backward taking into consideration of the availability of agricultural raw materials and other infrastructural support. The industrial estate at Bolpur is still under construction covering an area of 21.32 acres at Mouza Layek Bazar. Some vocational institutions are situated in this district to train the new and small entrepreneurs like Arambag Hatchery unit at Tantipara and Amar Kutir at Bolpur. Besides, DIC Small Industries Service Institute (S.I.S.I.) is taking its role to expand the technical manpower of this district. The District Industries Centre co-ducted Training Programme to different artisans in collaboration with all India Handicrafts Board to expand the human resources by 20 to 25 persons per year in the field of painting, lace ware, cane and bamboo products etc.

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

There are three numbers of passenger ferry services found in this zone of river which are tabulated below:-

Name of Ferry Ghat	Chainage (km)	Easting (m)	Northing (m)	Latitude (N)	Longitude (E)
Sehalai Kheya ghat	13.600	611830.72	2645860.08	23°55'13.814	88°05'55.589
Ramghati ferry ghat	56.540	589908.69	2633127.17	23°48'24.829	87°52'57.453
Sital gram ferry ghat	62.000	586395.59	2631853.54	23°47'44.116	87°50'53.039

l) Existing Cargo Movement:-

The cargo movement is processed through the waterways system. Three passenger ferry services named Sehalai Ferry ghat, Ramghat Ferry ghat and Sital gram ferry ghat are available in this river near Chainage of 13.600 km, 56.540 km and 62.000 km. The light cargo is available in this zone of river including vegetables, cycle and motor cycles, light goods etc.

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

Chinpai, Ahmadpur, kopai, Labpur, Bolpur etc. towns are located in this zone of river. Tarapith temple, Bakreswar Thermal power plant, Bakreswar dam, Rampurhat etc. places located in this zone of river which is the tourist spot in this region of river.

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

Hijal, Bharatpur, Kandi, Laltakuri, Jaychandrapur, Purba Haripur, Belbuni, Khanpur, Brahmanpara, Gokulbati etc. villages are located in this zone of river.

o) Availability of Passenger Ferry Services with facilities and Annual movement data:-

There are three numbers of passenger ferry services found in this zone of river which are tabulated below:-

Name of Ferry Ghat	Chainage (km)	Easting (m)	Northing (m)	Latitude (N)	Longitude (E)
Sehalai Kheya ghat	13.600	611830.72	2645860.08	23°55'13.814	88°05'55.589
Ramghati ferry ghat	56.540	589908.69	2633127.17	23°48'24.829	87°52'57.453
Sital gram ferry ghat	62.000	586395.59	2631853.54	23°47'44.116	87°50'53.039

p) Available and probable Water Sport Recreational Facilities:-

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

q) Fishing activities:-

Fish and fishing business are an important sector in this region. Cast nets, Scoop nets, Gill nets, Fishing lines and Traditional Bamboo Trap used for catching the fishes here. Fishing plays an important role in supporting livelihood for the inhabitants of this Region. Fishes are one of the main occupations in this region of people where so many people are engaged with this profession for the demand of fish.

r) Sand mining:-

The bank of the River Bakreswar-Mayurakshi is also used for the sand mines. The Sand Mining helps the people for collection sand which is the major component for Building purposes. The Motor vehicles can easily collect the sand and move for transportation. Sand Mines is an important sector where so many people are engaged and these activities help them to get their daily livelihood. Besides this, sand is also exported to other states as it becomes demandful for making Building or Industries.

s) Tributaries:-

Brahmani, Dwaraka, Bakreshwar and Kopai are the tributaries of Mayurakshi River.

t) Details of Irrigation Canals and Outlets:-

The irrigation canal and outlets are located near Chainage of 1.500 km, 3.100km, 12.600 km, 14.400 km, 16.550 km, 27.500 km, 30.500 km, 37.600 km, 39.600 km, 58.00 km, 61.800 km, 64.800 km, 74.50 km, 114.00 km, 121.300 km in the right bank side and Chainage 37.700 km, 37.800 km, 38.550 km, 39.400 km, 39.600 km, 41.50 km, 43.250 km, 43.800 km, 58.600 km, 69.300 km, 70.700 km, 80.50 km, 86.60 km, 90.650 km, 91.150 km, 98.400 km, 99.600 km in the left bank side of the river.

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

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 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. As much as six check Dams are located in this zone of river which supplies the water for cultivation. This area is mainly covered with agricultural land like paddy, potato etc. so the water is essential for agriculture purposes.

Section 4: Terminals

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

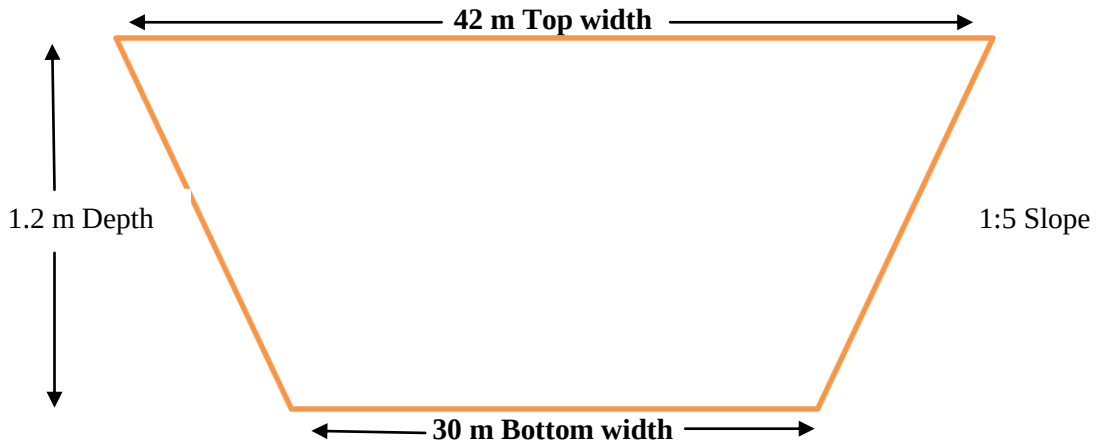
4.4 Details of Land use, owner etc.:-

The both sides bank of the River Bakreswar-Mayurakshi used for 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. The lands of the river side are covered with paddy land, brick field, Burning ghat, villages etc.

Section 5: Fairway development:-

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

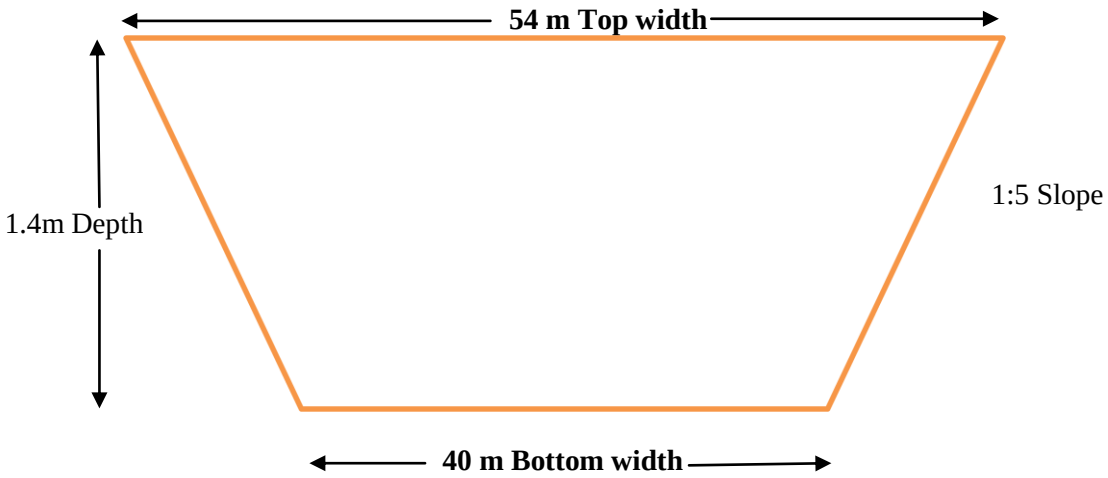
Class-I:-



Location		Chainage (km)		Observed Dredging Qty w.r.t Sounding Datum					Reduced Dredging Qty w.r.t Sounding Datum				
From	To	From	To	Min depth (m)	Max depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)`	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)`
Dwarka Confluence	Jayrampur village	0	10	0.1	2.8	9200	279068.110	279068.110	-0.3	1.8	10000	457197.420	457197.420
Jayrampur village	Ibrahimpur village	10	20	0.1	3.0	10000	390472.970	669541.080	-0.3	2.1	10000	512239.250	969436.670
Ibrahimpur village	Sherpur village	20	30	0.1	0.4	10000	403636.920	1073178.000	-0.3	0	10000	523758.950	1493195.620
Sherpur village	Majlishpur village	30	40	0.1	2.3	10000	382292.450	1455470.450	-0.3	2.0	10000	489200.180	1982395.800
Majlishpur village	Belbuni village	40	50	0.5	3.2	9700	127297.750	1582768.200	0.1	2.6	10000	171219.780	2153615.580
Belbuni village	Gokulbati	50	60	0.4	6.9	6510	52333.150	1635101.350	-0.3	4.2	7400	74822.630	2228438.210
Gokulbati	Paschim Kadipur	60	70	0.3	3.6	8200	110259.220	1745360.570	-0.3	3.4	8800	134013.360	2362451.570
Paschim Kadipur	Pancha Ganga	70	80	0.1	0.6	10000	378451.800	2123812.370	-0.3	0	10000	490220.080	2852671.650
Pancha Ganga	Byaspur	80	90	0.1	0.5	10000	387703.270	2511515.640	-0.3	0	10000	502387.050	3355058.700
Byaspur	Ikra	90	100	0.1	0.4	10000	408177.660	2919693.300	-0.3	0	10000	527665.110	3882723.810
Ikra	Beira kalitala	100	110	0.1	0.5	10000	407201.200	3326894.500	-0.3	0	10000	526532.460	4409256.270
Beira kalitala	Meherpur	110	120	0.1	0.5	10000	421816.480	3748710.980	-0.3	0	10000	545548.860	4954805.130
Meherpur	Bhadutia	120	130	0.1	0.5	10000	411521.290	4160232.270	-0.3	0	10000	532498.840	5487303.970
Bhadutia	Nil Nirjan Dam	130	135.165	0.1	0.4	5000	212029.950	4372262.220	-0.3	0	5000	273870.910	5761174.880
Total						128610	4372262.220		Total		131200	5761174.880	

Table 16- Dredging quantity in class-I

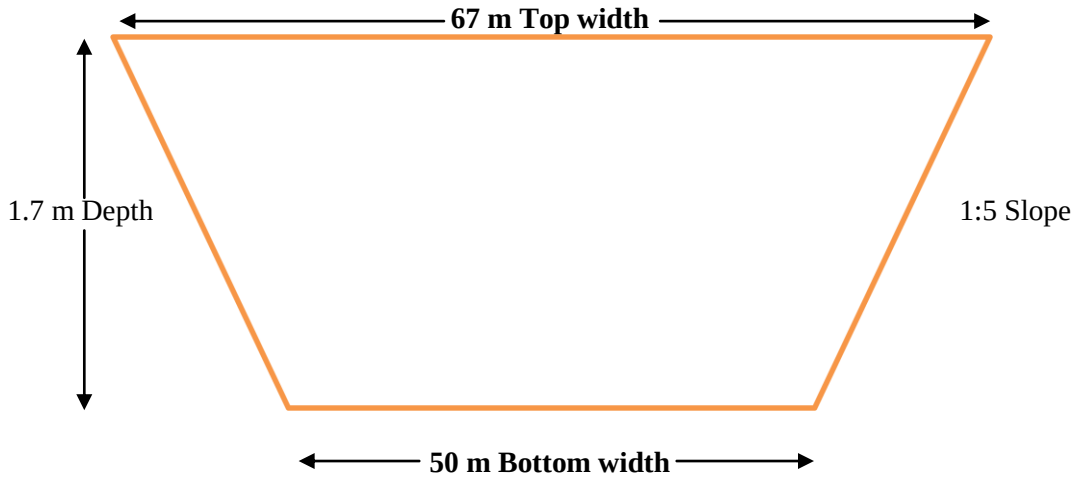
Class-II:-



Location		Chainage (km)		Observed Dredging Qty w.r.t Sounding Datum					Reduced Dredging Qty w.r.t Sounding Datum				
From	To	From	To	Min. depth (m)	Max depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)`	Min Depth (m)	Max Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)`
Dwarka Confluence	Jayrampur village	0	10	0.1	2.9	10000	450336.130	450336.130	-0.3	2.0	10000	693274.420	693274.420
Jayrampur village	Ibrahimpur village	10	20	0.1	3.1	10000	602967.070	1053303.200	-0.3	2.1	10000	762848.440	1456122.860
Ibrahimpur village	Sherpur village	20	30	0.1	0.4	10000	618489.390	1671792.590	-0.3	0	10000	773345.720	2229468.580
Sherpur village	Majlishpur village	30	40	0.1	2.3	10000	599029.970	2270822.560	-0.3	2.0	10000	739895.280	2969363.860
Majlishpur village	Belbuni village	40	50	0.5	3.2	10000	272810.960	2543633.520	0.1	2.6	10000	345631.850	3314995.710
Belbuni village	Gokulbati	50	60	0.4	6.9	10000	147113.790	2690747.310	-0.3	4.2	10000	193954.110	3508949.820
Gokulbati	Paschim Kadipur	60	70	0.3	3.7	10000	250725.370	2941472.680	-0.3	3.4	10000	298120.920	3807070.740
Paschim Kadipur	Pancha Ganga	70	80	0.1	0.6	10000	578435.050	3519907.730	-0.3	0	10000	722093.440	4529164.180
Pancha Ganga	Byaspur	80	90	0.1	0.5	10000	593320.640	4113228.370	-0.3	0	10000	740781.180	5269945.360
Byaspur	Ikra	90	100	0.1	0.4	10000	622437.940	4735666.310	-0.3	0	10000	776103.760	6046049.120
Ikra	Beira kalitala	100	110	0.1	0.5	10000	621188.440	5356854.750	-0.3	0	10000	775207.840	6821256.960
Beira kalitala	Meherpur	110	120	0.1	0.5	10000	643500.790	6000355.540	-0.3	0	10000	803106.910	7624363.870
Meherpur	Bhadutia	120	130	0.1	0.5	10000	629954.860	6630310.400	-0.3	0	10000	786165.950	8410529.820
Bhadutia	Nil Nirjan Dam	130	135.165	0.1	0.4	5000	322954.820	6953265.220	-0.3	0	5000	402465.410	8812995.230
Total						135000	6953265.220		Total		135000	8812995.230	

Table 17- Dredging quantity in class-II

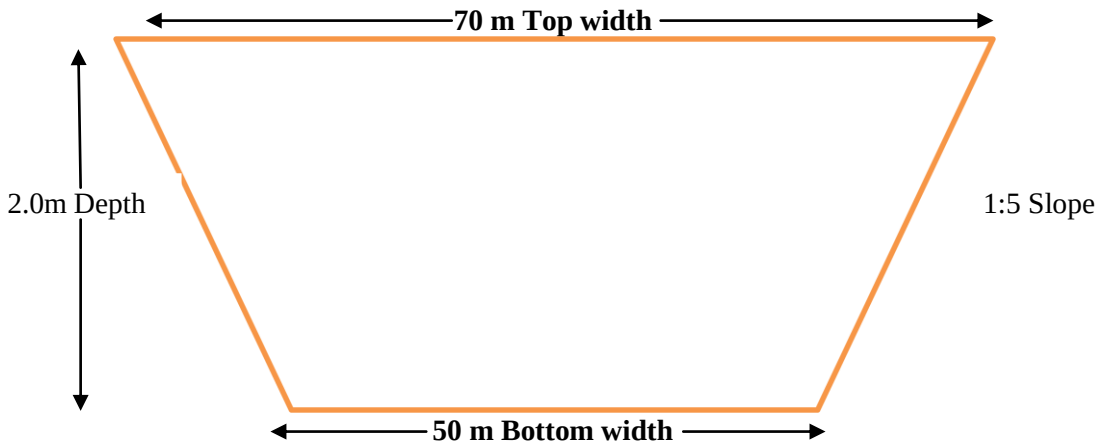
Class-III:-



Location		Chainage (km)		Observed Dredging Qty w.r.t sounding Datum					Reduced Dredging Qty w.r.t. Sounding Datum				
From	To	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)`	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)`
Dwarka Confluence	Jayrampur village	0	10	0.1	3.2	10000	735194.420	735194.420	-0.3	2.1	10000	1040262.490	1040262.490
Jayrampur village	Ibrahimpur village	10	20	0.1	3.1	10000	925903.140	1661097.560	-0.3	2.1	10000	1126813.910	2167076.400
Ibrahimpur village	Sherpur village	20	30	0.1	0.4	10000	939941.520	2601039.080	-0.3	0	10000	1132169.160	3299245.560
Sherpur village	Majlishpur village	30	40	0.1	2.3	10000	925873.990	3526913.070	-0.3	2.1	10000	1104255.090	4403500.650
Majlishpur village	Belbuni village	40	50	0.4	3.2	10000	529773.500	4056686.570	0.1	2.6	10000	635445.020	5038945.670
Belbuni village	Gokulbati	50	60	0.3	6.9	10000	355375.490	4412062.060	-0.3	4.3	10000	435104.140	5474049.810
Gokulbati	Paschim Kadipur	60	70	0.3	3.8	10000	521042.550	4933104.610	-0.3	3.4	10000	602382.470	6076432.280
Paschim Kadipur	Pancha Ganga	70	80	0.1	0.6	10000	876399.310	5809503.920	-0.3	0	10000	1054591.480	7131023.760
Pancha Ganga	Byaspur	80	90	0.1	0.5	10000	899588.950	6709092.870	-0.3	0	10000	1082486.890	8213510.650
Byaspur	Ikra	90	100	0.1	0.4	10000	941628.810	7650721.680	-0.3	0	10000	1132288.570	9345799.220
Ikra	Beira kalitala	100	110	0.1	0.5	10000	940938.960	8591660.640	-0.3	0	10000	1132248.570	10478047.790
Beira kalitala	Meherpur	110	120	0.1	0.5	10000	974705.140	9566365.780	-0.3	0	10000	1172864.620	11650912.410
Meherpur	Bhaduti a	120	130	0.1	0.5	10000	955534.590	10521900.370	-0.3	0	10000	1150128.690	12801041.100
Bhaduti a	Nil Nirjan Dam	130	135.165	0.1	0.4	5000	488107.680	11010008.050	-0.3	0	5000	586759.010	13387800.110
Total						135000	11010008.050		Total		135000	13387800.110	

Table 18- Dredging quantity in class-III

Class-IV:-



Location		Chainage (km)		Observed Dredging Qty w.r.t Sounding Datum					Reduced Dredging Qty w.r.t Sounding Datum				
From	To	From	To	Min. depth (m)	Max depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)`	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)`
Dwarka Confluence	Jayrampur village	0	10	0.1	3.2	10000	921291.200	921291.200	-0.3	2.2	10000	1242604.860	1242604.860
Jayrampur village	Ibrahimpur village	10	20	0.1	3.2	10000	1124185.290	2045476.490	-0.3	2.2	10000	1335669.870	2578274.730
Ibrahimpur village	Sherpur village	20	30	0.1	0.4	10000	1136457.240	3181933.730	-0.3	0	10000	1337296.730	3915571.460
Sherpur village	Majlishpur village	30	40	0.1	2.4	10000	1126372.930	4308306.660	-0.3	2.3	10000	1313477.620	5229049.080
Majlishpur village	Belbuni village	40	50	0.3	3.3	10000	695990.600	5004297.260	0.1	2.7	10000	809373.670	6038422.750
Belbuni village	Gokulbati	50	60	0.3	6.9	10000	495026.550	5499323.810	-0.3	4.3	10000	584111.460	6622534.210
Gokulbati	Paschim Kadipur	60	70	0.3	3.9	10000	702265.460	6201589.270	-0.3	3.4	10000	792144.700	7414678.910
Paschim Kadipur	Pancha Ganga	70	80	0.1	0.6	10000	1058583.830	7260173.100	-0.3	0	10000	1244752.830	8659431.740
Pancha Ganga	Byaspur	80	90	0.1	0.5	10000	1086559.620	8346732.720	-0.3	0	10000	1277600.960	9937032.700
Byaspur	Ikra	90	100	0.1	0.4	10000	1136561.130	9483293.850	-0.3	0	10000	1335756.890	11272789.590
Ikra	Beira kalitala	100	110	0.1	0.5	10000	1136505.860	10619799.710	-0.3	0	10000	1336407.450	12609197.040
Beira kalitala	Meherpur	110	120	0.1	0.5	10000	1177279.430	11797079.140	-0.3	0	10000	1384325.190	13993522.230
Meherpur	Bhadutia	120	130	0.1	0.5	10000	1154500.720	12951579.860	-0.3	0	10000	1358126.240	15351648.470
Bhadutia	Nil Nirjan Dam	130	135.165	0.1	0.4	5000	588972.470	13540552.330	-0.3	0	5000	692042.110	16043690.580
Total						135000	13540552.330		Total		135000	16043690.580	

Table 19- Dredging quantity in class- IV

Section 6: Conclusion

The Survey stretch of Bakreswar-Mayurakshi River is 135.165 km. As much as three numbers of passenger Ferry services including Sehalai ferry ghat, Ramghati ghat, Sital gram kheya ghat etc. are available in this zone of river. The waterway of the Bakreswar-Mayurakshi River includes with many villages, Rail and Road, Ferry Ghats, Jetty etc. There are four Railway Bridges crossing over the river which is very communicative for the native villagers and the foreigners. The Railway line is connected with Kopai, Chinpai, Ahmadpur etc Railway station. Nine numbers of RCC bridges are situated in this zone of river which is very communicative to the daily passengers and also for the tourist. Tourists can have beautiful view of the river and its natural surroundings from the bridges situated on NH no- 34. Five numbers of Check Dam including Bakreswar Dam are located in this zone of river. An under construction Rail Bridge is located near Chainage of 65.650 km. NH-34, NH-60, NH-2B are the major communicative way in this zone and other state-Highways like SH-6, SH-7, SH-11, SH-13 are situated for a better communication system and good transportation.

