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

"DETAILED HYDROGRAPHIC SURVEY

KOSI RIVER (NW-58) (233.040 km)"

FROM "CONFLUENCE OF KOSI WITH GANGA RIVER AT KURSELA TO KOSI BARRAGE"

SURVEY PERIOD FROM 10.05.16 TO 29.09.16

FINAL REPORT ON HYDROGRAPHICAL SURVEY OF KOSI RIVER, BIHAR

REPORT SUBMISSION DATE- 28.03.2019

SUBMITTED BY:

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Acknowledgement

Precision Survey Consultancy (PSC), Salap, Howrah express its sincere gratitude to **IWAI** for awarding the work and guidance for completing this Project of detailed Hydrographic Survey Report of **Kosi River from "Confluence of Kosi with Ganga River at Kursela to Kosi Barrage, Bihar (233.040 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 Hydrographic and Topographic survey in Kosi River." PSC would also like to thanks **Shri Pravir Pandey, Vice-Chairman, IA&AS. Shri Shashi Bhushan Shukla, Member (Traffic), Shri Alok Ranjan, Member (Finance) and Shri S.K.Gangwar, Member (Technical).**

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List of Abbreviations

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

Table 1- List of Abbreviations

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Salient Features of Kosi River

Sl. No	*Particulars*	*Details*
1.	Name of Consultant	Precision Survey consultancy
2.	Region/Cluster number & State (s)	Category -I, Bihar
3.	a) Waterway name b) NW # c) Total stretch and length of declared NW (from…. To…, length ….km) d) Survey Period (… to …`)	a) Kosi River b) NW - 58 c) "Confluence of Kosi with Ganga River at Kursela to Kosi Barrage at Bhim Nagar" (233.040 km). d) 10th May, 2016 to 29th September , 2016
4.	Tidal & non tidal portions (from … to …, length, tidal variation at every 10 km)	There is no tidal influence found in the entire stretch of this river.
5.	Lad (Least available depth) status	**Observed 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)

Stretch-1 (0 -10 km)	Stretch- 2 (10 -20 km)	Stretch - 3 (20-30 km)	Stretch-4 (30-40 km)	Stretch-5 (40 -50 km)	Stretch -6 (50 -60 km)
0	1.1	1.1	0	1.1	0
0	1.2	0	0	1.2	0
0	1.7	0	0	0	0
0	2.0	2.0	2.0	1.8	2.0
10.00	4.0	6.9	8.0	5.9	8.0
Total= 10. 0	Total= 10.0	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)

Stretch-7 (60 -70 km)	Stretch-8 (70 -80km)	Stretch - 9 (80-90 km)	Stretch-10 (90-100km)	Stretch-11 (100-110km)	Stretch-12 (110-120km)
0	1.1	2.6	6.7	6.5	6.5
0	0	1.3	1.2	1.2	1.2
1.5	0	0	0	0	0
2.0	2.0	2.0	0	0	0
6.5	6.9	4.1	2.1	2.3	2.3
Total= 10.0	Total= 10.0	Total= 10.0	Total= 10.0	Total= 10.0	Total= 10.0

Sl. No	Particulars	Details

6.

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)

Stretch-13 (120-130 km)	Stretch-14 (130-140km)	Stretch-15 (140-150km)	Stretch-16 (150-160)	Stretch-17 (160-170km)	Stretch-18 (170-180km)
2.7	4.4	4.9	4.6	3.2	3.5
1.3	0	1.2	1.2	1.2	1.2
0	1.5	1.6	1.6	1.6	1.4
2.0	1.9	0	0	1.9	1.8
4.0	2.2	2.3	2.6	2.1	2.1
Total-10.0	Total-10.0	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)

Stretch-19 (180-190km)	Stretch-20 (190-200km)	Stretch-21 (200-210km)	Stretch-22 (210-220km)	Stretch-23 (220-233.040 km)	Total (km)
3.1	3.1	3.2	1.1	3.640	64.140
1.4	1.4	1.2	1.2	2.1	20.7
1.6	1.6	1.5	1.7	2.0	19.3
1.8	1.8	1.8	1.9	1.8	32.5
2.1	2.1	2.3	4.1	3.5	96.4
Total-10.0	Total-10.0	Total-10.0	Total-10.0	Total-13.040	Total-233.040

Reduced 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)

Stretch-1 (0 -10 km)	Stretch- 2 (10 -20 km)	Stretch - 3 (20-30 km)	Stretch-4 (30-40 km)	Stretch-5 (40 -50 km)	Stretch -6 (50 -60 km)
0.9	3.4	4.9	6.1	3.8	3.8
1.3	1.2	1.2	0	1.2	0
1.5	1.5	0	0	0	0
1.8	1.8	1.8	1.8	1.8	0
4.5	2.1	2.1	2.1	3.2	6.2
Total= 10. 0	Total= 10.0	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)

Stretch-7 (60 -70 km)	Stretch-8 (70 -80 km)	Stretch - 9 (80-90 km)	Stretch-10 (90- 100 km)	Stretch-11 (100 -110 km)	Stretch-12 (110 -120 km)
2.8	3.6	5.7	6.3	6.4	7.3
0	0	1.2	0	0	1.2
0	0	0	1.7	1.5	1.5
2.0	2.0	0	0	0	0
5.2	4.4	3.1	2.0	2.1	0
Total= 10.0	Total= 10.0	Total= 10.0	Total= 10.0	Total= 10.0	Total= 10.0

Sl. No	Particulars	Details

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)

Stretch-7 (120 -130 km)	Stretch-8 (130 -140 km)	Stretch - 9 (140-150km)	Stretch-10 (150- 160km)	Stretch-11 (160 -170km)	Stretch-12 (170 -180km)
5.6	4.7	5.2	7.2	4.6	8.8
1.2	1.3	1.2	1.2	0	1.2
0	0	1.5	1.6	1.5	0
0	1.8	0	0	1.8	0
3.2	2.2	2.1	0	2.1	0
Total= 10.0	Total= 10.0	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)

Stretch-7 (180 -190 km)	Stretch-8 (190 -200 km)	Stretch - 9 (200-210 km)	Stretch-10 (210- 220km)	Stretch-11 (220 -233.040 km)	Total (Km)
8.8	8.8	8.8	8.8	6.240	132.540
1.2	1.2	1.2	1.2	1.3	19.50
0	0	0	0	1.6	13.90
0	0	0	0	1.8	18.4
0	0	0	0	2.1	48.7
Total= 10.0	Total= 10.0	Total= 10.0	Total= 10.0	Total= 13.040	Total- 233.040

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

i) Barrage – Kosi Barrage.

ii) RCC Bridge- 06 (Six), Railways Bridges-02 (Two)
iii) Under construction Railway Bridge -01 (one)

Clearance w.r.t H.F.L	Min (m)	Max (m)
Horizontal Clearance (m)	31.48	61.10
Vertical Clearance w.r.t. H.F.L (m)	3.295	7.200

iv) High Tension Line-3 (Three), Under-construction H.T.Line-1 (one)

Clearance w.r.t H.F.L	Min (m)	Max (m)
Horizontal Clearance (m)	615.34	1246.77
Vertical Clearance w.r.t. H.F.L (m)	6.10	10.03

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

Reach (km)		River Level Change (m)	Distance (km)	Slope (m/km)	Slope (cm/km)
From	To				
0	8.533	0.762	8.533	0.0893	8.9300
8.534	21.232	1.067	12.698	0.0840	8.4029
21.233	28.039	0.572	6.806	0.0840	8.4043
28.04	43.254	1.278	15.214	0.0840	8.4002
43.255	51.476	0.691	8.221	0.0841	8.4053
51.477	62.547	0.931	11.07	0.0841	8.4101
62.548	72.573	0.842	10.025	0.0840	8.3990
72.574	79.752	0.819	7.178	0.1141	11.4099
79.753	91.252	1.608	11.499	0.1398	13.9838
91.253	100.936	1.354	9.683	0.1398	13.9833
100.937	109.343	1.175	8.406	0.1398	13.9781
109.344	120.67	1.584	11.326	0.1399	13.9855
120.671	130.974	1.44	10.303	0.1398	13.9765
130.975	140.884	1.385	9.909	0.1398	13.9772
140.885	151.166	1.438	10.281	0.1399	13.9870
151.167	159.357	1.145	8.19	0.1398	13.9805
159.358	169.973	1.484	10.615	0.1398	13.9802
169.974	180.856	1.521	10.882	0.1398	13.9772
180.857	189.271	1.223	8.414	0.1454	14.5353
189.272	203.44	8.533	14.168	0.6023	60.2273
203.441	211.736	4.997	8.295	0.6024	60.2411
211.737	223.069	6.825	11.332	0.6023	60.2277
223.07	233.040	6.022	9.997	0.6024	60.2381
Avg. Slope				0.203 m/km	20.262 cm/km

<table>
<tr><td>9.</td><td>Average Discharge</td><td>
<table>
<tr><th>Sl. No.</th><th>Chainage (km)</th><th>Discharge (m3/sec)</th></tr>
<tr><td>1</td><td>2.122</td><td>1056.484</td></tr>
<tr><td>2</td><td>8.533</td><td>775.2702</td></tr>
<tr><td>3</td><td>21.232</td><td>653.462</td></tr>
<tr><td>4</td><td>28.039</td><td>853.788</td></tr>
<tr><td>5</td><td>43.254</td><td>1261.4</td></tr>
<tr><td>6</td><td>51.476</td><td>934.0399</td></tr>
<tr><td>7</td><td>62.547</td><td>2990.784</td></tr>
<tr><td>8</td><td>72.573</td><td>2500.632</td></tr>
<tr><td>9</td><td>79.752</td><td>294.0541</td></tr>
<tr><td>10</td><td>91.252</td><td>286.8273</td></tr>
<tr><td>11</td><td>100.936</td><td>1461.088</td></tr>
<tr><td>12</td><td>109.343</td><td>408.8167</td></tr>
<tr><td>13</td><td>120.67</td><td>325.2799</td></tr>
<tr><td>14</td><td>130.974</td><td>1268.508</td></tr>
<tr><td>15</td><td>140.884</td><td>403.5075</td></tr>
<tr><td>16</td><td>151.166</td><td>794.6394</td></tr>
<tr><td>17</td><td>159.357</td><td>2158.065</td></tr>
<tr><td>18</td><td>169.973</td><td>3379.581</td></tr>
<tr><td>19</td><td>180.856</td><td>1574.49</td></tr>
<tr><td>20</td><td>189.271</td><td>346.8235</td></tr>
<tr><td>21</td><td>203.44</td><td>2147.553</td></tr>
<tr><td>22</td><td>211.736</td><td>1551.258</td></tr>
<tr><td>23</td><td>223.069</td><td>1270.136</td></tr>
<tr><td>24</td><td>233.040</td><td>525.4964</td></tr>
<tr><td colspan="2">Avg. Discharge</td><td>1217.583 m3/sec</td></tr>
</table>
</td></tr>
<tr><td>10.</td><td>i) Present IWT operations
ii) Ferry services, tourism, cargo, if any</td><td>As Follows
The only passenger Ferry service is available near Dharma Ghat near the Chainage 91.200 km. There is no cargo available in this zone of river. Kosi Tappu wildlife reserve is located 15km (approx) far from the Kosi Barrage.</td></tr>
<tr><td>11.</td><td>Approx distance of Rail & Road from waterway</td><td>Nearest Railway Station- Fungo Railway Station (approx 0.12 km from waterway). There is no major industry located in this zone of river.
National Highways –57,57A,106, 31, 81, 34
State Highways-58, 59, 66, 91, 92, 76</td></tr>
<tr><td>12.</td><td>Any other information / comment</td><td>Recommendations for Detailed Project Report Preparation</td></tr>
</table>

Section-1: Introductory Considerations

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

The Kosi was called Kausika in Rig-Veda, is situated in Nepal and Bihar in northern India. It is a major tributary of the Ganges. One major tributary of the Kosi is the Arun, much of whose course is in Tibet. This river is mentioned in the epic 'Mahabharata' as Kausiki.

The Kosi River drains the northern slopes of the Himalayas in Tibet Autonomous Region and the southern slopes in Nepal. From a major confluence of tributaries north of the Chatra Gorge onwards, the Kosi River is also known as Saptakoshi for its seven upper tributaries. These include the Tamur Kosi originating from the Kanchenjunga area in the east, Arun River and Sun Kosi from Tibet. The Sun Kosi's tributaries from east to west are Dudh Kosi, Bhote Kosi, Tamba Kosi and Indravati Kosi. The Saptakoshi crosses into northern Bihar where it branches into distributaries before joining the Ganges near Kursela in Katihar district.

The Kosi is 720 km (450 mi) long and drains an area of about 74,500 km2 (28,800 sq mi) in Tibet, Nepal and Bihar. In the past, several authors proposed that the river has shifted its course for more than 133 km (83 mi) from east to west during the last 200 years. But a review of 28 historical maps dating 1760 to 1960 revealed a slight eastward shift for a long duration, and that the shifting was random and oscillating in nature.

The river basin is surrounded by ridges which separate it from the Yarlung Tsangpo River in the north, the Gandaki in the west and the Mahananda in the east. The river is joined by major tributaries in the Mahabharat Range approximately 48 km (30 mi) north of the Indo-Nepal border. Below the Siwaliks, the river has built up a megafan some 15,000 km2 (5,800 sq mi) in extent, breaking into more than twelve distinct channels, all with shifting courses due to flooding. Kamala, Bagmati (Kareh) and Budhi Gandak are major tributaries of Kosi in India, besides minor tributaries such as Bhutahi Balan.

Figure 1- Kosi River site map

1.2 - Tributaries / Network of River/ Basin:-

Kosi is a major tributary of the Ganga River. Tributaries of Kosi are:-

Kamala

Bagmati

Budhi Gandak

Bhutahi Balan

Arun

1.3 - State / District through which river passes:-

Kosi River passes through the states of Bihar, Nepal and the following districts of the Bihar states:-

i) Supaul

ii) Araria

iii) Madherpura

1.4 - Project Site Location Map:-

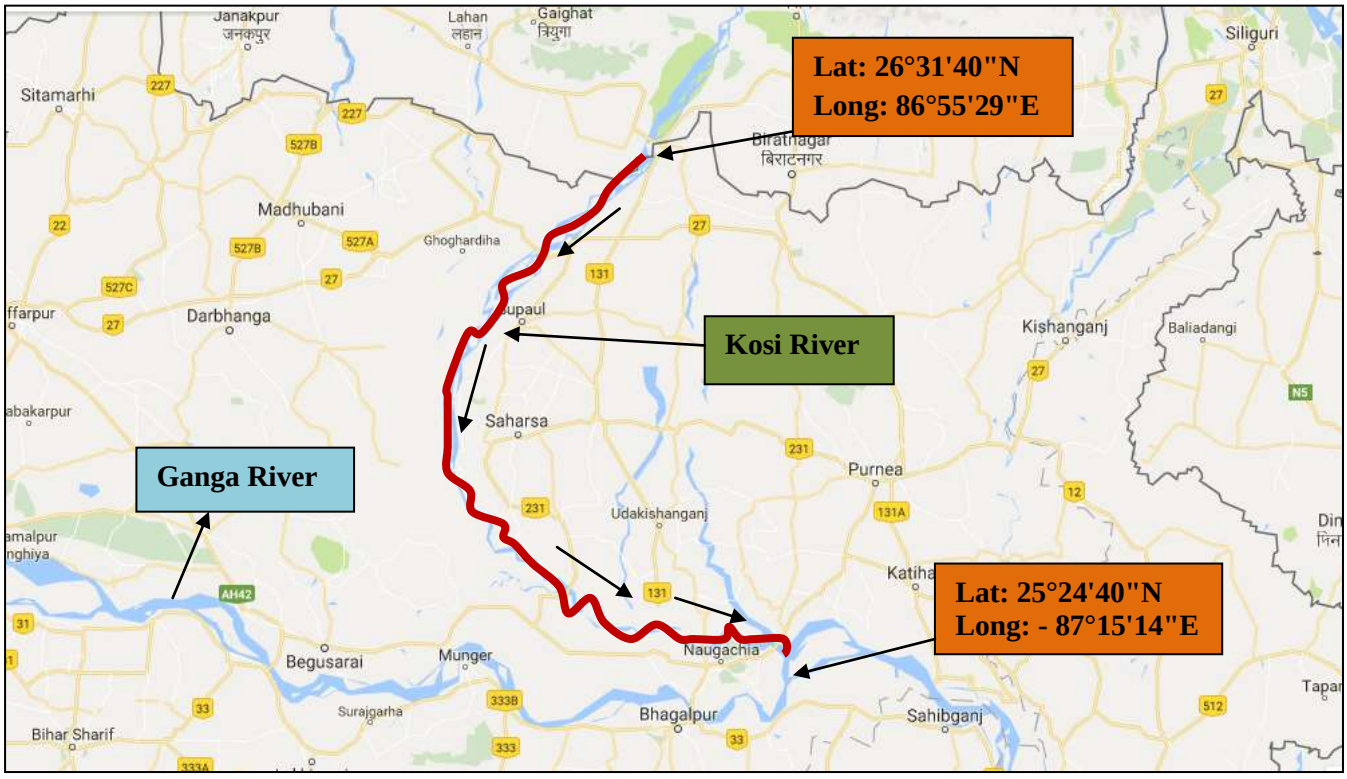

Figure 2 - Project site Location Map

1.5 - Scope of work:-

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

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

- Detailed Hydro graphic Survey to assess the navigability of the waterway.
- To collect Water and bottom samples, current meter observation and discharge from the deepest route at every 10 km interval.
- To identify cross structures which are obstructing navigation.
- To identify the length of bank protection required.
- The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.
- The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar.
- The main objective of the Study was to recommend the strategy and programs for the development of the Kosi River waterway and to provide an appropriate economic and organizational framework for restoring trade and navigation (cargo and passengers) on the Kosi River with an aim to do as follows: Improve public and private investments into transport on the Kosi River, in accordance with adequate economic and financial analys is;
- Propose enhancement of coordination of activities regarding inland navigation and to set up priorities of public interests; obtain an integrated approach considering water management, energy production, flood control and environmental aspects in the Kosi River basin and Propose improvement of the in-frastructure.

Section-2: Methodology Adopted to undertake Study

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

2.1.1 Recee:-

Advance recce of the survey stretch was conducted on 10th May 2016. The River takes off from Confluence of Kosi with Ganga River at Kursela to Barrage at Bhim Nagar. The approximate length of the river is 233.040 km.

There was no problem to spot levelling, boundary details during the survey period. No obstacle was found during the survey period. The spot levels along the river course were obtained by using GPS levelling technique. In the GPS spot levelling technique being used, the GPS control was extended using the co-ordinates.

Recce started from Confluence of kosi with Ganga River with a small boat for mobilization which is commenced on 10th May, 2016 and was completed on 29th September, 2016.

2.1.2 Survey Resources and Methodology:-

- The actual survey was commenced on 10th May, 2016 and completed on 29th September, 2016.

  The survey has undertaken as per following projection parameters:-

- Projection - UTM ***(Universal Transverse Mercator coordinate system)***

- **Spheroid - WGS 84**
- **Vertical Datum - MSL**
- **Grid - UTM North (45N)**
- **Scale factor - As per requirement**

2.1.3 Survey Launch:-

The Bathymetric survey was conducted by a small vessel and also hired a boat for the river stretch to Kosi Barrage. The overall stretch was fulfilled for the Hydrographic Survey near confluence of kosi with Ganga River to Kosi Barrage. The water level was enough for the entire stretch of the survey.

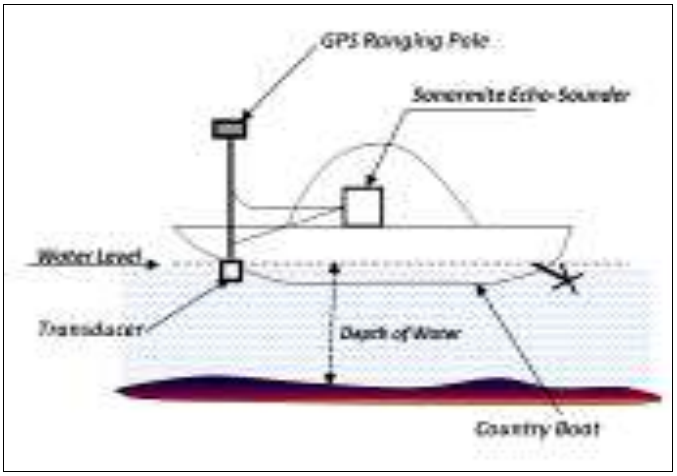

Figure 3- Schematic diagram showing the sequence of operation

2.1.4 Survey Equipment:-

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

Table 2 - Equipments

2.1.5 Topographic Survey:-

The Topography survey of Kosi river has been carried out from **"**Confluence of Kosi with Ganga River at Kursela (Lat 25°24'40"N, Long 87°15'14"E) to Barrage at Bhim Nagar **(**Lat 26°31'40"N, Long 86°55'29"E)". The length of the Topography survey is from Chainage 0.00 km to Chainage 233.040 km.

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 hydro graphic 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 centimetre-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 millimetres, although their absolute position is accurate only to the same accuracy as the position of the base station.

2.1.6 Bathymetry Survey:-

The length of the Bathymetry survey is from Chainage 0.00 km to Chainage 233.040 km.
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 sounding lines were run using Survey boat to identify the possible stretch. The sounding lines were run perpendicular to the orientation of river flow (i.e. perpendicular to the orientation of depth contours) in respective stretches. The DGPS position along with water depths was recorded simultaneously.

Figure 4-During Bathymetry Survey

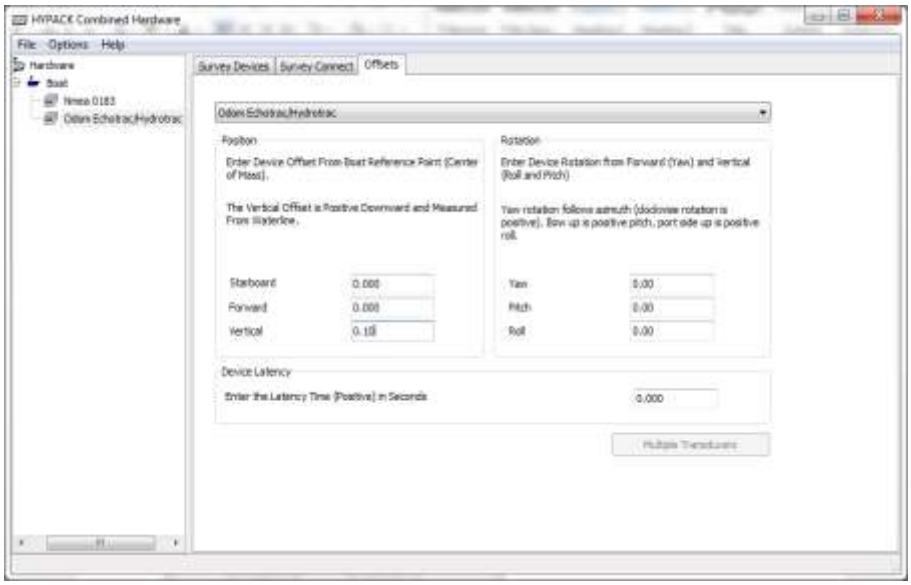

Figure 5- HYPACK Data Logging, Echo sounder settings

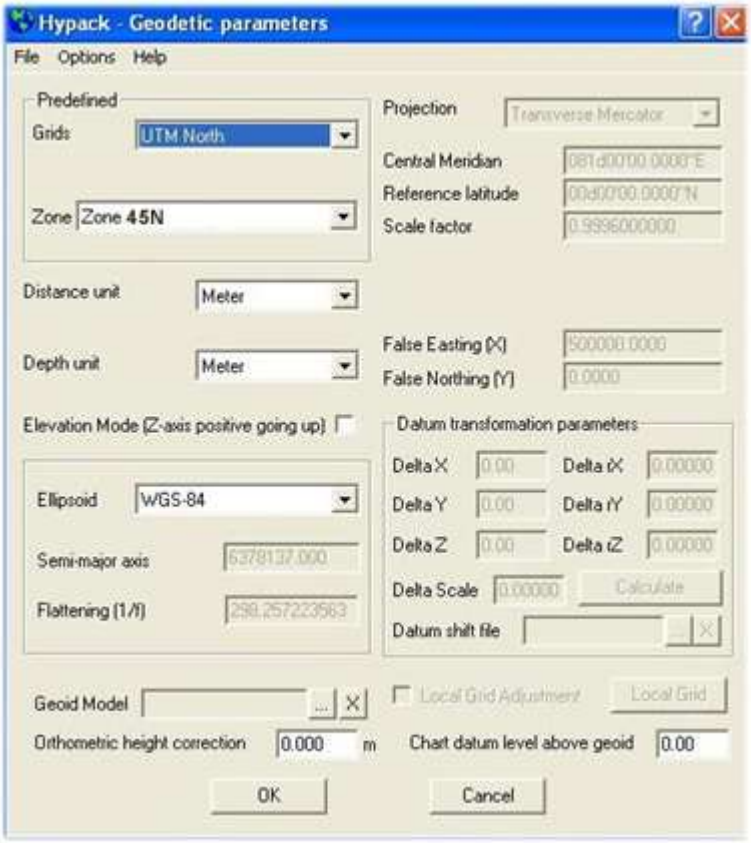

Figure 6- Hypack Data Logging, Geodetic Parameters

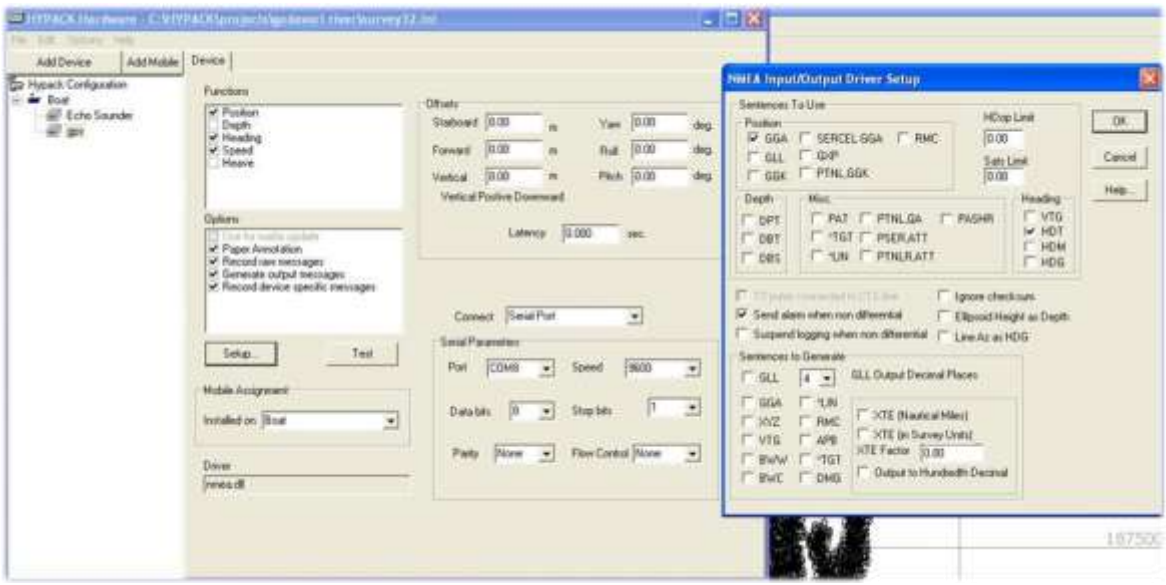

Figure 7- Hypack Data logging, Navigation I/P settings

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

For the Topography survey, the Horizontal control / Vertical control has been carried out from the G.T.S level of the Kosi Barrage. The G.T.S pillar has been established by the Central Water commission office (C.W.C). The details of the G.T.S Bench Mark are tabulated below with photograph:-

	Geographic position		UTM position		MSL
Location Name	**Latitude (N)**	**Longitude (E)**	**Northing (m)**	**Easting (m)**	**Elevation (m)**
Kosi Barrage	26°31'23.07"	86°55'54.26"	2933615.4245	493199.4995	78.760m w.r.t M.S.L

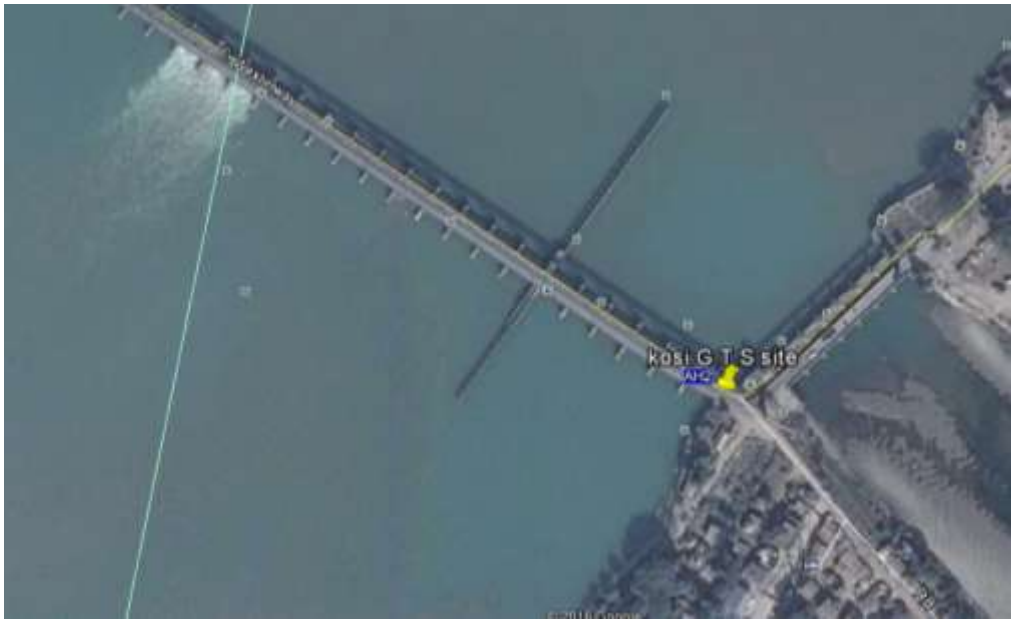

Figure 8- G.T.S level of Kosi River

Figure 9- C.W.C office near the Kosi Barrage

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

Non tidal influence is found in this zone of river.