Bakreswar Thermal power plant,Hot water tank at Bakreswar, Bakreswar Dam, Massanjore Dam, Tarapith Temple, Rampurhat etc. places are situated in this zone of river which are also a historical and tourist places in this river zone. Tarapith is also famous for deity Tarama which brings lakhs of pilgrims every year. Kopai, Ahmedpur, Chauhatta, Labpur, Bolpur are the important places located in this zone of river.

6.1 Min width/Max width and Avg. Width of waterway:-

Sl No	Chainage (From km)	Chainage (To km)	Min width of waterway (m)	Max width of waterway (m)	Avg. width of waterway (m)
1	0.00	10.00	50.37	54.44	52.41
2	10.00	20.00	54.44	70.00	62.22
3	20.00	30.00	70.00	42.00	56.00
4	30.00	40.00	42.00	20.00	31.00
5	40.00	50.00	20.00	32.30	26.15
6	50.00	60.00	32.30	46.78	39.54
7	60.00	70.00	46.78	25.40	36.09
8	70.00	80.00	25.40	31.60	28.50
9	80.00	90.00	31.60	60.42	46.01
10	90.00	100.00	60.42	57.09	58.76
11	100.00	110.00	57.09	77.37	67.23
12	110.00	120.00	77.37	90.00	83.69
13	120.00	130.00	90.00	114.52	102.26
14	130.00	135.165	114.52	116.72	115.62

6.2 Avg. Slope:-

Reach		River Level Change (m)	Distance (km)	Slope (m/km)	Slope (cm/km)
From	To				
0.00	10.00	0.502	10.00	0.050	5.02
10.01	20.00	1.386	9.99	0.139	13.87
20.01	30.00	1.594	9.99	0.160	15.96
30.01	40.00	2.840	9.99	0.284	28.43
40.01	50.00	2.270	9.99	0.227	22.72
50.01	60.00	1.720	9.99	0.172	17.22
60.01	70.00	0.253	9.99	0.025	2.53
70.01	80.00	2.507	9.99	0.251	25.10
80.01	90.00	3.060	9.99	0.306	30.63
90.01	100.00	5.108	9.99	0.511	51.13
100.01	110.00	5.842	9.99	0.585	58.48
110.01	120.00	8.960	9.99	0.897	89.69
120.01	130.00	9.49	9.99	0.950	94.99
130.00	135.165	5.30	5.165	1.026	102.61
Avg. Slope				0.399	39.88

6.3 Min. Average Reduced Depth/ Max. Average Reduced Depth:-

Sl. No	From Chainage (km)	To Chainage (km)	Minimum Avg. Reduced Depth/Percentage				Maximum Avg. Reduced Depth/percentage			
			Class-I	Class-II	Class-III	Class-IV	Class-I	Class-II	Class-III	Class-IV
1	0.00	10.00	-0.19/-0.0019	-0.2/-0.002	-0.2/-0.002	-0.2/-0.002	0.44/0.0044	0.46/0.0046	0.49/0.0049	0.52/0.0052
2	10.00	20.00	-0.26/-0.0026	-0.26/0.0026	-0.26/0.0026	-0.26/0.0026	0.21/0.0021	0.21/0.0021	0.21/0.0021	0.22/0.0022
3	20.00	30.00	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	0/0	0/0	0/0	0/0
4	30.00	40.00	-0.2/-0.002	-0.2/-0.002	-0.2/-0.002	-0.17/0.0017	0.33/0.0033	0.35/0.0035	0.38/0.0038	1.57/0.0157
5	40.00	50.00	0.33/0.0033	-0.3/-0.003	0.28/0.0028	0.19/0.0019	2.1/0.021	2.16/0.0216	2.24/0.0224	2.27/0.0227
6	50.00	60.00	0.19/0.0019	0.17/0.0017	0.14/0.0014	0.1/0.001	3.31/0.0331	3.37/0.0337	3.43/0.0337	3.49/0.0349
7	60.00	70.00	0.19/0.0019	0.18/0.0018	0.17/0.0017	0.12/0.0012	2.24/0.0224	2.30/0.0230	2.35/0.0235	2.41/0.0241
8	70.00	80.00	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	0/0	0/0	0/0	0/0
9	80.00	90.00	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	0/0	0/0	0/0	0/0
10	90.00	100.00	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	0/0	0/0	0/0	0/0
11	100.00	110.00	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	0/0	0/0	0/0	0/0
12	110.00	120.00	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	0/0	0/0	0/0	0/0
13	120.00	130.00	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	0/0	0/0	0/0	0/0
14	130.00	135.165	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	0/0	0/0	0/0	0/0

6.4 Range of Depths:-

Sl No	From Chainage (km)	To Chainage (km)	Reduced Depth (w.r.t LAD)				
			<1.2 m	1.2 m to 1.4 m	1.5 m to 1.7 m	1.8 m to 2.0 m	>2.0 m
			(km)	(km)	(km)	(km)	(km)
1	0.00	10.00	7.0	1.2	0	1.8	0
2	10.00	20.00	10	0	0	0	0
3	20.00	30.00	8.0	0	0	0	2.0
4	30.00	40.00	8.0	0	0	0	2.0
5	40.00	50.00	4.1	1.3	0	2.0	2.6
6	50.00	60.00	5.8	0	0	0	4.2
7	60.00	70.00	5.4	1.2	0	0	3.4
8	70.00	80.00	10.00	0	0	0	0
9	80.00	90.00	10.00	0	0	0	0
10	90.00	100.00	10.00	0	0	0	0
11	100.00	110.00	10.00	0	0	0	0
12	110.00	120.00	10.00	0	0	0	0
13	120.00	130.00	10.00	0	0	0	0
14	130.00	135.165	5.165	0	0	0	0

6.5 Dredging Summary:-

Class	Sounding Observed w.r.t Sounding Datum (Cubic meter)	Sounding Reduced w.r.t Sounding Datum (Cubic meter)
Class-I	4372262.22	5761174.88
Class-II	6953265.22	8812995.23
Class-III	11010008.05	13387800.11
Class-IV	13540552.33	16043690.58

The Detailed project Report may develop in this zone of river. Three passenger ferry services with light cargo (Sand, vegetables, cycle and motor cycle, light goods) are available in this zone of river. The Bathymetry survey was not carried out the entire stretches of the river due to insufficient layer of water. The Bathymetry survey has been carried out approx 40.00 km in this stretches of river. Bakreswar Thermal power plant is located close to the Chinpai railway station. Chinpai, Labpur, Maheshpur etc. Railway stations are located in this zone of river. NH-34, NH-2B, NH-60 etc are also located in this zone of river for a better communication. SH-3, SH-6, SH-7, SH-11, SH-13 are also communicated through the states. Bolpur, Chinpai, Labpur, Hijal, kandi etc. places located in this zone of river.

Annexure:-

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

The Chart Datum value of Confluence with Dwarka 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:-

Class-I											
Chainage (km)		Observed Dredging Qty w.r.t Sounding Datum					Reduced Dredging Qty w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m)
0	1	0.2	0.5	1000	34724.83	34724.83	-0.3	0	1000	44852.68	44852.68
1	2	0.1	0.3	1000	42353.68	77078.51	-0.3	0	1000	54706.17	99558.85
2	3	0.2	0.5	1000	40263.97	117342.48	-0.3	0	1000	52006.71	151565.56
3	4	0.1	0.3	1000	39613.76	156956.24	-0.3	0	1000	51167.75	202733.31
4	5	0.2	0.5	1000	42194.21	199150.45	-0.3	0	1000	54500.35	257233.66
5	6	0.3	0.5	1000	41855.59	241006.04	-0.3	0	1000	54062.5	311296.16
6	7	0.5	1.9	1000	15568.4	256574.44	0.1	1.2	1000	38054.35	349350.51
7	8	0.6	1.4	1000	11268.07	267842.51	-0.2	0.2	1000	45963.86	395314.37
8	9	0.5	2.1	800	8747.6	276590.11	-0.1	1.2	1000	39678.83	434993.2
9	10	0.9	2.8	400	2478	279068.11	0.1	1.8	1000	22204.22	457197.42
10	11	0.6	3.0	1000	27559.01	306627.12	0.1	2.1	1000	39156.11	496353.53
11	12	0.1	0.3	1000	42504.63	349131.75	-0.3	0	1000	54901.53	551255.06
12	13	0.2	0.3	1000	41001.14	390132.89	-0.3	0	1000	52958.95	604214.01
13	14	0.1	0.3	1000	38259.93	428392.82	-0.3	0	1000	50474.43	654688.44
14	15	0.2	0.3	1000	40950.97	469343.79	-0.3	0	1000	53042.6	707731.04
15	16	0.2	0.4	1000	44919.38	514263.17	-0.3	0	1000	58204.57	765935.61
16	17	0.2	0.4	1000	31417.83	545681	-0.3	0	1000	43069.53	809005.14
17	18	0.3	0.5	1000	41326.99	587007.99	-0.3	0	1000	53381.26	862386.4
18	19	0.1	0.3	1000	41270.01	628278	-0.3	0	1000	53752.9	916139.3
19	20	0.1	0.3	1000	41263.08	669541.08	-0.3	0	1000	53297.37	969436.67
20	21	0.2	0.4	1000	28882.8	698423.88	-0.3	0	1000	39066.24	1008502.91
21	22	0.1	0.3	1000	41610.03	740033.91	-0.3	0	1000	53753.06	1062255.97
22	23	0.2	0.3	1000	41291.08	781324.99	-0.3	0	1000	53333.56	1115589.53
23	24	0.1	0.3	1000	42596.17	823921.16	-0.3	0	1000	55058.47	1170648
24	25	0.2	0.4	1000	45866.2	869787.36	-0.3	0	1000	59243.93	1229891.93
25	26	0.1	0.3	1000	42477.98	912265.34	-0.3	0	1000	54867.44	1284759.37
26	27	0.2	0.3	1000	42231.61	954496.95	-0.3	0	1000	54549.13	1339308.5
27	28	0.3	0.4	1000	37043.01	991539.96	-0.3	0	1000	47846.97	1387155.47
28	29	0.1	0.3	1000	40283.9	1031823.86	-0.3	0	1000	52401.78	1439557.25

Class-I											
Chainage (km)		Observed Dredging Qty w.r.t Sounding Datum					Reduced Dredging Qty w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m)
29	30	0.2	0.4	1000	41354.14	1073178	-0.3	0	1000	53638.37	1493195.62
30	31	0.1	0.3	1000	41036.02	1114214.02	-0.3	0	1000	53028.82	1546224.44
31	32	0.2	0.4	1000	41961.61	1156175.63	-0.3	0	1000	54200.46	1600424.9
32	33	0.1	0.3	1000	42175.2	1198350.83	-0.3	0	1000	54476.32	1654901.22
33	34	0.2	0.4	1000	42330.7	1240681.53	-0.3	0	1000	54775.56	1709676.78
34	35	0.2	0.3	1000	41284.36	1281965.89	-0.3	0	1000	53325.34	1763002.12
35	36	0.1	0.3	1000	42014.91	1323980.8	-0.3	0	1000	54419.02	1817421.14
36	37	0.2	0.4	1000	42278.11	1366258.91	-0.3	0	1000	54608.97	1872030.11
37	38	0.6	2.3	1000	17446.53	1383705.44	0.3	2.0	1000	20699.24	1892729.35
38	39	0.3	1.3	1000	26924.32	1410629.76	0.1	1	1000	32372.88	1925102.23
39	40	0.5	1.2	1000	44840.69	1455470.45	-0.3	0.3	1000	57293.57	1982395.8
40	41	0.7	2.3	700	9340.96	1464811.41	0.1	2.0	1000	12745.7	1995141.5
41	42	1.1	2.4	1000	15218.52	1480029.93	0.9	2	1000	20917.54	2016059.04
42	43	0.9	1.7	1000	21916.86	1501946.79	0.5	1.3	1000	29018.85	2045077.89
43	44	0.7	2.4	1000	19087.15	1521033.94	0.3	2	1000	24656.84	2069734.73
44	45	0.5	2.9	1000	14128.75	1535162.69	0.2	2.5	1000	18781.92	2088516.65
45	46	0.8	3.1	1000	12751.08	1547913.77	0.3	2.6	1000	17473.31	2105989.96
46	47	0.7	2.6	1000	9311.63	1557225.4	0.3	2.2	1000	12785.65	2118775.61
47	48	0.5	2.5	1000	9315.98	1566541.38	0.2	2.1	1000	12704.07	2131479.68
48	49	0.8	3.2	1000	8485.27	1575026.65	0.3	2.2	1000	11607.42	2143087.1
49	50	0.6	2.4	1000	7741.55	1582768.2	0.2	2.1	1000	10528.48	2153615.58
50	51	0.4	3.5	1000	3138.66	1585906.86	0.1	3.1	500	4698.53	2158314.11
51	52	0.9	3.9	550	4072	1589978.86	0.2	3.1	600	5554.96	2163869.07
52	53	1.1	4.6	500	3642.64	1593621.5	-0.3	2.2	600	5569.78	2169438.85
53	54	0.9	4.3	600	6940.01	1600561.51	0.2	3.2	800	9873.7	2179312.55
54	55	1	3.6	660	6559.49	1607121	0.1	3.3	700	9064.22	2188376.77
55	56	0.9	4.9	600	4487.57	1611608.57	0.3	4.2	1000	6744.58	2195121.35
56	57	1.1	3.8	450	3479.36	1615087.93	0.3	3.2	700	5600.27	2200721.62
57	58	1	3.9	550	5708.02	1620795.95	0.3	3.5	1000	8301.82	2209023.44
58	59	0.9	3.7	1000	12276.88	1633072.83	0.4	3.2	1000	16281.57	2225305.01
59	60	1.1	6.9	600	2028.52	1635101.35	0.3	4.1	500	3133.2	2228438.21
60	61	0.8	3.1	500	4525.17	1639626.52	0.3	2.9	700	6545.21	2234983.42
61	62	0.4	3.6	500	4064.89	1643691.41	0.2	3.4	500	5042.56	2240025.98
62	63	0.8	3.2	1000	8637.88	1652329.29	0.4	3	1000	11346.95	2251372.93
63	64	0.9	2.5	1000	10063.5	1662392.79	0.3	2.2	1000	13809.36	2265182.29
64	65	0.9	3.6	500	4124.67	1666517.46	0.3	3.2	600	5995.33	2271177.62
65	66	0.9	2.8	700	7605.2	1674122.66	0.3	2.5	1000	9121.42	2280299.04
66	67	0.3	1.7	1000	14250.76	1688373.42	0.1	1.3	1000	15951.07	2296250.11
67	68	0.3	1.6	1000	14091.61	1702465.03	0.1	1.4	1000	15192.78	2311442.89

Class-I												
Chainage (km)		Observed Dredging Qty w.r.t Sounding Datum					Reduced Dredging Qty w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m)
68	69	0.5	3.1	1000	16488.52	1718953.55	0.2	1.3	1000	19593.34	2331036.23
69	70	0.3	1.3	1000	26407.02	1745360.57	-0.3	1.2	1000	31415.34	2362451.57
70	71	0.1	0.3	1000	36049.7	1781410.27	-0.3	0	1000	46887.12	2409338.69
71	72	0.2	0.4	1000	33656.48	1815066.75	-0.3	0	1000	43656.47	2452995.16
72	73	0.1	0.3	1000	40539.34	1855606.09	-0.3	0	1000	52485.97	2505481.13
73	74	0.2	0.4	1000	33078.93	1888685.02	-0.3	0	1000	42726.74	2548207.87
74	75	0.2	0.5	1000	44649.26	1933334.28	-0.3	0	1000	57892.22	2606100.09
75	76	0.3	0.6	1000	37551.01	1970885.29	-0.3	0	1000	49066.79	2655166.88
76	77	0.2	0.4	1000	40002.3	2010887.59	-0.3	0	1000	51671.01	2706837.89
77	78	0.2	0.5	1000	36084.88	2046972.47	-0.3	0	1000	46628.01	2753465.9
78	79	0.1	0.3	1000	37657.06	2084629.53	-0.3	0	1000	48594.86	2802060.76
79	80	0.3	0.5	1000	39182.84	2123812.37	-0.3	0	1000	50610.89	2852671.65
80	81	0.2	0.4	1000	36639.48	2160451.85	-0.3	0	1000	47914.4	2900586.05
81	82	0.2	0.5	1000	35929.43	2196381.28	-0.3	0	1000	47287.04	2947873.09
82	83	0.3	0.5	1000	40663.6	2237044.88	-0.3	0	1000	52524.16	3000397.25
83	84	0.1	0.2	1000	35000.18	2272045.06	-0.3	0	1000	45208.98	3045606.23
84	85	0.2	0.3	1000	37711.21	2309756.27	-0.3	0	1000	48709.87	3094316.1
85	86	0.1	0.3	1000	39999.55	2349755.82	-0.3	0	1000	51804.29	3146120.39
86	87	0.2	0.3	1000	41042.98	2390798.8	-0.3	0	1000	53013.82	3199134.21
87	88	0.1	0.3	1000	40228.45	2431027.25	-0.3	0	1000	51961.06	3251095.27
88	89	0.2	0.4	1000	40675.21	2471702.46	-0.3	0	1000	52538.73	3303634
89	90	0.1	0.3	1000	39813.18	2511515.64	-0.3	0	1000	51424.7	3355058.7
90	91	0.2	0.4	1000	41315.57	2552831.21	-0.3	0	1000	53365.75	3408424.45
91	92	0.1	0.3	1000	41798.76	2594629.97	-0.3	0	1000	53990.06	3462414.51
92	93	0.2	0.3	1000	41168.44	2635798.41	-0.3	0	1000	53174.9	3515589.41
93	94	0.1	0.3	1000	41276.12	2677074.53	-0.3	0	1000	53314.41	3568903.82
94	95	0.2	0.4	1000	40971.66	2718046.19	-0.3	0	1000	52920.63	3621824.45
95	96	0.1	0.4	1000	39861.02	2757907.21	-0.3	0	1000	51486.53	3673310.98
96	97	0.2	0.3	1000	40267.97	2798175.18	-0.3	0	1000	52197.52	3725508.5
97	98	0.2	0.4	1000	40135.24	2838310.42	-0.3	0	1000	51841.48	3777349.98
98	99	0.1	0.3	1000	41968.88	2880279.3	-0.3	0	1000	54209.26	3831559.24
99	100	0.2	0.4	1000	39414	2919693.3	-0.3	0	1000	51164.57	3882723.81
100	101	0.1	0.3	1000	41621.69	2961314.99	-0.3	0	1000	53761.11	3936484.92
101	102	0.2	0.3	1000	41302.26	3002617.25	-0.3	0	1000	53348.06	3989832.98
102	103	0.1	0.3	1000	41294.83	3043912.08	-0.3	0	1000	53338.76	4043171.74
103	104	0.2	0.5	1000	40809.06	3084721.14	-0.3	0	1000	52711.09	4095882.83
104	105	0.1	0.3	1000	41751.04	3126472.18	-0.3	0	1000	54237.57	4150120.4
105	106	0.2	0.4	1000	37901.2	3164373.38	-0.3	0	1000	48955.82	4199076.22
106	107	0.1	0.3	1000	41897.3	3206270.68	-0.3	0	1000	54117.26	4253193.48