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

IWAI had provided Sounding Datum at Ganga Mouth, Kursela, Baltara, Basua and Birpur site. The same was used interpolate Sounding Datum values at BM Pillars and at tide gauges. The Details provided by the IWAI area as follow:-

Sl. No	Place	Sounding Datum w.r.t MSL (Provided by IWAI)
1	Ganga Mouth	23.046 meter
2	Kursela	23.267 meter
3	Baltara	29.467 meter
4	Basua	45.305 meter
5	Birpur	71.742 meter

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

Base data for calculating CD has been provided by IWAI office which has been described follows:-

The C.D levels of the kosi River are-

i) Ganga Mouth (Chainage-0.000 km)- 23.046 meter

ii) Kursela (Chainage-2.100 km) – 23.267 meter

iii) Baltara (Chainage-75.880 km) – 29.467 meter

iv) Basua(Chainage-189.172 km) – 45.305 meter

v) Birpur (Chainage-233.067) – 71.742 meter

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

There are no tidal influences found in this zone of river.

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

There are no tidal influences found in this zone of river.

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

The Kosi Barrage has been situated near Bhimnagar near Chainage of 233.040 km.

Salient Features:

Name of River	:	**Kosi River**
Design Discharge for Barrage	:	**1200** Cumec
Total Width of Barrage	:	**54.25** M
Capacity of Reservoir	:	**0.40 MCM**
Length of Reservoir	:	**2.0 km**
No. of Bays	:	**5** Nos.
Width of each Bay	:	**9.25** M
No. of Piers	:	**4** Nos.
Type of Gates	:	**Vertical Gates**
Size of Gates	:	**9.85m(Width)X8.20m(Height)**
River Bed Level	:	**1126.5** M
High Flood Level	:	**1131.75** M
Maximum Pond Level	:	**1135.00** M
Top of Wing Walls	:	**1135.60** M
Land Acquisition		
Forest Land	:	**0.525 Hectare**
State Land	:	**8.683 Hectare**
Total Land	:	**9.208 Hectare**
Power Generation	:	**600 Kw**

Table 3- Salient Feature of Kosi Barrage

2.9 - Description of erected Bench mark pillar:-

Sl. No	Station Name	Chain-age (Km)	Latitude (N)	Longitude (E)	Easting (m)	Northing (m)	Height above MSL (m)	Height above SD (m)
1	BM 1	2.122	25°25'28.963"	87°14'03.013"	523548.217	2811997.512	34.013	10.7
2	BM 2	8.533	25°25'01.65"	87°10'29.151"	517575.414	2811148.197	32.921	9.12
3	BM 3	21.232	25°25'54.167"	87°07'33.834"	512676.384	2812758.097	31.552	6.91
4	BM 4	28.039	25°24'31.3"	87°03'20.878"	505611.933	2810204.329	38.654	13.2
5	BM 5	43.254	25°26'05.375"	86°57'25.921"	495696.428	2813097.572	33.498	6.77
6	BM 6	51.476	25°25'44.948"	86°52'50.516"	488003.513	2812473.913	37.154	9.63
7	BM 7	62.547	25°27'43.237"	86°47'24.858"	478912.828	2816123.682	38.946	10.5
8	BM 8	72.573	25°30'58.554"	86°43'25.258"	472234.489	2822143.877	40.233	10.7
9	BM 9	79.752	25°34'18.309"	86°42'00.303"	469877.050	2828293.564	39.108	9.03
10	BM 10	91.252	25°37'06.969"	86°36'16.647"	460304.620	2833506.799	40.648	9.02
11	BM 11	100.936	25°38'51.605"	86°32'55.309"	454700.462	2836743.480	38.811	5.84
12	BM 12	109.343	25°43'37.95"	86°30'51.236"	451273.403	2845564.108	42.412	8.26
13	BM 13	120.670	25°47'22.202"	86°27'34.39"	445816.782	2852483.863	44.248	8.38
14	BM 14	130.974	25°52'49.717"	86°27'15.278"	445326.342	2862561.189	42.832	5.68
15	BM 15	140.884	25°57'51.465"	86°26'59.773"	444933.804	2871845.571	47.783	9.24
16	BM 16	151.166	26°02'44.135"	86°28'57.375"	448239.805	2880835.612	45.981	5.98
17	BM 17	159.357	26°05'53.77"	86°31'07.869"	451887.674	2886655.487	50.854	9.71
18	BM 18	169.973	26°09'06.255"	86°35'49.585"	459731.141	2892550.394	52.771	10.15
19	BM 19	180.856	26°13'13.519"	86°39'12.479"	465384.581	2900140.792	53.730	9.58
20	BM 20	189.271	26°16'44.149"	86°39'28.336"	465841.677	2906619.366	62.646	16.9
21	BM 21	203.440	26°19'54.143"	86°45'48.71"	476401.496	2912440.679	62.978	9.08
22	BM 22	211.736	26°23'27.608"	86°49'34.459"	482668.308	2918997.722	67.243	8.47
23	BM 23	223.069	26°26'51.573"	86°54'09.535"	490294.521	2925264.473	72.078	6.39
24	BM 24	233.040	26°31'22.424"	86°55'55.649"	493237.562	2933595.121	79.572	7.84

Table 4 – Bench Mark Details

2.10- Description of erected Tide Gauges: -

Tide Gauge Name	Location	Chainage (km)	Easting	Northing	Latitude	Longitude	W.L w.r.t M.S.L	Period of observation
			(m)	(m)	(N)	(E)	(m)	
GS-(TP)-1	Patthar Tola	2.131	523528.700	2811983.800	25°25' 28.520"	87° 14' 2.313"	28.080	24 Hrs
GS-(TP)-2	Madrauni Pachhiarital	8.458	517615.700	2811171.500	25°25' 2.406"	87° 10' 30.594"	28.530	24 Hrs
GS-(TP)-21	Baisi Ja-hangirpur Village	18.453	513579.700	2812995.400	25° 26' 1.852"	87° 8' 6.183"	29.540	24 Hrs
GS-(TP)-22	Lokmanpur Village	27.565	506081.800	2811993.300	25° 25' 29.452"	87° 3' 37.724"	31.670	24 Hrs
GS-(TP)-10	Bainadih Village	51.793	489347.000	2814922.100	25° 27' 4.575"	86° 53' 38.544"	32.690	24 Hrs
GS-(TP)-6	Bainadih	52.723	488411.400	2815725.600	25° 27' 30.672"	86° 53' 5.016"	32.730	24 Hrs
GS-(TP)-9	Bhimri Village	62.359	479430.200	2815941.000	25° 27' 37.324"	86° 47' 43.396"	33.140	24 Hrs
GS-(TP)-7	Bhimri	62.637	478929.000	2816155.200	25° 27' 44.262"	86° 47' 25.435"	33.100	24 Hrs
GS-(TP)-8	Borne Vil-lage	75.789	472096.800	2824896.100	25° 32' 28.017"	86° 43' 20.118"	34.160	24 Hrs
GS-(TP)-18	Agrahan Village	80.253	469354.600	2828365.100	25° 34' 20.596"	86° 41' 41.571"	34.790	24 Hrs
GS-(TP)-20	Dhamara Ghat Vil-lage	91.279	460199.400	2833507.100	25° 37' 6.966"	86° 36' 12.873"	36.180	24 Hrs
GS-(TP)-19	Rajhanpur Village	120.516	445385.500	2852246.100	25° 47' 14.416"	86° 27' 18.939"	38.620	24 Hrs
GS-(TP)-17	Gamrahu Village	121.612	445105.400	2853311.500	25° 47' 49.008"	86° 27' 8.7222"	39.340	24 Hrs
GS-(TP)-3	Ara Village	130.831	443720.800	2862194.100	25° 52' 37.563"	86° 26' 17.641"	40.320	24 Hrs
GS-(TP)-4	Akardh Village	140.795	444743.300	2871814.300	25° 57' 50.421"	86° 26' 52.926"	41.390	24 Hrs
GS-(TP)-5	Shahpur Village	145.668	446307.500	2875979.400	26° 0' 6.026"	86° 27' 48.559"	42.260	24 Hrs
GS-(TP)-16	Baspiti Village	159.451	451595.900	2887062.900	26° 6' 6.976"	86° 30' 57.311"	45.520	24 Hrs
GS-(TP)-14	Itahari Village	189.9	465916.000	2906735.400	26° 16' 47.927"	86° 39' 31.003"	50.590	24 Hrs
GS-(TP)-15	Gopalpur Village	210.707	481655.300	2918596.600	26° 23' 14.524"	86° 48' 57.916"	64.110	24 Hrs
GS-(TP)-13	Gopalpur Village	211.53	482385.500	2918959.700	26° 23' 26.361"	86° 49' 24.253"	64.460	24 Hrs
GS-(TP)-12	Piprahipatti Golari Village	223	490211.700	2925268.300	26° 26' 51.694"	86° 54' 6.544"	67.880	24 Hrs
GS-(TP)-11	Bhantabari Village	233.035	493168.800	2933562.100	26° 31' 21.349"	86° 55' 53.165"	73.920	24 Hrs

Table 5 - Details of Different Gauge Stations

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

Sl no	CWC gauge / Dam / Barrage / Weir / Anicut / Bench Mark / tide gauges	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 MSL)
1	Birpur	233.067		71.742			Kosi reduced topo.xyz
2	GS (TP) - 11	233.035	228.019-233.040		71.723	-2.194	Submitted in Soft Copy
3	GS (TP) - 12	223.000	217.266-228.018		65.679	-2.197	
4	GS (TP) - 13	211.530	211.120-217.265		58.771	-5.691	
5	GS (TP) - 15	210.707	200.305-211.119		58.275	-5.835	
6	GS (TP) -14	189.900	174.676-200.304		45.743	-4.849	
7	Basua	189.172		45.305	45.305		
8	GS (TP) - 16	159.451	152.561-174.675		41.137	-4.380	
9	GS (TP) - 5	145.668	143.233-152.560		39.223	-3.037	
10	GS (TP) - 4	140.795	135.814-143.232		38.542	-2.850	
11	GS (TP) - 3	130.831	126.223-135.813		37.149	-3.169	
12	GS (TP) - 17	121.612	121.065-122		35.860	-3.475	
13	GS (TP) -19	120.516	105.899-121.064		35.707	-2.910	
14	GS (TP) - 20	91.279	85.768-105.898		31.620	-4.557	
15	GS (TP) - 18	80.253	78.022-85.767		30.078	-4.710	
16	Baltara	75.880		29.467			
17	GS (TP) - 8	75.789	69.214-78.021		29.459	-4.696	
18	GS (TP) - 7	62.637	62.499-69.213		28.354	-4.746	
19	GS (TP) - 9	62.359	57.546-62.498		28.331	-4.805	
20	GS (TP) - 6	52.723	52.264-57.545		27.522	-5.207	
21	GS (TP) - 10	51.793	39.680-52.263		27.443	-5.246	
22	GS (TP) - 22	27.565	23.011-39.679		25.407	-6.258	
23	GS (TP) - 21	18.453	13.457-23.010		24.641	-4.896	
24	GS (TP) - 2	8.458	5.296-13.456		23.801	-4.726	
25	GS (TP) - 1	2.131	0.000-5.295		23.270	-4.813	
26	Kursela	2.100		23.267			
27	Confluence point	0.000		23.046			

Table 6- Chart Datum/ Sounding Datum and reduction details

2.12- High Flood Level (H.F.L.) at known gauge stations and cross-structures: -

Sl no	Location and description of CWC gauge / Dam / Barrages / Weirs / Anicut / Locks / Aqueducts / BM	Cross-structure details	Chain-age (km)	Established HFL / MHWS / FSL / MWL / FRL w.r.t. MSL (m)	Computed HFL at Cross-Structures w.r.t. MSL (m)
1	Birpur		233.067	76.010	
2	Basua		189.172	49.170	
3	Baltara		75.880	36.400	
4	Kursela		2.100	32.100	
5	Ganga Mouth		0.000		
6		RCC Bridge	2.101		32.100
7		RCC Bridge	27.636		33.584
8		RCC Bridge	75.732	33.200	
9		Rail Bridge	90.335	38.550	
10		RCC Bridge	131.036		42.594
11		RCC Bridge	189.163		49.170

Table 7 - HFL Details

2.13 - Graph: Sounding Datum and HFL vs. Chainage:-

Chainage	S.D	H.F.L
2.100	23.267	32.100
2.131	23.27	32.102
8.458	23.801	32.471
18.453	24.641	33.053
27.565	25.407	33.584
51.793	27.443	34.996
52.732	27.522	35.051
62.359	28.331	35.612
62.637	28.354	35.628
75.789	29.459	36.395
75.880	29.467	36.400
80.253	30.078	36.893
91.279	31.620	38.136
120.516	35.607	41.431
121.612	35.860	41.555
130.831	37.149	42.594
140.795	38.542	43.717
145.668	39.223	44.269
159.451	41.137	45.820
189.172	45.305	49.170
189.900	45.743	49.616
210.707	58.275	62.338
211.530	58.771	62.842
223.000	65.679	69.855
233.035	71.723	75.990
233.067	71.742	76.010

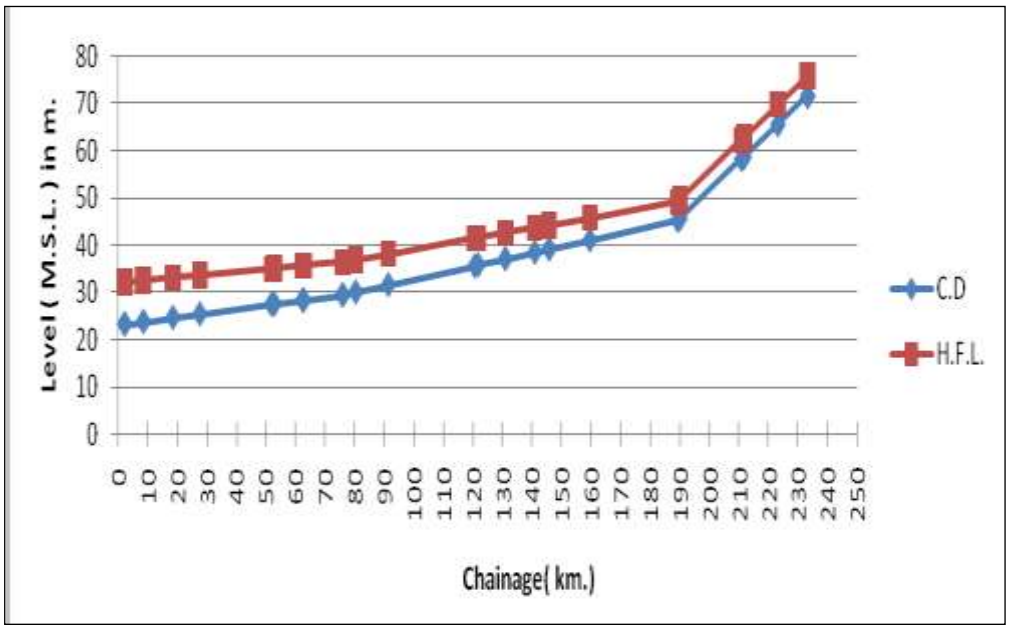

Figure 10- Graph (S.D and H.F.L vs. Chainage)

2.14 - Average Slope: -

Reach (km)		River Level Change (m)	Distance (km)	Slope (m/km)	Slope (cm/km)
From	To				
0	8.533	0.762	8.533	0.0893	8.9300
8.534	21.232	1.067	12.698	0.0840	8.4029
21.233	28.039	0.572	6.806	0.0840	8.4043
28.04	43.254	1.278	15.214	0.0840	8.4002
43.255	51.476	0.691	8.221	0.0841	8.4053
51.477	62.547	0.931	11.07	0.0841	8.4101
62.548	72.573	0.842	10.025	0.0840	8.3990
72.574	79.752	0.819	7.178	0.1141	11.4099
79.753	91.252	1.608	11.499	0.1398	13.9838
91.253	100.936	1.354	9.683	0.1398	13.9833
100.937	109.343	1.175	8.406	0.1398	13.9781
109.344	120.67	1.584	11.326	0.1399	13.9855
120.671	130.974	1.44	10.303	0.1398	13.9765
130.975	140.884	1.385	9.909	0.1398	13.9772
140.885	151.166	1.438	10.281	0.1399	13.9870
151.167	159.357	1.145	8.19	0.1398	13.9805
159.358	169.973	1.484	10.615	0.1398	13.9802
169.974	180.856	1.521	10.882	0.1398	13.9772
180.857	189.271	1.223	8.414	0.1454	14.5353
189.272	203.44	8.533	14.168	0.6023	60.2273
203.441	211.736	4.997	8.295	0.6024	60.2411
211.737	223.069	6.825	11.332	0.6023	60.2277
223.07	233.040	6.022	9.997	0.6024	60.2381
Avg. Slope				0.203 m/km	20.262 cm/km

Table 8-Average slope

2.15 -Details of Dam, Barrages, Weirs, Anicut, etc. w.r.t. M.S.L:-

Kosi Barrage is found in this zone of River near Chainage of 233.040 km.

Sl No	Structure Name	Chainage (km)	Location	Latitude (N)	Longitude (E)	Easting (m)	Northing (m)	Length (m)	Width (m)	Height w.r.t H.F.L (m)	Present Condition
1	Kosi Barrage	233.040	Bhimnagar	26°31'31.39"	86°55'41.57"	492848.4262	2933871.4104	1149.911	8.986	1.960	Complete & well-condition

Table 9-Details of kosi Barrage

2.16- Details of Locks:-

There are no locks found in this zone of river.

2.17- Details of Aqueducts:-

There are no aqueducts found in this zone of River.

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

There are six no's of RCC bridges and two no's of Rail bridges are located in this zone of river. The Permanent bridges are tabulated below:-

Sl. No	Chainage (km)	Location	Cross-Structure details	Latitude (N)	Longitude (E)	Northing (m)	Easting (m)	No of Piers	Length (m)	Width (m)	Horizontal Clearance (m)	Vertical Clearance w.r.t H.F.L (m)	Present condition
1	1.724	Patthar Tola Village	Rail Bridge	25°25'03.296"	87°13'57.776"	2811207.73	523403.32	14	965.42	6.50	56.09	4.880	Complete
2	2.101	Patthar Tola Village	RCC Bridge	25°25'14.815"	87°13'51.366"	2811561.75	523223.63	15	1032.98	8.25	56.01	7.200	Complete
3	27.566	Dadpur Village	RCC Bridge	25°25'1.03"	87° 3'28.55"	2811119.43	505826.17	33	1838.25	20.55	50.05	3.295	Complete
4	75.900	Ramnagar Village	RCC Bridge	25°32'34.10"	86°43'26.17"	2825035.19	472223.30	15	680.42	10.51	32.05	6.885	Complete
5	90.294	Dhamhara Village	RCC Bridge	25°36'41.86"	86°36'21.05"	2832734.77	460425.50	5	172.30	3.292	31.48	4.024	Complete
6	90.325	Dhamhara Village	Rail Bridge	25°36'43.71"	86°36'19.78"	2832791.14	460390.74	3	315.55	6.128	61.10	3.934	Complete
7	131.036	Baluaha Village	RCC Bridge	25°52'47.86"	86°26'40.92"	2862508.43	444370.00	40	2058.50	15.55	40.99	6.026	Complete
8	189.163	Itahari Village	RCC Bridge	26°17'18.09"	86°38'42.70"	2907679.24	464591.37	40	1884.89	20.37	40.09	5.068	Complete

Table 10 - Details of Permanent Bridges

2.19 - Details of other Cross structures, pipe-lines, and underwater cables: -

There is an under-construction Rail bridge found in this zone of river which is tabulated below:-

Sl. No	Chainage (km)	Location	Cross-Structure details	Latitude (N)	Longitude (E)	Northing (m)	Easting (m)	No of Piers	Length (m)	Width (m)	Horizontal Clearance (m)	Vertical Clearance w.r.t H.F.L (m)	Present condition
1	189.100	Dinajpur Village	Under Construction Rail Bridge	26°16'56.44"	86°39'7.90"	2906999.16	465276.11	3	1876.63	5.80	45.64	-	Under Construction

Table 11- Details of Under-Construction Rail Bridge

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

There are three high tension lines and one under-construction high tension line found in this zone of river.

Sl No	Line	Chainage (km)	Location	Position				No of piers	Horizontal clearance (m)	Vertical clearance w.r.t H.F.L (m)	Remarks
				Latitude (N)	Longitude (E)	Easting (m)	Northing (m)				
1	High Tension Line	2.516	Kursila village	25°25'10.418"	87°13'27.633"	522560.8935	2811425.3515	8	1102.57	6.10	Complete
2	High Tension Line	2.662	Kursila village	25°25'12.205"	87°13'22.53"	522418.2600	2811480.0900	-	-	-	Under Construction
3	High Tension Line	89.754	Dhamhara village	25°36'35.827"	86°36'35.664"	460832.1500	2832547.2905	8	615.34	8.423	Complete
4	High Tension Line	129.800	Teghra Village	25°52'09.749"	86°26'01.979"	443281.2440	2861340.3110	8	1246.77	10.03	Complete

Table 12 - Electric Line Details

2.21 - Current Meter and Discharge details:-

Stretch No.	Chainage (km)	Position				Observed Depth (m) (D)	Velocity (m/sec)	Average Velocity (m/sec.)	X-Sectional area (Sq. m.)	Discharge (m3/sec)
		Easting (m)	Northing (m)	Latitude (N)	Longitude (E)		0.5 D			
1	2.122	523428.5286	2811901.921	25°25'25.862"	87°13'58.722"	2.3	1.10	1.10	960.44	1056.484
2	8.533	517525.8022	2811379.648	25°25'09.176"	87°10'27.386"	2.00	0.921	0.921	841.77	775.2702
3	21.232	511630.4050	2813116.7830	25°26'05.859"	87°06'56.398"	1.3	0.823	0.823	794.00	653.462
4	28.039	505515.8429	2810409.5668	25°24'37.974"	87°03'17.441"	0.6	0.421	0.421	2028.00	853.788
5	43.254	495613.0610	2814717.4720	25°26'58.037"	86°57'22.918"	0.9	0.742	0.742	1700.00	1261.40
6	51.476	479409.1334	2816328.877	25°27'49.933"	86°47'42.62"	1.2	0.621	0.621	1504.09	934.0399
7	62.547	473464.3037	2822243.043	25°31'01.859"	86°44'09.311"	2.5	1.20	1.20	2492.32	2990.784
8	72.573	472271.5547	2824978.02	25°32'30.693"	86°43'26.375"	3.00	1.35	1.35	1852.32	2500.632
9	79.752	469857.3644	2827767.8152	25°34'01.216"	86°41'59.64"	0.5	0.411	0.411	715.46	294.0541
10	91.252	460145.4180	2833431.3150	25°37'04.499"	86°36'10.947"	0.6	0.421	0.421	681.30	286.8273
11	100.936	453711.0526	2837268.3568	25°39'08.557"	86°32'19.758"	1.5	0.823	0.823	1775.32	1461.088
12	109.343	450999.0457	2843861.8441	25°42'42.58"	86°30'41.616"	1.2	0.621	0.621	658.32	408.8167
13	120.670	445205.0139	2852300.4324	25°47'16.157"	86°27'12.451"	0.7	0.523	0.523	621.95	325.2799
14	130.974	443706.8927	2862042.8647	25°52'32.646"	86°26'17.165"	0.9	0.742	0.742	1709.58	1268.508
15	140.884	444639.7576	2871938.2837	25°57'54.439"	86°26'49.185"	0.6	0.421	0.421	958.45	403.5075
16	151.166	446830.6561	2881517.9184	26°03'06.13"	86°28'06.568"	1.3	0.823	0.823	965.54	794.6394
17	159.357	451521.1642	2887115.3465	26°06'08.673"	86°30'54.613"	1.1	0.651	0.651	3315.00	2158.065
18	169.973	455771.6880	2894437.0785	26°10'07.165"	86°33'26.744"	2.1	1.01	1.01	3346.12	3379.581
19	180.856	458969.6716	2902359.2340	26°14'25.022"	86°35'21.041"	1.3	0.823	0.823	1913.11	1574.49
20	189.271	464754.4124	2907698.6560	26°17'19.137"	86°38'49.026"	0.3	0.212	0.212	1635.96	346.8235
21	203.44	475781.7114	2914066.4802	26°20'46.954"	86°45'26.242"	0.8	0.523	0.523	4106.22	2147.553
22	211.736	482362.7635	2919185.4036	26°23'33.695"	86°49'23.422"	1.2	0.621	0.621	2498.00	1551.258
23	223.069	489524.1880	2925504.2411	26°26'59.347"	86°53'41.711"	2.1	0.942	0.942	1348.34	1270.136
24	233.040	492500.4200	2934070.4800	26°31'37.863"	86°55'29.004"	0.6	0.421	0.421	1248.21	525.4964

Table 13- Current Meter Details

2.22 - (a) Soil Sample Locations:-

Sample No.	Chainage (km)	Easting (m)	Northing (m)	Latitude (N)	Longitude (E)	Depth (m)
1	2.122	523428.5286	2811901.921	25°25'25.862"	87°13'58.722"	2.3
2	8.533	517525.8022	2811379.648	25°25'09.176"	87°10'27.386"	2.0
3	21.232	512641.3092	2814087.31	25°26'37.381"	87°07'32.623"	1.3
4	28.039	505571.1389	2810527.453	25°24'41.806"	87°03'19.422"	0.6
5	43.254	495474.286	2814736.392	25°26'58.651"	86°57'17.948"	0.9
6	51.476	479409.1334	2816328.877	25°27'49.933"	86°47'42.62"	1.2
7	62.547	473464.3037	2822243.043	25°31'01.859"	86°44'09.311"	2.5
8	72.573	472271.5547	2824978.02	25°32'30.693"	86°43'26.375"	3.0
9	79.752	469328.6863	2827961.564	25°34'07.475"	86°41'40.676"	0.5
10	91.252	460046.18	2833503.69	25°37'06.843"	86°36'07.381"	0.6
11	100.936	453711.15	2837247.66	25°39'07.884"	86°32'19.764"	1.5
12	109.343	450442.3214	2843897.187	25°42'43.662"	86°30'21.634"	1.2
13	120.670	445117.982	2852356.946	25°47'17.982"	86°27'09.318"	0.7
14	130.974	444755.5903	2862449.591	25°52'46.012"	86°26'54.786"	0.9
15	140.884	444362.7185	2871965.533	25°57'55.286"	86°26'39.218"	0.6
16	151.166	446647.6732	2881074.348	26°02'51.687"	86°28'00.048"	1.3
17	159.357	451347.2378	2886967.822	26°06'03.857"	86°30'48.371"	1.1
18	169.973	454162.88	2893831.07	26°09'47.285"	86°32'28.868"	2.1
19	180.856	459125.9312	2902733.173	26°14'37.193"	86°35'26.63"	1.3
20	189.271	464498.165	2907626.415	26°17'16.766"	86°38'39.793"	0.3
21	203.440	475798.6728	2912656.931	26°20'01.136"	86°45'26.949"	0.8
22	211.736	482478.5588	2919219.956	26°23'34.824"	86°49'27.599"	1.2
23	223.069	489998.2818	2925609.762	26°27'02.789"	86°53'58.828"	2.1
24	233.040	492511.17	2933981.58	26°31'34.973"	86°55'29.394"	0.6

Table 14- Soil Sample Locations

Note: - The Soil samples Report have been shown in Annexure-11, starting at page no - 212

(b) Water Sample Locations:-

Sample No.	Chain-age (km)	Easting (m)	Northing (m)	Latitude (N)	Longitude (E)	Total Depth (d) (m)	Mid-Depth (0.5d) (m)
1	2.122	523428.5286	2811901.921	25°25'25.862"	87°13'58.722"	2.3	1.15
2	8.533	517525.8022	2811379.648	25°25'09.176"	87°10'27.386"	2.0	1.0
3	21.232	512641.3092	2814087.31	25°26'37.381"	87°07'32.623"	1.3	0.65
4	28.039	505571.1389	2810527.453	25°24'41.806"	87°03'19.422"	0.6	0.30
5	43.254	495474.286	2814736.392	25°26'58.651"	86°57'17.948"	0.9	0.45
6	51.476	479409.1334	2816328.877	25°27'49.933"	86°47'42.62"	1.2	0.60
7	62.547	473464.3037	2822243.043	25°31'01.859"	86°44'09.311"	2.5	1.25
8	72.573	472271.5547	2824978.02	25°32'30.693"	86°43'26.375"	3.0	1.50
9	79.752	469328.6863	2827961.564	25°34'07.475"	86°41'40.676"	0.5	0.25
10	91.252	460046.18	2833503.69	25°37'06.843"	86°36'07.381"	0.6	0.30
11	100.936	453711.15	2837247.66	25°39'07.884"	86°32'19.764"	1.5	0.75
12	109.343	450442.3214	2843897.187	25°42'43.662"	86°30'21.634"	1.2	0.60
13	120.670	445117.982	2852356.946	25°47'17.982"	86°27'09.318"	0.7	0.35
14	130.974	444755.5903	2862449.591	25°52'46.012"	86°26'54.786"	0.9	0.45
15	140.884	444362.7185	2871965.533	25°57'55.286"	86°26'39.218"	0.6	0.30
16	151.166	446647.6732	2881074.348	26°02'51.687"	86°28'00.048"	1.3	0.65
17	159.357	451347.2378	2886967.822	26°06'03.857"	86°30'48.371"	1.1	0.55
18	169.973	454162.88	2893831.07	26°09'47.285"	86°32'28.868"	2.1	1.05
19	180.856	459125.9312	2902733.173	26°14'37.193"	86°35'26.63"	1.3	0.65
20	189.271	464498.165	2907626.415	26°17'16.766"	86°38'39.793"	0.3	0.15
21	203.440	475798.6728	2912656.931	26°20'01.136"	86°45'26.949"	0.8	0.40
22	211.736	482478.5588	2919219.956	26°23'34.824"	86°49'27.599"	1.2	0.60
23	223.069	489998.2818	2925609.762	26°27'02.789"	86°53'58.828"	2.1	1.05
24	233.040	492511.17	2933981.58	26°31'34.973"	86°55'29.394"	0.6	0.30

Table 15- Water sample Locations

Note: - The water samples Report have been shown in Annexure-12, starting at page no- 237

Section-3: Description of waterway

3.1 From Chainage 0.00 Km to Chainage 10.00 Km (Patthar Tola village to Madrauni Pachhiarital village):-

Figure 11- Chainage 0.000 Km. to Chainage 10.000 km

The width of Kosi River from Chainage 0.00 km to Chainage 10.00 km is approximately 950 m to1054 m. The average width portion of the River is 1002 m.

During the survey it was noticed that Shahpur Dharmi village, Katria village, Madrauni Pachhiarital village, Kumadpur village are situated left bank side of the river and Patthar Tola village, Khatiaha Badh village, Tingharia village, Madrauni Gobindpur Kausli village are situated right bank side of the river. One Rail Bridge and one RCC Bridge are situated near Chainage of 1.724 km and 2.101 km. The Rail Bridge's location is (**Lat. - 25°25'03.296"N**, **Long. - 87°13'57.776"E**) and the RCC Bridge's location is (**Lat. - 25°25'14.815"N, Long. - 87°13'51.366"E**). The RCC Bridge is also linked with NH-31. The Rail Bridge is communicated between West Bengal to Saharsa. The RCC Bridge is communicated through Naugachia and Kursela village. Both side char land and also agricultural land are found. BM-1 and BM-2 both are situated near Chainage of 2.122 km and 8.533 km respectively in the right and left bank side respectively. There are two high tension lines found near Chainage of 2.516 km and 2.662 km (under-construction H.T.Line). The Railway and Road ways communication are really very helpful for daily communication system. The position of the high tension lines are (**Lat: 25°25'10.418"N, Long: - 87°13'27.633"E**), (**Lat: 25°25'12.205"N, Long: - 87°13'22.53"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	0.00	10.00	2.12	29.76	0.00	0.00	0.1	23.58	4100	95511.51
II	0.00	10.00	2.11	29.77	0.00	0.00	0.02	23.59	5500	160486.33
III	0.00	10.00	2.09	29.78	100	17.02	0.01	23.60	5000	262789.7
IV	0.00	10.00	1.5	29.79	0.00	0.00	-0.1	23.61	6000	349794.98

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Figure 12- RCC Bridge at Patthar Tala (Chainage- 2.101 km)

Figure 13- Rail Bridge at Patthar Tala (Chainage- 1.724 km)

Bathymetry Survey

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

The Bathymetry survey has been carried out from Confluence of Kosi with Ganga River to Madrauni pachhiarital. The Length of the Bathymetric survey is Chainage 0.00 km to Chainage 10.00 km.

Topographic Survey:-

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

The Topography survey has been carried out Confluence of Kosi with Ganga River to Madrauni pachhiarital. The Length of the Topography survey is Chainage 0.00 km to Chainage 10.00 km.

a) Prominent Dams / Barrage: -

There is no dam or Barrages found in this stretches of river.

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

Kosi River annually bears the brunt of floods and where embankment construction and repairing seems like permanent affair. Displacement of people living on the banks of rivers due to river bank erosion is another major issue here. The tributaries continue to erode the banks rapidly. The River banks are constantly being changed by means of flood of very high magnitude, channel widening, and change in channel pattern and of river bank erosion. To protect the shore and its properties various methods are in use like, geobags filling with sand, porcupine (triangle shaped concrete structure), sand bags and boulder bags called Gabions are in use to strengthen the embankments.

c) Hindrances - Hyacinth, rocks, rapid waterfalls, forest, wild-life sanctuary, security issues:-

There is no wildlife sanctuary found in this stretches of river.

d) Details of Protected Area- Wildlife Defence: -

There is no wildlife sanctuary found in this stretches of river.

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

NH 31is the important highway is located in this stretches of river which help to communicate easily.

f) Railway Line and Stations in the vicinity: -

There is a Railway line found in this stretches of river near Chainage of 1.724 km. Katareah railway station is located in this stretches of river.

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

Agricultural land is found both sides bank of the river.

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

The Major crops along the river is Paddy, jute, Wheat, Maize, Sorghum, gram, Millets, Sugarcane and Spices are cultivated in this stretches of river.

i) Availability of Bulk / Construction Material: -

There is no construction material found in this stretches of river.

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

There is no major industry found in this stretches of river.

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

There is no ferry ghat found in this zone of river. The First terminal is found near Chainage of 1.748 km. One Rail Bridge and one RCC bridge are situated near this terminal area. So the communication system is well connected in this area.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Patthar tola, katria, Madrauni Gobindopur kausli, Kumadpur etc. villages are located both sides bank of the river.

n) Village / Colonies along the sub stretch and approx.population:-

Kursela, Nagachia, Baltara, Basua, Birpur, Saharsa etc. villages and towns have been located in this zone of river.

o) Availability of passenger Ferry services with facilities:-

There is no ferry service available in this stretches of river.

p) Available and probable water sport Recreational Facilities:-

There is no water sport and other facilities are available in this stretches of river.

q) Fishing activities:-

There is no fishing activities found in this stretches of river.

r) Sand Mining:-

There is no sand mines found in this stretches of river.

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and outlets:-

There is no irrigation canal and outlets found in this stretches of river.

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

There are no nalas found in this zone of river.

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

The water is used for agriculture purposes in this stretches of river.

3.2 From Chainage 10.00 Km to Chainage 20.00 Km (Madrauni Pachhiarital village to Bhaua Parbal village):-

Figure 14- Chainage 10.00 km to Chainage. 20.00 km

The width of Kosi River from Chainage 10.00 km to Chainage 20.00 km is approximately 1000 m. to1107 m. The average width portion of the River is 1053.5 m.

During the survey it was noticed that Sadhopur village, Bhaua Parbal etc.villages are situated right bank side of the river and Baisi Jahangirpur etc. villages are situated left bank side of the river. Paddy land and char land are also noticed both bank sides in this stretch. The Channel has become curve in some places. No cross- structures are found in this stretches.

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	1.1	8.23	1100	7898.03	-0.09	5.74	9550	199829.08
II	10.00	20.00	1.05	8.33	4200	23533.31	-0.19	5.94	10000	355079.1
III	10.00	20.00	1.0	8.43	4000	46494.06	-0.29	6.14	10000	509780.27
IV	10.00	20.00	0.65	8.58	5000	58453.38	-0.3	6.34	10000	733066.63

Bathymetry Survey

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

The Bathymetry survey has been carried out from Madrauni pachhiarital to Bijaithana. The Length of the Bathymetric survey is Chainage 10.00 km to Chainage 20.00 km.

Topographic Survey:-

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

The Topography survey has been carried out from Madrauni pachhiarital to Bijaithana. The Length of the Topography survey is Chainage 10.00 km to Chainage 20.00 km.

a) Prominent Dams / Barrage: -

There is no Dam or Barrage found in this stretches of river.

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

Kosi River annually bears the brunt of floods and where embankment construction and repairing seems like permanent affair. Displacement of people living on the banks of rivers due to river bank erosion is another major issue here. The tributaries continue to erode the banks rapidly. The River banks are constantly being changed by means of flood of very high magnitude, channel widening, and change in channel pattern and of river bank erosion. To protect the shore and its properties various methods are in use like, geobags filling with sand, porcupine (triangle shaped concrete structure), sand bags and boulder bags called Gabions are in use to strengthen the embankments.

c) Hindrances - Hyacinth, rocks, rapid waterfalls, forest, wild-life sanctuary, security issues:-

There is no wildlife sanctuary found in this stretches of river.

d) Details of Protected Area- Wildlife Defense: -

There is no wildlife sanctuary found in this stretches of river.

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

There is no NH/SH found in this stretches of river.

f) Railway Line and Stations in the vicinity: -

There is no Railway line found in this stretches of river.

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

The right bank of the river side is cultivated with paddy land than the left bank side. Some char lands are also found in the left bank side of the river.

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

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

i) Availability of Bulk / Construction Material: -

There is no major construction material found in this stretches of river.

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

There is no major industry located in this stretches of river.

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

There is no ferry ghat found in this stretch of river.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Baisi Jahangirpur, Sadhopur, Bhaua parbal etc. villages are located both sides bank of the river. Durga mata mandir is also located left bank side of the river.

n) Village / Colonies along the sub stretch and approx.population:-

Baisi Jahangirpur, Sadhopur, Bhaua parbal etc. villages are located both sides bank of the river.

o) Availability of passenger Ferry services with facilities:-

There is no passenger ferry service available in this stretches of river.

p) Available and probable water sport Recreational Facilities:-

There is no water sport and other facilities are available in this river.

q) Fishing activities:-

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

r) Sand Mining:-

There is no sand mining found in this stretches of river.

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and outlets:-

There is no irrigation canal and outlets found in this stretches of river.

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

There are no nalas found in this zone of river.

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

The water is used for the agricultural purposes.

3.3 From Chainage 20.00 Km to Chainage 30.00km (Bhaua Parbal village to Dadpur village):-

Figure 15 - Chainage 20.000 Km. to Chainage 30.000 km

The width of Kosi River from Chainage 20.00 km to 30.00 km is approximately 1107m. to 700 m. The average width portion of the river is 903.50 m.

During the survey it was noticed that Bijaithana village, Lokmanpur village are situated right bank side of the river and Nagrah, Milaki, Pratapnagar village, Fazar Ali Chak, Pamna village, Dadpur village are situated left bank side of the river. One RCC Bridge is situated near Chainage of 27.566 km. The Bridge's location is (Lat-25°25'1.03"N, Long-87° 3'28.55"E).The Bridge is communicated between Garia and Laualagam village. An irrigation canal and outlet is found near Chainage of 25.200km. Both side char land and paddy land are also found near these Chainage. BM-3 and BM-4 are situated near Chainage of 21.232 km and 28.039 km respectively.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	20.00	30.00	1.1	6.32	1000	1092.45	-0.04	1.2	10000	216687.37
II	20.00	30.00	2.0	6.32	0.00	0.00	-0.14	1.3	10000	356297.4
III	20.00	30.00	1.5	6.32	1000	11794.61	-0.24	1.4	10000	579670.19
IV	20.00	30.00	2.0	6.32	0.00	0.00	-0.3	1.6	10000	738599.09

Figure 16- RCC Bridge (Chainage- 27.566 km)

Bathymetry Survey

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

The Bathymetry survey has been carried out from Bijaithana to Baluachak. The Length of the Bathymetric survey is Chainage 20.00 km to Chainage 30.00 km.

Topographic Survey:-

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

The Topography survey has been carried out from Bijaithana to Baluachak. The Length of the Topography survey is Chainage 20.00 km to Chainage 30.00 km.

a) Prominent Dams / Barrage: -

There is no Dam or Barrages found in this stretches of river.

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

Kosi River annually bears the brunt of floods and where embankment construction and repairing seems like permanent affair. Displacement of people living on the banks of rivers due to river bank erosion is another major issue here. The tributaries continue to erode the banks rapidly. The River banks are constantly being changed by means of flood of very high magnitude, channel widening, and change in channel pattern and of river bank erosion. To protect the shore and its properties various methods are in use like, geobags filling with sand, porcupine (triangle shaped concrete structure), sand bags and boulder bags called Gabions are in use to strengthen the embankments.

c) Hindrances - Hyacinth, rocks, rapid waterfalls, forest, wild-life sanctuary, security issues:-

There is no wildlife sanctuary found in this stretches of river.

d) Details of Protected Area- Wildlife Defence:-

There is no wildlife sanctuary found in this stretches of river.

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

SH-54 is located in this stretches of river.

f) Railway Line and Stations in the vicinity:-

There is no Railway line located in this stretches of river.

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

Both sides bank of the river are used for agricultural land in this stretches of river.

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

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

i) Availability of Bulk / Construction Material:-

There is no construction material found in this stretches of river.

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

There is no major industry found in this stretch of river.

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

There is no ferry ghat, jetty found in this stretches of river.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Naugachia, Bhawanipur, Dadpur, Banikpur etc. places are located in this stretches of river.

n) Village / Colonies along the sub stretch and approx.population:-

Nagrah, Bijaythana, Milaki, Dadpur, Lokmanpur etc. villages are located both sides bank of the river.

o) Availability of passenger Ferry services with facilities:-

There is no passenger ferry service available in this stretches of river.

p) Available and probable water sport Recreational Facilities:-

There is no water sport and other facilities are available in this river.

q) Fishing activities:-

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

r) Sand Mining:-

There is no sand mining found in this stretches of river.

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and outlets:-

The irrigation canal and outlet has been found near Chainage of 25.200 km in the left bank side of the river.

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

There are no nalas found in this zone of river.

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

The water is mainly used for agricultural purposes. With the help of the irrigation system, the cultivation can easily accessible in this stretches of river. Irrigation Canals supply the sufficient water for the cultivation.

3.4 From Chainage 30.00 Km to Chainage 40.00 Km (Dadpur village to Gobindpur Gobind village):-

Figure 17 Chainage 30.00 km to 40.00 km

The River width of Kosi River from Chainage 30.00km to Chainage 40.00km is approximately 700 m. to 1566 m. The average width portion of the river is 1133 m.

During the survey it was noticed that Dhodhia village, Bhawanpura village, Maheshur Madan village, Gobindpur Gobind village, Bishnupur Ramsahai village are situated left bank side of the river and Baluachak village, Seokund village are situated right bank side of the river. Both side char land and agricultural land are also found near these Chainage. Two irrigation canal and outlets are also found near Chainage of 32.800km left bank side of this 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	2.0	4.6	0.00	0.00	-0.04	2.64	9000	195034.5
II	30.00	40.00	2.0	4.6	0.00	0.00	-0.24	2.65	8250	317911.66
III	30.00	40.00	2.0	4.6	0.00	0.00	-0.3	2.66	9000	506246.33
IV	30.00	40.00	2.0	4.6	0.00	0.00	-0.3	2.66	9000	645322.51

Bathymetry Survey

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

The Bathymetry survey has been carried out from Baluachak to Gobindpur Gobind. The Length of the Bathymetric survey is Chainage 30.00 km to Chainage 40.00 km.

Topographic Survey:-

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

The Topography survey has been carried out from Baluachak to Gobindpur Gobind. The Length of the Topography survey is from Chainage 30.00 km to Chainage 40.00 km.

a) Prominent Dams / Barrage: -

There is no Dam or Barrage found in this stretches of river.

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

Kosi River annually bears the brunt of floods and where embankment construction and repairing seems like permanent affair. Displacement of people living on the banks of rivers due to river bank erosion is another major issue here. The tributaries continue to erode the banks rapidly. The River banks are constantly being changed by means of flood of very high magnitude, channel widening, and change in channel pattern and of river bank erosion. To protect the shore and its properties various methods are in use like, geobags filling with sand, porcupine (triangle shaped concrete structure), sand bags and boulder bags called Gabions are in use to strengthen the embankments.

c) Hindrances - Hyacinth, rocks, rapid waterfalls, forest, wild-life sanctuary, security issues:-

There is no wildlife sanctuary found in this stretches of river.

d) Details of Protected Area- Wildlife Defence: -

There is no wildlife sanctuary found in this stretches of river.

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

There is no NH/SH located in this stretches of river.

f) Railway Line and Stations in the vicinity: -

There is no railway line found in this stretches of river.

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

Most of the land portions of the both sides river bank are covered with paddy land, Maize land, Mustard land.

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

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

i) Availability of Bulk / Construction Material:-

There is no construction material found in this stretches of river.

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

There are no major industries found in this stretches of river.

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

There is no ferry ghat available in this stretches of river.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Bhawanpura, Maheshpur Madan, Seokund, Gobindpur Gobind etc. villages are located in this stretches of river.

n) Village / Colonies along the sub stretch and approx.population:-

Bhawanpura, Maheshpur Madan, Seokund, Gobindpur Gobind etc. villages are located in this stretches of river.

o) Availability of passenger Ferry services with facilities:-

There is no ferry service available in this stretches of river.

p) Available and probable water sport Recreational Facilities:-

There is no water sport and other facilities are available in this river.

q) Fishing activities:-

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

r) Sand Mining:-

There is no sand mines found in this stretches of river.

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and outlets:-

There are two irrigation canal and outlets found (left bank side) in this stretches of river near Chainage of 33.00 km.

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

There are no nalas found in this zone of river.

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

The water is used for agriculture purposes in this stretches of river.

3.5 Chainage 40.00 Km to Chainage 50.00 Km (Gobindpur Gobind village to Goari village):-

Figure 18- Chainage 40.00 km to Chainage 50.00 km

The width of Kosi River from Chainage 40.00 km to Chainage 50.00 km is approximately 1566m. to 950m. The average width portion of the river is 1258 m.

During the survey it was noticed that Kaharpur village, Tarbana village, Kishunpur Banwari village, Baiswara village are situated right bank side of the river and Goari village, Hario village, Jhandapur village, Shehab chak village are situated left bank side of the river. Most of the portions of this river side are char land in this river channel and river curve is also found near this stretches. One irrigation canal and outlet have been found near Chainage of 49.600 km. BM-5 is situated near Chainage of 43.254km.

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	1.1	5.68	1000	6191.58	-0.12	3.21	9200	203792.65
II	40.00	50.00	1.1	5.68	1000	11082.97	-0.3	3.41	9000	302014.92
III	40.00	50.00	1.1	5.68	1400	19618.22	-0.3	3.61	9000	548809.32
IV	40.00	50.00	0.05	5.68	1500	19740.86	-0.3	3.81	9000	629049.51

Bathymetry Survey

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

The Bathymetry survey has been carried out from Gobindpur Gobind to Goari. The Length of the Bathymetric survey is Chainage 40.00 km to Chainage 50.00 km.

Topographic Survey:-

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

The Topography survey has been carried out from Gobindpur Gobind to Goari. The Length of the Topography survey is Chainage 40.00 km to Chainage 50.00 km.

a) Prominent Dams / Barrage: -

There is no Dam or Barrage found in this stretches of river.

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

Kosi River annually bears the brunt of floods and where embankment construction and repairing seems like permanent affair. Displacement of people living on the banks of rivers due to river bank erosion is another major issue here. The tributaries continue to erode the banks rapidly. The River banks are constantly being changed by means of flood of very high magnitude, channel widening, and change in channel pattern and of river bank erosion. To protect the shore and its properties various methods are in use like, geobags filling with sand, porcupine (triangle shaped concrete structure), sand bags and boulder bags called Gabions are in use to strengthen the embankments.

c) Hindrances - Hyacinth, rocks, rapid waterfalls, forest, wild-life sanctuary, security issues:-

There is no wildlife sanctuary found in this stretches of river.

d) Details of Protected Area- Wildlife Defence: -

There is no wildlife sanctuary found in this stretches of river.

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

NH -106 is passed in this stretches of river.

f) Railway Line and Stations in the vicinity: -

There is no railway line found in this stretches of river.

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

Agricultural land is found both sides bank of the river.

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

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

i) Availability of Bulk / Construction Material: -

There is no construction material found in this stretches of river.

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

There is no major industry found in this stretches of river.