Class-I												
Chainage (km)		Observed Dredging Qty w.r.t Sounding Datum					Reduced Dredging Qty w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m)
107	108	0.2	0.3	1000	38185.2	3244455.88	-0.3	0	1000	49575.11	4302768.59
108	109	0.1	0.4	1000	42264.52	3286720.4	-0.3	0	1000	54591.57	4357360.16
109	110	0.2	0.3	1000	40174.1	3326894.5	-0.3	0	1000	51896.11	4409256.27
110	111	0.2	0.3	1000	42514.71	3369409.21	-0.3	0	1000	54914.51	4464170.78
111	112	0.2	0.4	1000	43130.29	3412539.5	-0.3	0	1000	55708.91	4519879.69
112	113	0.1	0.3	1000	43038.68	3455578.18	-0.3	0	1000	55591.55	4575471.24
113	114	0.2	0.3	1000	43052.39	3498630.57	-0.3	0	1000	55608.75	4631079.99
114	115	0.3	0.5	1000	41794.67	3540425.24	-0.3	0	1000	53984.66	4685064.65
115	116	0.2	0.4	1000	43021.95	3583447.19	-0.3	0	1000	55570.06	4740634.71
116	117	0.3	0.4	1000	40561.48	3624008.67	-0.3	0	1000	52723.62	4793358.33
117	118	0.1	0.3	1000	39085.27	3663093.94	-0.3	0	1000	50858.76	4844217.09
118	119	0.2	0.3	1000	42790.83	3705884.77	-0.3	0	1000	55270.99	4899488.08
119	120	0.2	0.3	1000	42826.21	3748710.98	-0.3	0	1000	55317.05	4954805.13
120	121	0.1	0.3	1000	42835.15	3791546.13	-0.3	0	1000	55328.74	5010133.87
121	122	0.2	0.3	1000	41799.92	3833346.05	-0.3	0	1000	53991.58	5064125.45
122	123	0.1	0.3	1000	42495.25	3875841.3	-0.3	0	1000	54889.39	5119014.84
123	124	0.2	0.3	1000	42014.91	3917856.21	-0.3	0	1000	54268.74	5173283.58
124	125	0.1	0.3	1000	42397.35	3960253.56	-0.3	0	1000	54762.44	5228046.02
125	126	0.2	0.4	1000	41739.59	4001993.15	-0.3	0	1000	54077.89	5282123.91
126	127	0.3	0.5	1000	35447.53	4037440.68	-0.3	0	1000	46574.88	5328698.79
127	128	0.1	0.3	1000	37649.4	4075090.08	-0.3	0	1000	48630.12	5377328.91
128	129	0.2	0.3	1000	42908.83	4117998.91	-0.3	0	1000	55423.85	5432752.76
129	130	0.1	0.3	1000	42233.36	4160232.27	-0.3	0	1000	54551.21	5487303.97
130	131	0.2	0.3	1000	42931.33	4203163.6	-0.3	0	1000	55452.49	5542756.46
131	132	0.2	0.4	1000	41554.76	4244718.36	-0.3	0	1000	53674.45	5596430.91
132	133	0.1	0.3	1000	41868.83	4286587.19	-0.3	0	1000	54080.73	5650511.64
133	134	0.2	0.3	1000	42519.58	4329106.77	-0.3	0	1000	54920.77	5705432.41
134	135.165	0.1	0.3	1000	43155.45	4372262.22	-0.3	0	1000	55742.47	5761174.88
Total				128610	4372262.22		Total		131200	5761174.88	

Table 20- Minimum & Maximum depth per km wise (Class-I)

Class-II:-

Class-II											
Chainage (km)		Observed Dredging Qty w.r.t Sounding datum					Reduced Dredging Qty w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
0	1	0.2	0.5	1000	52887.37	52887.37	-0.3	0	1000	65908.98	65908.98
1	2	0.1	0.3	1000	64508.82	117396.19	-0.3	0	1000	80390.66	146299.64
2	3	0.2	0.5	1000	61327.1	178723.29	-0.3	0	1000	76425.47	222725.11
3	4	0.1	0.3	1000	60337.81	239061.1	-0.3	0	1000	75192.63	297917.74
4	5	0.2	0.5	1000	64267.92	303329.02	-0.3	0	1000	80090.57	378008.31
5	6	0.3	0.5	1000	63749.35	367078.37	-0.3	0	1000	79443.9	457452.21
6	7	0.4	2.1	1000	28040.98	395119.35	0.1	1.2	1000	60713.96	518166.17
7	8	0.5	1.4	1000	25906.82	421026.17	-0.3	0.2	1000	70374.39	588540.56
8	9	0.5	2.1	1000	21098.09	442124.26	-0.1	1.2	1000	63317.12	651857.68
9	10	0.8	2.9	1000	8211.87	450336.13	0.1	2	1000	41416.74	693274.42
10	11	0.6	3.1	1000	44031.3	494367.43	0.1	2.1	1000	61599.43	754873.85
11	12	0.1	0.3	1000	64741.19	559108.62	-0.3	0	1000	80679.87	835553.72
12	13	0.2	0.3	1000	62452.38	621561	-0.3	0	1000	77828.15	913381.87
13	14	0.1	0.3	1000	59690.08	681251.08	-0.3	0	1000	75526.07	988907.94
14	15	0.2	0.3	1000	62580.81	743831.89	-0.3	0	1000	78134.37	1067042.31
15	16	0.2	0.4	1000	68598.32	812430.21	-0.3	0	1000	85809.22	1152851.53
16	17	0.2	0.4	1000	51752.54	864182.75	-0.3	0	1000	67087.15	1219938.68
17	18	0.3	0.5	1000	62949.36	927132.11	-0.3	0	1000	78447.64	1298386.32
18	19	0.1	0.3	1000	63323.98	990456.09	-0.3	0	1000	79417.14	1377803.46
19	20	0.1	0.3	1000	62847.11	1053303.2	-0.3	0	1000	78319.4	1456122.86
20	21	0.2	0.4	1000	46560.18	1099863.38	-0.3	0	1000	60062.85	1516185.71
21	22	0.1	0.3	1000	63368.35	1163231.73	-0.3	0	1000	78982.83	1595168.54
22	23	0.2	0.3	1000	62892.63	1226124.36	-0.3	0	1000	78376.77	1673545.31
23	24	0.1	0.3	1000	64949.53	1291073.89	-0.3	0	1000	80973.21	1754518.52
24	25	0.2	0.4	1000	69861.52	1360935.41	-0.3	0	1000	87061.23	1841579.75
25	26	0.1	0.3	1000	64700.02	1425635.43	-0.3	0	1000	80629.21	1922208.96
26	27	0.2	0.3	1000	64325.87	1489961.3	-0.3	0	1000	80162.29	2002371.25
27	28	0.3	0.4	1000	56422.46	1546383.76	-0.3	0	1000	70313.73	2072684.98
28	29	0.1	0.3	1000	62020.18	1608403.94	-0.3	0	1000	77600.84	2150285.82
29	30	0.2	0.4	1000	63388.65	1671792.59	-0.3	0	1000	79182.76	2229468.58
30	31	0.1	0.3	1000	62547.6	1734340.19	-0.3	0	1000	77967.43	2307436.01
31	32	0.2	0.4	1000	63914.43	1798254.62	-0.3	0	1000	79650.09	2387086.1
32	33	0.1	0.3	1000	64238.65	1862493.27	-0.3	0	1000	80053.54	2467139.64
33	34	0.2	0.4	1000	64651.96	1927145.23	-0.3	0	1000	80652.49	2547792.13
34	35	0.2	0.3	1000	62884.19	1990029.42	-0.3	0	1000	78366.22	2626158.35
35	36	0.1	0.3	1000	64265.24	2054294.66	-0.3	0	1000	80215.3	2706373.65
36	37	0.2	0.5	1000	64393.73	2118688.39	-0.3	0	1000	80246.65	2786620.3

Class-II											
Chainage (km)		Observed Dredging Qty w.r.t Sounding datum					Reduced Dredging Qty w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
37	38	0.5	2.3	1000	36013.54	2154701.93	0.3	2	1000	41774.67	2828394.97
38	39	0.3	1.3	1000	46359.28	2201061.21	0.1	1.1	1000	54754.5	2883149.47
39	40	0.5	1.2	1000	69761.35	2270822.56	-0.3	0.4	1000	86214.39	2969363.86
40	41	0.6	2.3	1000	19177.12	2289999.68	0.1	2.2	1000	24940.04	2994303.9
41	42	1.1	2.5	1000	31756.71	2321756.39	0.8	2.1	1000	40521.92	3034825.82
42	43	0.8	1.7	1000	39121.18	2360877.57	0.4	1.3	1000	49167.59	3083993.41
43	44	0.6	2.5	1000	38199.24	2399076.81	0.3	2	1000	46861.17	3130854.58
44	45	0.5	3.1	1000	28289.26	2427366.07	0.2	2.5	1000	35564.85	3166419.43
45	46	0.7	3.2	1000	26409.08	2453775.15	0.3	2.6	1000	34098.93	3200518.36
46	47	0.6	2.7	1000	22147.79	2475922.94	0.3	2.3	1000	28596.55	3229114.91
47	48	0.5	2.5	1000	23738.14	2499661.08	0.2	2.2	1000	30066.38	3259181.29
48	49	0.7	3.2	1000	23567.77	2523228.85	0.2	2.2	1000	29861.58	3289042.87
49	50	0.5	2.5	1000	20404.67	2543633.52	0.2	2.2	1000	25952.84	3314995.71
50	51	0.4	3.5	1000	15231.72	2558865.24	0.1	3.2	1000	19606.59	3334602.3
51	52	0.8	4.1	1000	11744.97	2570610.21	0.2	3.2	1000	15230.77	3349833.07
52	53	1.1	4.6	1000	13401.19	2584011.4	-0.3	2.2	1000	18017.31	3367850.38
53	54	0.8	4.3	1000	16122.04	2600133.44	0.2	3.2	1000	21326.18	3389176.56
54	55	1	3.6	1000	16558.8	2616692.24	0.1	3.4	1000	21838.11	3411014.67
55	56	0.8	4.9	1000	14798.72	2631490.96	0.2	4.2	1000	19782.79	3430797.46
56	57	1.1	3.9	1000	13564.58	2645055.54	0.3	3.3	1000	18465.15	3449262.61
57	58	1	4.1	1000	15191.41	2660246.95	0.3	3.5	1000	20637.32	3469899.93
58	59	0.8	3.8	1000	22463.73	2682710.68	0.3	3.3	1000	28374.07	3498274
59	60	1	6.9	1000	8036.63	2690747.31	0.3	4.2	1000	10675.82	3508949.82
60	61	0.7	3.1	1000	15455.14	2706202.45	0.3	3.1	1000	19722.16	3528671.98
61	62	0.4	3.7	1000	13739.9	2719942.35	0.2	3.4	1000	16628.41	3545300.39
62	63	0.7	3.3	1000	21114.68	2741057.03	0.3	3.1	1000	26040.67	3571341.06
63	64	0.8	2.6	1000	21504.72	2762561.75	0.3	2.2	1000	27839.13	3599180.19
64	65	0.8	3.7	1000	16596.12	2779157.87	0.3	3.3	1000	21828.07	3621008.26
65	66	0.8	2.9	1000	22559.93	2801717.8	0.3	2.6	1000	26385.76	3647394.02
66	67	0.3	1.7	1000	30624.79	2832342.59	0.1	1.3	1000	34280.46	3681674.48
67	68	0.3	1.6	1000	31081.11	2863423.7	0.1	1.4	1000	34368.53	3716043.01
68	69	0.5	3.1	1000	33192.99	2896616.69	0.2	1.3	1000	38586.8	3754629.81
69	70	0.3	1.4	1000	44855.99	2941472.68	-0.3	1.3	1000	52440.93	3807070.74
70	71	0.1	0.3	1000	55491.36	2996964.04	-0.3	0	1000	69430.94	3876501.68
71	72	0.2	0.4	1000	51590	3048554.04	-0.3	0	1000	64459.01	3940960.69
72	73	0.1	0.3	1000	61968.5	3110522.54	-0.3	0	1000	77330.44	4018291.13
73	74	0.2	0.4	1000	50384.76	3160907.3	-0.3	0	1000	62789.5	4081080.63
74	75	0.2	0.5	1000	68394.96	3229302.26	-0.3	0	1000	85421.84	4166502.47
75	76	0.3	0.6	1000	58043.46	3287345.72	-0.3	0	1000	72869.26	4239371.73
76	77	0.2	0.4	1000	60931.56	3348277.28	-0.3	0	1000	75934.6	4315306.33
77	78	0.2	0.5	1000	54993.31	3403270.59	-0.3	0	1000	68548.88	4383855.21

Class-II											
Chainage (km)		Observed Dredging Qty w.r.t Sounding datum					Reduced Dredging Qty w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
78	79	0.1	0.3	1000	56962.25	3460232.84	-0.3	0	1000	70941.4	4454796.61
79	80	0.3	0.5	1000	59674.89	3519907.73	-0.3	0	1000	74367.57	4529164.18
80	81	0.2	0.4	1000	56866.26	3576773.99	-0.3	0	1000	71362.02	4600526.2
81	82	0.2	0.5	1000	56209.49	3632983.48	-0.3	0	1000	70823.96	4671350.16
82	83	0.3	0.5	1000	61939.46	3694922.94	-0.3	0	1000	77188.19	4748538.35
83	84	0.1	0.2	1000	53311.55	3748234.49	-0.3	0	1000	66436.66	4814975.01
84	85	0.2	0.3	1000	57436.96	3805671.45	-0.3	0	1000	71577.34	4886552.35
85	86	0.1	0.3	1000	61174.55	3866846	-0.3	0	1000	76352.3	4962904.65
86	87	0.2	0.3	1000	62514.64	3929360.64	-0.3	0	1000	77905.7	5040810.35
87	88	0.1	0.3	1000	61269.66	3990630.3	-0.3	0	1000	76354.59	5117164.94
88	89	0.2	0.4	1000	61957.63	4052587.93	-0.3	0	1000	77210.64	5194375.58
89	90	0.1	0.3	1000	60640.44	4113228.37	-0.3	0	1000	75569.78	5269945.36
90	91	0.2	0.4	1000	62930.08	4176158.45	-0.3	0	1000	78423.45	5348368.81
91	92	0.1	0.3	1000	63664.69	4239823.14	-0.3	0	1000	79339.12	5427707.93
92	93	0.2	0.3	1000	62697.68	4302520.82	-0.3	0	1000	78134.37	5505842.3
93	94	0.1	0.3	1000	62868.81	4365389.63	-0.3	0	1000	78346.67	5584188.97
94	95	0.2	0.4	1000	62401.17	4427790.8	-0.3	0	1000	77764.41	5661953.38
95	96	0.1	0.4	1000	60713.87	4488504.67	-0.3	0	1000	75661.22	5737614.6
96	97	0.2	0.3	1000	61607.37	4550112.04	-0.3	0	1000	76984.56	5814599.16
97	98	0.2	0.4	1000	61135.84	4611247.88	-0.3	0	1000	76185.74	5890784.9
98	99	0.1	0.3	1000	63927.98	4675175.86	-0.3	0	1000	79666.12	5970451.02
99	100	0.2	0.4	1000	60490.45	4735666.31	-0.3	0	1000	75598.1	6046049.12
100	101	0.1	0.3	1000	63395.7	4799062.01	-0.3	0	1000	79003.35	6125052.47
101	102	0.2	0.3	1000	62908.87	4861970.88	-0.3	0	1000	78396.5	6203448.97
102	103	0.1	0.3	1000	62898.62	4924869.5	-0.3	0	1000	78384.39	6281833.36
103	104	0.2	0.5	1000	62158.6	4987028.1	-0.3	0	1000	77461.69	6359295.05
104	105	0.1	0.3	1000	63820.17	5050848.27	-0.3	0	1000	79866.94	6439161.99
105	106	0.2	0.4	1000	57729.27	5108577.54	-0.3	0	1000	71941.36	6511103.35
106	107	0.1	0.3	1000	63817.33	5172394.87	-0.3	0	1000	79527.95	6590631.3
107	108	0.2	0.3	1000	58834.17	5231229.04	-0.3	0	1000	74060.49	6664691.79
108	109	0.1	0.4	1000	64373.96	5295603	-0.3	0	1000	80222.68	6744914.47
109	110	0.2	0.3	1000	61251.75	5356854.75	-0.3	0	1000	76342.49	6821256.96
110	111	0.2	0.3	1000	64757.17	5421611.92	-0.3	0	1000	80699.89	6901956.85
111	112	0.2	0.4	1000	65693.54	5487305.46	-0.3	0	1000	81866.58	6983823.43
112	113	0.1	0.3	1000	65554.4	5552859.86	-0.3	0	1000	81693.75	7065517.18
113	114	0.2	0.3	1000	65573.43	5618433.29	-0.3	0	1000	81717.52	7147234.7
114	115	0.3	0.5	1000	63660.2	5682093.49	-0.3	0	1000	79333.3	7226568
115	116	0.2	0.4	1000	65528.95	5747622.44	-0.3	0	1000	81662.28	7308230.28
116	117	0.3	0.4	1000	62255.11	5809877.55	-0.3	0	1000	78144.25	7386374.53
117	118	0.1	0.3	1000	60069.9	5869947.45	-0.3	0	1000	75475.97	7461850.5
118	119	0.2	0.3	1000	65175.74	5935123.19	-0.3	0	1000	81221.43	7543071.93

Class-II											
Chainage (km)		Observed Dredging Qty w.r.t Sounding datum					Reduced Dredging Qty w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
119	120	0.2	0.3	1000	65232.35	6000355.54	-0.3	0	1000	81291.94	7624363.87
120	121	0.1	0.3	1000	65244.52	6065600.06	-0.3	0	1000	81307.42	7705671.29
121	122	0.2	0.3	1000	63667.87	6129267.93	-0.3	0	1000	79343.16	7785014.45
122	123	0.1	0.3	1000	64725.99	6193993.92	-0.3	0	1000	80661.23	7865675.68
123	124	0.2	0.3	1000	63995.25	6257989.17	-0.3	0	1000	79750.5	7945426.18
124	125	0.1	0.3	1000	64575.78	6322564.95	-0.3	0	1000	80474.44	8025900.62
125	126	0.2	0.4	1000	63870.52	6386435.47	-0.3	0	1000	79733.95	8105634.57
126	127	0.3	0.5	1000	56843.62	6443279.09	-0.3	0	1000	71817.67	8177452.24
127	128	0.1	0.3	1000	57345.64	6500624.73	-0.3	0	1000	71464.09	8248916.33
128	129	0.2	0.3	1000	65356.66	6565981.39	-0.3	0	1000	81447.16	8330363.49
129	130	0.1	0.3	1000	64329.01	6630310.4	-0.3	0	1000	80166.33	8410529.82
130	131	0.2	0.3	1000	65390.52	6695700.92	-0.3	0	1000	81489.57	8492019.39
131	132	0.2	0.4	1000	63290.31	6758991.23	-0.3	0	1000	78872.57	8570891.96
132	133	0.1	0.3	1000	63776.56	6822767.79	-0.3	0	1000	79478.32	8650370.28
133	134	0.2	0.3	1000	64765.26	6887533.05	-0.3	0	1000	80709.7	8731079.98
134	135.165	0.1	0.3	1000	65732.17	6953265.22	-0.3	0	1000	81915.25	8812995.23
Total				135000	6953265.22		Total		135000	8812995.23	