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

There is no ferry ghat, jetty and terminals found in this stretches of river.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Kaharpur, Kishunpur Banwari, Shah Chak, Muzaffarpur sadik milik, Baiswara, goari etc. villages are located in this stretches of river.

n) Village / Colonies along the sub stretch and approx.population:-

Kaharpur, Kishunpur Banwari, Shah Chak, Muzaffarpur sadik milik, Baiswara, goari etc. villages are located in this stretches of river.

o) Availability of passenger Ferry services with facilities:-

There is no passenger ferry service available in this stretches of river.

p) Available and probable water sport Recreational Facilities:-

There is no water sport and other facilities are available in this river.

q) Fishing activities:-

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

r) Sand Mining:-

There is no sand mines found in this stretches of river.

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and outlets:-

There is no irrigation canal and outlets found in this stretches of river.

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

There are no nalas found in this zone of river.

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

The water is used for agriculture purposes in this stretches of river.

3.6 From Chainage 50.00 Km to Chainage 60.00 Km (Goari village to Kapasia village):-

Figure 19- Chainage 50.00 km to Chainage 60.00 km

The width of Kosi River from Chainage 50.00 km to Chainage 60.00 km is approximately 950 m. to 422 m. The average width portion of the river is 686 m.

During the survey it was noticed that BM-6 has been situated near Chainage of 51.476 km. Bainadih village, Kapasia village, Muraut village, Kishunpur Ratwara villages are situated right bank side of the river and Nagarpara Arazi Milik village, Mahanpur village, Paharpur village, Joipur chuhar villages are situated left bank side of the river. Char land and paddy land are also found both bank side of the river. Two irrigation canal and outlets have been found near Chainage of 51.200 km and and 54.800 km in the left bank and right bank side of the river 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	50.00	60.00	2.0	7.21	0.00	0.00	-0.12	3.21	9100	168299.29
II	50.00	60.00	2.0	7.21	0.00	0.00	-0.07	6.32	9400	269351.87
III	50.00	60.00	2.0	7.21	0.00	0.00	-0.17	6.42	9100	447957.58
IV	50.00	60.00	2.0	7.21	0.00	0.00	-0.3	6.52	10000	577804.41

Bathymetry Survey

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

The Bathymetry survey has been carried out from Goari to Kapasia. The Length of the Bathymetric survey is Chainage 50.00 km to Chainage 60.00 km.

Topographic Survey:-

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

The Topography survey has been carried out from Goari to Kapasia. The Length of the Topography survey is Chainage 50.00 km to Chainage 60.00 km.

a) Prominent Dams / Barrage: -

There is no Dam or Barrages found in this stretches of river.

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

Kosi River annually bears the brunt of floods and where embankment construction and repairing seems like permanent affair. Displacement of people living on the banks of rivers due to river bank erosion is another major issue here. The tributaries continue to erode the banks rapidly. The River banks are constantly being changed by means of flood of very high magnitude, channel widening, and change in channel pattern and of river bank erosion. To protect the shore and its properties various methods are in use like, geobags filling with sand, porcupine (triangle shaped concrete structure), sand bags and boulder bags called Gabions are in use to strengthen the embankments.

c) Hindrances - Hyacinth, rocks, rapid waterfalls, forest, wild-life sanctuary, security issues:-

There are no hindrances like rocks, waterfalls, forest and wildlife sanctuary found in this stretches of river.

d) Details of Protected Area- Wildlife Defence: -

There is no wildlife sanctuary found in this stretches of river.

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

There is no NH/SH found in this stretches of river.

f) Railway Line and Stations in the vicinity: -

There is no railway line found in this stretches of river.

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

Agricultural lands are found both sides of the river bank.

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

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

i) Availability of Bulk / Construction Material: -

There is no construction material found in this stretches of river.

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

There is no major industry found in this stretches of river.

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

There is no ferry ghat, Jetty and terminal found in this stretches of river.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Bainadih, Mohanpur, Kishunpur Ratwara, Kapasia etc. places are found in this stretches of river.

n) Village / Colonies along the sub stretch and approx.population:-

Bainadih, Mohanpur, Kishunpur Ratwara, Kapasia etc. villages and towns have been located in this zone of river.

o) Availability of passenger Ferry services with facilities:-

There is no passenger ferry service available in this stretches of river.

p) Available and probable water sport Recreational Facilities:-

There is no water sport and other facilities are available in this river.

q) Fishing activities:-

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

r) Sand Mining:-

There is no sand mines found in this stretches of river.

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and outlets:-

There are two irrigation canal and outlets found in this stretches of river near Chainage of 51.356 km and 54.826 km left side and right side respectively.

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

There are no nalas found in this zone of river.

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

The water is used for agriculture purposes in this stretches of river.

3.7 From Chainage 60.00 Km to Chainage 70.00 Km (Kapasia village to Baltara village):-

Figure 20 –Chainage 60.00 km to Chainage 70.00 km

The width of Kosi River from Chainage 60.00 km to Chainage 70.00 km is approximately 422m. to 405m. The average width portion of the river is 413.50 m.

During the survey it was noticed that Bhimri village, Kulsara village, Maira village, Paura villages are situated left bank side of the river and Birbas village, Kapasia village, Barun village, sahraun villages are situated right bank side of the river. BM-7 is situated near Chainage of 62.547km left bank side of the river. One irrigation canal and outlet has been found near Chainage of 68.600 km 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	60.00	70.00	1.5	8.92	0	0	-0.12	6.55	7350	128502.49
II	60.00	70.00	1.5	8.92	0	0	-0.3	6.75	8100	207612.72
III	60.00	70.00	1.1	8.92	200	36.84	-0.3	6.95	9000	373512.75
IV	60.00	70.00	0.1	8.92	300	89.01	-0.3	7.15	9000	446243.89

Bathymetry Survey

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

The Bathymetry survey has been carried out from Kapasia to Baltara. The Length of the Bathymetric survey is Chainage 60.00 km to Chainage 70.00 km.

Topographic Survey:-

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

The Topography survey has been carried out from Kapasia to Baltara. The Length of the Topography survey is Chainage 60.00 km to Chainage 70.00 km.

a) Prominent Dams / Barrage: -

There is no dam or barrages found in this stretch of river.

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

Kosi River annually bears the brunt of floods and where embankment construction and repairing seems like permanent affair. Displacement of people living on the banks of rivers due to river bank erosion is another major issue here. The tributaries continue to erode the banks rapidly. The River banks are constantly being changed by means of flood of very high magnitude, channel widening, and change in channel pattern and of river bank erosion. To protect the shore and its properties various methods are in use like, geobags filling with sand, porcupine (triangle shaped concrete structure), sand bags and boulder bags called Gabions are in use to strengthen the embankments.

c) Hindrances - Hyacinth, rocks, rapid waterfalls, forest, wild-life sanctuary, security issues:-

There are no hindrances like rocks, waterfalls, forest and wildlife sanctuary found in this stretches of river.

d) Details of Protected Area- Wildlife Defence: -

There is no wildlife sanctuary found in this stretches of river.

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

There is no NH/SH found in this stretches of river.

f) Railway Line and Stations in the vicinity: -

There is no railway line found in this stretches of river.

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

Agricultural lands (paddy) are found both sides bank of the river.

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

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

i) Availability of Bulk / Construction Material:-

There is no construction material found in this stretches of river.

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

There is no major industry found in this stretches of river.

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

There is no jetty, Ferry and terminals found in this stretch of river.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Birbas, bhimri, Paura, Sahraun, Kulsara, Barun, Itmadi, Mora etc. villages are located in this stretches of river.

n) Village / Colonies along the sub stretch and approx.population:-

Birbas, bhimri, Paura, Sahraun, Kulsara, Barun, Itmadi, Mora etc villages are located in this stretches of river.

o) Availability of passenger Ferry services with facilities:-

There is no ferry available in this stretches of river.

p) Available and probable water sport Recreational Facilities:-

There is no water sport and other facilities are available in this river.

q) Fishing activities:-

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

r) Sand Mining:-

There is no sand mines found in this stretches of river.

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and outlets:-

There is an irrigation canal found near Chainage of 68.706 km right bank side of the river.

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

There are no nalas found in this stretches of river.

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

The water is used for agriculture purposes in this stretches of river.

3.8 From Chainage 70.00 Km to Chainage 80.00 Km (Baltara village to Murus village):-

Figure 21- Chainage 70.000 Km. to Chainage 80.000 Km.

The width of Kosi River from Chainage 70.00 km to Chainage 80.00 km is approximately 405m. to 676.08m. The average width portion of the river is 540.54 m.

During the survey it was noticed that BM-8 has been situated near Chainage of 72.573km. Pachaut village, Dumri village, Ramnagar village, Telihar village, Pensalva village, Murus village, Telihar village, Dharhi village are situated right bank side of the river and Baltara village, Borne village, Kanhauli village are situated left bank side of the river. BM-9 is also situated near Chainage of 79.752 km. One irrigation canal and outlet has been situated near Chainage of 76.200km left bank side of the river. One RCC Bridge has been situated near Chainage of 75.900 km. The Bridge's location is (Lat. - 25°32'34.10"N, Long. - 86°43'26.17"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	70.00	80.00	0.3	10.21	3000	18937.19	0.3	8.04	6000	154997.29
II	70.00	80.00	0.1	10.21	4000	47809.9	0.1	8.14	8150	300296.69
III	70.00	80.00	0.1	10.21	3000	91380.52	-0.1	8.24	9000	389711.39
IV	70.00	80.00	0.1	10.21	4000	106869.15	-0.3	8.34	9000	612954.01

Figure 22- RCC Bridge (Chainage-75.732 km)

Bathymetry Survey

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

The Bathymetry survey has been carried out from Baltara to Agrahan. The Length of the Bathymetric survey is Chainage 70.00 km to Chainage 80.00 km.

Topographic Survey:-

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

The Topography survey has been carried out from Baltara to Agrahan. The Length of the Topography survey is Chainage 70.00 km to Chainage 80.00 km.

a) Prominent Dams / Barrage: -

There is no dam or Barrages found in this stretches of river.

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

Kosi River annually bears the brunt of floods and where embankment construction and repairing seems like permanent affair. Displacement of people living on the banks of rivers due to river bank erosion is another major issue here. The tributaries continue to erode the banks rapidly. The River banks are constantly being changed by means of flood of very high magnitude, channel widening, and change in channel pattern and of river bank erosion. To protect the shore and its properties various methods are in use like, geobags filling

with sand, porcupine (triangle shaped concrete structure), sand bags and boulder bags called Gabions are in use to strengthen the embankments.

c) Hindrances - Hyacinth, rocks, rapid waterfalls, forest, wild-life sanctuary, security issues:-

There are no hindrances like rocks, rapid waterfalls, forest and wildlife sanctuary found in this stretches of river.

d) Details of Protected Area- Wildlife Defence: -

There is no wildlife sanctuary found in this stretches of river.

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

SH-59 is located in this stretches of river.

f) Railway Line and Stations in the vicinity: -

There is no railway line located in this stretches of river.

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

Agricultural land is found both sides of the river bank.

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

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

i) Availability of Bulk / Construction Material: -

There is no construction material found in this stretches of river.

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

There is no major industry found in this stretches of river.

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

There is no ferry service available in this stretches of river.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Kanhauli, Baltara, Pachaut, Dumri, pensalva, Ramnagar, Telihar, Murus, chautham etc. villages are located both sides bank of the river.

n) Village / Colonies along the sub stretch and approx.population:-

Kanhauli, Baltara, Pachaut, Dumri, pensalva, Ramnagar, Telihar, Murus, chautham etc. villages are located both sides bank of the river.

o) Availability of passenger Ferry services with facilities:-

There is no ferry service available in this stretches of river.

p) Available and probable water sport Recreational Facilities:-

There is no water sport and other facilities are available in this stretches of river.

q) Fishing activities:-

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

r) Sand Mining:-

There is no sand mines found in this stretches of river.

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and outlets:-

There is an irrigation canal found near Chainage of 68.706 km right bank side of the river.

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

There are no nalas found in this stretches of river.

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

The water is used for agriculture purposes in this stretches of river.

3.9 From Chainage 80.00 Km to Chainage 90.00 Km (Murus village to Dhamhara village):-

Figure 23 Chainage 80.000 Km. to Chainage 90.000 Km.

The River stretch from Chainage 80.000 Km. to Chainage 90.000 km is approximately 676.08m to 660m. The average width portion of the river is approximately 668.04 meter.

The River has meandering and braiding behavior includes high sand dunes. The both banks of the River are surrounded by many villages namely Bira, Singhar Sanwa, Phango and Buchcha villages on the right side of the bank and Kharaita village, Thuthi village, Sarsawa village, Balkundu village on the left side bank of the river. One High Tension line is situated near Chainage of 89.900 km. This river provides water for cultivation land along the river of the both banks though a system of irrigation canals. There is a high tension line found in this stretches of river near Chainages of 89.754 km. The position of the H.T.Line is (**Lat: - 25°36'35.827"N, Long: 86°36'35.664"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	80.00	90.00	0.3	4.56	4450	16959.6	-0.01	3.12	10000	310735.19
II	80.00	90.00	0.1	4.76	6000	41832.54	-0.21	3.32	10000	491250.72
III	80.00	90.00	0.1	4.96	8000	133215.01	-0.3	3.52	10000	801550.34
IV	80.00	90.00	0.2	5.16	7100	116640.27	-0.3	3.72	10000	980041.89

Bathymetry Survey

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

The Bathymetry survey has been carried out from Agrahan to Dhamhara. The Length of the Bathymetric survey is Chainage 80.00 km to Chainage 90.00 km.

Topographic Survey:-

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

The Topography survey has been carried out from Agrahan to Dhamhara. The Length of the Topography survey is Chainage 80.00 km to Chainage 90.00 km.

a) Prominent Dams / Barrage: -

There is no Dam or Barrage found in this stretches of river.

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

Kosi River annually bears the brunt of floods and where embankment construction and repairing seems like permanent affair. Displacement of people living on the banks of rivers due to river bank erosion is another major issue here. The tributaries continue to erode the banks rapidly. The River banks are constantly being changed by means of flood of very high magnitude, channel widening, and change in channel pattern and of river bank erosion. To protect the shore and its properties various methods are in use like, geobags filling with sand, porcupine (triangle shaped concrete structure), sand bags and boulder bags called Gabions are in use to strengthen the embankments.

c) Hindrances - Hyacinth, rocks, rapid waterfalls, forest, wild-life sanctuary, security issues:-

There is no hindrance like rocks, rapid waterfalls, forest, wildlife sanctuary found in this stretches of river.

d) Details of Protected Area- Wildlife Defence: -

There is no wildlife sanctuary found in this stretches of river.

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

There is no NH, SH found in this stretches of river.

f) Railway Line and Stations in the vicinity: -

There is no railway line found in this stretches of river.

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

Agricultural land is found both sides bank of the river.

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

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

i) Availability of Bulk / Construction Material: -

The construction material is not found the river side area.

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

There is no major industry found in this stretches of river.

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

There is no ferry ghat available in this stretches of river. Dhamaraghat terminal is located in this stretches of river near Chainage of 89.775 km.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Kharaita, Thuthi, Sar sawa, Singhar Sanwa, Bira, Phango, Dhamara etc. villages are located in this stretches of river.

n) Village / Colonies along the sub stretch and approx.population:-

Kharaita, Thuthi, Sar sawa, Singhar Sanwa, Bira, Phango, Dhamara etc. villages are located in this stretches of river.

o) Availability of passenger Ferry services with facilities:-

There is no ferry ghat available in this stretches of river.

p) Available and probable water sport Recreational Facilities:-

There is no water sport and other facilities are available in this river.

q) Fishing activities:-

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

r) Sand Mining:-

There is no sand mines found in this stretches of river.

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and outlets:-

There is no irrigation canal found in this stretches of river.

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

There are no nalas found in this stretches of river.

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

The water is used for agriculture purposes in this stretches of river.

3.10 From Chainage 90.00 Km to Chainage 100.00 Km (Dhamhara village to Muria village):-

Figure 24- Chainage 90.000 Km. to Chainage 100.000 Km.

The River stretch from Chainage 90.000 Km. to Chainage 100.000 km is approximately 660m to 669.95m. The average width portion of the River is 664.975 meter. Approximate.

The Both banks of the river are also connected by Fungo halt Railway station, which is popular and renowned station near Dhamara Ghat. BM-10 has been situated near Chainage of 91.252km right bank side of the river. One RCC and one Rail Bridge have been situated near Chainage of 90.294 km and 90.325 km respectively. The First one Bridge's location is (Lat. - 25°36'41.86"N, Long.- 86°36'21.05"E) and the second Rail Bridge's location is (Lat- 25°36'43.71"N, Long.- 86°36'19.78"E) The Rail Bridge is well connected through Fungo Railway station and Mansi Railway station. The both banks of the River are surrounded by many villages namely Sahsaili Thuthi, Kuchaut, Chhachhua, Tajpur, Murla on the right side and Samhar, Kalan, Baldehi, Kabirpur, Sauthi, Kajurbana on the left bank. In few portions of this river provides water for cultivation land along the river of both banks though a system of irrigation canals. Dhamara ferry ghat is located in this stretch of river near the Chainage of 91.200 km.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	90.00	100.00	0.3	7.35	3850	17910.67	-0.12	5.02	10000	276774.85
II	90.00	100.00	0.1	7.45	6650	55567.98	-0.22	5.12	10000	450387.04
III	90.00	100.00	0.1	7.55	8100	119477.86	-0.3	5.22	10000	699346.08
IV	90.00	100.00	0.01	7.65	9000	136003.74	-0.3	5.32	10000	878222.56

Figure 25- Fungo Rail Bridge and RCC Bridge (Chainage-90.325 km and Chainage 90.294 km)

Figure 26- Dhamara Ghat (Chainage-91.200 km)

Bathymetry Survey

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

The Bathymetry survey has been carried out from Dhamhara to Khajur Bana. The Length of the Bathymetric survey is Chainage 90.00 km to Chainage 100.00 km.

Topographic Survey:-

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

The Topography survey has been carried out from Dhamhara to Khajur Bana. The Length of the Topography survey is Chainage 90.00 km to Chainage 100.00 km.

a) Prominent Dams / Barrage: -

There is no Dam or Barrage found in this stretches of river.

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

Kosi River annually bears the brunt of floods and where embankment construction and repairing seems like permanent affair. Displacement of people living on the banks of rivers due to river bank erosion is another major issue here. The tributaries continue to erode the banks rapidly. The River banks are constantly being changed by means of flood of very high magnitude, channel widening, and change in channel pattern and of river bank erosion. To protect the shore and its properties various methods are in use like, geobags filling with sand, porcupine (triangle shaped concrete structure), sand bags and boulder bags called Gabions are in use to strengthen the embankments.

c) Hindrances - Hyacinth, rocks, rapid waterfalls, forest, wild-life sanctuary, security issues:-

There is no hindrance like rocks, rapid waterfalls, forest and wildlife sanctuary

d) Details of Protected Area- Wildlife Defence: -

There is no wildlife sanctuary found in this stretches of river.

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

There is a RCC bridge located in this stretches of river near Chainage of 90.294 km.

f) Railway Line and Stations in the vicinity: -

There is a railway line located in this stretches of river near Chainage of 90.325 km. Fungo Railway station is located near the waterway of this stretches.

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

The agricultural land is found both side of the river bank.

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

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

i) Availability of Bulk / Construction Material: -

There is no construction material found in this stretches of river.

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

There is no major industry found in this stretches of river.

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

A passenger ferry ghat named Dhamra ghat is located near Chainage of 91.200km.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Dhamhara, Kuchaut, Seoti, Baldehi, Kabirpur, Sauthi, Murla, Chhachhua, Khajur Bana etc. places are located in this stretches of river.

n) Village / Colonies along the sub stretch and approx.population:-

Dhamhara, Kuchaut, Seoti, Baldehi, Kabirpur, Sauthi, Murla, Chhachhua, Khajur Bana etc. villages and towns have been located in this zone of river.

o) Availability of passenger Ferry services with facilities:-

The only Ferry service is available named Dhamraghat situated near Chainage of 91.200 km.

p) Available and probable water sport Recreational Facilities:-

There is no water sport and other facilities are available in this river.

q) Fishing activities:-

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

r) Sand Mining:-

There is no sand mines found in this stretches of river.

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and outlets:-

There is no irrigation canal found in this stretches of river.

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

There are no nalas found in this stretches of river.

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

The water is used for agriculture purposes in this stretches of river.

3.11 From Chainage 100.00 Km to Chainage 110.00 Km (Muria village to Khochardewa village):-

Figure 27- Chainage 100.000 Km. to Chainage 110.000 Km.

The River stretch from Chainage 100.000 Km. to Chainage 110.000 km is approximately 670m to 1500m.The average width portion of the river is approximately 1085 meter.

One major road namely E.Kosi Bund Road passes through the right bank of the Kosi River. The both banks of the river are surrounded by many villages namely Banganwan, Kamra, Gauri, Bhelwa, Gaurdah in the right bank side of the river and Alani, Sahuria villages are situated left bank side of the river. BM-11and BM-12 has been situated near Chainage of 100.936 km and 109.343 km right bank side of the river 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	100.00	110.00	0.3	5.67	7100	31561.05	0.2	3.68	10000	323508.92
II	100.00	110.00	0.2	5.87	8900	72261.69	0.08	3.77	10000	511526.25
III	100.00	110.00	0.1	6.07	10000	152190.81	-0.2	3.97	10000	817819.95
IV	100.00	110.00	0.03	6.27	10000	170359.9	-0.3	4.17	10000	1010566.36

Bathymetry Survey

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

The Bathymetry survey has been carried out from Khajur Bana to Chanan. The Length of the Bathymetric survey is Chainage 100.00 km to Chainage 110.00 km.

Topographic Survey:-

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

The Topography survey has been carried out from from Khajur Bana to Chanan. The Length of the Topography survey is Chainage 100.00 km to Chainage 110.00 km.

a) Prominent Dams / Barrage: -

There is no barrage or dam found in this stretches of river.

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

Kosi River annually bears the brunt of floods and where embankment construction and repairing seems like permanent affair. Displacement of people living on the banks of rivers due to river bank erosion is another major issue here. The tributaries continue to erode the banks rapidly. The River banks are constantly being changed by means of flood of very high magnitude, channel widening, and change in channel pattern and of river bank erosion. To protect the shore and its properties various methods are in use like, geobags filling with sand, porcupine (triangle shaped concrete structure), sand bags and boulder bags called Gabions are in use to strengthen the embankments.

c) Hindrances - Hyacinth, rocks, rapid waterfalls, forest, wild-life sanctuary, security issues:-

There is no hindrance like rocks, rapid waterfalls, forest, wildlife sanctuary are found in this stretches of river.

d) Details of Protected Area- Wildlife Defence: -

There is no wildlife sanctuary found in this stretches of river..

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

There is no NH/SH found in this stretches of river.

f) Railway Line and Stations in the vicinity: -

There is no railway line is found in this stretches of river.

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

Agricultural land is found both sides bank of the river.

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

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

i) Availability of Bulk / Construction Material: -

The construction material is not found in this stretches of river.

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

There is no major industry found in this stretches of river.

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

There is no ferry ghat available in this stretches of river.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Murla, Raingnian, banganwan, Kamra, Alani, Gauri, Mianjagir, Basahi, Sahuria, Gaurdah etc. places are located in this stretches of river.

n) Village / Colonies along the sub stretch and approx.population:-

Murla, Raingnian, banganwan, Kamra, Alani, Gauri, Mianjagir, Basahi, Sahuria, Gaurdah etc. villages are located in this stretches of river.

o) Availability of passenger Ferry services with facilities:-

There is no passenger ferry ghat available in this stretches of river.

p) Available and probable water sport Recreational Facilities:-

There is no water sport and other facilities are available in this river.

q) Fishing activities:-

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

r) Sand Mining:-

There is no sand mines found in this stretches of river.

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and outlets:-

There is no irrigation canal found in this stretches of river.

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

There are no nalas found in this stretches of river.

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

The water is used for agriculture purposes in this stretches of river.

3.12 From Chainage 110.00 Km to Chainage 120.00 Km (Khochardewa village to Ghoghsan village):-

Figure 28 Chainage 110.000 Km. to Chainage 120.000 Km.

The River stretch from Chainage 110.000 Km. to Chainage 120.000km is approximately1500 m to 838.74 m. The average width portion of the river is approximately 1169.37 meter.

The both banks of the river are surrounded by many villages namely Kathghara, Khochardewar, Balwara, Pahar-pur, and Tilani on the right side bank of the river and Katholumar, Sukhasem, Katholumar villages are situated left bank side of the river.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	110.00	120.00	0.3	2.85	5200	31720.87	-0.05	1.56	10000	303067.71
II	110.00	120.00	0.1	2.95	8100	61046.82	-0.25	1.66	10000	488460.91
III	110.00	120.00	0.1	3.05	9850	167516.66	-0.3	1.76	10000	779134.36
IV	110.00	120.00	0.05	3.16	10000	150189.68	-0.3	1.86	10000	971994.5

Bathymetry Survey

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

The Bathymetry survey has been carried out from Chanan to Ghoghsan. The Length of the Bathymetric survey is Chainage 110.00 km to Chainage 120.00 km.

Topographic Survey:-

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

The Topography survey has been carried out from Chanan to Ghoghsan . The Length of the Topography survey is Chainage 110.00 km to Chainage 120.00 km.

a) Prominent Dams / Barrage: -

There is no dam or barrage found in this stretches of river.

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

Kosi River annually bears the brunt of floods and where embankment construction and repairing seems like permanent affair. Displacement of people living on the banks of rivers due to river bank erosion is another major issue here. The tributaries continue to erode the banks rapidly. The River banks are constantly being changed by means of flood of very high magnitude, channel widening, and change in channel pattern and of river bank erosion. To protect the shore and its properties various methods are in use like, geobags filling with sand, porcupine (triangle shaped concrete structure), sand bags and boulder bags called Gabions are in use to strengthen the embankments.

c) Hindrances - Hyacinth, rocks, rapid waterfalls, forest, wild-life sanctuary, security issues:-

There is no hindrance like rock, rapid waterfall, forest and wildlife sanctuary found in this stretches of river.

d) Details of Protected Area- Wildlife Defence: -

There is no wildlife sanctuary found in this stretches of river.

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

There is no NH/SH found in this stretches of river.

f) Railway Line and Stations in the vicinity: -

There is no railway line found in this stretches of river.

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

Agricultural land is found both sides bank of the river.

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

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

i) Availability of Bulk / Construction Material: -

There is no construction material found in this stretches of river.

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

There is no major industry found in this stretch of river.

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

There is no ferry ghat, jetty, terminal found in this stretch of river.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Chanan, Khochardewa, Bhagdewa, Belwara, Katholumar, Ghoghsan, Tilanthi etc. places are located in this stretches of river.

n) Village / Colonies along the sub stretch and approx. population:-

Chanan, Khochardewa, Bhagdewa, Belwara, Katholumar, Ghoghsan, Tilanthi etc. villages are located in this stretches of river.

o) Availability of passenger Ferry services with facilities:-

There is no passenger ferry service available in this stretches of river.

p) Available and probable water sport Recreational Facilities:-

There is no water sport and other facilities are available in this river.

q) Fishing activities:-

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

r) Sand Mining:-

There is no sand mines found in this stretches of river.

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and outlets:-

There is no irrigation canal found in this stretches of river.

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

There are no nalas found in this stretches of river.

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

The water is used for agriculture purposes in this stretches of river.

3.13 From Chainage 120.00 Km to Chainage 130.00 Km (Ghoghsan village to Teghra village):-

Figure 29- Chainage 120.00 km to Chainage 130.00 km

The River stretch from Chainage 120.000 Km. to Chainage 130.000 km is 10 Km is approximately 838.74 m to 1541.13m. The average width portion of the river is 1189.935 meter. approximate.

The river has meandering and braiding behavior. High sand dunes and a number channels form part of this river stretch. The river flow is diverted to concave banks, wherever the river meanders. The river bed in this stretch is sandy but the right bank of the river is developed and well connected by various roads whereas the left bank is not so developed. BM-13 has been situated near Chainage of 120.670km right bank side of the river.

The Right bank of the River are surrounded by many villages namely Rajhanpur, Nakanch, Gamrahu, Maina, Naharwar, Lahthabathan, Mahpura, Sharmatola, Jalkaur, Bhadiya, Mahishi Satarwar whereas only Rajhanpur and Bihna villages located on the left bank side of the river. There is a high tension line located near Chainage of 129.800 km. The position of H.T.line is (**Lat: - 25°52'09.749"N, Long: - 86°26'01.979"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	120.00	130.00	0.3	4.68	2650	8590.81	-0.14	3.25	10000	288882.75
II	120.00	130.00	0.2	4.68	3550	19155.41	-0.25	3.35	10000	455404.6
III	120.00	130.00	0.1	4.68	5250	57457.43	-0.3	3.45	10000	752878.48
IV	120.00	130.00	0.1	4.68	4300	41925.4	-0.3	3.55	10000	928349.66

Bathymetry Survey

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

The Bathymetry survey has been carried out from Ghoghsan to Ara . The Length of the Bathymetric survey is Chainage 120.00 km to Chainage 130.00 km.

Topographic Survey:-

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

The Topography survey has been carried out from Ghoghsan to Ara. The Length of the Topography survey is Chainage 120.00 km to Chainage 130.00 km.

a) Prominent Dams / Barrage: -

There is no dam or barrage found in this stretches of river.

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

Kosi River annually bears the brunt of floods and where embankment construction and repairing seems like permanent affair. Displacement of people living on the banks of rivers due to river bank erosion is another major issue here. The tributaries continue to erode the banks rapidly. The River banks are constantly being changed by means of flood of very high magnitude, channel widening, and change in channel pattern and of river bank erosion. To protect the shore and its properties various methods are in use like, geobags filling with sand, porcupine (triangle shaped concrete structure), sand bags and boulder bags called Gabions are in use to strengthen the embankments.

c) Hindrances - Hyacinth, rocks, rapid waterfalls, forest, wild-life sanctuary, security issues:-

There is no hindrance like rock, rapid waterfall, forest and wildlife sanctuary found in this stretches of river.

d) Details of Protected Area- Wildlife Defence: -

There is no wildlife sanctuary found in this stretches of river.

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

There is no NH/SH found in this stretches of river.

f) Railway Line and Stations in the vicinity: -

There is no railway line found in this stretches of river.

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

Agricultural land is found both sides bank of the river.

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

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

i) Availability of Bulk / Construction Material: -

There is no construction material found in this stretches of river.

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

There is no major industry found in this stretch of river.

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

There is no ferry ghat, jetty, terminal found in this stretch of river.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Rajhanpur, Birwar, Sirwar, Bihna, Gamrahu, Nakauch, Baghaud, Lahthabathan, Mahpura, Sharma Tola, Aina, Aina Sohagpur , Aksaur, Baghandarzi, Jalkaur, Bhadaiya Tola etc. places are located in this stretches of river.

n) Village / Colonies along the sub stretch and approx. population:-

Rajhanpur, Birwar, Sirwar, Bihna, Gamrahu, Nakauch, Baghaud, Lahthabathan, Mahpura, Sharma Tola, Aina, Aina Sohagpur , Aksaur, Baghandarzi, Jalkaur, Bhadaiya Tola etc. villages are located in this stretches of river.

o) Availability of passenger Ferry services with facilities:-

There is no passenger ferry service available in this stretches of river.

p) Available and probable water sport Recreational Facilities:-

There is no water sport and other facilities are available in this river.

q) Fishing activities:-

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

r) Sand Mining:-

There is no sand mines found in this stretches of river.

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and outlets:-

There is no irrigation canal found in this stretches of river.

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

There are no nalas found in this stretches of river.

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

The water is used for agriculture purposes in this stretches of river.

3.14From Chainage 130.00 Km to Chainage 140.00 Km (Teghra village to Akardh village):-

Figure 30-Chainage 130.00 km to Chainage 140.00 km

The River stretch from Chainage 130.000 Km. to Chainage 140.000 km is approximately 1541.13 m to 674.77m. The average width portion of the river is 1107.95 meter. approximate.

Due to the high sand dunes and a number of channels form part of this river stretch, it leads to formation of number of sand patches and islands in the river, besides the river becomes narrow near Akardh. The river has also meandering and braiding behavior. Both banks are connected by Baluha Ghat (Gandaul rd) to Kosi Mega Bridge (Saharsa) near Chainage of 131.370 km. BM-14 has been situated near Chainage of 130.974km . The right bank of the river are surrounded by many villages namely Baluaha, Nania, Mahesraho, Parewa, Sarauni, Chandrain, Dharhara and Paranpur, Semar, Thanwar, Sataur, Narainpur, Narga are located on the left bank side of the river. One RCC Bridge is situated near Chainage of 131.036 km which is communicated between Saharsa to Patna. The position of the RCC Bridge is **(Lat: - 25°52'47.86"N, Long: - 86°26'40.92"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	130.00	140.00	0.3	5.6	8250	51829.48	-0.12	3.68	10000	306266.85
II	130.00	140.00	0.1	5.61	10000	138599.69	-0.22	3.69	10000	494595.71
III	130.00	140.00	0.1	5.72	9000	252449.9	-0.3	3.7	10000	786774.27
IV	130.00	140.00	0.05	5.92	10000	293023.86	-0.3	3.71	10000	980807.49

Figure 31- RCC Bridge (Chainage-131.036 km)

Bathymetry Survey

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

The Bathymetry survey has been carried out from Ara to Akardh. The Length of the Bathymetric survey is Chainage 130.00 km to Chainage 140.00 km.

Topographic Survey:-

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

The Topography survey has been carried out from Ara to Akardh . The Length of the Topography survey is Chainage 130.00 km to Chainage 140.00 km.

a) Prominent Dams / Barrage: -

There is no dam or barrage found in this stretches of river.

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

Kosi River annually bears the brunt of floods and where embankment construction and repairing seems like permanent affair. Displacement of people living on the banks of rivers due to river bank erosion is another major issue here. The tributaries continue to erode the banks rapidly. The River banks are constantly being changed by means of flood of very high magnitude, channel widening, and change in channel pattern and of river bank erosion. To protect the shore and its properties various methods are in use like, geobags filling with sand, porcupine (triangle shaped concrete structure), sand bags and boulder bags called Gabions are in use to strengthen the embankments.

c) Hindrances - Hyacinth, rocks, rapid waterfalls, forest, wild-life sanctuary, security issues:-

There is no hindrance like rock, rapid waterfall, forest and wildlife sanctuary found in this stretches of river.

d) Details of Protected Area- Wildlife Defence: -

There is no wildlife sanctuary found in this stretches of river.

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

There is a RCC Bridge located in this stretches of river near Chainage of 131.036 km.

f) Railway Line and Stations in the vicinity: -

There is no railway line found in this stretches of river.

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

Agricultural land is found both sides bank of the river.

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

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

i) Availability of Bulk / Construction Material: -

There is no construction material found in this stretches of river.

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

There is no major industry found in this stretch of river.

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

There is no ferry ghat, jetty, terminal found in this stretch of river.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Khairaha, Paranpur, Thanwar, Teghra, Nagar, Nonia, Mahesraho, Dhamwara, Semar, Pastwar, Lohaur, Parewa, Sarauni khurd, Balia, Kargaon, Kundali, Sataur, Chandrain, Narainpur, Narga, Akardah etc. places are located in this stretches of river.

n) Village / Colonies along the sub stretch and approx. population:-

Khairaha, Paranpur, Thanwar, Teghra, Nagar, Nonia, Mahesraho, Dhamwara, Semar, Pastwar, Lohaur, Parewa, Sarauni khurd, Balia, Kargaon, Kundali, Sataur, Chandrain, Narainpur, Narga, Akardahetc. villages are located in this stretches of river.

o) Availability of passenger Ferry services with facilities:-

There is no passenger ferry service available in this stretches of river.

p) Available and probable water sport Recreational Facilities:-

There is no water sport and other facilities are available in this river.

q) Fishing activities:-

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

r) Sand Mining:-

There is no sand mines found in this stretches of river.

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and outlets:-

There is an irrigation canal found in this stretches of river near the Chainage of 137.00 km in the left bank side of the river.

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

There are no nalas found in this stretches of river.

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

The water is used for agriculture purposes in this stretches of river.

3.15 From Chainage 140.00 Km to Chainage 150.00 Km (Akardh village to Barahi village):-

Figure 32-Chainage 140.00 km to Chainage 150.00 km

The River stretch from Chainage 140.000 Km. to Chainage 150.000 km is approximately 674.77m to 3776.93m. The average width portion of the river is 2225.85 meter. approximate.

The navigable stretch is widest near Hempur, few dry and very shallow channels were also notices along the stretch near Hempur to Parkhotimpur. Due to the high sand dunes and a number channels form part of this river stretch, it leads to formation of number of sand patches and islands in the river. BM-15 has been situated near Chainage of 140.884kmThere are no locks, barrage in this stretch. The right bank of the river are surrounded by many villages namely Eanaetpur, Mohanpur, Fequrali, Majhaul, Shahpur, Hempur, Barahi, Dharampur and Bir-jain, Rasulpur, Gahia Lohir, Mahua, Partaha etc on the 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	140.00	150.00	0.3	5.45	8650	73187.56	-0.15	3.68	10000	304764.16
II	140.00	150.00	0.2	5.65	10000	139221.92	-0.16	3.88	10000	502729.21
III	140.00	150.00	0.1	5.85	10000	310499.65	-0.21	4.08	10000	785498.42
IV	140.00	150.00	0.1	6.05	10000	296664.44	-0.3	4.28	10000	999030.91

Bathymetry Survey

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

The Bathymetry survey has been carried out from Akardh to Hati. The Length of the Bathymetric survey is Chainage 140.00 km to Chainage 150.00 km.

Topographic Survey:-

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

The Topography survey has been carried out from from Akardh to Hati. The Length of the Topography survey is Chainage 140.00 km to Chainage 150.00 km.

a) Prominent Dams / Barrage: -

There is no dam or barrage found in this stretches of river.

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

Kosi River annually bears the brunt of floods and where embankment construction and repairing seems like permanent affair. Displacement of people living on the banks of rivers due to river bank erosion is another major issue here. The tributaries continue to erode the banks rapidly. The River banks are constantly being changed by means of flood of very high magnitude, channel widening, and change in channel pattern and of river bank erosion. To protect the shore and its properties various methods are in use like, geobags filling with sand, porcupine (triangle shaped concrete structure), sand bags and boulder bags called Gabions are in use to strengthen the embankments.

c) Hindrances - Hyacinth, rocks, rapid waterfalls, forest, wild-life sanctuary, security issues:-

There is no hindrance like rock, rapid waterfall, forest and wildlife sanctuary found in this stretches of river.

d) Details of Protected Area- Wildlife Defence: -

There is no wildlife sanctuary found in this stretches of river.

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

There is no NH/SH found in this stretches of river.

f) Railway Line and Stations in the vicinity: -

There is no railway line found in this stretches of river.

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

Agricultural land is found both sides bank of the river.

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

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

i) Availability of Bulk / Construction Material: -

There is no construction material found in this stretches of river.

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

There is no major industry found in this stretch of river.

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

There is no ferry ghat, jetty found in this stretch of river. Akardah terminal is found near the Chainage of 140.839 km.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Rasulpur, Garhia Lohir, Bhakua, Mohammadpur Bhelahi, Bahrampur, Majhaul, Fequrahi, Rampur, Partaha, Hempur Asnahi patti, Mohanpur, Nauhata etc. places are located in this stretches of river.

n) Village / Colonies along the sub stretch and approx. population:-

Rasulpur, Garhia Lohir, Bhakua, Mohammadpur Bhelahi, Bahrampur, Majhaul, Fequrahi, Rampur, Partaha, Hempur Asnahi patti, Mohanpur, Nauhata etc. villages are located in this stretches of river.

o) Availability of passenger Ferry services with facilities:-

There is no passenger ferry service available in this stretches of river.

p) Available and probable water sport Recreational Facilities:-

There is no water sport and other facilities are available in this river.

q) Fishing activities:-

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

r) Sand Mining:-

There is no sand mines found in this stretches of river.

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and outlets:-

There is no irrigation canal found in this stretches of river.

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

There are no nalas found in this stretches of river.

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

The water is used for agriculture purposes in this stretches of river.

3.16 From Chainage 150.00 Km to Chainage 160.00 Km (Barahi village to Baspiti village):-

Figure 33- Chainage 150.00 km to Chainage 160.00 km

The River stretch from Chainage 150.000 Km. to Chainage 160.000 km is approximately 3776.93 m to 2345m. The average width portion of the river is 3060.965 meter. Approximate.

The navigable stretches along this river are dry and very shallow channels were also notices along the stretch. Due to the high sand dunes and a number of channels form part of this river stretch, it leads to formation of number of sand patches and islands in the river.

This river provides water for cultivation land along the river of the both banks at various places though a system of irrigation canals. Roads run along the right bank of the river in this stretch. BM-16 and BM-17 have been situated near Chainage of 151.166 km and 159.357 km right bank side of the river. Two irrigation canal and outlets have been found near Chainage of 156.600km left bank side of the river. The right bank of the river are surrounded by many villages namely Parsauni, Maricha, Bakaur, Rampur, Nemua, Baspiti on the right bank side of the river and Kaliali, Bhargawan, Murlipur, Gopalpur Siri, Telwa etc villages are situated in the 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	150.00	160.00	0.3	2.85	9000	75377.6	0.02	1.65	10000	308633.97
II	150.00	160.00	0.2	2.95	10000	150306.46	-0.08	1.75	10000	483522.09
III	150.00	160.00	0.1	3.05	10000	296379.91	-0.18	1.85	10000	780200.19
IV	150.00	160.00	0.1	3.15	10000	292129.05	-0.3	1.95	10000	955797.21

Bathymetry Survey

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

The Bathymetry survey has been carried out from Hati to Baspiti. The Length of the Bathymetric survey is Chainage 150.00 km to Chainage 160.00 km.

Topographic Survey:-

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

The Topography survey has been carried out from Hati to Baspiti. The Length of the Topography survey is Chainage 150.00 km to Chainage 160.00 km.

a) Prominent Dams / Barrage: -

There is no dam or barrage found in this stretches of river.

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

Kosi River annually bears the brunt of floods and where embankment construction and repairing seems like permanent affair. Displacement of people living on the banks of rivers due to river bank erosion is another major issue here. The tributaries continue to erode the banks rapidly. The River banks are constantly being changed by means of flood of very high magnitude, channel widening, and change in channel pattern and of river bank erosion. To protect the shore and its properties various methods are in use like, geobags filling with sand, porcupine (triangle shaped concrete structure), sand bags and boulder bags called Gabions are in use to strengthen the embankments.

c) Hindrances - Hyacinth, rocks, rapid waterfalls, forest, wild-life sanctuary, security issues:-

There is no hindrance like rock, rapid waterfall, forest and wildlife sanctuary found in this stretches of river.

d) Details of Protected Area- Wildlife Defence: -

There is no wildlife sanctuary found in this stretches of river.

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

There is no NH/SH found in this stretches of river.

f) Railway Line and Stations in the vicinity: -

There is no railway line found in this stretches of river.

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

Agricultural land is found both sides bank of the river.

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

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

i) Availability of Bulk / Construction Material: -

There is no construction material found in this stretches of river.

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

There is no major industry found in this stretch of river.

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

There is no ferry ghat, jetty and terminal found in this stretch of river.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Kaliali, Hati, Barahi, Kathwar Arazi, Parsauni, Murlipur, Maricha, Gopalpur Khurd, Gopalpur siri, Chandail, Nemua, Rampur, Telwa, Baspiti etc. places are located in this stretches of river.

n) Village / Colonies along the sub stretch and approx. population:-

Kaliali, Hati, Barahi, Kathwar Arazi, Parsauni, Murlipur, Maricha, Gopalpur Khurd, Gopalpur siri, Chandail, Nemua, Rampur, Telwa, Baspiti etc. villages are located in this stretches of river.

o) Availability of passenger Ferry services with facilities:-

There is no passenger ferry service available in this stretches of river.

p) Available and probable water sport Recreational Facilities:-

There is no water sport and other facilities are available in this river.

q) Fishing activities:-

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

r) Sand Mining:-

There is no sand mines found in this stretches of river.

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and outlets:-

There are two irrigation canal and outlets found in this stretches of river near the Chainage of 156.100 km and 157 km left bank side of the river respectively.

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

There are no nalas found in this stretches of river.

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

The water is used for agriculture purposes in this stretches of river.

3.17 From Chainage 160.00 Km to Chainage 170.00 Km (Baspiti village to Balwa village):-

Figure 34- Chainage 160.00 km to 170.00 km

The River stretch from Chainage 160.000 Km. to Chainage 170.000 km is approximately 2345m to 2290m. The average width portion of the river is 2317.50 meter. Approximate.

The navigable stretches along this river are becoming dry and very shallow channels noticed in this zone of river. Due to the high sand dunes and a number of channels form part of this river stretch, it leads to formation of number of sand patches and islands in this stretch. BM-18 has been situated near Chainage of 169.973km. The right bank of the river are surrounded by many villages like Papra Khurd, Parsa, Piprali, Mahuwa, Sisauni etc. are situated right bank side of the river and Bhawanipur, Garhgaon, Parsauni, Asurgarh, Harari etc villages are situated in the 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	160.00	170.00	0.3	21.85	7150	20326.38	-0.23	19.83	10000	273356.23
II	160.00	170.00	0.1	22.05	8250	42045.91	-0.3	22.03	10000	431638.47
III	160.00	170.00	0.1	22.25	9000	136798.82	-0.3	20.23	10000	697911.61
IV	160.00	170.00	0.1	22.45	8500	109318.69	-0.3	20.43	10000	826466.03

Bathymetry Survey

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

The Bathymetry survey has been carried out from Baspiti to Sukaila. The Length of the Bathymetric survey is Chainage 160.00 km to Chainage 170.00 km.

Topographic Survey:-

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

The Topography survey has been carried out from Baspiti to Sukaila. The Length of the Topography survey is Chainage 160.00 km to Chainage 170.00 km.

a) Prominent Dams / Barrage: -

There is no dam or barrage found in this stretches of river.

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

Kosi River annually bears the brunt of floods and where embankment construction and repairing seems like permanent affair. Displacement of people living on the banks of rivers due to river bank erosion is another major issue here. The tributaries continue to erode the banks rapidly. The River banks are constantly being changed by means of flood of very high magnitude, channel widening, and change in channel pattern and of river bank erosion. To protect the shore and its properties various methods are in use like, geobags filling with sand, porcupine (triangle shaped concrete structure), sand bags and boulder bags called Gabions are in use to strengthen the embankments.

c) Hindrances - Hyacinth, rocks, rapid waterfalls, forest, wild-life sanctuary, security issues:-

There is no hindrance like rock, rapid waterfall, forest and wildlife sanctuary found in this stretches of river.

d) Details of Protected Area- Wildlife Defence: -

There is no wildlife sanctuary found in this stretches of river.

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

There is no NH/SH found in this stretches of river.

f) Railway Line and Stations in the vicinity: -

There is no railway line found in this stretches of river.

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

Agricultural land is found both sides bank of the river.

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

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

i) Availability of Bulk / Construction Material: -

There is no construction material found in this stretches of river.

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

There is no major industry found in this stretch of river.

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

There is no ferry ghat, jetty and terminal found in this stretch of river.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Bagewa, Bhawanipur, Rampur, Narahia, Mainahi, Balwa, Kanpatti, Fakirana, parriahi, Luchpani, Garhgaon, Asurgarh etc. places are located in this stretches of river.

n) Village / Colonies along the sub stretch and approx. population:-

Bagewa, Bhawanipur, Rampur, Narahia, Mainahi, Balwa, Kanpatti, Fakirana, parriahi, Luchpani, Garhgaon, Asurgarh etc. villages are located in this stretches of river.

o) Availability of passenger Ferry services with facilities:-

There is no passenger ferry service available in this stretches of river.

p) Available and probable water sport Recreational Facilities:-

There is no water sport and other facilities are available in this river.

q) Fishing activities:-

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

r) Sand Mining:-

There is no sand mines found in this stretches of river.

s) Tributaries:-

Kamala, Bagmati and Budhi Gandak are the major Tributary of Kosi River, on the other side Bhutahi Balan is the minor Tributary of Kosi River.

t) Details of Irrigation Canals and outlets:-

There is an irrigation canal and outlets found in this stretches of river near the Chainage of 166.00 km in the left bank side of the river.

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

There are no nalas found in this stretches of river.

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

The water is used for agriculture purposes in this stretches of river.

3.18 From Chainage 170.00 Km to Chainage 180.00 Km (Balwa village to Jobaha village):-

Figure 35- Chainage 170.00 km to Chainage 180.00 km

The River stretch from Chainage 170.000 Km. to Chainage 180.000 km is approximately 2290 m to 2147 m. The average width portion of the river is 2218.50 m.

The navigable stretches along this river are dry and very shallow channels were also notices along the stretch. Due to the high sand dunes and a number channels form part of this river stretch, it leads to formation of number of sand patches and islands in the river. The right bank of the river are surrounded by many villages like Abhwar, Belatarha, Madhura, Koraia, Sohagpur, Kishanpur and Pachlehira, Parkonch, Manharputti, Saraunjabela etc on the left bank.

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	170.00	180.00	0.3	3.69	5300	16069.55	0.03	1.51	10000	296205.36
II	170.00	180.00	0.1	3.79	7400	55106.60	-0.17	1.52	10000	486011.8
III	170.00	180.00	0.1	3.89	10000	114168.35	-0.3	1.53	10000	740790.09
IV	170.00	180.00	0.1	3.99	9500	138195.51	-0.3	1.54	10000	956822.11

Bathymetry Survey

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

The Bathymetry survey has been carried out from Sukaila to Jobaha . The Length of the Bathymetric survey is Chainage 170.00 km to Chainage 180.00 km.

Topographic Survey:-

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

The Topography survey has been carried out from Sukaila to Jobaha. The Length of the Topography survey is Chainage 170.00 km to Chainage 180.00 km.

a) Prominent Dams / Barrage: -

There is no dam or barrage found in this stretches of river.

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

Kosi River annually bears the brunt of floods and where embankment construction and repairing seems like permanent affair. Displacement of people living on the banks of rivers due to river bank erosion is another major issue here. The tributaries continue to erode the banks rapidly. The River banks are constantly being changed by means of flood of very high magnitude, channel widening, and change in channel pattern and of river bank erosion. To protect the shore and its properties various methods are in use like, geobags filling with sand, porcupine (triangle shaped concrete structure), sand bags and boulder bags called Gabions are in use to strengthen the embankments.

c) Hindrances - Hyacinth, rocks, rapid waterfalls, forest, wild-life sanctuary, security issues:-

There is no hindrance like rock, rapid waterfall, forest and wildlife sanctuary found in this stretches of river.

d) Details of Protected Area- Wildlife Defence: -

There is no wildlife sanctuary found in this stretches of river.

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

There is no NH/SH found in this stretches of river.

f) Railway Line and Stations in the vicinity: -

There is no railway line found in this stretches of river.

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

Agricultural land is found both sides bank of the river.

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

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

i) Availability of Bulk / Construction Material: -

There is no construction material found in this stretches of river.

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

There is no major industry found in this stretch of river.

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

There is no ferry ghat, jetty and terminal found in this stretch of river.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Bela, Begamganj, Pachgachhia, Ghogkaria, Sukmarpur, Siswa, Manharpatti, Sujanpur, Jobaha etc. places are located in this stretches of river.

n) Village / Colonies along the sub stretch and approx. population:-

Bela, Begamganj, Pachgachhia, Ghogkaria, Sukmarpur, Siswa, Manharpatti, Sujanpur, Jobaha etc. villages are located in this stretches of river.

o) Availability of passenger Ferry services with facilities:-

There is no passenger ferry service available in this stretches of river.

p) Available and probable water sport Recreational Facilities:-

There is no water sport and other facilities are available in this river.

q) Fishing activities:-

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

r) Sand Mining:-

There is no sand mines found in this stretches of river.

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and outlets:-

There is an irrigation canal and outlets found in this stretches of river near the Chainage of 174.00 km in the right bank side of the river.

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

There are no nalas found in this stretches of river.

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

The water is used for agriculture purposes in this stretches of river.

3.19 From Chainage 180.00 Km to Chainage 190.00 Km (Jobaha village to Lachhmini village):-

Figure 36-Chainage 180.00 km to Chainage 190.00 km

The River stretch from Chainage 180.000 Km. to Chainage 190.000 km is approximately 2147 m to 252.31m. The average width portion of the river is 1199.65 m.