Table 21 - Minimum & Maximum depth per km wise (Class II)

Class-III:-

Class-III											
Chainage (km)		Observed Dredging Qty w.r.t Sounding Datum					Reduced Dredging Qty Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
0	1	0.2	0.5	1000	79939.04	79939.04	-0.3	0	1000	96095.49	96095.49
1	2	0.1	0.3	1000	97498.59	177437.63	-0.3	0	1000	117204.32	213299.81
2	3	0.2	0.5	1000	92690.96	270128.59	-0.3	0	1000	111424.5	324724.31
3	4	0.1	0.3	1000	91202.22	361330.81	-0.3	0	1000	109633.39	434357.7
4	5	0.2	0.5	1000	97134.2	458465.01	-0.3	0	1000	116765.99	551123.69
5	6	0.3	0.5	1000	96350.42	554815.43	-0.3	0	1000	115823.81	666947.5
6	7	0.3	2.1	1000	53401.45	608216.88	0.1	1.3	1000	94879.19	761826.69
7	8	0.4	1.4	1000	54688.45	662905.33	-0.3	0.2	1000	106897.88	868724.57
8	9	0.4	2.2	1000	46422.1	709327.43	-0.1	1.3	1000	98799.02	967523.59
9	10	0.7	3.2	1000	25866.99	735194.42	0.1	2.1	1000	72738.9	1040262.49
10	11	0.5	3.1	1000	71783.65	806978.07	0.1	2.1	1000	95716.17	1135978.66
11	12	0.1	0.3	1000	97850.25	904828.32	-0.3	0	1000	117626.48	1253605.14
12	13	0.2	0.3	1000	94389.8	999218.12	-0.3	0	1000	113466.65	1367071.79
13	14	0.1	0.3	1000	92306.5	1091524.62	-0.3	0	1000	111983.88	1479055.67
14	15	0.2	0.3	1000	94846.01	1186370.63	-0.3	0	1000	114144.72	1593200.39
15	16	0.2	0.4	1000	104413.97	1290784.6	-0.3	0	1000	125872.71	1719073.1
16	17	0.2	0.4	1000	83650.57	1374435.17	-0.3	0	1000	102844.33	1821917.43
17	18	0.3	0.5	1000	95141.74	1469576.91	-0.3	0	1000	114371.19	1936288.62
18	19	0.1	0.3	1000	96533.32	1566110.23	-0.3	0	1000	116602.29	2052890.91
19	20	0.1	0.3	1000	94987.33	1661097.56	-0.3	0	1000	114185.49	2167076.4
20	21	0.2	0.4	1000	74398.27	1735495.83	-0.3	0	1000	91243	2258319.4
21	22	0.1	0.3	1000	95799.59	1831295.42	-0.3	0	1000	115173.8	2373493.2
22	23	0.2	0.3	1000	95055.02	1926350.44	-0.3	0	1000	114266.49	2487759.69
23	24	0.1	0.3	1000	98235.1	2024585.54	-0.3	0	1000	118116.53	2605876.22
24	25	0.2	0.4	1000	105587.41	2130172.95	-0.3	0	1000	126927.5	2732803.72
25	26	0.1	0.3	1000	97787.49	2227960.44	-0.3	0	1000	117550.93	2850354.65
26	27	0.2	0.3	1000	97222.16	2325182.6	-0.3	0	1000	116871.56	2967226.21
27	28	0.3	0.4	1000	85277.37	2410459.97	-0.3	0	1000	102513.09	3069739.3
28	29	0.1	0.3	1000	94383.9	2504843.87	-0.3	0	1000	113715.34	3183454.64
29	30	0.2	0.4	1000	96195.21	2601039.08	-0.3	0	1000	115790.92	3299245.56
30	31	0.1	0.3	1000	94578.76	2695617.84	-0.3	0	1000	113711.25	3412956.81
31	32	0.2	0.4	1000	96601.09	2792218.93	-0.3	0	1000	116125.15	3529081.96
32	33	0.1	0.3	1000	97093.51	2889312.44	-0.3	0	1000	116716.73	3645798.69
33	34	0.2	0.4	1000	97888.3	2987200.74	-0.3	0	1000	117740.52	3763539.21
34	35	0.2	0.3	1000	95041.78	3082242.52	-0.3	0	1000	114250.42	3877789.63
35	36	0.1	0.3	1000	97396.48	3179639	-0.3	0	1000	117185.86	3994975.49
36	37	0.2	0.6	1000	97303.68	3276942.68	-0.3	0	1000	116957.53	4111933.02

Class-III											
Chainage (km)		Observed Dredging Qty w.r.t Sounding Datum					Reduced Dredging Qty Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
37	38	0.5	2.3	1000	66675.28	3343617.96	0.3	2.1	1000	75694.58	4187627.6
38	39	0.3	1.3	1000	76098.06	3419716.02	0.1	1.2	1000	87874.22	4275501.82
39	40	0.4	1.3	1000	107197.05	3526913.07	-0.3	0.5	1000	127998.83	4403500.65
40	41	0.5	2.3	1000	37758.53	3564671.6	0.1	2.3	1000	45980.26	4449480.91
41	42	1	2.5	1000	59066.41	3623738.01	0.6	2.2	1000	71229.67	4520710.58
42	43	0.7	1.7	1000	66955.36	3690693.37	0.4	1.4	1000	80272.54	4600983.12
43	44	0.5	2.5	1000	68247.32	3758940.69	0.3	2.1	1000	80363.31	4681346.43
44	45	0.4	3.2	1000	53549.97	3812490.66	0.2	2.6	1000	63989.5	4745335.93
45	46	0.6	3.2	1000	51461.78	3863952.44	0.3	2.6	1000	62492.12	4807828.05
46	47	0.5	2.7	1000	45889.88	3909842.32	0.3	2.3	1000	55706.03	4863534.08
47	48	0.4	2.6	1000	49678.7	3959521.02	0.2	2.3	1000	59305.88	4922839.96
48	49	0.6	3.2	1000	51766.8	4011287.82	0.2	2.3	1000	61685.34	4984525.3
49	50	0.5	2.6	1000	45398.75	4056686.57	0.2	2.3	1000	54420.37	5038945.67
50	51	0.3	3.5	1000	40194.35	4096880.92	0.1	3.2	1000	47902.7	5086848.37
51	52	0.7	3.8	1000	29806.68	4126687.6	0.2	3.3	1000	36616.91	5123465.28
52	53	1	4.6	1000	32488.94	4159176.54	-0.3	2.2	1000	40487.78	5163953.06
53	54	0.7	4.3	1000	35554.27	4194730.81	0.2	3.3	1000	43903.02	5207856.08
54	55	0.9	3.7	1000	38375.66	4233106.47	0.1	3.5	1000	47169.18	5255025.26
55	56	0.8	4.9	1000	36236.66	4269343.13	0.2	4.3	1000	44475.32	5299500.58
56	57	1	4	1000	36882.72	4306225.85	0.2	3.3	1000	45495.69	5344996.27
57	58	0.8	4.2	1000	38317.32	4344543.17	0.2	3.6	1000	47662.74	5392659.01
58	59	0.7	3.9	1000	42773	4387316.17	0.2	3.4	1000	51500.16	5444159.17
59	60	1	6.9	1000	24745.89	4412062.06	0.3	4.2	1000	29890.64	5474049.81
60	61	0.6	3.2	1000	42141.12	4454203.18	0.2	3.2	1000	50080.76	5524130.57
61	62	0.3	3.8	1000	38292.61	4492495.79	0.2	3.4	1000	44848.41	5568978.98
62	63	0.6	3.4	1000	45942.94	4538438.73	0.3	3.2	1000	54099.62	5623078.6
63	64	0.7	2.7	1000	45873.5	4584312.23	0.3	2.3	1000	56234.46	5679313.06
64	65	0.7	3.7	1000	42212.52	4626524.75	0.3	3.4	1000	51339.63	5730652.69
65	66	0.7	3.1	1000	50523.28	4677048.03	0.3	2.6	1000	57426.93	5788079.62
66	67	0.3	1.8	1000	59698.9	4736746.93	0.1	1.4	1000	66380.13	5854459.75
67	68	0.3	1.7	1000	61890.75	4798637.68	0.1	1.4	1000	68531.22	5922990.97
68	69	0.5	3.2	1000	60502.68	4859140.36	0.2	1.3	1000	68746.15	5991737.12
69	70	0.3	1.5	1000	73964.25	4933104.61	-0.3	1.3	1000	84695.16	6076432.28
70	71	0.1	0.3	1000	84470.88	5017575.49	-0.3	0	1000	101769.13	6178201.41
71	72	0.2	0.4	1000	78318.19	5095893.68	-0.3	0	1000	94284.33	6272485.74
72	73	0.1	0.3	1000	93876.37	5189770.05	-0.3	0	1000	112936.15	6385421.89
73	74	0.2	0.4	1000	76153.81	5265923.86	-0.3	0	1000	91543.92	6476965.81
74	75	0.2	0.5	1000	103752.79	5369676.65	-0.3	0	1000	124878.31	6601844.12
75	76	0.3	0.6	1000	88723.27	5458399.92	-0.3	0	1000	107151.06	6708995.18
76	77	0.2	0.4	1000	92094.6	5550494.52	-0.3	0	1000	110709.29	6819704.47

Class-III											
Chainage (km)		Observed Dredging Qty w.r.t Sounding Datum					Reduced Dredging Qty Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
77	78	0.2	0.5	1000	83148.11	5633642.63	-0.3	0	1000	99966.25	6919670.72
78	79	0.1	0.3	1000	85658.79	5719301.42	-0.3	0	1000	102920.15	7022590.87
79	80	0.3	0.5	1000	90202.5	5809503.92	-0.3	0	1000	108432.89	7131023.76
80	81	0.2	0.4	1000	86972.64	5896476.56	-0.3	0	1000	104958.36	7235982.12
81	82	0.2	0.5	1000	86568.16	5983044.72	-0.3	0	1000	104702.11	7340684.23
82	83	0.3	0.5	1000	93612.17	6076656.89	-0.3	0	1000	112531.62	7453215.85
83	84	0.1	0.2	1000	80577.85	6157234.74	-0.3	0	1000	96862.99	7550078.84
84	85	0.2	0.3	1000	86767.19	6244001.93	-0.3	0	1000	104246.55	7654325.39
85	86	0.1	0.3	1000	92701.37	6336703.3	-0.3	0	1000	111533.36	7765858.75
86	87	0.2	0.3	1000	94483.94	6431187.24	-0.3	0	1000	113580.05	7879438.8
87	88	0.1	0.3	1000	92610.89	6523798.13	-0.3	0	1000	111327.7	7990766.5
88	89	0.2	0.4	1000	93641.29	6617439.42	-0.3	0	1000	112567.17	8103333.67
89	90	0.1	0.3	1000	91653.45	6709092.87	-0.3	0	1000	110176.98	8213510.65
90	91	0.2	0.4	1000	95113.48	6804206.35	-0.3	0	1000	114336.96	8327847.61
91	92	0.1	0.3	1000	96223.85	6900430.2	-0.3	0	1000	115671.44	8443519.05
92	93	0.2	0.3	1000	94767.69	6995197.89	-0.3	0	1000	113920.59	8557439.64
93	94	0.1	0.3	1000	95019.41	7090217.3	-0.3	0	1000	114224.05	8671663.69
94	95	0.2	0.4	1000	94310.45	7184527.75	-0.3	0	1000	113372.24	8785035.93
95	96	0.1	0.4	1000	91764.23	7276291.98	-0.3	0	1000	110309.67	8895345.6
96	97	0.2	0.3	1000	93549.83	7369841.81	-0.3	0	1000	112628.08	9007973.68
97	98	0.2	0.4	1000	92393.04	7462234.85	-0.3	0	1000	111066.71	9119040.39
98	99	0.1	0.3	1000	96611.79	7558846.64	-0.3	0	1000	116138.98	9235179.37
99	100	0.2	0.4	1000	91875.04	7650721.68	-0.3	0	1000	110619.85	9345799.22
100	101	0.1	0.3	1000	95816.2	7746537.88	-0.3	0	1000	115181.55	9460980.77
101	102	0.2	0.3	1000	95081.31	7841619.19	-0.3	0	1000	114298.01	9575278.78
102	103	0.1	0.3	1000	95065.43	7936684.62	-0.3	0	1000	114278.96	9689557.74
103	104	0.2	0.5	1000	93946.33	8030630.95	-0.3	0	1000	112933.8	9802491.54
104	105	0.1	0.3	1000	96746.27	8127377.22	-0.3	0	1000	116674.35	9919165.89
105	106	0.2	0.4	1000	87253.54	8214630.76	-0.3	0	1000	104887.95	10024053.84
106	107	0.1	0.3	1000	96451.27	8311082.03	-0.3	0	1000	115945.1	10139998.94
107	108	0.2	0.3	1000	90583.22	8401665.25	-0.3	0	1000	109632.02	10249630.96
108	109	0.1	0.4	1000	97296.6	8498961.85	-0.3	0	1000	116960.94	10366591.9
109	110	0.2	0.3	1000	92698.79	8591660.64	-0.3	0	1000	111455.89	10478047.79
110	111	0.2	0.3	1000	97873.68	8689534.32	-0.3	0	1000	117654.39	10595702.18
111	112	0.2	0.4	1000	99289.3	8788823.62	-0.3	0	1000	119356.57	10715058.75
112	113	0.1	0.3	1000	99078.52	8887902.14	-0.3	0	1000	119103.45	10834162.2
113	114	0.2	0.3	1000	99109.76	8987011.9	-0.3	0	1000	119140.97	10953303.17
114	115	0.3	0.5	1000	96215.91	9083227.81	-0.3	0	1000	115662.13	11068965.3
115	116	0.2	0.4	1000	99040.25	9182268.06	-0.3	0	1000	119057.16	11188022.46
116	117	0.3	0.4	1000	95098.6	9277366.66	-0.3	0	1000	114877.14	11302899.6

Class-III											
Chainage (km)		Observed Dredging Qty w.r.t Sounding Datum					Reduced Dredging Qty Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
117	118	0.1	0.3	1000	91901.09	9369267.75	-0.3	0	1000	111079.92	11413979.52
118	119	0.2	0.3	1000	98508.74	9467776.49	-0.3	0	1000	118417.66	11532397.18
119	120	0.2	0.3	1000	98589.29	9566365.78	-0.3	0	1000	118515.23	11650912.41
120	121	0.1	0.3	1000	98610.05	9664975.83	-0.3	0	1000	118539.8	11769452.21
121	122	0.2	0.3	1000	96226.42	9761202.25	-0.3	0	1000	115674.44	11885126.65
122	123	0.1	0.3	1000	97827.64	9859029.89	-0.3	0	1000	117599.63	12002726.28
123	124	0.2	0.3	1000	96722.99	9955752.88	-0.3	0	1000	116271.65	12118997.93
124	125	0.1	0.3	1000	97602.23	10053355.11	-0.3	0	1000	117328.02	12236325.95
125	126	0.2	0.4	1000	96822.24	10150177.35	-0.3	0	1000	116504.41	12352830.36
126	127	0.3	0.5	1000	89049.27	10239226.62	-0.3	0	1000	108406.11	12461236.47
127	128	0.1	0.3	1000	86670.4	10325897.02	-0.3	0	1000	104187.6	12565424.07
128	129	0.2	0.3	1000	98779.75	10424676.77	-0.3	0	1000	118743.41	12684167.48
129	130	0.1	0.3	1000	97223.6	10521900.37	-0.3	0	1000	116873.62	12801041.1
130	131	0.2	0.3	1000	98833.06	10620733.43	-0.3	0	1000	118807.83	12919848.93
131	132	0.2	0.4	1000	95656.86	10716390.29	-0.3	0	1000	114990.47	13034839.4
132	133	0.1	0.3	1000	96391.2	10812781.49	-0.3	0	1000	115872.67	13150712.07
133	134	0.2	0.3	1000	97878.68	10910660.17	-0.3	0	1000	117661.01	13268373.08
134	135.165	0.1	0.3	1000	99347.88	11010008.05	-0.3	0	1000	119427.03	13387800.11
Total				135000	11010008.05		Total		135000	13387800.11	

Table 22 - Minimum & Maximum depth per km wise (Class III)

Class - IV:-

Class-IV											
Chainage (km)		Observed Dredging Qty w.r.t sounding Datum					Reduced Dredging Qty w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
0	1	0.2	0.5	1000	96457.28	96457.28	-0.3	0	1000	113337.22	113337.22
1	2	0.1	0.3	1000	117644.8	214102.08	-0.3	0	1000	138232.81	251570.03
2	3	0.2	0.5	1000	111843.86	325945.94	-0.3	0	1000	131415.43	382985.46
3	4	0.1	0.3	1000	110051.73	435997.67	-0.3	0	1000	129308.15	512293.61
4	5	0.2	0.5	1000	117205.32	553202.99	-0.3	0	1000	137715.54	650009.15
5	6	0.3	0.5	1000	116257.91	669460.9	-0.3	0	1000	136602.43	786611.58
6	7	0.3	2.1	1000	71895.16	741356.06	0.1	1.3	1000	115415.59	902027.17
7	8	0.3	1.5	1000	74482.79	815838.85	-0.3	0.3	1000	128037.9	1030065.07
8	9	0.3	2.1	1000	64405.29	880244.14	-0.1	1.4	1000	119881.93	1149947
9	10	0.6	3.2	1000	41047.06	921291.2	0.1	2.2	1000	92657.86	1242604.86
10	11	0.5	3.2	1000	89175.54	1010466.74	0.1	2.2	1000	115719.52	1358324.38
11	12	0.1	0.3	1000	118067.97	1128534.71	-0.3	0	1000	138729.76	1497054.14
12	13	0.2	0.3	1000	113893.64	1242428.35	-0.3	0	1000	133824.66	1630878.8
13	14	0.1	0.3	1000	112384.32	1354812.67	-0.3	0	1000	132943.06	1763821.86
14	15	0.2	0.3	1000	114571.88	1469384.55	-0.3	0	1000	134736.1	1898557.96
15	16	0.2	0.4	1000	126352.48	1595737.03	-0.3	0	1000	148788.06	2047346.02
16	17	0.2	0.4	1000	103270.52	1699007.55	-0.3	0	1000	123341.8	2170687.82
17	18	0.3	0.5	1000	114801.5	1813809.05	-0.3	0	1000	134891.97	2305579.79
18	19	0.1	0.3	1000	117051.45	1930860.5	-0.3	0	1000	138021.27	2443601.06
19	20	0.1	0.3	1000	114615.99	2045476.49	-0.3	0	1000	134673.67	2578274.73
20	21	0.2	0.4	1000	91600.7	2137077.19	-0.3	0	1000	109204.68	2687479.41
21	22	0.1	0.3	1000	115608.51	2252685.7	-0.3	0	1000	135850.41	2823329.82
22	23	0.2	0.3	1000	114697.61	2367383.31	-0.3	0	1000	134769.02	2958098.84
23	24	0.1	0.3	1000	118560.88	2485944.19	-0.3	0	1000	139332.29	3097431.13
24	25	0.2	0.4	1000	127406.53	2613350.72	-0.3	0	1000	149702.16	3247133.29
25	26	0.1	0.3	1000	117993.44	2731344.16	-0.3	0	1000	138642.05	3385775.34
26	27	0.2	0.3	1000	117311.66	2848655.82	-0.3	0	1000	137841.21	3523616.55
27	28	0.3	0.4	1000	102897.93	2951553.75	-0.3	0	1000	120904.61	3644521.16
28	29	0.1	0.3	1000	114149.32	3065703.07	-0.3	0	1000	134346.19	3778867.35
29	30	0.2	0.4	1000	116230.66	3181933.73	-0.3	0	1000	136704.11	3915571.46
30	31	0.1	0.3	1000	114138.74	3296072.47	-0.3	0	1000	134127.73	4049699.19
31	32	0.2	0.4	1000	116562.23	3412634.7	-0.3	0	1000	136960.58	4186659.77
32	33	0.1	0.3	1000	117157.95	3529792.65	-0.3	0	1000	137659.75	4324319.52
33	34	0.2	0.4	1000	118185.68	3647978.33	-0.3	0	1000	138926.63	4463246.15
34	35	0.2	0.3	1000	114680.2	3762658.53	-0.3	0	1000	134749.12	4597995.27
35	36	0.1	0.3	1000	117629.68	3880288.21	-0.3	0	1000	138305.74	4736301.01