The river is consisting with dry and very shallow channels along the stretch. Due to the high sand dunes and a number of channels form part of this river stretch, it leads to formation of number of sand patches and islands in the river. The area is well connected with railways and roads named Kosi MahaSetu Bridge, is an important communication way in this stretches of river. The right bank of the river are surrounded by many villages named Shivpuri, Nawabakhar, Malar, Andauli, Tengaraha, Candpipar, Arraha and Kataia, Gotrahi, Parsa Madha, Lalmania, Asanpur Kupaha, Katmungra etc on the left bank. BM-19 and BM-20 have been situated near Chainage of 180.856km and 189.271km. One under-Construction Rail Bridge and one RCC Bridge have been situated near Chainage of 189.100 km and 189.163km respectively. The Under construction Railway Bridge's location is- (**Lat. - 26°16'56.44"N, Long-86°39'7.90"E)** and the RCC bridge's location is (**Lat-26°17'18.09"N, Long-86°38'42.70"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	180.00	190.00	0.1	3.6	9000	33565.47	0.1	0.6	10000	318221.71
II	180.00	190.00	0.1	3.61	8800	66999.05	-0.1	0.8	10000	513615.6
III	180.00	190.00	0.1	3.62	10000	188998.87	-0.3	1.0	10000	817985.89
IV	180.00	190.00	0.02	3.63	10000	162028.46	-0.3	1.2	10000	1020337.79

Figure 37- Under Construction Rail Bridge and RCC Bridge (Chainage- 189.100 km and 189.163 km)

Bathymetry Survey

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

The Bathymetry survey has been carried out from Jobaha to Lachhminia. The Length of the Bathymetric survey is Chainage 180.00 km to Chainage 190.00 km.

Topographic Survey:-

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

The Topography survey has been carried out from Jobaha to Lachhminia. The Length of the Topography survey is Chainage 180.00 km to Chainage 190.00 km.

a) Prominent Dams / Barrage: -

There is no dam or barrage found in this stretches of river.

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

Kosi River annually bears the brunt of floods and where embankment construction and repairing seems like permanent affair. Displacement of people living on the banks of rivers due to river bank erosion is another major issue here. The tributaries continue to erode the banks rapidly. The River banks are constantly being changed by means of flood of very high magnitude, channel widening, and change in channel pattern and of river bank erosion. To protect the shore and its properties various methods are in use like, geobags filling with sand, porcupine (triangle shaped concrete structure), sand bags and boulder bags called Gabions are in use to strengthen the embankments.

c) Hindrances - Hyacinth, rocks, rapid waterfalls, forest, wild-life sanctuary, security issues:-

There is no hindrance like rock, rapid waterfall, forest and wildlife sanctuary found in this stretches of river.

d) Details of Protected Area- Wildlife Defence: -

There is no wildlife sanctuary found in this stretches of river.

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

The NH-57 is found in this stretches of river near the Chainage of 189.163 km.

f) Railway Line and Stations in the vicinity: -

There is an under construction railway line found in this stretches of river near the Chainage of 189.10 km.

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

Agricultural land is found both sides bank of the river.

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

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

i) Availability of Bulk / Construction Material: -

There is no construction material found in this stretches of river.

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

There is no major industry found in this stretch of river.

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

There is no ferry ghat, jetty and terminal found in this stretch of river.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Jobaha, Sisauni, Gotrahi, Parsa Madho, Sonbarsa, Gadahwa, Shivpuri, Malar, Nawabakhar, Andauli, Arraha, Katmungra, Lachhminia etc. places are located in this stretches of river.

n) Village / Colonies along the sub stretch and approx. population:-

Jobaha, Sisauni, Gotrahi, Parsa Madho, Sonbarsa, Gadahwa, Shivpuri, Malar, Nawabakhar, Andauli, Arraha, Katmungra, Lachhminia etc. villages are located in this stretches of river.

o) Availability of passenger Ferry services with facilities:-

There is no passenger ferry service available in this stretches of river.

p) Available and probable water sport Recreational Facilities:-

There is no water sport and other facilities are available in this river.

q) Fishing activities:-

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

r) Sand Mining:-

There is no sand mines found in this stretches of river.

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and outlets:-

There are two irrigation canal and outlets found in this stretches of river near the Chainage of 180.40 km and 184.00 km in the right bank side of the river respectively.

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

There are no nalas found in this stretches of river.

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

The water is used for agriculture purposes in this stretches of river.

3.20 From Chainage 190.00 Km to Chainage 200.00 Km (Lachhmini village to Dhadi village):-

Figure 38- Chainage 190.00 km to Chainage 200.00 km

The River stretch from Chainage 190.000 Km. to Chainage 200.000 km is approximately 252.31m to 764.86m. The average width portion of the river is 508.585 m.

The both banks are well connected by railways and roads. The important road- NH-57 passes through this stretch in the left bank side of the river. The river has meandering and braiding behavior of its stretches. High sand dunes and a number of channels have been also noticed in this river stretch. The water of the river is inundated at various places in this stretch which leads to formation of number of sand patches and islands in the river.

The right bank of the river are surrounded by many villages named Saraigarh, Bhaptiahi, Paprakhurd, Bishunpur etc. and Majhari, Bela Singan Moti, Dighia, Dudhaila, Dhadi etc villages are situated in the 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	190.00	200.00	0.3	3.65	7300	17046.16	0.2	0.8	10000	245578.87
II	190.00	200.00	0.1	3.66	8800	42006.71	-0.1	0.9	10000	380246.09
III	190.00	200.00	0.1	3.67	9600	102341.61	-0.2	1.0	10000	617177.73
IV	190.00	200.00	0.02	3.68	10000	102496.98	-0.3	1.1	10000	747468.8

Bathymetry Survey

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

The Bathymetry survey has been carried out from Lachhminia to Kaleanpur. The Length of the Bathymetric survey is Chainage 190.00 km to Chainage 200.00 km.

Topographic Survey:-

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

The Topography survey has been carried out from Lachhminia to Kaleanpur. The Length of the Topography survey is Chainage 190.00 km to Chainage 200.00 km.

a) Prominent Dams / Barrage: -

There is no dam or barrage found in this stretches of river.

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

Kosi River annually bears the brunt of floods and where embankment construction and repairing seems like permanent affair. Displacement of people living on the banks of rivers due to river bank erosion is another major issue here. The tributaries continue to erode the banks rapidly. The River banks are constantly being changed by means of flood of very high magnitude, channel widening, and change in channel pattern and of river bank erosion. To protect the shore and its properties various methods are in use like, geobags filling with sand, porcupine (triangle shaped concrete structure), sand bags and boulder bags called Gabions are in use to strengthen the embankments.

c) Hindrances - Hyacinth, rocks, rapid waterfalls, forest, wild-life sanctuary, security issues:-

There is no hindrance like rock, rapid waterfall, forest and wildlife sanctuary found in this stretches of river.

d) Details of Protected Area- Wildlife Defence: -

There is no wildlife sanctuary found in this stretches of river.

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

There is no NH/SH found in this stretches of river.

f) Railway Line and Stations in the vicinity: -

There is no railway line found in this stretches of river.

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

Agricultural land is found both sides bank of the river.

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

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

i) Availability of Bulk / Construction Material: -

There is no construction material found in this stretches of river.

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

There is no major industry found in this stretch of river.

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

There is no ferry ghat, jetty and terminal found in this stretch of river.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Raharia, Aurahi, Banainia, Baltharwa, Bhulia, Jhahura,Kataia Bhulia, Dhadi, Dudhaila, Dighia, Kaleanpur etc. places are located in this stretches of river.

n) Village / Colonies along the sub stretch and approx. population:-

Raharia, Aurahi, Banainia, Baltharwa, Bhulia, Jhahura,Kataia Bhulia, Dhadi, Dudhaila, Dighia, Kaleanpur etc. villages are located in this stretches of river.

o) Availability of passenger Ferry services with facilities:-

There is no passenger ferry service available in this stretches of river.

p) Available and probable water sport Recreational Facilities:-

There is no water sport and other facilities are available in this river.

q) Fishing activities:-

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

r) Sand Mining:-

There is no sand mines found in this stretches of river.

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and outlets:-

There is no irrigation canal and outlets found in this stretches of river.

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

There are no nalas found in this stretches of river.

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

The water is used for agriculture purposes in this stretches of river.

3.21 From Chainage 200.00 Km to Chainage 210.00 Km (Dhadi village to Gopalpur village):-

Figure 39- Chainage 200.00 km to Chainage 210.00 km

The River stretch from Chainage 200.000 Km. to Chainage 210.000 km is approximately 764.86m to 452.63m. The average width portion of the river is 608.745 m.

The river has meandering and braiding behavior of its stretches. High sand dunes and a number of channels have been also noticed in this river stretch. The right bank of the river are surrounded by many villages like Sadanandpur, Shahpur Pirthipatti, Nonpara, Simri and Dudhaila, Sikrahata, Rauwahi, Dagmara etc on the left bank side of the river and Sikrahata, Takia, Laukaha etc villages are situated left bank side of the river. BM-21 has been situated near Chainage of 203.440 km.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	200.00	210.00	0.03	3.62	8050	39436.43	0.1	0.5	10000	303750.3
II	200.00	210.00	0.03	3.72	8200	90851.49	-0.1	0.7	10000	491064.41
III	200.00	210.00	0.02	3.82	10000	179496.1	-0.2	0.9	10000	777325.2
IV	200.00	210.00	0.02	3.92	9800	194036.36	-0.3	1.1	10000	978302.21

Bathymetry Survey

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

The Bathymetry survey has been carried out from Kaleanpur to Gopalpur. The Length of the Bathymetric survey is Chainage 200.00 km to Chainage 210.00 km.

Topographic Survey:-

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

The Topography survey has been carried out from Kaleanpur to Gopalpur. The Length of the Topography survey is Chainage 200.00 km to Chainage 210.00 km.

a) Prominent Dams / Barrage: -

There is no dam or barrage found in this stretches of river.

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

Kosi River annually bears the brunt of floods and where embankment construction and repairing seems like permanent affair. Displacement of people living on the banks of rivers due to river bank erosion is another major issue here. The tributaries continue to erode the banks rapidly. The River banks are constantly being changed by means of flood of very high magnitude, channel widening, and change in channel pattern and of river bank erosion. To protect the shore and its properties various methods are in use like, geobags filling with sand, porcupine (triangle shaped concrete structure), sand bags and boulder bags called Gabions are in use to strengthen the embankments.

c) Hindrances - Hyacinth, rocks, rapid waterfalls, forest, wild-life sanctuary, security issues:-

There is no hindrance like rock, rapid waterfall, forest and wildlife sanctuary found in this stretches of river.

d) Details of Protected Area- Wildlife Defence: -

There is no wildlife sanctuary found in this stretches of river.

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

There is no NH/SH found in this stretches of river.

f) Railway Line and Stations in the vicinity: -

There is no railway line found in this stretches of river.

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

Agricultural land is found both sides bank of the river.

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

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

i) Availability of Bulk / Construction Material: -

There is no construction material found in this stretches of river.

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

There is no major industry found in this stretch of river.

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

There is no ferry ghat, jetty found in this stretch of river. Kaleanpur terminal is found near the Chainage of 203.440 km in this stretches of river.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Kaleanpur, Sikra Baisa, Takiahata, Korhali, Takia, Simri, Gopalpur etc. places are located in this stretches of river.

n) Village / Colonies along the sub stretch and approx. population:-

Sikra Baisa, Takiahata, Korhali, Takia, Simri, Gopalpur etc. villages are located in this stretches of river.

o) Availability of passenger Ferry services with facilities:-

There is no passenger ferry service available in this stretches of river.

p) Available and probable water sport Recreational Facilities:-

There is no water sport and other facilities are available in this river.

q) Fishing activities:-

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

r) Sand Mining:-

There is no sand mines found in this stretches of river.

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and outlets:-

There is an irrigation canal and outlets found in this stretches of river near the Chainage of 209.00 km in the left bank side of the river.

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

There are no nalas found in this stretches of river.

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

The water is used for agriculture purposes in this stretches of river.

3.22 From Chainage 210.00 Km to Chainage 220.00 Km (Gopalpur village to Dharhapatti village):-

Figure 40- Chainage 210.00 km to Chainage 220.00 km

The River stretch from Chainage 210.000 Km. to Chainage 220.000 km is approximately 452.63 m to 3226 m. The average width portion of the river is 1839.31 m.

The river becomes narrower near Gopalpur then it extends with high sand dunes and a number channels form part of this river stretch. The water is inundated at various places in this stretch which leads to formation of number of sand patches and islands in the river. The right bank of the river are surrounded by many villages named Bahtunia, Satan patti, Narpat Patti, Jagdispur, Kohbarwa, Paprahigot, Karjain, Rajpur Arazi, Basawanpatti and Harpur, Bilandi, Rampuramaihaniya etc. villages are situated in the 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	210.00	220.00	0.65	3.2	7100	22906.82	0.2	0.6	10000	307350.18
II	210.00	220.00	0.2	3.4	9100	76270.89	-0.3	0.7	10000	501432.99
III	210.00	220.00	0.1	3.6	10000	158320.21	-0.2	0.9	10000	779433.09
IV	210.00	220.00	0.1	3.8	10000	185554.49	-0.4	1.1	10000	990064.95

Bathymetry Survey

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

The Bathymetry survey has been carried out from Gopalpur to Dharhapatti. The Length of the Bathymetric survey is Chainage 210.00 km to Chainage 220.00 km.

Topographic Survey:-

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

The Topography survey has been carried from Gopalpur to Dharhapatti. The Length of the Topography survey is Chainage 210.00 km to Chainage 220.00 km.

a) Prominent Dams / Barrage: -

There is no Dam or Barrage found in this stretches of river.

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

Kosi River annually bears the brunt of floods and where embankment construction and repairing seems like permanent affair. Displacement of people living on the banks of rivers due to river bank erosion is another major issue here. The tributaries continue to erode the banks rapidly. The River banks are constantly being changed by means of flood of very high magnitude, channel widening, and change in channel pattern and of river bank erosion. To protect the shore and its properties various methods are in use like, geobags filling with sand, porcupine (triangle shaped concrete structure), sand bags and boulder bags called Gabions are in use to strengthen the embankments.

c) Hindrances - Hyacinth, rocks, rapid waterfalls, forest, wild-life sanctuary, security issues:-

There is no hindrance like rock, rapid waterfalls, forest and wildlife sanctuary found in this stretches of river.

d) Details of Protected Area- Wildlife Defence: -

There is no wildlife sanctuary found in this stretches of river.

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

There is no NH/SH found in this stretches of river.

f) Railway Line and Stations in the vicinity: -

There is no railway line found in this stretches of river.

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

The agricultural land is found both sides of the river bank.

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

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

i) Availability of Bulk / Construction Material: -

The construction material is not found in this stretches of river.

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

There are no major industries found in this stretches of river.

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

There is no ghat, jetty and terminal found in this stretches of river.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Laukaha, Bajdari Chakla, Repauli, Banania, Narpat Patti, piprahigot, rajpur Arazi, parsahi, Dharhapatti etc. places are located in this stretches of river.

n) Village / Colonies along the sub stretch and approx.population:-

Laukaha, Bajdari Chakla, Repauli, Banania, Narpat Patti, piprahigot, rajpur Arazi, parsahi, Dharhapatti etc. villages are located in this stretches of river.

o) Availability of passenger Ferry services with facilities:-

There is no ferry service available in this stretches of river.

p) Available and probable water sport Recreational Facilities:-

There is no water sport and other facilities are available in this river.

q) Fishing activities:-

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

r) Sand Mining:-

There is no sand mines found in this stretches of river.

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and outlets:-

There is an irrigation canal and outlets found in this stretches of river near the Chainage of 217.00 km in the left bank side of the river.

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

There are no nalas found in this stretches of river.

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

The water is used for agriculture purposes in this stretches of river.

3.23 From Chainage 220.00 Km to Chainage 233.040 Km (Dharhapatti village to Bhimnagar village):-

Figure 41- Chainage 220.00 km to Chainage 233.040 km

The river stretch from Chainage 220.000 Km. to Chainage 233.040 km is approximately 3226 m to 1221m. The average width portion of the river is 2223.50 meter.

Due to high sand dunes and a number of channels in this river stretch, the water is inundated at various places in this stretch which leads to formation of number of sand patches and islands in the river stretches. Kosi Barrage is situated in this stretches of river near Chainage of 233.040 km. The Barrage's position is (Lat- 26°31'31.39"N, Long- 86°55'41.57"E). The right bank of the river are surrounded by many villages named Baisi chakla, Bahorwa, Ratanpura, Bhagwanpur, Saheban, Shibnagar, Raniganj and Gobargada, Hanumannagar, Joginiya etc villages are situated in the left bank side of the river. BM-23 and BM-24 have been situated near Chainage of 223.069 km and 233.040 km right bank side of the river 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	220.00	233.040	0.12	3.54	13000	70080.10	0.1	0.6	13000	367703.19
II	220.00	233.040	0.11	3.55	13000	133420.07	-0.3	0.7	13000	562522.8
III	220.00	233.040	0.01	3.56	13000	334520.81	-0.2	0.9	13000	972715.98
IV	220.00	233.040	0.01	3.57	13000	70080.10	-0.3	1.1	13000	367703.19

Figure 42- Kosi Barrage (Chainage-233.040 km)

Bathymetry Survey

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

The Bathymetry survey has been carried out from Dharhapatti to kosi Barrage. The Length of the Bathymetric survey is Chainage 0.00 km to Chainage 233.040 km.

Topographic Survey:-

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

The Topography survey has been carried out from Dharhapatti to kosi Barrage. The Length of the Topography survey is Chainage 0.00 km to Chainage 233.040 km.

a) Prominent Dams / Barrage: -

Koshi Barrage is found in this stretches of river near the Chainage of 233.040 km.

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

In this stretches of river, Kosi barrage is located near the Chainage of 233.040 km. During the rainy season, The River turns dangerous and sometimes over flooded. Kosi River annually bears the brunt of floods and where embankment construction and repairing seems like permanent affair. Displacement of people living on the banks of rivers due to river bank erosion is another major issue here. The tributaries continue to erode the banks rapidly. The River banks are constantly being changed by means of flood of very high magnitude, channel widening, and change in channel pattern and of river bank erosion. To protect the shore and its properties various methods are in use like, geobags filling with sand, porcupine (triangle shaped concrete structure), sand bags and boulder bags called Gabions, Boulder pitching are in use to strengthen the em-bankments.

c) Hindrances - Hyacinth, rocks, rapid waterfalls, forest, wild-life sanctuary, security issues:-

There is no hindrance like rock, rapid waterfalls, forest and wildlife sanctuary found in this stretches of river. Koshi Barrage is situated in this river stretches.

d) Details of Protected Area- Wildlife Defence: -

Kosi Tappu wildlife Reserve is located 15 km far from kosi barrage.

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

NH-106 is located right bank side of the river.

f) Railway Line and Stations in the vicinity: -

There is no railway line found in this stretches of river.

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

The agricultural land is found both sides of the river bank.

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

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

i) Availability of Bulk / Construction Material: -

The construction material is not found in this stretches of river.

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

There are no major industries found in this stretches of river.

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

There is no ghat, jetty and terminal found in this stretches of river.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Chhitauni, Dharha, Saranpur, piprahipatti Golari, Dumri Milik, Panchpanduria, Saheban, Bahadurganj, Dubiahi, Shibnagar, Raniganj, Bhimnagar etc. places are located in this stretches of river.

n) Village / Colonies along the sub stretch and approx. population:-

Chhitauni, Dharha, Saranpur, piprahipatti Golari, Dumri Milik, Panchpanduria, Saheban, Bahadurganj, Dubiahi, Shibnagar, Raniganj, Bhimnagar etc. villages are located in this stretches of river.

o) Availability of passenger Ferry services with facilities:-

There is no ferry service available in this stretches of river.

p) Available and probable water sport Recreational Facilities:-

There is no water sport and other facilities are available in this river.

q) Fishing activities:-

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

r) Sand Mining:-

There is no sand mines found in this stretches of river.

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and outlets:-

There is an irrigation canal and outlets found in this stretches of river near the Chainage of 226.354 km in the left bank side of the river.

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

There are no nalas found in this stretches of river.

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

The water is used for agriculture purposes in this stretches of river.

.

w) Photographs of cross-structures in each stretch with description, location, Chainage, clearance and condition:-

This RCC Bridge is linked with NH-31, situated near Chainage of 2.101km. The RCC Bridge's location is (Lat. - 25°25'24.01"N, Long. - 87°13'59.85"E). The Bridge has a good horizontal and vertical clearance for the development of the waterways, located at kursela village.

The Rail Bridge's location is (Lat.-25°25'10.12"N, Long. - 87°14'4.44"E). The Rail Bridge is communicated between West Bengal to Saharsa. The Rail Bridge has been situated near Chainage of 1.724km.

The RCC Bridge is situated near Chainage of 27.566 km. The Bridge's location is (Lat. - 25°25'1.03"N, Long-87° 3'28.55"E).

The RCC Bridge is situated near Chainage of 75.900 km. The Bridge's location is (Lat. - 25°32'34.10"N, Long-86°43'26.17"E).

Two Bridges are situated near Chainage of 90.294km and 90.325km. The First one is RCC Bridge and its location is (Lat. - 25°36'41.86"N, Long. - 86°36'21.05"E). The next one is Rail Bridge which is well connected through Fungo Railway station and Mansi Railway station. The Rail Bridge's location is (Lat. - 25°36'43.71"N, Long. - 86°36'19.78"E).

The RCC Bridge is situated near Chainage of 131.036 km which is communicated between Saharsa to Patna.

One under-Construction Rail Bridge and one RCC Bridge have been situated near Chainage of 189.100km and 189.163km respectively. The Under construction Rail Bridge's location is-(Lat. - 26°16'56.44"N, Long-86°39'7.90"E) and the RCC bridge's location is (Lat-26°17'18.09"N, Long-86°38'42.70"E).

Section 4: Terminals:

4.1 Details of Terminal survey carried out /proposed with Chainage, Lat/Long, Google images

There are four Terminals site found in this zone of river-

Sl. No	Chainage (Km)	Location	Latitude (N)	Longitude (E)	Easting (m)	Northing (m)	Length (m)	Width (m)	Area (sq.m)	Land owner	Present land use
i)	1.748	Kursela	25°25'4.51"	87°13'58.70"	523429.8545	2811245.7199	686.03	341.15	233417.32	Bihar Govt land	Agri-cultural land

Figure 43- Google image view of Terminal location-1

Sl. No	Chainage (Km)	Location	Latitude (N)	Longitude (E)	Easting (m)	Northing (m)	Length (m)	Width (m)	Area (sq.m)	Land owner	Present land use
i)	89.775	Dhamara Ghat	25°36'54.39"	86°36'38.65"	460917.8335	2833118.7855	512.65	430.37	220630	Bihar Govt land	Charland

Figure 44- Google image of Terminal location-2

Sl. No	Chainage (Km)	Location	Latitude (N)	Longitude (E)	Easting (m)	Northing (m)	Length (m)	Width (m)	Area (sq.m)	Land owner	Present land use
i)	140.839	Akardah	25°57'53.89"	86°26'53.76"	444766.92	2871920.87	430.59	187.20	80553.02	Bihar Govt land	Barren land

Figure 45- Google image of Terminal location-3

Sl. No	Chainage	Location	Latitude (N)	Longitude (E)	Easting (m)	Northing (m)	Length (m)	Width (m)	Area (sq.m)	Land owner	Present land use
i)	203.440	Kalean-pur	26°19'55.28"	86°45'42.34"	476224.99	2912475.97	468.55	333.60	155959.649	Bihar Govt land	Agricul-tural land

Figure 46- Google image of Terminal location-4

4.2 Proposed Terminal site shall have following considerations:-

a) Availability of suitable depths for vessel berthing

The availability of suitable depths for vessel berthing in the Kosi River is 2.00 m. Water level in this zone of river is almost appropriate for the Bathymetry survey.

a) Availability of land for construction of terminal and warehouse

N.A

b) Connectivity to hinterland

There are four terminal sites situated in this zone of river. The terminals are Kursela, Dhamra Ghat, Akardah and Kaleanpur. The First Terminal Kursela is linked with NH-31 at left side and also connects with a Rail Bridge (Kursela Railway Station) at right side. Most of the portions of this site are covered with agricultural land. Dhamra Ghat Terminal is situated near Phango Railway station at the right side and this terminal is covered with char land (Barren land). Akardah Terminal is linked with Dhiro Roy Road at right side and it is also a barren land. The last terminal Kaleanpur is situated near NH-57 and some agricultural land is found near this terminal.

c) Distance from city traffic limits

The first terminal is connected with Kursela Railway station and also close to the NH-31. Dhamra Ghat terminal is closed to the Phango Railway station (0.74 km). Akardah terminal is closed to the Dhiro Roy road (0.19 km) and the Kaleanpur Terminal is situated near to the NH-57(2.70 km).

d) Possibility of future expansion

The Possibility of future expansion for the terminal may be increase for its importance (warehouse)

e) Possibility of new industrial set up along the river stretch in future

All the terminals are closed to the road site so the industrial hub can be set up in this zone of river. The possibility of industry like cement, brickfield and petro-chemical may be set up in future.

4.3 Description of terminal as per above considerations:-

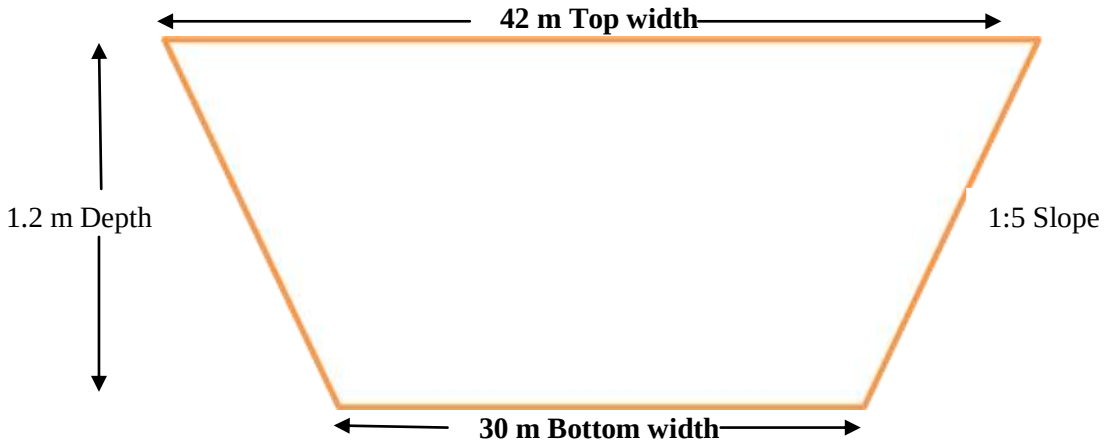
The terminal description has been described in para no-4.1

4.4 Details of land use, owner etc.:-

The both side banks of the River Kosi used for cultivation. Most of the lands are cultivated with Paddy, Maize, and Mustard etc. Besides, Char land, Barren land is also found in the survey stretches. The Farmers are cultivated their crops with using this fertile land and grows a huge amount of crops every year. Besides, some portions of the land are surrounded by small industries and Forests. Though bolder pitching is found in some places, But in Recent times, the bank of the river has been worn away in some places for lack of trees. Sometimes, the land of the river has been changed into a heap of garbage. As a result, the river side becomes polluted land. In the Monsoon period, Flood and erosion has been affected both side of the river bank.