Class-IV											
Chainage (km)		Observed Dredging Qty w.r.t sounding Datum					Reduced Dredging Qty w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
36	37	0.2	0.7	1000	117406.95	3997695.16	0.2	2.1	1000	137933.88	4874234.89
37	38	0.5	2.4	1000	86110.55	4083805.71	0.1	1.3	1000	95942.35	4970177.24
38	39	0.3	1.4	1000	94418.29	4178224	-0.3	0.6	1000	106983.94	5077161.18
39	40	0.3	1.3	1000	130082.66	4308306.66	0.1	2.3	1000	151887.9	5229049.08
40	41	0.4	2.3	1000	50254.46	4358561.12	0.1	2.3	1000	59015.83	5288064.91
41	42	1	2.5	1000	76557.15	4435118.27	0.3	1.3	1000	89450.59	5377515.5
42	43	0.6	1.8	1000	84557.38	4519675.65	0.3	1.5	1000	98641.31	5476156.81
43	44	0.4	2.5	1000	87067.77	4606743.42	0.2	2.6	1000	99986.01	5576142.82
44	45	0.3	3.3	1000	70322.08	4677065.5	0.1	2.7	1000	81516.76	5657659.58
45	46	0.5	3.2	1000	67538.33	4744603.83	0.3	2.7	1000	79364.29	5737023.87
46	47	0.4	2.7	1000	61737.29	4806341.12	0.2	2.4	1000	72400.89	5809424.76
47	48	0.3	2.7	1000	66478.06	4872819.18	0.1	2.4	1000	76919.39	5886344.15
48	49	0.5	3.3	1000	69741.26	4942560.44	0.2	2.4	1000	80500.91	5966845.06
49	50	0.4	2.6	1000	61736.82	5004297.26	0.1	2.4	1000	71577.69	6038422.75
50	51	0.3	3.5	1000	56390.98	5060688.24	0.1	3.3	1000	64942.57	6103365.32
51	52	0.6	3.9	1000	41854.35	5102542.59	0.1	3.3	1000	49940.73	6153306.05
52	53	0.9	4.7	1000	44785.45	5147328.04	-0.3	2.3	1000	53877.38	6207183.43
53	54	0.6	4.4	1000	48688.61	5196016.65	0.1	3.5	1000	58001.08	6265184.51
54	55	0.8	3.8	1000	52939.49	5248956.14	0.1	3.6	1000	62627.09	6327811.6
55	56	0.7	5	1000	50671.66	5299627.8	0.2	4.3	1000	59718.66	6387530.26
56	57	0.9	4.1	1000	52044.86	5351672.66	0.2	3.3	1000	61611.41	6449141.67
57	58	0.7	4.3	1000	53890.88	5405563.54	0.2	3.6	1000	64351.99	6513493.66
58	59	0.6	4.1	1000	57214.06	5462777.6	0.1	3.5	1000	66679.77	6580173.43
59	60	0.9	6.9	1000	36546.21	5499323.81	0.2	4.2	1000	42360.78	6622534.21
60	61	0.4	3.2	1000	61696.38	5561020.19	0.2	3.4	1000	70582.01	6693116.22
61	62	0.3	3.9	1000	55861.13	5616881.32	0.2	3.4	1000	63289.88	6756406.1
62	63	0.5	3.5	1000	63688.37	5680569.69	0.3	3.3	1000	72695.29	6829101.39
63	64	0.5	2.7	1000	62267.66	5742837.35	0.2	2.4	1000	73648.66	6902750.05
64	65	0.6	3.7	1000	58365.33	5801202.68	0.2	3.4	1000	68426.88	6971176.93
65	66	0.6	3.2	1000	69389.12	5870591.8	0.1	2.7	1000	77090.04	7048266.97
66	67	0.3	2.1	1000	78915.41	5949507.21	0.1	1.5	1000	86412.89	7134679.86
67	68	0.3	1.8	1000	81775.99	6031283.2	0.1	1.4	1000	89274.91	7223954.77
68	69	0.4	3.3	1000	78113.16	6109396.36	0.1	1.3	1000	87067.21	7311021.98
69	70	0.3	1.5	1000	92192.91	6201589.27	-0.3	1.3	1000	103656.93	7414678.91
70	71	0.1	0.3	1000	102168.63	6303757.9	-0.3	0	1000	120242.14	7534921.05
71	72	0.2	0.4	1000	94642.33	6398400.23	-0.3	0	1000	111323.7	7646244.75
72	73	0.1	0.3	1000	113363.56	6511763.79	-0.3	0	1000	133276.95	7779521.7
73	74	0.2	0.4	1000	91890.97	6603654.76	-0.3	0	1000	107971.1	7887492.8
74	75	0.2	0.5	1000	125350.84	6729005.6	-0.3	0	1000	147422.39	8034915.19
75	76	0.3	0.6	1000	107554.21	6836559.81	-0.3	0	1000	126819.61	8161734.8

Class-IV											
Chainage (km)		Observed Dredging Qty w.r.t sounding Datum					Reduced Dredging Qty w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
76	77	0.2	0.4	1000	111127.53	6947687.34	-0.3	0	1000	130575.81	8292310.61
77	78	0.2	0.5	1000	100345.6	7048032.94	-0.3	0	1000	117917.29	8410227.9
78	79	0.1	0.3	1000	103298.7	7151331.64	-0.3	0	1000	121315.86	8531543.76
79	80	0.3	0.5	1000	108841.46	7260173.1	-0.3	0	1000	127887.98	8659431.74
80	81	0.2	0.4	1000	105355.88	7365528.98	-0.3	0	1000	124146.54	8783578.28
81	82	0.2	0.5	1000	105110.59	7470639.57	-0.3	0	1000	124056.52	8907634.8
82	83	0.3	0.5	1000	112956.33	7583595.9	-0.3	0	1000	132723.8	9040358.6
83	84	0.1	0.2	1000	97227.7	7680823.6	-0.3	0	1000	114242.46	9154601.06
84	85	0.2	0.3	1000	104616.76	7785440.36	-0.3	0	1000	122832.25	9277433.31
85	86	0.1	0.3	1000	111954.02	7897394.38	-0.3	0	1000	131628.73	9409062.04
86	87	0.2	0.3	1000	114009.81	8011404.19	-0.3	0	1000	133961.04	9543023.08
87	88	0.1	0.3	1000	111745.42	8123149.61	-0.3	0	1000	131299.96	9674323.04
88	89	0.2	0.4	1000	112990.66	8236140.27	-0.3	0	1000	132764.06	9807087.1
89	90	0.1	0.3	1000	110592.45	8346732.72	-0.3	0	1000	129945.6	9937032.7
90	91	0.2	0.4	1000	114766.38	8461499.1	-0.3	0	1000	134850.21	10071882.91
91	92	0.1	0.3	1000	116107.06	8577606.16	-0.3	0	1000	136425.4	10208308.31
92	93	0.2	0.3	1000	114348.89	8691955.05	-0.3	0	1000	134359.32	10342667.63
93	94	0.1	0.3	1000	114653.01	8806608.06	-0.3	0	1000	134717.38	10477385.01
94	95	0.2	0.4	1000	113799.92	8920407.98	-0.3	0	1000	133714.35	10611099.36
95	96	0.1	0.4	1000	110725.79	9031133.77	-0.3	0	1000	130101.78	10741201.14
96	97	0.2	0.3	1000	113057.13	9144190.9	-0.3	0	1000	132990.46	10874191.6
97	98	0.2	0.4	1000	111486.3	9255677.2	-0.3	0	1000	130996.04	11005187.64
98	99	0.1	0.3	1000	116577.2	9372254.4	-0.3	0	1000	136978.12	11142165.76
99	100	0.2	0.4	1000	111039.45	9483293.85	-0.3	0	1000	130623.83	11272789.59
100	101	0.1	0.3	1000	115614.88	9598908.73	-0.3	0	1000	135847.23	11408636.82
101	102	0.2	0.3	1000	114728.58	9713637.31	-0.3	0	1000	134806	11543442.82
102	103	0.1	0.3	1000	114707.79	9828345.1	-0.3	0	1000	134781.51	11678224.33
103	104	0.2	0.5	1000	113357.67	9941702.77	-0.3	0	1000	133195.39	11811419.72
104	105	0.1	0.3	1000	117097.02	10058799.79	-0.3	0	1000	137935.41	11949355.13
105	106	0.2	0.4	1000	105283.04	10164082.83	-0.3	0	1000	123706.67	12073061.8
106	107	0.1	0.3	1000	116381.51	10280464.34	-0.3	0	1000	136747.76	12209809.56
107	108	0.2	0.3	1000	110058.83	10390523.17	-0.3	0	1000	129961.17	12339770.73
108	109	0.1	0.4	1000	117401.74	10507924.91	-0.3	0	1000	137946.44	12477717.17
109	110	0.2	0.3	1000	111874.8	10619799.71	-0.3	0	1000	131479.87	12609197.04
110	111	0.2	0.3	1000	118098.39	10737898.1	-0.3	0	1000	138764.86	12747961.9
111	112	0.2	0.4	1000	119806.21	10857704.31	-0.3	0	1000	140772.03	12888733.93
112	113	0.1	0.3	1000	119551.54	10977255.85	-0.3	0	1000	140472.37	13029206.3
113	114	0.2	0.3	1000	119589.14	11096844.99	-0.3	0	1000	140516.08	13169722.38
114	115	0.3	0.5	1000	116098.12	11212943.11	-0.3	0	1000	136414.99	13306137.37
115	116	0.2	0.4	1000	119505.78	11332448.89	-0.3	0	1000	140418.98	13446556.35

Class-IV											
Chainage (km)		Observed Dredging Qty w.r.t sounding Datum					Reduced Dredging Qty w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
116	117	0.3	0.4	1000	115308.98	11447757.87	-0.3	0	1000	135980.87	13582537.22
117	118	0.1	0.3	1000	111494.76	11559252.63	-0.3	0	1000	131539.83	13714077.05
118	119	0.2	0.3	1000	118864.61	11678117.24	-0.3	0	1000	139665.29	13853742.34
119	120	0.2	0.3	1000	118961.9	11797079.14	-0.3	0	1000	139779.89	13993522.23
120	121	0.1	0.3	1000	118986.28	11916065.42	-0.3	0	1000	139808.94	14133331.17
121	122	0.2	0.3	1000	116111.53	12032176.95	-0.3	0	1000	136430.27	14269761.44
122	123	0.1	0.3	1000	118042.26	12150219.21	-0.3	0	1000	138699.58	14408461.02
123	124	0.2	0.3	1000	116708.99	12266928.2	-0.3	0	1000	137132.54	14545593.56
124	125	0.1	0.3	1000	117770.04	12384698.24	-0.3	0	1000	138379.38	14683972.94
125	126	0.2	0.4	1000	116945.96	12501644.2	-0.3	0	1000	137510.06	14821483
126	127	0.3	0.5	1000	108850.9	12610495.1	-0.3	0	1000	129391.18	14950874.18
127	128	0.1	0.3	1000	104579.93	12715075.03	-0.3	0	1000	122881.21	15073755.39
128	129	0.2	0.3	1000	119191.3	12834266.33	-0.3	0	1000	140049.48	15213804.87
129	130	0.1	0.3	1000	117313.53	12951579.86	-0.3	0	1000	137843.6	15351648.47
130	131	0.2	0.3	1000	119257.12	13070836.98	-0.3	0	1000	140126.71	15491775.18
131	132	0.2	0.4	1000	115424.75	13186261.73	-0.3	0	1000	135624.18	15627399.36
132	133	0.1	0.3	1000	116309.93	13302571.66	-0.3	0	1000	136663.73	15764063.09
133	134	0.2	0.3	1000	118103.64	13420675.3	-0.3	0	1000	138772.23	15902835.32
134	135.165	0.1	0.3	1000	119877.03	13540552.33	-0.3	0	1000	140855.26	16043690.58
Total				135000	13540552.33		Total		135000	16043690.58	

Table 23- Minimum & Maximum depth per km wise (Class IV)

Annexure-3 Details of collected Water level of different gauge stations w.r.t. MSL (CWC, Irrigation, Ports, Maritime Boards, Observed stations during survey etc.) – Table indicating Chainage (zero at downstream) and following:-

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
08.11.15	GS (TP)-5	69.74	24 hrs	1.45	20.35	21.8	21.8	0.000
24.01.16	GS (TP)-4	57.846	24 hrs	1.47	20.1	21.57	21.57	0.000
23.01.16	GS (TP)-3	51.38	24 hrs	1.49	18.36	19.85	19.85	0.000
23.01.16	GS(TP)-2	38.056	24 hrs	1.51	16.07	17.58	17.58	0.000
22.01.16	GS (TP)-1	10.263	24 hrs	2.05	10.21	12.26	11.76	-0.500

Table 24- Details of Collected water level at erected gauge stations

Annexure-4 Details of Bathymetric surveys carried out:-

The Bathymetry survey was not carried out the entire stretches of the river due to insufficient layer of water.

Date of Survey	Type of survey	Chainage	
		From (km)	To (km)
08.11.15	Bathymetry Survey	6.350	10.300
24.01.16	Bathymetry Survey	37.00	45.180
23.01.16	Bathymetry Survey	45.180	61.680
22.01.16	Bathymetry Survey	61.680	70.00

Table 25- Details of Bathymetry survey

Annexure-5 Bank Protection along the Bank:-

The bank of the river includes with villages, Roads, Ferry Ghats, Jetty, electric lines, check Dams, RCC and Rail Bridges etc. RCC, Rail and check Dam area are highly protected by concrete pitching. Most of the river stretches are protected by long embankments and Boulder pitching.The Bank of the River Bakreswar-Mayurakshi has been affected by floods, sometimes it become dangerous during the monsoon. As a result, the lower portion or the bank side villages are flooded. The embankment are found near Chainage 4.00 km to 27.00 km, 34.00km to 37.00 km, 47.00 km to 564.00 km. Moram road has been found near Chainage 60.00km to SH-6. Bituminus road has been found near Chainage of 126.00 km to 129.00 km. As much as six check Dams are situated in this river channel. The dams are over flooded during the monsoon.

Annexure-6 Details of Features across the Bank:-

The bank of the river Bakreswar-Mayurakshi includes with villages, Ferry ghat, Irrigation canals and outlets, Rail Bridges, RCC Bridges, electric lines, Check Dams etc. The both side river bank are highly protected by embankment and bolder pitching due to flood, erosion etc. The villagers are also situated near the bank side of the river. Recently different kinds of industries are also located near the bank side of the river. Paddy lands, forest side, Bakreswar Dam, Bakreswar Rail bridges, Bolpur- Labpur RCC Bridge are located in this zone of river. Kopai, Ahmedpur, Chauhatta, Chinpai etc. Railway station are situated in this zone of river, NH-34, NH-60 are located in this zone of river and SH-6, SH-7, SH-11 etc. helps a well communication system in this zone of river.

Annexure-7 Detailed methodology adopted for carrying out survey. Horizontal Control and Vertical Details Control:-

- **Establishment of Horizontal Control:-**

  The Horizontal control for Topography surveys: - High precision RTK DGPS in fix mode is using UHF Radio Modem with IHO accuracy standards, with minimum 24 hours observations at some permanent platform/base on UTM Projection at Zone 45 N using topographic survey Equipments like South (S86T) GNSS RTK, Total Station for conducting the topographic survey.

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

- **Establishment of Vertical Control:-**

  Vertical control from NBM-C-27 is used for the entire survey work. Its value is 14.971 meter w.r.t. MSL has been considered for calculating the vertical levels. Total 15 no. BM was established along the 135.165 km Bakreswar-Mayurakshi River with the reference of NBM-C-27 which is situated near Kalayanpur Ghat beside the Bhagirathi River.

Topography Survey:-

The survey was commenced on 28th September, 2015 and completed on 11th October, 2015. Then the days were autumn season and arrival of winter season. The climate become normal which reached about 20◦ 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 45 N 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 37- Topography Survey Instruments

- **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 Echosounder: 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 38- Bathymetry Survey Instruments

Annexure-8 Photographs 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 :-**

Figure 39- Survey Vessel

- **Positioning System:-**

- 1 no Trimble DGPS system (SPS361)

Figure 40- DGPS Survey 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 41- Echo Sounder Instrument

- **Current Meter:-**

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

Figure 42- Current Meter Reading

- **Calibration:-**

  All the equipments of Machinery details are attached in **Annexure** portion

Annexure-9 Bench Mark Forms:-

BM Name	Northing (m)	Easting (m)	BM Heights above M.S.L (m)	Latitude (N)	Longitude (E)	BM Heights above S.D (m)
BM-1	2651681.840	617482.380	14.846	23°58'21.613"	88°9'17.148"	3.465

Pillar Established by: - B.S Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment: 30.09.15

Station Description :-

Benchmark is located near Dakhin Hijal 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", and BM-1 No. can be seen on the face of the pillar.

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

Life of Station : 15Yrs	Datum: - WGS 84	**ZONE :** 45N

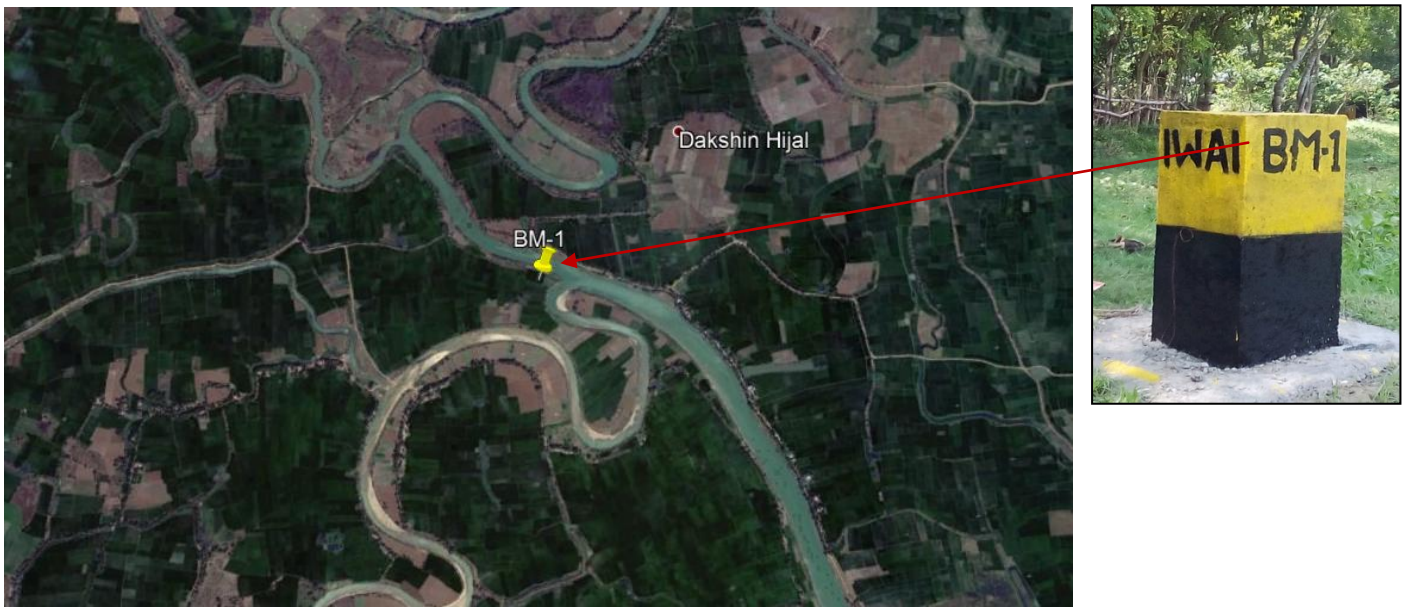


Figure 43- BM Form & Google image view of BM-1

BM Name	Northing (m)	Easting (m)	BM Heights above M.S.L (m)	Latitude (N)	Longitude (E)	BM Heights above S.D (m)
BM-2	2648125.816	613414.263	20.16	23°56'27.071"	88°6'52.224"	8.40

Pillar Established by: - B.S Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment: 30.09.15

Station Description :-

Benchmark is located near Jayrampur 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 30cm X 30cm X 150cm.The pillar extends 60.cms above ground level. Inscription "IWAI", and BM-2 No. can be seen on the face of the pillar.