Section 5: Fairway development:-

Class-1:- (Channel design: - Bottom width- 30 meter, Top width- 42 meter)

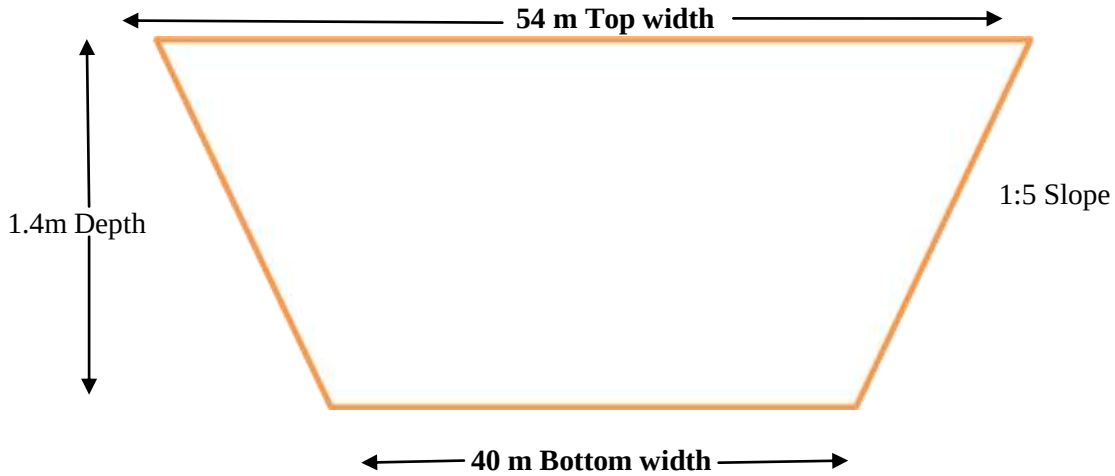


Location		Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumula-tive Dredg-ing Qty (cu.m)	Min. Depth (m)	Max Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m)
Patthar Tola village	Madrauni Pachhi-arital village	0	10	2.12	29.76	0	0	0	0.1	23.58	4100	95511.51	95511.51
Madrauni Pachhiarital village	Bhaua Parbal Village	10	20	1.1	8.23	1100	7898.03	7898.03	-0.09	5.74	9550	199829.08	295340.59
Bhaua Parbal Village	Dadpur village	20	30	1.1	6.32	1000	1092.45	8990.48	-0.04	1.2	10000	216687.37	512027.96
Dadpur village	Gobind-pur Go-bind village	30	40	2	4.6	0	0	8990.48	-0.04	2.64	9000	195034.5	707062.46
Gobindpur Gobind village	Goari village	40	50	1.1	5.68	1000	6191.58	15182.06	-0.12	3.21	9200	203792.65	910855.11
Goari vil-lage	Kapasia village	50	60	2	7.21	0	0	15182.06	-0.05	6.22	9000	168299.29	1079154.4
Kapasia village	Baltara village	60	70	1.5	8.92	0	0	15182.06	-0.12	6.55	7350	128502.49	1207656.9
Baltara village	Murus village	70	80	0.3	10.21	3000	18937.19	34119.25	0.3	8.04	6000	154997.29	1362654.2
Murus village	Dham-hara village	80	90	0.3	4.56	4450	16959.6	51078.85	-0.01	3.12	10000	310735.19	1673389.4
Dhamhara village	Muria village	90	100	0.3	7.35	3850	17910.67	68989.52	-0.12	5.02	10000	276774.85	1950164.2
Muria village	Kho-chardewa village	100	110	0.3	5.67	7100	31561.05	100550.57	0.2	3.68	10000	323508.92	2273673.1
Kho-chardewa village	Ghogh-san vil-lage	110	120	0.3	2.85	5200	31720.87	132271.44	-0.05	1.56	10000	303067.71	2576740.9

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.)	Cumula-tive Dredg-ing Qty (cu.m)	Min. Depth (m)	Max Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m)
Ghoghsan village	Teghra village	120	130	0.3	4.68	2650	8590.81	140862.25	-0.14	3.25	10000	288882.75	2865623.6
Teghra village	Akardh village	130	140	0.3	5.6	8250	51829.48	192691.73	-0.12	3.68	10000	306266.85	3171890.5
Akardh village	Barahi village	140	150	0.3	5.45	8650	73187.56	265879.29	-0.15	3.68	10000	304764.16	3476654.6
Barahi village	Baspiti village	150	160	0.3	2.85	9000	75377.6	341256.89	0.02	1.65	10000	308633.97	3785288.6
Baspiti village	Balwa village	160	170	0.3	21.85	7150	20326.38	361583.27	-0.23	19.83	10000	273356.23	4058644.8
Balwa village	Jobaha village	170	180	0.3	3.69	5300	16069.55	377652.82	0.03	1.51	10000	296205.36	4354850.2
Jobaha village	Lachhmini village	180	190	0.1	3.6	9000	33565.47	411218.29	0.1	0.6	10000	318221.71	4673071.9
Lachhmini village	Dhadi village	190	200	0.3	3.65	7300	17046.16	428264.45	0.2	0.8	10000	245578.87	4918650.8
Dhadi village	Gopalpur village	200	210	0.03	3.62	8050	39436.43	467700.88	0.1	0.5	10000	303750.3	5222401.1
Gopalpur village	Dharha-patti village	210	220	0.65	3.2	7100	22906.82	490607.7	0.2	0.6	10000	307350.18	5529751.2
Dharhapatti village	Bhimpur village	220	233.040	0.12	3.54	13000	70080.1	560687.8	0.1	0.6	13000	367703.19	5897454.4
Total						112150	560687.8		**Total**		217200	5897454.4	

Table 16- Minimum & Maximum Depth for Class-I

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

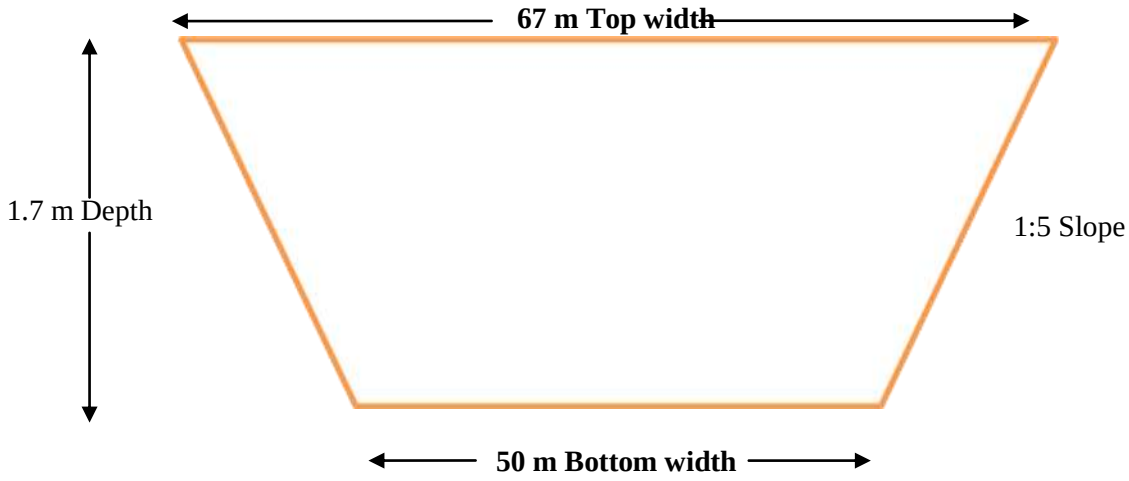


Location		Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	From	To	Min. depth (m)	Max depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)
Patthar Tola village	Madrauni Pachhiarital village	0	10	2.11	29.77	0	0	0	0.02	23.59	5500	160486.33	160486.33
Madrauni Pachhiarital village	Bhaua Parbal Village	10	20	1.05	8.33	4200	23533.31	23533.31	-0.19	5.94	10000	355079.1	515565.43
Bhaua Parbal Village	Dadpur village	20	30	2.0	6.32	0	0	23533.31	-0.14	1.3	10000	356297.41	871862.84
Dadpur village	Gobindpur Gobind village	30	40	2.0	4.6	0	0	23533.31	-0.24	2.65	8250	317911.66	1189774.5
Gobindpur Gobind village	Goari village	40	50	1.1	5.68	1000	11082.97	34616.28	-0.3	3.41	9000	302014.92	1491789.4
Goari village	Kapasia village	50	60	2.0	7.21	0	0	34616.28	-0.07	6.32	9400	269351.87	1761141.3
Kapasia village	Baltara village	60	70	1.5	8.92	0	0	34616.28	-0.32	6.75	8100	207612.72	1968754
Baltara village	Murus village	70	80	0.1	10.21	4000	47809.9	82426.18	0.1	8.14	8150	300296.69	2269050.7
Murus village	Dhamhara village	80	90	0.1	4.76	6000	41832.54	124258.72	-0.21	3.32	10000	491250.72	2760301.4
Dhamhara village	Muria village	90	100	0.1	7.45	6650	55567.98	179826.7	-0.22	5.12	10000	450387.04	3210688.5
Muria village	Khochardewa village	100	110	0.2	5.87	8900	72261.69	252088.39	0.08	3.77	10000	511526.25	3722214.7
Khochardewa village	Ghoghsan village	110	120	0.1	2.95	8100	61046.82	313135.21	-0.25	1.66	10000	488460.91	4210675.6
Ghoghsan village	Teghra village	120	130	0.2	4.68	3550	19155.41	332290.62	-0.25	3.35	10000	455404.6	4666080.2

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.)	Cumula-tive Dredg-ing Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumula-tive Dredg-ing Qty. (cu.m.)
Teghra village	Akardh village	130	140	0.1	5.61	10000	138599.69	470890.31	-0.22	3.69	10000	494595.71	5160675.9
Akardh village	Barahi village	140	150	0.2	5.65	10000	139221.92	610112.23	-0.16	3.88	10000	502729.21	5663405.1
Barahi village	Baspiti village	150	160	0.2	2.95	10000	150306.46	760418.69	-0.08	1.75	10000	483522.09	6146927.2
Baspiti village	Balwa village	160	170	0.1	22.05	8250	42045.91	802464.6	-0.3	22.03	10000	431638.47	6578565.7
Balwa village	Jobaha village	170	180	0.1	3.79	7400	55106.6	857571.2	-0.17	1.52	10000	486011.8	7064577.5
Jobaha village	Lachhmini village	180	190	0.1	3.61	8800	66999.05	924570.25	-0.1	0.8	10000	513615.6	7578193.1
Lachhmini village	Dhadi village	190	200	0.1	3.66	8800	42006.71	966576.96	-0.1	0.9	10000	380246.09	7958439.2
Dhadi village	Gopalpur village	200	210	0.03	3.72	8200	90851.49	1057428.45	-0.1	0.7	10000	491064.41	8449503.6
Gopalpur village	Dharhapatti village	210	220	0.2	3.4	9100	76270.89	1133699.34	-0.3	0.7	10000	501432.99	8950936.6
Dharha-patti village	Bhimpur village	220	233.040	0.11	3.55	13000	133420.07	1267119.41	-0.3	0.7	13000	562522.8	9513459.4
Total						135950	1267119.41		**Total**		221400	9513459.40	

Table 17- Minimum & Maximum Depth for Class-II

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

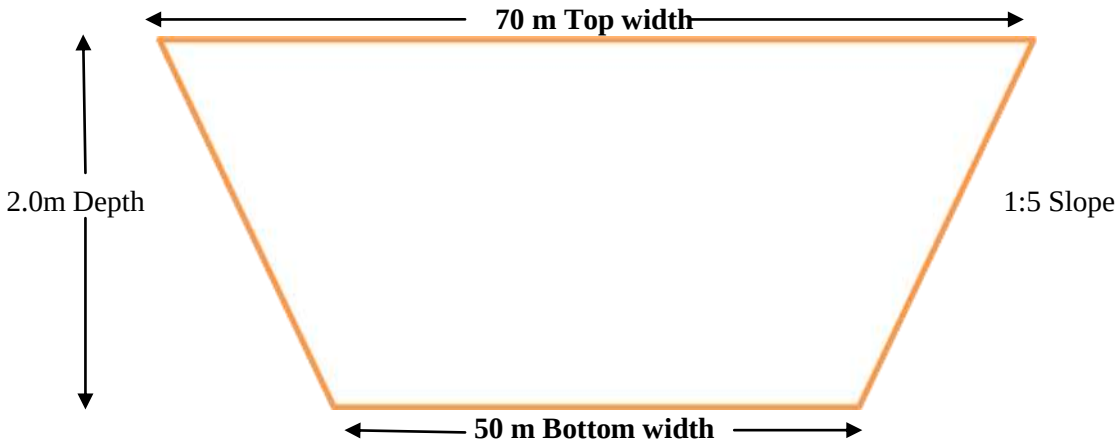


Location		Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	From	To	Min. depth (m)	Max depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumula-tive Dredging Qty (m)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumula-tive Dredg-ing Qty (m)
Patthar Tola village	Madrauni Pachhiari-tal village	0	10	2.09	29.78	100	17.02	17.02	0.01	23.6	5000	262789.7	262789.7
Madrauni Pachhiarital village	Bhaua Parbal Village	10	20	1.0	8.43	4000	46494.06	46511.08	-0.29	6.14	10000	509780.27	772569.97
Bhaua Par-bal Village	Dadpur village	20	30	1.5	6.32	1000	11794.61	58305.69	-0.24	1.4	10000	579670.19	1352240.2
Dadpur village	Gobindpur Gobind village	30	40	2.0	4.6	0	0	58305.69	-0.3	2.66	9000	506246.33	1858486.5
Gobindpur Gobind village	Goari village	40	50	1.5	5.68	1300	19618.22	77923.91	-0.3	3.61	9000	548809.32	2407295.8
Goari village	Kapasia village	50	60	2.0	7.21	0	0	77923.91	-0.17	6.42	9100	447957.58	2855253.4
Kapasia village	Baltara village	60	70	1.1	8.92	200	36.84	77960.75	-0.3	6.95	9000	373512.75	3228766.1
Baltara village	Murus village	70	80	0.1	10.21	3000	91380.52	169341.27	-0.1	8.24	9000	389711.39	3618477.5
Murus vil-lage	Dhamhara village	80	90	0.1	4.96	8000	133215.01	302556.28	-0.3	3.52	10000	801550.34	4420027.9
Dhamhara village	Muria village	90	100	0.1	7.55	8100	119477.86	422034.14	-0.3	5.22	10000	699346.08	5119374

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 (m)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (m)
Muria village	Khochardewa village	100	110	0.1	6.07	10000	152190.81	574224.95	-0.2	3.97	10000	817819.95	5937193.9
Khochardewa village	Ghoghsan village	110	120	0.1	3.05	9850	167516.66	741741.61	-0.3	1.76	10000	779134.36	6716328.3
Ghoghsan village	Teghra village	120	130	0.1	4.68	5250	57457.43	799199.04	-0.3	3.45	10000	752878.48	7469206.7
Teghra village	Akardh village	130	140	0.1	5.72	9000	252449.9	1051648.9	-0.3	3.7	10000	786774.27	8255981
Akardh village	Barahi village	140	150	0.1	5.85	10000	310499.65	1362148.6	-0.21	4.08	10000	785498.42	9041479.4
Barahi village	Baspiti village	150	160	0.1	3.05	10000	296379.91	1658528.5	-0.18	1.85	10000	780200.19	9821679.6
Baspiti village	Balwa village	160	170	0.1	22.25	9000	136798.82	1795327.3	-0.3	20.23	10000	697911.61	10519591
Balwa village	Jobaha village	170	180	0.1	3.89	10000	114168.35	1909495.7	-0.3	1.53	10000	740790.09	11260381
Jobaha village	Lachhmini village	180	190	0.1	3.62	10000	188998.87	2098494.5	-0.3	1.0	10000	817985.89	12078367
Lachhmini village	Dhadi village	190	200	0.1	3.67	9600	102341.61	2200836.2	-0.2	1.0	10000	617177.73	12695545
Dhadi village	Gopalpur village	200	210	0.02	3.82	10000	179496.1	2380332.3	-0.2	0.9	10000	777325.2	13472870
Gopalpur village	Dharhapatti village	210	220	0.1	3.6	10000	158320.21	2538652.5	-0.2	0.9	10000	779433.09	14252303
Dharhapatti village	Bhimpur village	220	233.040	0.01	3.56	13000	334520.81	2873173.3	-0.2	0.9	13000	972715.98	15225019
Total						151400	2873173.3		Total		223100	15225019	

Table 18- Minimum & Maximum depth for class-III

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



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.)
Patthar Tola village	Madrauni Pachhiarital village	0	10	1.5	29.79	0	0	0	-0.1	23.61	6000	349794.98	349794.98
Madrauni Pachhiarital village	Bhaua Parbal Village	10	20	0.65	8.58	5000	58453.38	58453.38	-0.3	6.34	10000	733066.63	1082861.6
Bhaua Parbal Village	Dadpur village	20	30	2.0	6.32	0	0	58453.38	-0.3	1.6	10000	738599.09	1821460.7
Dadpur village	Gobindpur Gobind village	30	40	2.0	4.6	0	0	58453.38	-0.3	2.76	9000	645322.51	2466783.2
Gobindpur Gobind village	Goari village	40	50	0.05	5.68	1500	19740.86	78194.24	-0.3	3.81	9000	629049.51	3095832.7
Goari village	Kapasia village	50	60	2.0	7.21	0	0	78194.24	-0.3	6.52	10000	577804.41	3673637.1
Kapasia village	Baltara village	60	70	0.1	8.92	300	89.01	78283.25	-0.3	7.15	9000	446243.89	4119881
Baltara village	Murus village	70	80	0.2	10.21	4000	106869.15	185152.4	-0.3	8.34	9000	612954.01	4732835
Murus village	Dhamhara village	80	90	0.2	5.16	7100	116640.27	301792.67	-0.3	3.72	10000	980041.89	5712876.9
Dhamhara village	Muria village	90	100	0.01	7.65	9000	136003.74	437796.41	-0.3	5.32	10000	878222.56	6591099.5
Muria village	Khochardewa village	100	110	0.03	6.27	10000	170359.9	608156.31	-0.3	4.17	10000	1010566.4	7601665.8
Khochardewa village	Ghoghsan village	110	120	0.05	3.16	10000	150189.68	758345.99	-0.3	1.86	10000	971994.5	8573660.3

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.)
Ghoghsan village	Teghra village	120	130	0.1	4.68	4300	41925.4	800271.39	-0.3	3.55	10000	928349.66	9502010
Teghra village	Akardh village	130	140	0.05	5.92	10000	293023.86	1093295.3	-0.3	3.71	10000	980807.49	10482817
Akardh village	Barahi village	140	150	0.1	6.05	10000	296664.44	1389959.7	-0.3	4.28	10000	999030.91	11481848
Barahi village	Baspiti village	150	160	0.1	3.15	10000	292129.05	1682088.7	-0.3	1.95	10000	955797.21	12437646
Baspiti village	Balwa village	160	170	0.1	22.45	8500	109318.69	1791407.4	-0.3	20.43	10000	826466.03	13264112
Balwa village	Jobaha village	170	180	0.27	3.99	9500	138195.51	1929602.9	-0.3	1.54	10000	956822.11	14220934
Jobaha village	Lachhmini village	180	190	0.02	3.63	10000	162028.46	2091631.4	-0.3	1.2	10000	1020337.8	15241272
Lachhmini village	Dhadi village	190	200	0.02	3.68	10000	102496.98	2194128.4	-0.3	1.1	10000	747468.8	15988740
Dhadi village	Gopalpur village	200	210	0.02	3.92	9800	194036.36	2388164.7	-0.3	1.1	10000	978302.21	16967043
Gopalpur village	Dharhapatti village	210	220	0.1	3.8	10000	185554.49	2573719.2	-0.4	1.1	10000	990064.95	17957108
Dharhapatti village	Bhimpur village	220	233.040	0.01	3.57	13000	293521.83	2867241.1	-0.3	1.1	13000	1154039.1	19111147
Total							2867241.1		Total			19111147	

Table 19-Minimum & Maximum depth for class-IV

Section 6: Conclusion:

The surveyed stretch of kosi River is 233.040 km in length and was not explored for any navigational possibility in earlier time. The Bank of the river is moderately connected with roads and Railways and other infrastructures. The settlements are thickly populated on the both bank side of the river. The major cities like Saharsa, Naugachia, Baltara etc are located near the bank side of the river. However massive bank erosion and unprecedented flooding and changing river course make the navigation in vain. Continues changing of river course, high flood and widening of river has to taken in consideration during the implement stage.

The river is carrying a large amount of water every year particularly in the Rainy season. Kosi Tappu wildlife sanctuary is located near the bank side of the river. The wild life sanctuary becomes a security issue which prevent the other states and made strong defence for the states. During the Rainy season, the water level has been rising up than its normal level. In this time, the both bank side are being flooded. In summer, the water level is almost down but rest of the season the water level has remained average. The Communication and transportation is well connected by the roads and also by the railways. The Railway Terminal helps for communication system easily. NH-31, NH-31A, NH-104, NH-106, NH-57, NH-57A are the strong communication system in this area. The both side lands of the Kosi River used as an agricultural land, Residential area, Forest, plantation etc. There are four Terminals named Basua, Birpur, Kursela and Baltara found in this zone of river.

6.1Range of Depths:-

Sl No	From Chainage (km)	To Chainage (km)	Observed Depth					Reduced Depth				
			<1.2 m (km)	1.2 m to 1.4 m (km)	1.5 m to 1.7 m (km)	1.8 m to 2.0 m (km)	>2.0 m (km)	<1.2 m (km)	1.2 m to 1.4 m (km)	1.5 m to 1.7 m (km)	1.8 m to 2.0 m (km)	>2.0 m (km)
1	0.00	10.00	0	0	0	0	10.00	0.9	1.3	1.5	1.8	4.5
2	10.00	20.00	1.1	1.2	1.7	2.0	4.0	3.4	1.2	1.5	1.8	2.1
3	20.00	30.00	1.1	0	0	2.0	6.9	4.9	1.2	0	1.8	2.1
4	30.00	40.00	0	0	0	2.0	8.0	6.1	0	0	1.8	2.1
5	40.00	50.00	1.1	1.2	0	1.8	5.9	3.8	1.2	0	1.8	3.2
6	50.00	60.00	0	0	0	2.0	8.0	3.8	0	0	0	6.2
7	60.00	70.00	0	0	1.5	2.0	6.5	2.8	0	0	2.0	5.2
8	70.00	80.00	1.1	0	0	2.0	6.9	3.6	0	0	2.0	4.4
9	80.00	90.00	2.6	1.3	0	2.0	4.1	5.7	1.2	0	0	3.1
10	90.00	100.00	6.7	1.2	0	0	2.1	6.3	0	1.7	0	2.0
11	100.00	110.00	6.5	1.2	0	0	2.3	6.4	0	1.5	0	2.1
12	110.00	120.00	6.5	1.2	0	0	2.3	7.3	1.2	1.5	0	0
13	120.00	130.00	2.7	1.3	0	2.0	4.0	5.6	1.2	0	0	3.2
14	130.00	140.00	4.4	0	1.5	1.9	2.2	4.7	1.3	0	1.8	2.2
15	140.00	150.00	4.9	1.2	1.6	0	2.3	5.2	1.2	1.5	0	2.1
16	150.00	160.00	4.6	1.2	1.6	0	2.6	7.2	1.2	1.6	0	0
17	160.00	170.00	3.2	1.2	1.6	1.9	2.1	4.6	0	1.5	1.8	2.1
18	170.00	180.00	3.5	1.2	1.4	1.8	2.1	8.8	1.2	0	0	0
19	180.00	190.00	3.1	1.4	1.6	1.8	2.1	8.8	1.2	0	0	0
20	190.00	200.00	3.1	1.4	1.6	1.8	2.1	8.8	1.2	0	0	0
21	200.00	210.00	3.2	1.2	1.5	1.8	2.3	8.8	1.2	0	0	0
22	210.00	220.00	1.1	1.2	1.7	1.9	4.1	8.8	1.2	0	0	0
23	220.00	233.040	3.667	2.1	2.0	1.8	3.5	6.267	1.3	1.6	1.8	2.1

6.2The Slope of kosi River:-

Chainage (km)		Slope (m/km)
From	**To**	
0	8.533	0.0893
8.534	21.232	0.0840
21.233	28.039	0.0840
28.04	43.254	0.0840
43.255	51.476	0.0841
51.477	62.547	0.0841
62.548	72.573	0.0840
72.574	79.752	0.1141
79.753	91.252	0.1398
91.253	100.936	0.1398
100.937	109.343	0.1398
109.344	120.67	0.1399
120.671	130.974	0.1398
130.975	140.884	0.1398
140.885	151.166	0.1399
151.167	159.357	0.1398
159.358	169.973	0.1398
169.974	180.856	0.1398
180.857	189.271	0.1454
189.272	203.44	0.6023
203.441	211.736	0.6024
211.737	223.069	0.6023
223.07	233.040	0.6024
Avg. Slope		0.203 m/km

6.3 Min width/Max width and Avg. Width of the Waterway:

Sl No	From Chainage (km)	To Chainage (km)	Min width of Waterway (m)	Max width of Waterway (m)	Avg width of waterway (m)
1	0.00	10.00	950.00	1054.00	1002.00
2	10.00	20.00	1000.00	1107.00	1053.50
3	20.00	30.00	1107.00	700.00	903.50
4	30.00	40.00	700.00	1566.00	1133.00
5	40.00	50.00	1566.00	950.00	1258.00
6	50.00	60.00	950.00	422.00	686.00
7	60.00	70.00	422.00	405.00	413.50
8	70.00	80.00	405.00	676.08	540.54
9	80.00	90.00	676.08	660.00	668.04
10	90.00	100.00	660.00	669.95	664.98
11	100.00	110.00	670.00	1500.00	1085.00
12	110.00	120.00	1500.00	838.74	1169.37
13	120.00	130.00	838.74	1541.13	1189.94
14	130.00	140.00	1541.13	674.77	1107.95
15	140.00	150.00	674.77	3776.93	2225.85
16	150.00	160.00	3776.93	2345.00	3060.97
17	160.00	170.00	2345.00	2290.00	2317.50
18	170.00	180.00	2290.00	2147.00	2218.50
19	180.00	190.00	2147.00	252.31	1199.65
20	190.00	200.00	252.31	764.86	508.59
21	200.00	210.00	764.86	452.63	608.75
22	210.00	220.00	452.63	3226.00	1839.31
23	220.00	233.040	3226.00	1221.00	2223.50

6.4Dredging volume:-

Class Details	Observed Dredging Qty (cubic meter) w.r.t Sounding Datum	Reduced Dredging Qty (cubic meter) w.r.t Sounding Datum
Class I	560687.80	5897454.42
Class II	1267119.41	9513459.39
Class III	2873173.30	15225019
Class IV	2867241.06	19111147

Table 20-Details of Dredging Sections

Section 7: Annexure

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

The Chart datum Data of Birpur, Basua, Baltara, Kursela and Confluence point have been provided by IWAI office.