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

Life of Station : 15Yrs	Datum: - WGS 84	**ZONE :** 45N

Figure 44- BM Form & Google image view of BM-2

BM Name	Northing (m)	Easting (m)	BM Heights above M.S.L (m)	Latitude (N)	Longitude (E)	BM Heights above S.D (m)
BM-3	2643778.117	609750.604	22.500	23°54'6.649"	88°4'41.461"	9.572

Pillar Established by: - B.S Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment: 02.10.15

Station Description :-

Benchmark is located near Ibrahimpur 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", and BM-3 No. can be seen on the face of the pillar.

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

Life of Station : 15Yrs	Datum: - WGS 84	**ZONE :** 45N

Figure 45- BM Form & Google image view of BM-3

BM Name	Northing (m)	Easting (m)	BM Heights above M.S.L (m)	Latitude (N)	Longitude (E)	BM Heights above S.D (m)
BM-4	2638620.849	604851.706	23.935	23°51'20.166"	88°1'46.901"	9.226

Pillar Established by: - B.S Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment: 02.10.15

Station Description :-

Benchmark is located near Sherpur 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", and BM-4 No. can be seen on the face of the pillar.

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

Life of Station : 15Yrs	Datum: - WGS 84	**ZONE :** 45N

Figure 46-BM Form & Google image view of BM-4

BM Name	Northing (m)	Easting (m)	BM Heights above M.S.L (m)	Latitude (N)	Longitude (E)	BM Heights above S.D (m)
BM-5	2636862.426	598577.856	25.975	23°50'24.434"	87°58'4.698"	8.395

Pillar Established by: - B.S Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment – 03.10.15

Station Description :-

Benchmark is located near Tarapur 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", and BM-5 No. can be seen on the face of the pillar.

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

Life of Station : 15Yrs	Datum: - WGS 84	**ZONE :** 45N

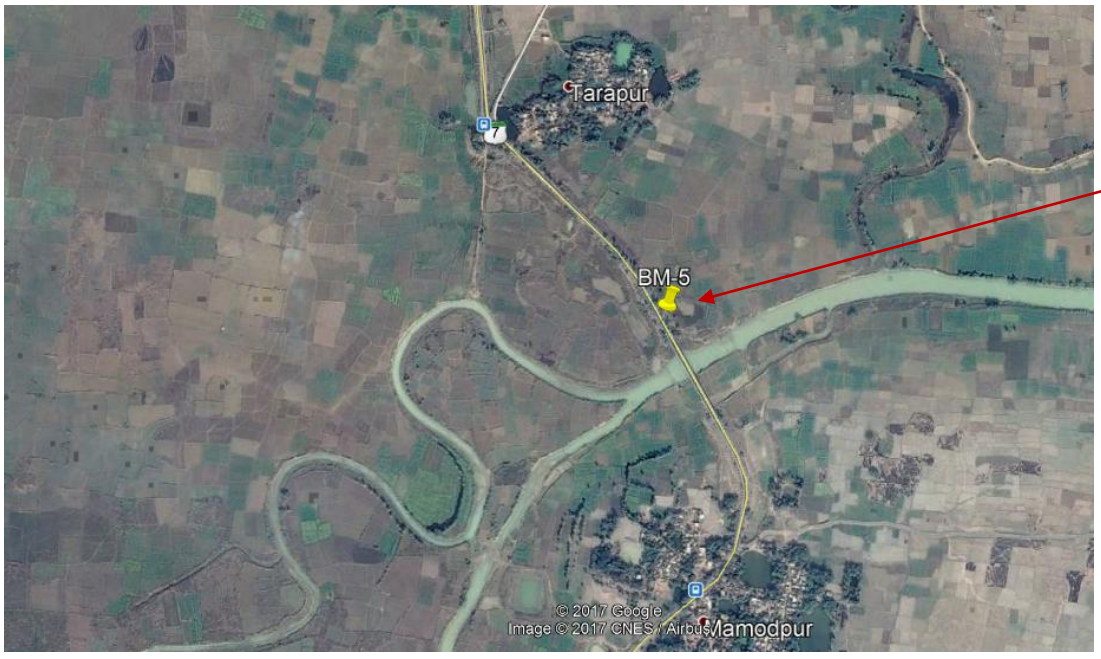


Figure 47-BM Form & Google image view of BM-5

BM Name	Northing (m)	Easting (m)	BM Heights above M.S.L (m)	Latitude (N)	Longitude (E)	BM Heights above S.D (m)
BM-6	2632958.613	591394.696	22.449	23°48'19.046"	87°53'49.927"	2.599

Pillar Established by: - B.S Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment – 03.10.15

Station Description :-

Benchmark is located near Khanpur 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", and BM-6 No. can be seen on the face of the pillar.

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

Life of Station : 15Yrs	Datum: - WGS 84	**ZONE :** 45N

Figure 48-BM Form & Google image view of BM-6

BM Name	Northing (m)	Easting (m)	BM Heights above M.S.L (m)	Latitude (N)	Longitude (E)	BM Heights above S.D (m)
BM-7	2632438.156	588625.034	24.59	23°48'2.685"	87°52'11.943"	3.02

Pillar Established by: - B.S Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment – 04.10.15

Station Description :-

Benchmark is located near Dangal 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", and BM-7 No. can be seen on the face of the pillar.

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

Life of Station : 15Yrs	Datum: - WGS 84	**ZONE :** 45N

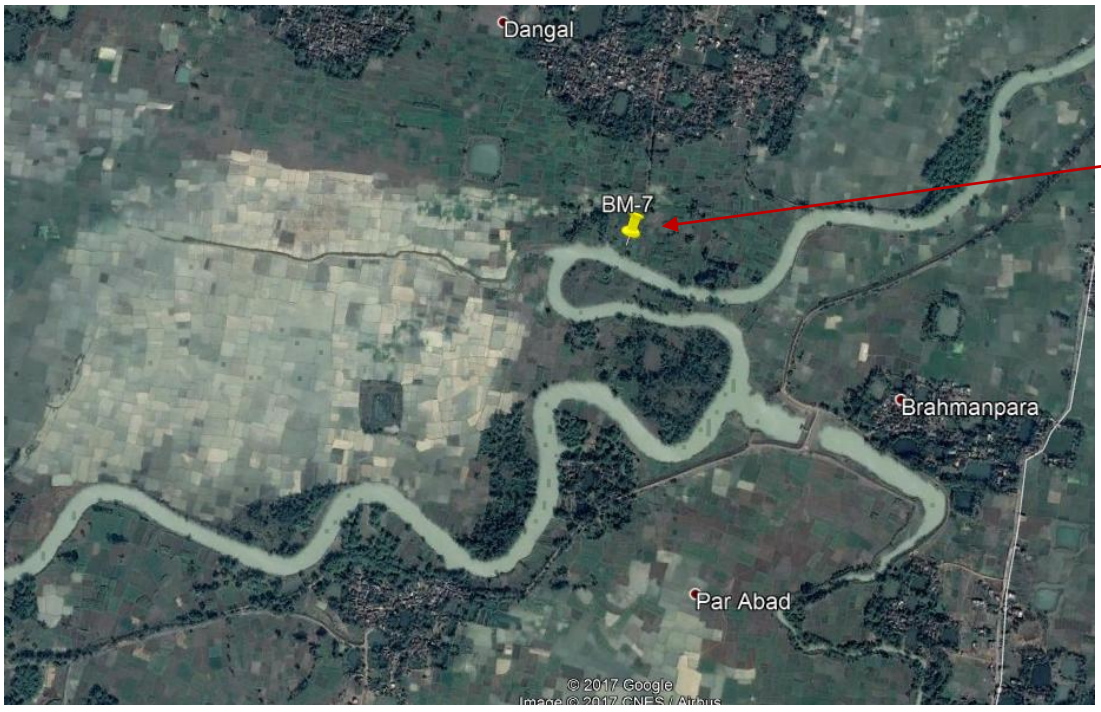


Figure 49-BM Form & Google image view of BM-7

BM Name	Northing (m)	Easting (m)	BM Heights above M.S.L (m)	Latitude (N)	Longitude (E)	BM Heights above S.D (m)
BM-8	2631131.969	582222.955	26.564	23°47'21.445"	87°48'25.454"	4.764

Pillar Established by: - B.S Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment: 06.10.15

Station Description :-

Benchmark is located near Paschim Kadipur 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 30cm X 30cm X 150 cm. The pillar extends 60.cms above ground level. Inscription "IWAI", and BM-8 No. can be seen on the face of the pillar.

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

Life of Station : 15Yrs	Datum: - WGS 84	**ZONE :** 45N

Figure 50- BM Form & Google image view of BM-8

BM Name	Northing (m)	Easting (m)	BM Heights above M.S.L (m)	Latitude (N)	Longitude (E)	BM Heights above S.D (m)
BM-9	2632145.275	579549.141	29.008	23°47'54.878"	87°46'51.175"	6.473

Pillar Established by : - B.S Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment: 06.10.15

Station Description :-

Benchmark is located near Gopalpur 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", and BM-9 No. can be seen on the face of the pillar.

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

Life of Station : 15Yrs	Datum: - WGS 84	**ZONE :** 45N

Figure 51-BM Form & Google image view of BM-9

BM Name	Northing (m)	Easting (m)	BM Heights above M.S.L (m)	Latitude (N)	Longitude (E)	BM Heights above S.D (m)
BM-10	2632051.591	570630.598	33.915	23°47'53.337"	87°41'36.007"	6.424

Pillar Established by: - B.S Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment:07.10.15

Station Description :-

Benchmark is located near Near SH-13.

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", and BM-10 No. can be seen on the face of the pillar.

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

Life of Station : 15Yrs	Datum: - WGS 84	**ZONE :** 45N

Figure 52-BM Form & Google image view of BM-10

BM Name	Northing (m)	Easting (m)	BM Heights above M.S.L (m)	Latitude (N)	Longitude (E)	BM Heights above S.D (m)
BM-11	2633478.994	566610.936	35.53	23°48'40.369"	87°39'14.196"	3.858

Pillar Established by : - B.S Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment – 07.10.15

Station Description :-

Benchmark is located near Dakhin Amarpur 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", and BM-11 No. can be seen on the face of the pillar.

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

Life of Station : 15Yrs	Datum: - WGS 84	**ZONE :** 45N

Figure 53-BM Form & Google image view of BM-11

BM Name	Northing (m)	Easting (m)	BM Heights above M.S.L (m)	Latitude (N)	Longitude (E)	BM Heights above S.D (m)
BM-12	2635341.969	560498.66	45.61	23°49'41.818"	87°35'38.458"	8.021

Pillar Established by: - B.S Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment – 08.10.15

Station Description :-

Benchmark is located near Suri-Bolpur Bridge.

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", and BM-12 No. can be seen on the face of the pillar.

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

Life of Station : 15Yrs	Datum: - WGS 84	**ZONE :** 45N

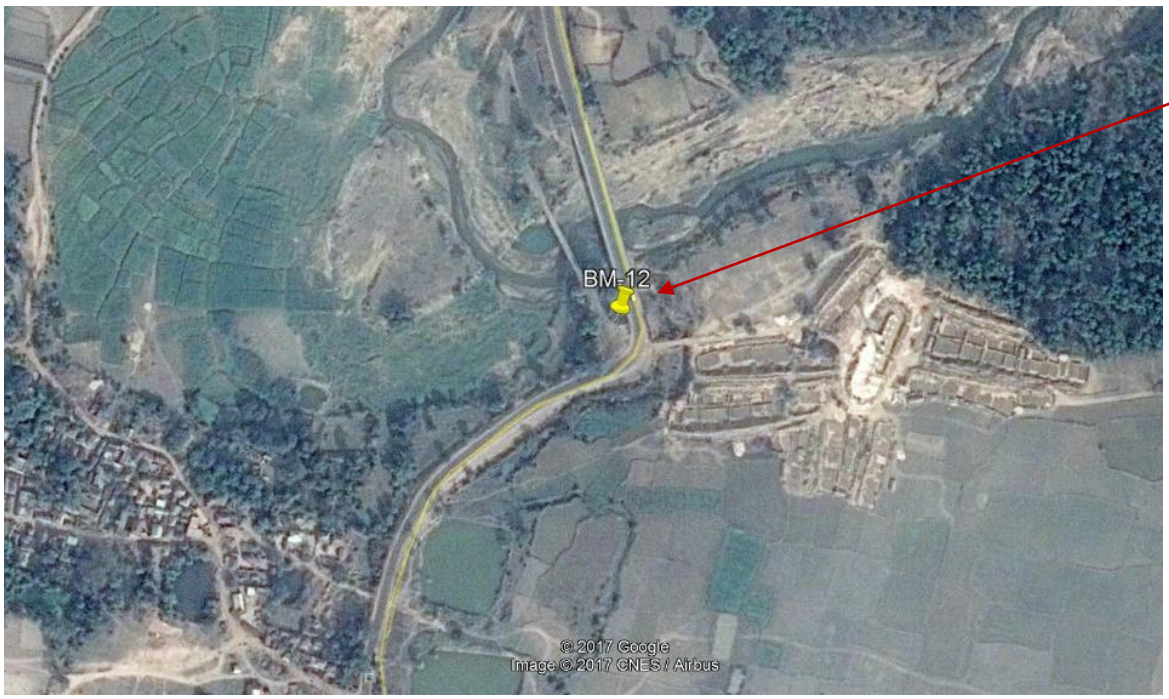


Figure 54-BM Form & Google image view of BM-12

BM Name	Northing (m)	Easting (m)	BM Heights above M.S.L (m)	Latitude (N)	Longitude (E)	BM Heights above S.D (m)
BM-13	2634439.077	553057.784	49.502	23°49'13.411"	87°31'15.336"	3.612

Pillar Established by: - B.S Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment – 09.10.15

Station Description :-

Benchmark is located near Dakhin Metagram village, near the check Dam.

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", and BM-13 No. can be seen on the face of the pillar.

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

Life of Station : 15Yrs	Datum: - WGS 84	**ZONE :** 45N

Figure 55-BM Form & Google image view of BM-13

BM Name	Northing (m)	Easting (m)	BM Heights above M.S.L (m)	Latitude (N)	Longitude (E)	BM Heights above S.D (m)
BM-14	2631380.432	546096.914	64.359	23°47'34.733"	87°27'8.965"	9.09

Pillar Established by: - B.S Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment – 09.10.15

Station Description :-

Benchmark is located near Bishalpur 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", and BM-14 No. can be seen on the face of the pillar.

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

Life of Station : 15Yrs	Datum: - WGS 84	**ZONE :** 45N

Figure 56-BM Form & Google image view of BM-14

BM Name	Northing	Easting	BM Heights above M.S.L (m)	Latitude (N)	Longitude (E)	BM Heights above S.D (m)
BM-15	2634931.86	542537.625	72.671	23°49'30.556"	87°25'3.559"	9.924

Pillar Established by: - B.S Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment: 10.10.15

Station Description :-

Benchmark is located near Chinpai village, close to the Nil Nirjan Dam area.

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", and BM-15 No. can be seen on the face of the pillar.

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

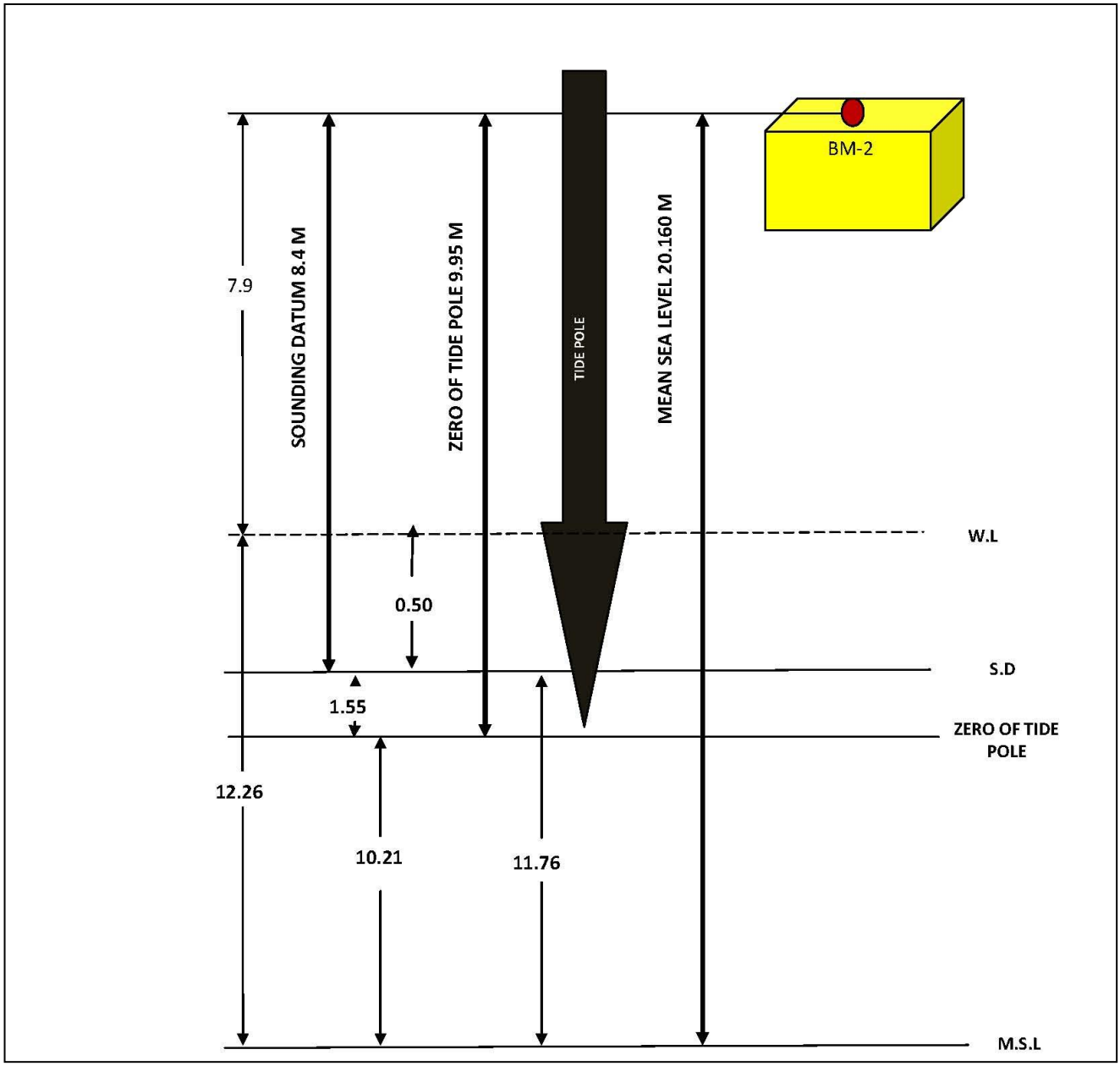
Life of Station : 15Yrs	Datum: - WGS 84	**ZONE :** 45 N

Figure 57- BM Form & Google image view of BM-15

Annexure-10 Levelling Calculations and Levelling Diagram:-

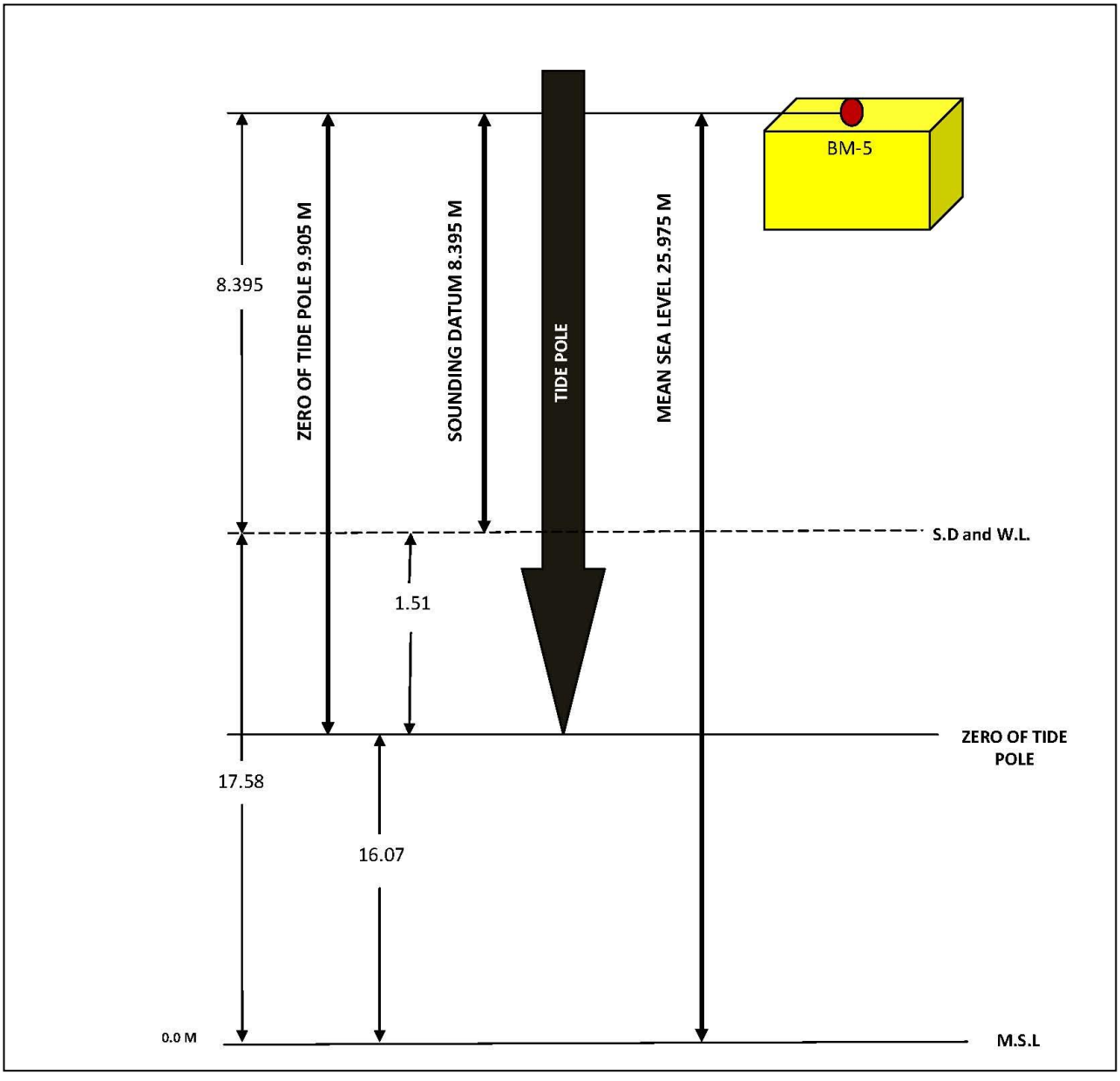
Levelling from BM-2 to GS-1

BS	IS	FS	RISE (+)	FALL (-)	RL	REMARKS
0.455					20.160	BM-2
0.425		2.991		2.536	17.624	
0.350		3.115		2.690	14.934	
		3.024		2.674	12.260	GS-1



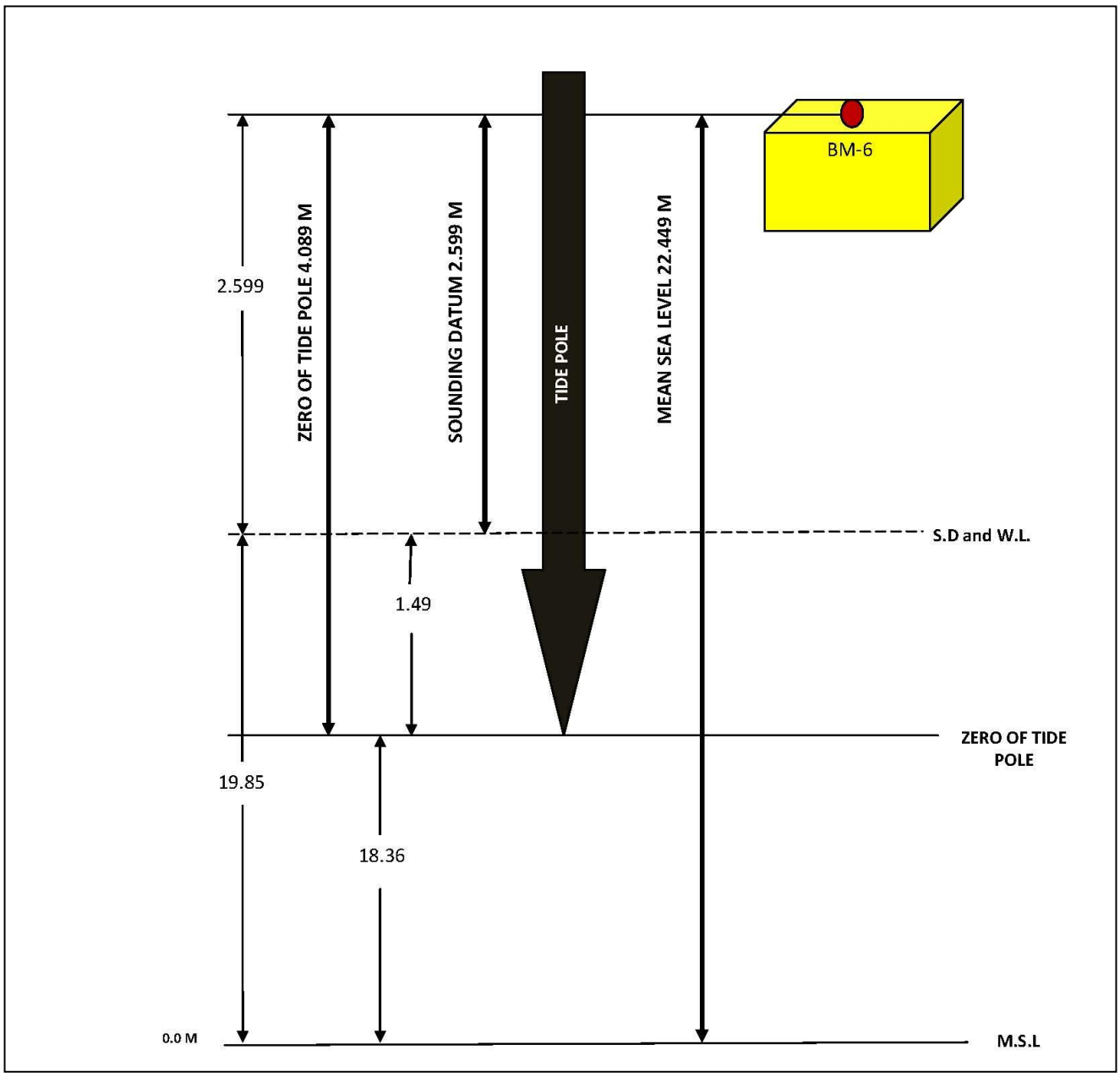
Levelling from BM-5 to GS-2

BS	IS	FS	RISE (+)	FALL (-)	RL	REMARKS
0.368					25.975	BM-5
0.675		2.253		1.885	24.090	
0.482		2.670		1.995	22.095	
0.861		2.350		1.868	20.227	
0.582		1.980		1.119	19.108	
		2.110		1.528	17.580	GS-2



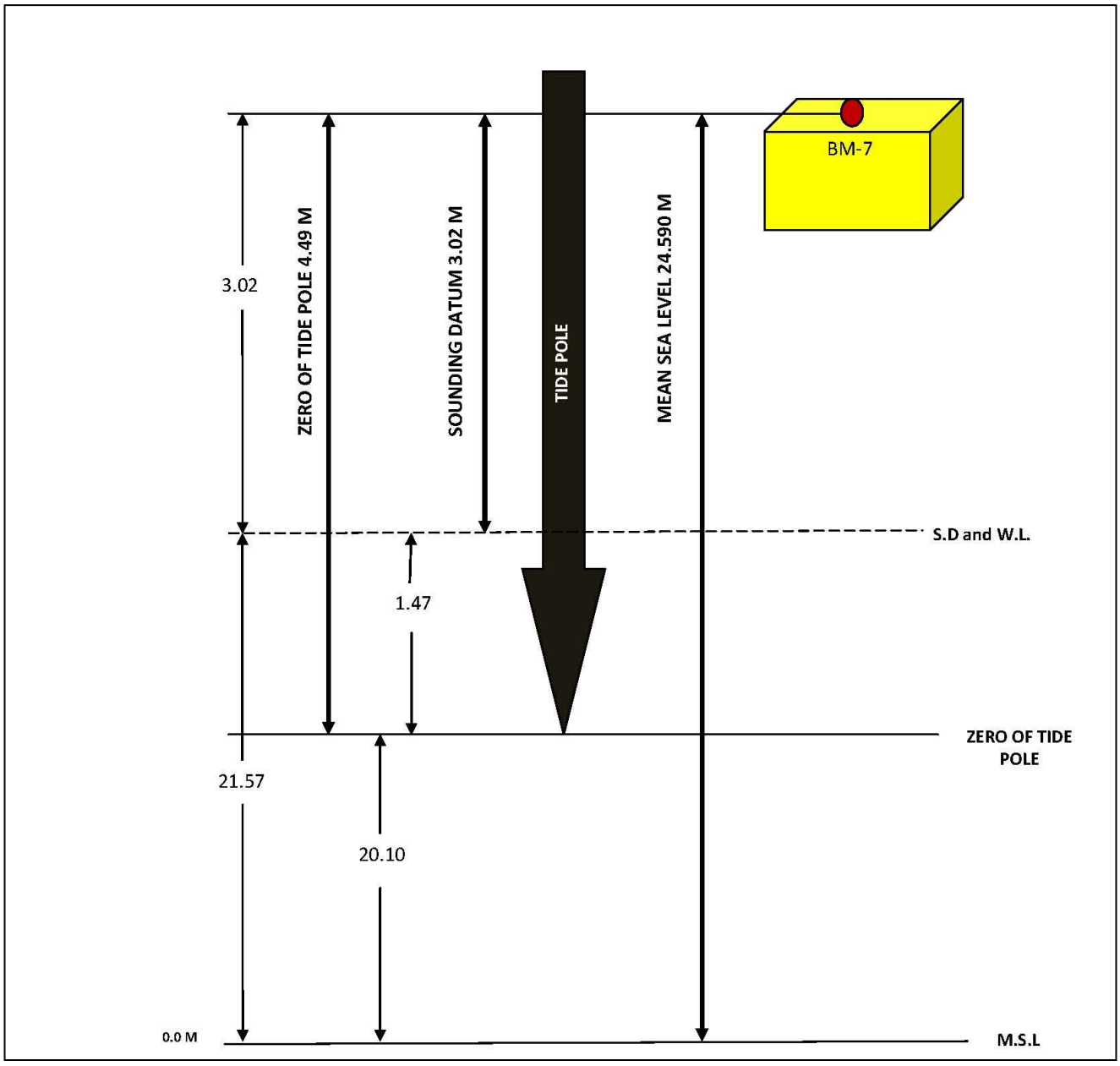
Levelling from BM-6 to GS-3

BS	IS	FS	RISE (+)	FALL (-)	RL	REMARKS
0.470					22.449	BM-6
0.660		1.680		1.210	21.239	
0.978		1.580		0.920	20.319	
		1.447		0.469	19.850	GS-3



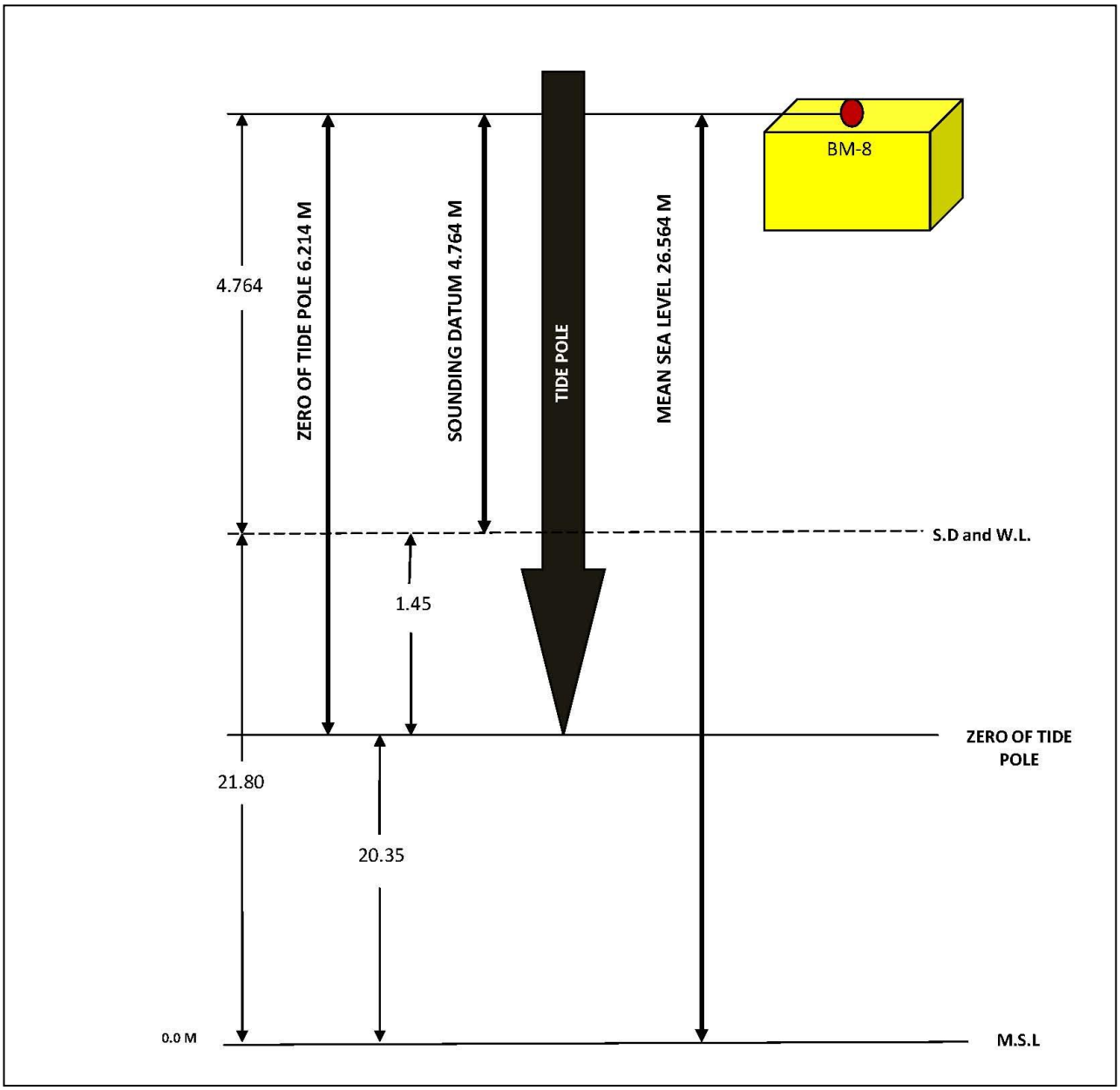
Levelling from BM-7 to GS-4

BS	IS	FS	RISE (+)	FALL (-)	RL	REMARKS
0.640					24.590	BM-7
0.452		2.135		1.495	23.095	
		1.977		1.525	21.570	GS-4



Levelling from BM-8 to GS-5

BS	IS	FS	RISE (+)	FALL (-)	RL	REMARKS
0.324					26.564	BM-8
0.480		1.850		1.526	25.038	
0.655		2.085		1.605	23.433	
		2.288		1.633	21.800	GS-5



Annexure-11 Soil Sample Report:

RESULTS OF TEST OF SOIL SAMPLES

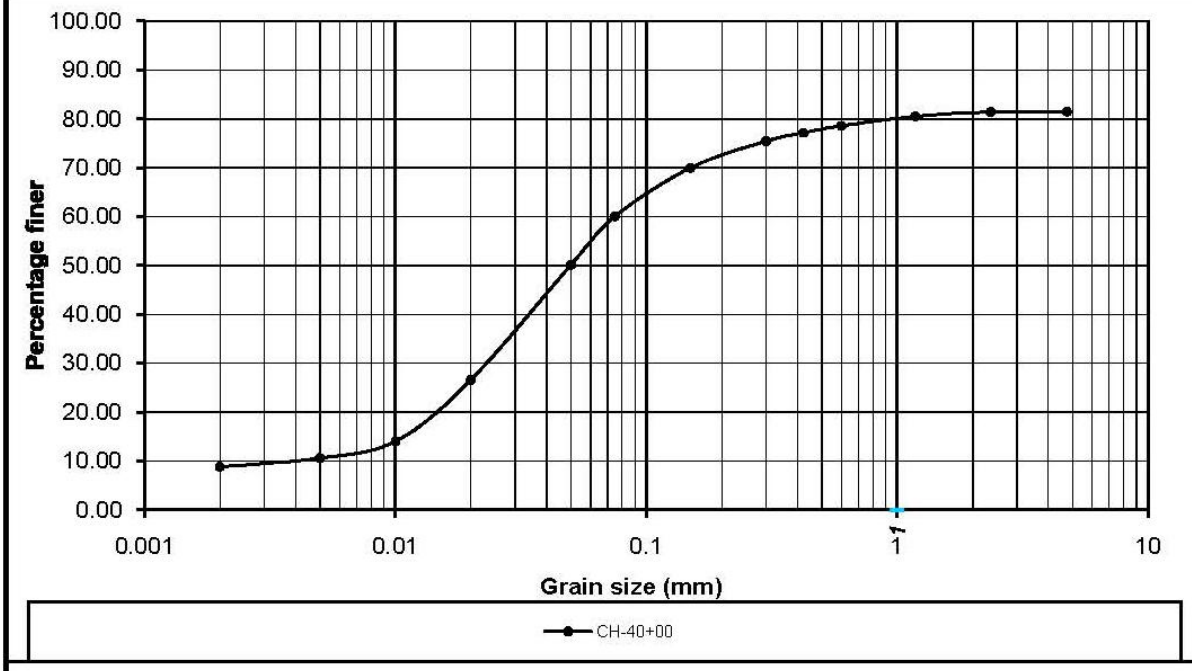
SITE – BAKRESHWAR RIVER

PHYSICAL ANALYSIS OF SOIL

Sl.No.	CH.	GRAVEL (%)	SAND (%)	SILT+CLAY (%)	SPECIFIC GRAVITY	pH VALUE	SILT (%)	CLAY (%)	Cu	Cc
1	40+000	18.54	21.40	60.06	2.62	7.20	51.24	8.82	13.39	1.31
2	50+000	22.78	19.86	57.36	2.63	7.10	48.80	8.56	3.02	6.32
3	80+000	7.15	51.02	41.83	2.65	7.30	36.50	5.33	11.49	1.03
4	110+000	16.78	26.54	56.68	2.62	7.20	47.00	9.68	16.07	1.34
5	130+00	5.80	29.60	64.60	2.64	7.30	58.50	6.10	9.09	3.93

Note: - The position of the Soil sample has been shown in the Para no-2.20 (a), page no-32

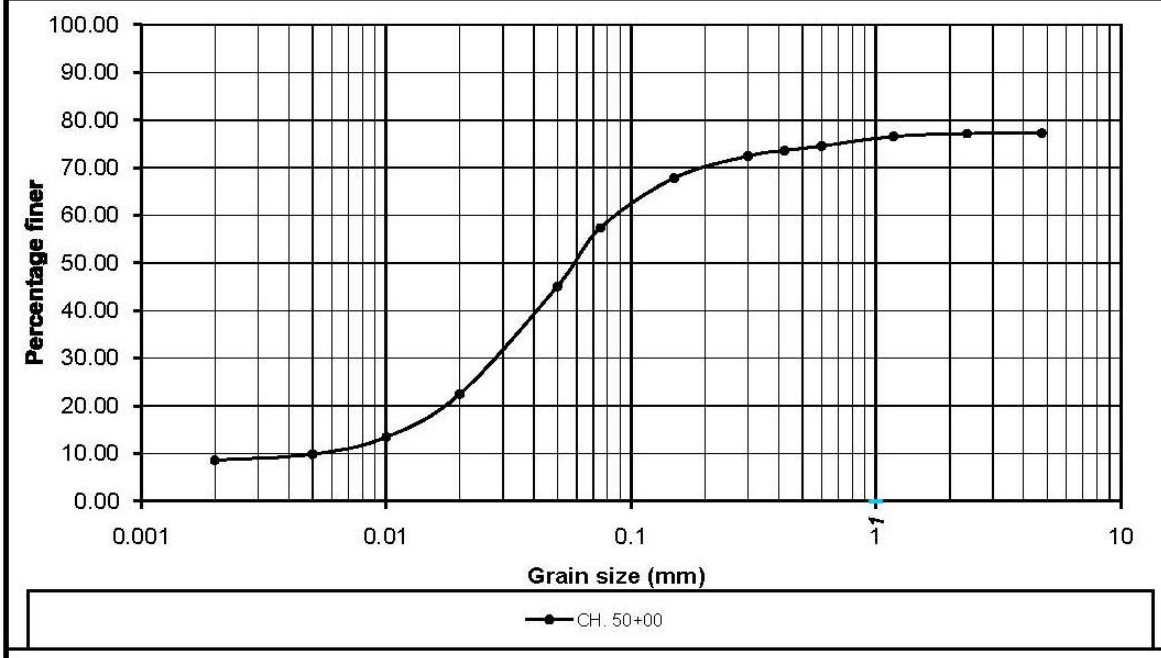
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
CH-40+00	8.82	51.24	21.40	18.54

*Silt & Clay

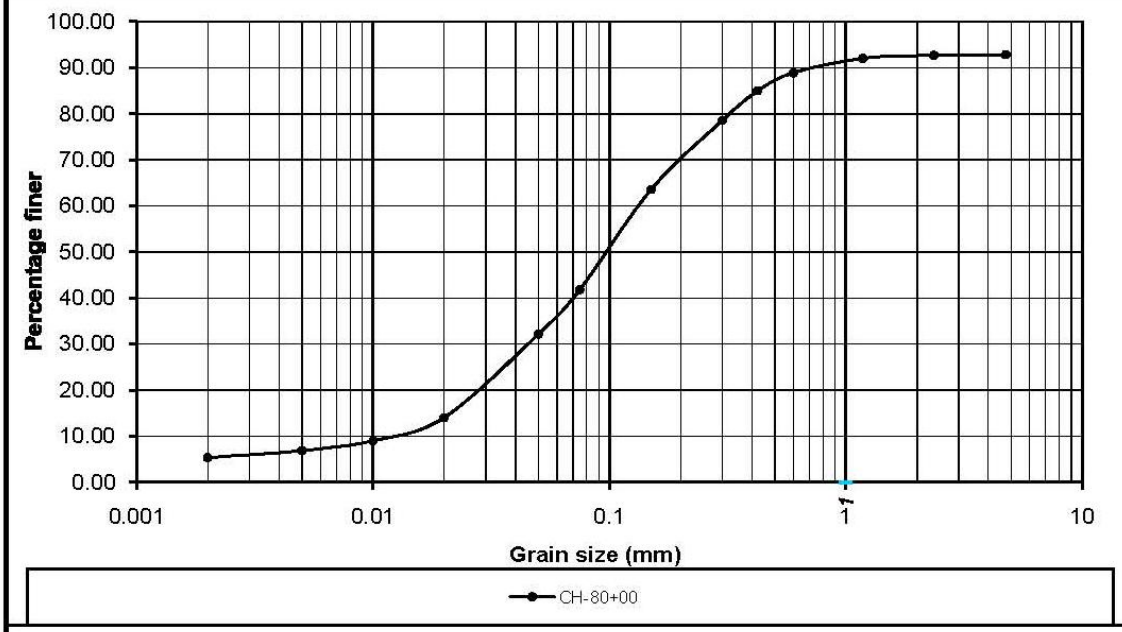
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
CH. 50+00	8.56	48.80	19.86	22.78

*Silt & Clay

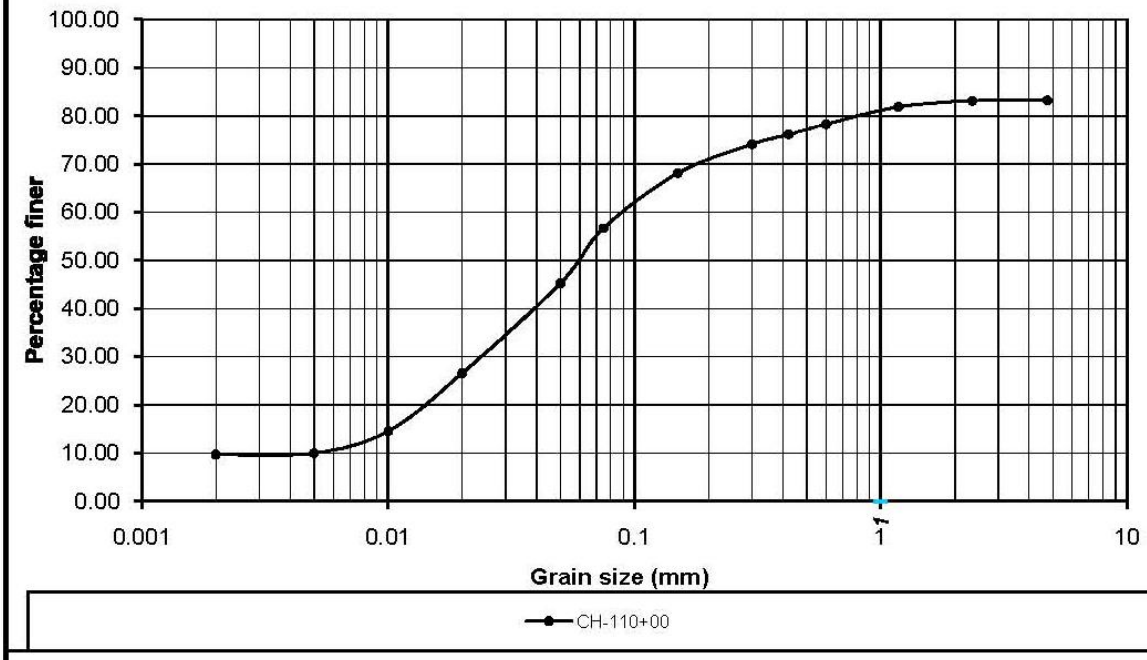
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
CH-80+00	5.33	36.50	51.02	7.15

*Silt & Clay

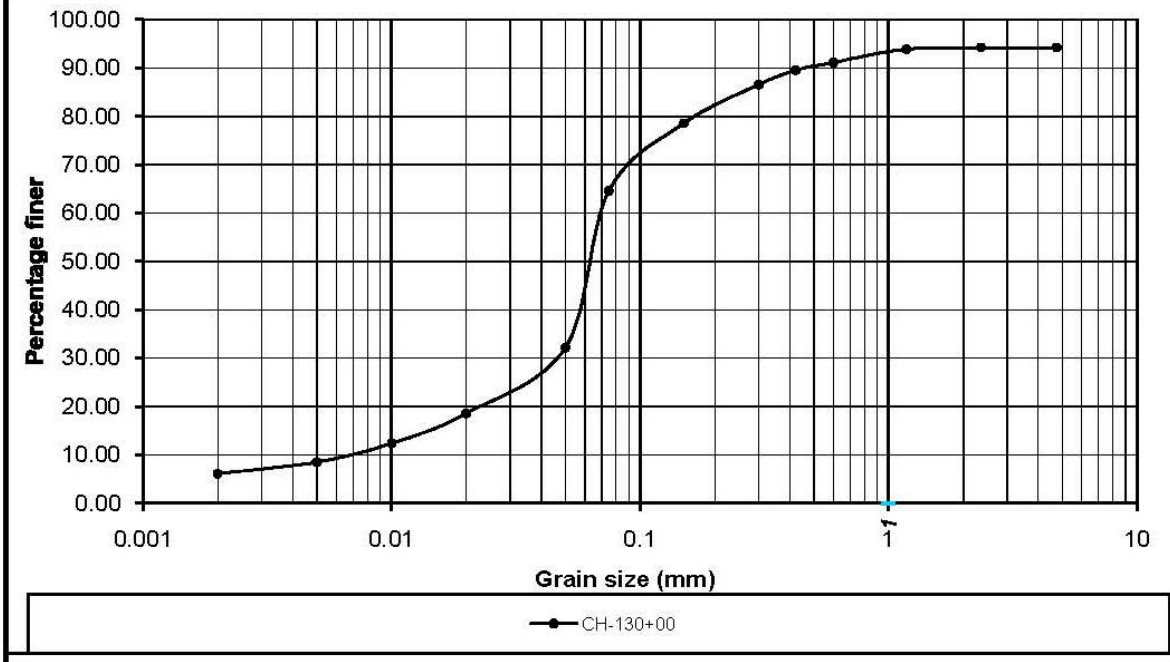
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
CH-110+00	9.68	47.00	26.54	16.78

*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 (%)**
CH-130+00	6.10	58.50	29.60	5.80

*Silt & Clay

Annexure-12 Water Sample Report:

PARAMETR - Chloride as Cl(mg/l)

SL.NO;	CH.	LOCATION	PARAMETER	WATER SAMPLE Result(mg/l)	PERMISSIBLE LIMITS IS: 456-2000
1	40+000	UPER	Chloride as Cl(mg/l)	17	2000mg/l for concrete not containing embedded steel and 500 mg/l for reinforced concrete work.
		MIDDLE		16	
		LOWER		17	
2	50+000	UPER		17	
		MIDDLE		17	
		LOWER		17	
3	80+000	UPER		17	
		MIDDLE		16	
		LOWER		17	
4	110+000	UPER		17	
		MIDDLE		17	
		LOWER		17	
5	130+000	UPER		16	
		MIDDLE		17	
		LOWER		10	

Note: - The position of the Water sample has been shown in the Para no-2.20 (b), page no-32

PARAMETR - **Sediment Concentration(mg/l)**

SL.NO;	CH.	LOCATION	PARAMETER	WATER SAMPLE Result(mg/l)	PERMISSIBLE LIMITS IS: 456-2000
1	40+000	UPER	Sediment Concentration(mg/l)	60	2000mg/l
		MIDDLE		120	
		LOWER		60	
2	50+000	UPER		60	
		MIDDLE		110	
		LOWER		55	
3	80+000	UPER		60	
		MIDDLE		60	
		LOWER		50	
4	110+000	UPER		60	
		MIDDLE		140	
		LOWER		65	
5	130+000	UPER		60	
		MIDDLE		110	
		LOWER		50	

Annexure-13 Calibration Certificate:-

PAN INDIA CONSULTANTS PVT. LTD.

SALES DEPARTMENT

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

CALIBRATION CERTIFICATE

CUSTOMER NAME	:	PRECISION SURVEY CONSUTLANCY
ADDRESS	:	Vichitra SP-45, KWIC Bankra, P.S.- Domjur, Dist. –Howrah, Pin: 711 403 (W.B)
INSTRUMENT	:	DGPS EQUIPMENT
SERIES	:	SPS-361
SERIAL NUMBER	:	5308K59587
CALIBRATION DATE	:	05/05/2015
VALIDITY	:	04/05/2016

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

Table 26- Calibration Certificate of DGPS

PAN INDIA CONSULTANTS PVT. LTD.

SALES DEPARTMENT

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

CALIBRATION CERTIFICATE

CUSTOMER NAME	:	PRECISION SURVEY CONSUTLANCY
ADDRESS	:	P.O. –SALAP, P.S.-Vichitra SP-45,KWIC NH-6, Dist. –Howrah Pin: 711 403 W.B
INSTRUMENT	:	Echo Sounder
SERIES	:	Bathy 500 MF
SERIAL NO.	:	B5MF0560
CALIBRATION DATE	:	17/01/2015
VALIDITY	:	16/01/2016

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.

Pan India Consultants Pvt. Ltd. Gurgaon

AUTHORISED SIGNATORY

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

Table 27- Calibration Certificate of Eco Sounder

SOUTH

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-86
MAKE	:	SOUTH
INSTRUMENT SR. NO.	:	H0986214510 (Accuracy –RTK Mode-Horizontal = 10mm +: PPm RMS, Vertical = 20mm +: PPm RMS H0986214519 (Static Mode – Horizontal = 2.5 mm + 1 PPm Vertical = 5mm + PPm)
CALIBRATION DATE	:	11/02/2015
VALID UPTO	:	10/02/2016
ISSUED TO	:	PRECISION SURVEY CONSULTANCY

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

Authorised Signatory

Table 28- Calibration Certificate of GPS RTK

Annexure-14 Site Picture:-

Figure 58- Embankment near the bank side near Ibrahimpur (Chainage -18.900 km)

Figure 59-Agricultural crop (paddy) near Udha village (Chainage 88.00 km)

Figure 60- River Channel of Bakreswar -Mayurakshi River

Figure 61- Topographic Survey Instruments

Figure 62-Forest area near the River bank side near Sindurtopa village (Chainage-98.00 km)

Figure 63- Bakreswar Dam Site near Chinpai village (Chainage-135.165 km)

Annexure-15 Survey Charts:-

Sl. No.	Chart No.	Chainage (from ..... km to .... km)	Location (from .... to .....)	Scale	Size of the Chart
1	1	0.00 km to 3.00 km	Dakhin Hijal village to Hijal village	1:2000	A-1
2	2	3.00 km to 5.678 km	Hijal village to Srikantapur village	1:2000	A-1
3	3	5.678 km to 7.690 km	Srikantapur village to Chand Nagar village	1:2000	A-1
4	4	7.690 km to 9.396 km	Chand Nagar village to Hizole Thakurani Chak	1:2000	A-1
5	5	9.396 km to 10.547 km	Hizole Thakurani Chak to Jayrampur village	1:2000	A-1
6	6	10.547 km to 12.796 km	Jayrampur village to Chak Ballavpur	1:2000	A-1
7	7	12.796 km to 14.746 km	Chak Ballavpur to Snia village	1:2000	A-1
8	8	14.746 km to 17.870 km	Snia village to Araji Jagadisbati village	1:2000	A-1
9	9	17.870 km to 19.800 km	Araji Jagadisbati village to Ibrahimpur village	1:2000	A-1
10	10	19.800 km to 21.823 km	Ibrahimpur village to Chhatrapur village	1:2000	A-1
11	11	21.823 km to 24.00 km	Chhatrapur village to Ruha palisa village	1:2000	A-1
12	12	24.00 km to 26.201 km	Ruha palisa village to Monoharpur village	1:2000	A-1
13	13	26.201 km to 27.770 km	Monoharpur village to Talgram village	1:2000	A-1
14	14	27.770 km to 29.810 km	Talgram village to Sherpur village	1:2000	A-1
15	15	29.810 km to 31.712 km	Sherpur village to Sahabajpur village	1:2000	A-1
16	16	31.712 km to 33.582 km	Sahabajpur village to Gayeshabad village	1:2000	A-1
17	17	33.582 km to 35.502 km	Gayeshabad village to Chechuri village	1:2000	A-1
18	18	35.502 km to 37.488 km	Chechuri village to Tarapur village	1:2000	A-1

Sl. No.	Chart No.	Chainage (from ..... km to .... km)	Location (from .... to .....)	Scale	Size of the Chart
19	19	37.488 km to 38.425 km	Tarapur village to Mamodpur village	1:2000	A-1
20	20	38.425 km to 41.00 km	Mamodpur village to Majilishpur village	1:2000	A-1
21	21	41.00 km to 43.451 km	Majilishpur village to Laltakuri village	1:2000	A-1
22	22	43.451 km to 45.653 km	Laltakuri village to Jaychandrapur village	1:2000	A-1
23	23	45.653 km to 48.578 km	Jaychandrapur village to Belbuni village	1:2000	A-1
24	24	48.578 km to 51.00 km	Belbuni village to Khanpur village	1:2000	A-1
25	25	51.00 km to 53.837 km	Khanpur village to Bagsina village	1:2000	A-1
26	26	53.837 km to 56.420 km	Bagsina village to Galaichandi village	1:2000	A-1
27	27	56.420 km to 59.130 km	Galaichandi village to Brahmanpara village	1:2000	A-1
28	28	59.130 km to 61.00 km	Brahmanpara village to Purba sahapur village	1:2000	A-1
29	29	61.00 km to 63.203 km	Purba sahapur village to Lohadda village	1:2000	A-1
30	30	63.203 km to 64.862 km	Lohadda village to Chitura village	1:2000	A-1
31	31	64.862 km to 66.909 km	Chitura village to Donaipur village	1:2000	A-1
32	32	66.909 km to 70.00 km	Donaipur village to Paschim kadipur village	1:2000	A-1
33	33	70.00 km to 72.676 km	Paschim kadipur village to Milanpur village	1:2000	A-1
34	34	72.676 km to 74.714 km	Milanpur village to Kendia village	1:2000	A-1

Sl. No.	Chart No.	Chainage (from ..... km to .... km)	Location (from .... to .....)	Scale	Size of the Chart
35	35	74.714 km to 76.802 km	Kendia village to Paschim Gobindopur village	1:2000	A-1
36	36	76.802 km to 79.457 km	Gobindopur village to Dhanghara village	1:2000	A-1
37	37	79.457 km to 82.532 km	Dhanghara village to Dhoadanga village	1:2000	A-1
38	38	82.532 km to 86.00 km	Dhoadanga village to Rajarampur village	1:2000	A-1
39	39	86.00 km to 88.177 km	Rajarampur village to Nohana village	1:2000	A-1
40	40	88.177 km to 90.770 km	Nohana village to Tekadhaya village	1:2000	A-1
41	41	90.770 km to 92.656 km	Tekadhaya village to Kusumjatra village	1:2000	A-1
42	42	92.656 km to 94.831 km	Kusumjatra village to Juita village	1:2000	A-1
43	43	94.831 km to 98.00 km	Juita village to Sindurtopa village	1:2000	A-1
44	44	98.00 km to 100.470 km	Sindurtopa village to Pashoa village	1:2000	A-1
45	45	100.470 km to 102.135 km	Pashoa village to Layekpur village	1:2000	A-1
46	46	102.135 km to 104.241 km	Layekpur village to Patharghata village	1:2000	A-1
47	47	104.241 km to 106.288 km	Patharghata village to Jinaipur village	1:2000	A-1
48	48	106.288 km to 108.617 km	Jinaipur village to Beharia village	1:2000	A-1
49	49	108.617 km to 110.932 km	Beharia village to Hatikra village	1:2000	A-1
50	50	110.932 km to 112.509 km	Hatikra village to Palshita village	1:2000	A-1

Sl. No.	Chart No.	Chainage (from ..... km to .... km)	Location (from .... to .....)	Scale	Size of the Chart
51	51	112.509 km to 114.73 km	Palshita village to Gangie village	1:2000	A-1
52	52	114.73 km to 116.154 km	Gangie village to Muradpur village	1:2000	A-1
53	53	116.154 km to 118.694 km	Muradpur village to Liara village	1:2000	A-1
54	54	118.694 km to 120.555 km	Liara village to Meherpur village	1:2000	A-1
55	55	120.555 km to 121.467 km	Meherpur village to Itekola village	1:2000	A-1
56	56	121.467 km to 123.702 km	Itekola village to Dostabad village	1:2000	A-1
57	57	123.702 km to 125.652 km	Dostabad village to Dechandra village	1:2000	A-1
58	58	125.652 km to 127.485 km	Dechandra village to Kolara village	1:2000	A-1
59	59	127.485 km to 129.136 km	Kolara village to Bishalpur village	1:2000	A-1
60	60	129.136 km to 131.60 km	Bishalpur village to Alalchak village	1:2000	A-1
61	61	131.60 km to 133.296 km	Alalchak village to Narayanpur village	1:2000	A-1
62	62	133.296 km to 135.165 km	Narayanpur village to Chinpai village	1:2000	A-1

Table 29- Survey Charts