Sl. No	Place	Sounding Datum w.r.t MSL (Provided by IWAI)
1	Ganga Mouth	23.046 meter
2	Kursela	23.267 meter
3	Baltara	29.467 meter
4	Basua	45.305 meter
5	Birpur	71.742 meter

For the Topography survey, the Horizontal control / Vertical control has been carried out from the G.T.S level of the Kosi Barrage. The G.T.S pillar has been established by the Central Water commission office (C.W.C). The details of the G.T.S Bench Mark are tabulated below:-

	Geographic position		UTM position		MSL
Location Name	Latitude (N)	Longitude (E)	Northing (m)	Easting (m)	Elevation (m)
Kosi Barrage	26°31'23.07"	86°55'54.26"	2933615.4245	493199.4995	78.760m w.r.t M.S.L

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	9.35	11.92	0	0	0	8.24	10.28	0	0	0
1	2	11.25	29.76	0	0	0	10.39	23.58	0	0	0
2	3	7.21	14.23	0	0	0	4.65	12	0	0	0
3	4	6.21	11.23	0	0	0	2.3	5.62	0	0	0
4	5	3.25	12.26	0	0	0	0.02	10.27	0	0	0
5	6	3.95	4.26	0	0	0	0.5	0.9	1000	1951.77	1951.77
6	7	4.1	8.65	0	0	0	0.5	1.2	1000	29256.12	31207.89
7	8	3.65	6.58	0	0	0	1	3.25	1000	37900.45	69108.34
8	9	2.65	7.54	0	0	0	0.3	2.15	1000	26341.09	95449.43
9	10	2.12	26.78	0	0	0	0.92	23.25	100	62.08	95511.51
10	11	2.2	7.98	0	0	0	0.28	5.74	550	843.98	96355.49
11	12	1.7	5.96	0	0	0	0.3	1.23	1000	4914.15	101269.64
12	13	3.1	7.56	0	0	0	0.3	1.2	1000	29116.72	130386.36
13	14	1.7	8.23	0	0	0	0.3	1.2	1000	11953.45	142339.81
14	15	1.1	5.65	100	28.37	28.37	0.3	2.23	1000	18527.69	160867.5
15	16	2.1	3.56	0	0	28.37	0.5	1.26	1000	21525.89	182393.39
16	17	2	4.2	0	0	28.37	0.3	1.2	1000	28761.37	211154.76
17	18	2.05	2.5	0	0	28.37	-0.03	0.45	1000	25151.41	236306.17
18	19	1.25	7.35	0	0	28.37	0.3	2.25	1000	22909.38	259215.55
19	20	1.1	1.25	1000	7898.03	7926.4	-0.09	0.63	1000	36125.04	295340.59
20	21	1.1	3.25	1000	1064.08	8990.48	0.3	0.56	1000	29148.88	324489.47
21	22	2.1	5.32	0	0	8990.48	0.5	1.2	1000	33197.26	357686.73
22	23	2.2	6.32	0	0	8990.48	0.45	1	1000	24230.88	381917.61
23	24	2	3.2	0	0	8990.48	0.3	0.45	1000	2429.85	384347.46
24	25	2.3	2.32	0	0	8990.48	-0.04	0.96	1000	4492.59	388840.05
25	26	2.2	3.21	0	0	8990.48	0.3	0.45	1000	32616.77	421456.82
26	27	2.1	3.25	0	0	8990.48	0.4	0.6	1000	21395.09	442851.91
27	28	2	2.1	0	0	8990.48	0.3	0.45	1000	32041.01	474892.92
28	29	2.2	3.65	0	0	8990.48	0.4	0.85	1000	2215.62	477108.54
29	30	2.1	2.65	0	0	8990.48	0.3	1	1000	34919.42	512027.96
30	31	2.12	2.3	0	0	8990.48	0.3	0.54	1000	30636.95	542664.91
31	32	2.2	2.5	0	0	8990.48	0.3	0.56	1000	26032.66	568697.57

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.)
32	33	2.1	3.6	0	0	8990.48	1.1	2.64	1000	6880.8	575578.37
33	34	2.1	4.2	0	0	8990.48	2	2.3	0	0	575578.37
34	35	2	4.2	0	0	8990.48	0.2	0.4	1000	27815.54	603393.91
35	36	2.3	4.5	0	0	8990.48	-0.04	2.16	1000	31594.65	634988.56
36	37	2	4.6	0	0	8990.48	0.2	0.45	1000	15113.24	650101.8
37	38	2.1	2.35	0	0	8990.48	0.3	1	1000	3683.23	653785.03
38	39	2.2	3.45	0	0	8990.48	0.6	0.5	1000	19205.36	672990.39
39	40	2	2.54	0	0	8990.48	0.3	1	1000	34072.07	707062.46
40	41	1.8	3.94	0	0	8990.48	0.17	0.87	1000	32599.95	739662.41
41	42	2.1	5.45	0	0	8990.48	0.3	1.25	1000	35679.74	775342.15
42	43	2	2.36	0	0	8990.48	0.4	0.89	1000	27835.02	803177.17
43	44	2.1	3.54	0	0	8990.48	1.1	3.12	1000	15888.89	819066.06
44	45	2.65	5.61	0	0	8990.48	-0.01	0.3	200	292.51	819358.57
45	46	1.2	2.3	0	0	8990.48	0.3	1.99	1000	25036.86	844395.43
46	47	1.1	3.95	1000	6191.58	15182.06	-0.12	0.45	1000	26102.22	870497.65
47	48	2.65	2.14	0	0	15182.06	0.12	0.87	1000	7762.16	878259.81
48	49	2.22	5.68	0	0	15182.06	1	3.21	1000	24352.19	902612
49	50	2.92	3.32	0	0	15182.06	0.3	0.3	1000	8243.11	910855.11
50	51	2.54	7.21	0	0	15182.06	1.26	6.22	1000	7628.19	918483.3
51	52	2.2	4.2	0	0	15182.06	2.1	2.21	0	0	918483.3
52	53	2.1	5.12	0	0	15182.06	0.5	3.1	1000	3056.4	921539.7
53	54	2	3.61	0	0	15182.06	0.6	2.58	1000	35002.35	956542.05
54	55	2	2.4	0	0	15182.06	0.03	0.78	1000	29278.01	985820.06
55	56	2.1	2.5	0	0	15182.06	-0.05	0.48	1000	9537.72	995357.78
56	57	2.3	3.24	0	0	15182.06	0.3	0.78	1000	37238.59	1032596.4
57	58	2	2.91	0	0	15182.06	0.4	1.28	1000	17570.59	1050167
58	59	2.1	3.25	0	0	15182.06	1	2.65	1000	9559.76	1059726.7
59	60	2.3	5.63	0	0	15182.06	0.6	3.45	1000	19427.68	1079154.4
60	61	2.1	8.92	0	0	15182.06	0.56	6.55	1000	10411.81	1089566.2
61	62	2.3	7.32	0	0	15182.06	2	5.2	1000	7431.1	1096997.3
62	63	2.1	2.78	0	0	15182.06	2	2.5	0	0	1096997.3
63	64	2.2	3.75	0	0	15182.06	0.4	0.78	1000	28034.44	1125031.8
64	65	2.1	4.23	0	0	15182.06	0.3	1.31	1000	12956.49	1137988.2
65	66	2.2	3.12	0	0	15182.06	0.3	0.3	1000	18046.15	1156034.4
66	67	1.5	2.65	0	0	15182.06	-0.12	1.25	1000	31037.93	1187072.3
67	68	2	3.65	0	0	15182.06	-0.01	2.35	1000	20156.25	1207228.6
68	69	2.1	3.85	0	0	15182.06	0.3	0.3	100	9.03	1207237.6
69	70	2	3.69	0	0	15182.06	0.5	1.65	250	419.29	1207656.9

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.)
70	71	2.47	6.52	0	0	15182.06	2	4.44	0	0	1207656.9
71	72	2.2	4.21	0	0	15182.06	2.1	3.5	0	0	1207656.9
72	73	2.1	3.25	0	0	15182.06	1.7	2.3	0	0	1207656.9
73	74	2	2.31	0	0	15182.06	0.3	1	1000	13060.87	1220717.8
74	75	2.1	3.36	0	0	15182.06	0.3	0.45	1000	34103.69	1254821.5
75	76	2.1	10.21	0	0	15182.06	0.3	8.04	1000	19725.17	1274546.6
76	77	2..1	2.56	0	0	15182.06	2	2.3	0	0	1274546.6
77	78	1	2.26	1000	3777.66	18959.72	0.5	1.25	1000	26231.28	1300777.9
78	79	0.3	1.28	1000	12370.37	31330.09	0.6	0.78	1000	30997.72	1331775.6
79	80	1.1	2.6	1000	2789.16	34119.25	0.3	0.45	1000	30878.56	1362654.2
80	81	1.1	3.42	1000	2893.91	37013.16	0.4	0.64	1000	36994.19	1399648.4
81	82	1	2.31	1000	7761.15	44774.31	0.3	0.3	1000	24713.01	1424361.4
82	83	0.3	1.28	250	433.79	45208.1	-0.01	0.3	1000	37036.14	1461397.5
83	84	1.36	2.56	0	0	45208.1	0.5	0.85	1000	31029.28	1492426.8
84	85	0.78	1.89	100	56.01	45264.11	0.4	0.78	1000	30788.94	1523215.7
85	86	1.1	3.65	1000	4174.96	49439.07	1	2.1	1000	30752.99	1553968.7
86	87	1.1	3.5	1000	1538.91	50977.98	0.3	0.3	1000	30800	1584768.7
87	88	2.1	2.37	0	0	50977.98	0.21	1.2	1000	31125.54	1615894.3
88	89	2	4.56	0	0	50977.98	0.3	3.12	1000	27733.14	1643627.4
89	90	1.1	3.65	100	100.87	51078.85	0.2	2.31	1000	29761.96	1673389.4
90	91	2.1	7.35	0	0	51078.85	0.23	5.02	1000	27770.88	1701160.3
91	92	1.23	3.87	0	0	51078.85	0.3	2.1	1000	14429.41	1715589.7
92	93	0.89	2.58	150	220.12	51298.97	0.4	1.65	1000	17551.88	1733141.5
93	94	0.54	3.69	1000	7351.24	58650.21	0.21	1.95	1000	30782.16	1763923.7
94	95	0.3	0.78	1000	3570.76	62220.97	0.3	0.68	1000	32212.72	1796136.4
95	96	1.2	1.7	0	0	62220.97	0.15	0.3	1000	30280.53	1826417
96	97	0.3	0.97	1000	5877.68	68098.65	-0.12	0.3	1000	30768.57	1857185.5
97	98	1.3	1.27	0	0	68098.65	-0.01	0.45	1000	30923.95	1888109.5
98	99	0.78	0.56	200	266.29	68364.94	0.3	0.3	1000	31019.45	1919128.9
99	100	1.15	2.85	500	624.58	68989.52	0.2	1.78	1000	31035.3	1950164.2
100	101	0.47	2.31	1000	6365.46	75354.98	0.3	1.53	1000	35459.52	1985623.7
101	102	1.3	2.65	0	0	75354.98	0.35	1.25	1000	30991.91	2016615.7
102	103	0.56	2.65	100	6	75360.98	0.28	1.57	1000	36790.84	2053406.5
103	104	0.63	5.67	1000	2340.18	77701.16	0.2	3.57	1000	36967.28	2090373.8
104	105	1.2	3.56	0	0	77701.16	0.3	2.32	1000	30467.62	2120841.4
105	106	0.3	2.56	1000	2771.22	80472.38	0.23	1.21	1000	27918.34	2148759.7
106	107	0.87	5.62	1000	6282.75	86755.13	0.26	3.68	1000	36050.06	2184809.8
107	108	0.3	0.78	1000	2737.37	89492.5	0.3	0.3	1000	29676.21	2214486

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.)
108	109	1	2.45	1000	8193.85	97686.35	0.56	1.58	1000	28373.48	2242859.5
109	110	1.28	3.59	1000	2864.22	100550.57	0.69	1.98	1000	30813.66	2273673.1
110	111	0.6	0.59	1000	8504.81	109055.38	-0.05	0.3	1000	30782.86	2304456
111	112	1.3	0.85	0	0	109055.38	0.3	0.3	1000	29259.48	2333715.5
112	113	0.65	1.28	100	14.86	109070.24	0.5	1.23	1000	31146.98	2364862.5
113	114	1.21	2.85	1000	1084.09	110154.33	0.78	1.56	1000	29384.27	2394246.7
114	115	0.4	1.65	1000	14329.99	124484.32	0.3	0.89	1000	30941.11	2425187.8
115	116	1.2	1.5	0	0	124484.32	-0.05	0.3	1000	32251.66	2457439.5
116	117	1.3	1.7	0	0	124484.32	0.3	0.15	1000	24001.63	2481441.1
117	118	0.3	2.56	1000	3919.78	128404.1	0.21	1.2	1000	32230.71	2513671.8
118	119	0.65	1.65	1000	3786.74	132190.84	0.32	0.96	1000	31815.88	2545487.7
119	120	0.35	0.45	100	80.6	132271.44	0.15	0.3	1000	31253.13	2576740.9
120	121	0.5	1.2	400	390.76	132662.2	-0.05	0.3	1000	31189.08	2607929.9
121	122	1.1	2.5	1000	6211.53	138873.73	0.3	0.4	1000	38134.08	2646064
122	123	2	2.6	0	0	138873.73	0.21	0.65	1000	31596.36	2677660.4
123	124	0.45	2.25	1000	1593.79	140467.52	0.3	1.2	1000	30980.85	2708641.2
124	125	1.3	3.45	0	0	140467.52	0.3	2.1	1000	26092.51	2734733.7
125	126	0.3	1.2	250	394.73	140862.25	-0.14	0.8	1000	31532.32	2766266.1
126	127	2.2	3.5	0	0	140862.25	0.15	1.2	1000	24071.97	2790338
127	128	2.1	3.2	0	0	140862.25	0.25	0.68	1000	22897.03	2813235.1
128	129	2	3.56	0	0	140862.25	0.3	1.2	1000	35465.62	2848700.7
129	130	2.1	4.68	0	0	140862.25	0.21	3.25	1000	16922.93	2865623.6
130	131	1.5	5.32	0	0	140862.25	0.21	2.23	1000	21287.06	2886910.7
131	132	1	2.3	1000	4548.05	145410.3	0.3	1.35	1000	31971.58	2918882.2
132	133	0.65	4.1	1000	6186.42	151596.72	0.45	2.54	1000	31024.03	2949906.3
133	134	0.3	5.6	1000	1530.81	153127.53	0.25	3.68	1000	31299.7	2981206
134	135	0.4	2.25	1000	6877.27	160004.8	0.3	1.28	1000	30414.49	3011620.5
135	136	0.3	3.64	1000	4504.6	164509.4	0.25	2.54	1000	29542.76	3041163.2
136	137	0.5	1.96	1000	4688.74	169198.14	0.3	1.87	1000	31301.98	3072465.2
137	138	0.4	1	250	382.99	169581.13	0.3	0.3	1000	32982.91	3105448.1
138	139	0.3	0.45	1000	8561.91	178143.04	-0.12	0.3	1000	36368.4	3141816.5
139	140	0.78	1.32	1000	14548.69	192691.73	0.3	0.45	1000	30073.94	3171890.5
140	141	0.3	4.56	1000	16011.12	208702.85	0.1	0.4	1000	24564.89	3196455.3
141	142	1	1.75	1000	10476.63	219179.48	0.3	0.75	1000	29408.36	3225863.7
142	143	0.7	2.45	1000	18050.73	237230.21	0.5	1.23	1000	37087.73	3262951.4
143	144	1.2	4.65	1000	6038.11	243268.32	0.6	2.56	1000	30839.58	3293791
144	145	0.78	5.45	1000	2875.19	246143.51	0.3	3.68	1000	30676.38	3324467.4
145	146	0.3	1	100	17.73	246161.24	-0.01	0.3	1000	22783.52	3347250.9

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.)
146	147	0.3	0.45	1000	6362.73	252523.97	-0.15	0.3	1000	31650.84	3378901.8
147	148	0.4	1.21	550	774.94	253298.91	0.3	0.3	1000	37250.33	3416152.1
148	149	1.1	1.69	1000	2907.52	256206.43	0.24	0.45	1000	30699.76	3446851.8
149	150	0.75	2.35	1000	9672.86	265879.29	0.65	1.25	1000	29802.77	3476654.6
150	151	0.65	1.65	1000	4397.14	270276.43	0.26	0.95	1000	30657.65	3507312.3
151	152	1.2	1.5	0	0	270276.43	0.3	0.58	1000	30051.97	3537364.2
152	153	0.6	0.82	1000	3336.94	273613.37	0.5	0.68	1000	30652.06	3568016.3
153	154	0.85	2.64	1000	2388.01	276001.38	0.6	1.65	1000	24685.92	3592702.2
154	155	1	1.5	1000	15035.39	291036.77	0.45	0.89	1000	36191.42	3628893.6
155	156	1.32	1.65	1000	8622.91	299659.68	0.02	0.3	1000	31144.6	3660038.2
156	157	0.3	2.85	1000	5635.8	305295.48	0.3	1.23	1000	27334.02	3687372.3
157	158	0.6	1	1000	21644.71	326940.19	0.4	0.68	1000	36220.19	3723592.4
158	159	0.7	1.25	1000	7834.31	334774.5	0.5	0.98	1000	30671.95	3754264.4
159	160	1	2.65	1000	6482.39	341256.89	0.3	0.87	1000	31024.19	3785288.6
160	161	0.5	2.1	1000	5227.28	346484.17	0.3	0.3	1000	24835.92	3810124.5
161	162	0.3	2.65	1000	2097.75	348581.92	0.2	1	1000	28685.79	3838810.3
162	163	1.2	4.35	0	0	348581.92	0.5	2.56	1000	31099.54	3869909.8
163	164	1.1	5.36	1000	1025.39	349607.31	0.6	1.56	1000	31887.23	3901797.1
164	165	0.3	21.83	700	674.29	350281.6	-0.12	3.65	1000	31263.21	3933060.3
165	166	0.3	21.85	1000	1177.26	351458.86	-0.23	19.83	1000	30371.94	3963432.2
166	167	1	3.45	1000	5116.03	356574.89	0.3	2.12	1000	30872.79	3994305
167	168	0.7	0.87	1000	4422.41	360997.3	0.5	0.78	1000	30705.5	4025010.5
168	169	1.1	4.23	450	585.97	361583.27	0.2	0.54	1000	14179.66	4039190.2
169	170	1.2	1.5	0	0	361583.27	0.3	0.3	1000	19454.65	4058644.8
170	171	1.1	2.31	100	86.35	361669.62	0.03	0.43	1000	23119.16	4081764
171	172	1.1	2.12	100	67.5	361737.12	0.3	0.45	1000	30066.8	4111830.8
172	173	1.2	3.65	0	0	361737.12	0.4	0.56	1000	31540.12	4143370.9
173	174	1.1	2.1	100	9.15	361746.27	0.6	1	1000	29041.65	4172412.5
174	175	1.28	3.69	0	0	361746.27	0.3	0.4	1000	30496.36	4202908.9
175	176	1.1	2.78	1000	2709.75	364456.02	0.03	1.51	1000	27843.78	4230752.7
176	177	0.3	1.2	1000	4498.36	368954.38	0.3	0.47	1000	36751.41	4267504.1
177	178	1.1	3.56	1000	1203.87	370158.25	0.24	1	1000	30027.14	4297531.2
178	179	0.3	2.6	1000	4502.28	374660.53	0.15	0.3	1000	30689.8	4328221
179	180	1.1	3.5	1000	2992.29	377652.82	0.25	1.24	1000	26629.14	4354850.2
180	181	1	2.1	1000	5848.26	383501.08	0.3	0.3	1000	30614.26	4385464.4
181	182	0.3	3.6	1000	6164.49	389665.57	0.3	0.5	1000	36612.04	4422076.5
182	183	1.2	2.5	1000	1618.72	391284.29	0.2	0.6	1000	30583.15	4452659.6
183	184	1.2	2.3	0	0	391284.29	0.3	0.6	1000	30795.41	4483455

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.)
184	185	1.1	3.5	1000	1705.2	392989.49	0.2	0.5	1000	30834.9	4514289.9
185	186	0.32	2.1	1000	2683.08	395672.57	0.3	0.5	1000	30990.12	4545280.1
186	187	1.1	2.64	1000	3332.45	399005.02	0.3	0.3	1000	37187.56	4582467.6
187	188	0.3	0.3	1000	3715.12	402720.14	0.2	0.5	1000	29422.8	4611890.4
188	189	0.2	0.45	1000	2290.66	405010.8	0.1	0.3	1000	30658.79	4642549.2
189	190	0.1	0.78	1000	6207.49	411218.29	0.1	0.3	1000	30522.68	4673071.9
190	191	0.4	0.98	100	90.45	411308.74	0.2	0.4	1000	30933.35	4704005.2
191	192	1.1	3.2	1000	3498.76	414807.5	0.5	0.8	1000	30745.32	4734750.6
192	193	0.63	2.13	1000	3858.44	418665.94	0.3	0.4	1000	25206.16	4759956.7
193	194	0.62	3.65	1000	1795.95	420461.89	0.3	0.6	1000	21597.62	4781554.3
194	195	0.58	2.54	1000	2236.84	422698.73	0.2	0.4	1000	22900.57	4804454.9
195	196	0.45	1.69	200	291.98	422990.71	0.3	0.5	1000	24051.49	4828506.4
196	197	1.2	2.54	0	0	422990.71	0.2	0.5	1000	6433.77	4834940.2
197	198	1	2.51	1000	1409.76	424400.47	0.3	0.4	1000	19832	4854772.2
198	199	0.3	1.2	1000	2166.64	426567.11	0.3	0.5	1000	27609.85	4882382
199	200	1.12	2.75	1000	1697.34	428264.45	0.3	0.5	1000	36268.74	4918650.8
200	201	0.25	1.2	1000	1303.89	429568.34	0.3	0.5	1000	30476.24	4949127
201	202	0.51	2.5	800	913.11	430481.45	0.3	0.4	1000	30023.44	4979150.4
202	203	0.61	3.62	100	34.32	430515.77	0.3	0.4	1000	30950.6	5010101
203	204	0.26	2.1	1000	4553.4	435069.17	0.3	0.4	1000	30966.09	5041067.1
204	205	0.3	3.21	1000	9539.82	444608.99	0.3	0.4	1000	30861.5	5071928.6
205	206	0.03	1.68	1000	1520.67	446129.66	0.3	0.5	1000	31035.47	5102964.1
206	207	0.69	2.1	1000	9090.45	455220.11	0.2	0.4	1000	43411.74	5146375.8
207	208	0.45	3.1	1000	8933.41	464153.52	0.1	0.3	1000	18600.47	5164976.3
208	209	0.6	2.6	1000	3351.3	467504.82	0.2	0.4	1000	26383.74	5191360
209	210	0.3	1	150	196.06	467700.88	0.3	0.5	1000	31041.01	5222401.1
210	211	1	2.64	1000	3029.85	470730.73	0.2	0.4	1000	31048.48	5253449.5
211	212	1.2	1.7	0	0	470730.73	0.3	0.5	1000	28284.32	5281733.9
212	213	1	1.95	1000	6201.26	476931.99	0.2	0.4	1000	31281.75	5313015.6
213	214	0.7	1	100	50.61	476982.6	0.3	0.5	1000	29171.52	5342187.1
214	215	1.1	2.1	500	643.34	477625.94	0.2	0.5	1000	30449.5	5372636.6
215	216	0.65	1.2	1000	1093.08	478719.02	0.3	0.6	1000	36035.03	5408671.7
216	217	0.98	2.31	1000	2527.07	481246.09	0.2	0.4	1000	31041.12	5439712.8
217	218	1	3.2	1000	2176.57	483422.66	0.2	0.4	1000	33805.11	5473517.9
218	219	1.1	1.3	500	505.6	483928.26	0.2	0.5	1000	28908.79	5502426.7
219	220	1.1	2.69	1000	6679.44	490607.7	0.2	0.3	1000	27324.56	5529751.2
220	221	0.5	1.2	1000	12520.23	503127.93	0.3	0.3	1000	30372.83	5560124.1
221	222	0.65	1.65	1000	4714.28	507842.21	0.2	0.4	1000	31586.61	5591710.7

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.)
222	223	0.48	1.3	1000	1100.84	508943.05	0.1	0.3	1000	21022.34	5612733
223	224	0.32	1.25	1000	10976.1	519919.15	0.3	0.5	1000	41285.31	5654018.3
224	225	0.21	2.45	1000	1745.47	521664.62	0.2	0.5	1000	20059.82	5674078.1
225	226	0.12	3.54	1000	11821.54	533486.16	0.3	0.6	1000	30874.82	5704953
226	227	0.65	1	1000	4866.78	538352.94	0.2	0.4	1000	30103.71	5735056.7
227	228	1	1.5	1000	1433.76	539786.7	0.3	0.5	1000	27381.3	5762438
228	229	1.1	2.1	1000	5694.33	545481.03	0.2	0.4	1000	30440.67	5792878.6
229	230	0.65	1	1000	4248.05	549729.08	0.3	0.5	1000	25827.06	5818705.7
230	231	0.6	1.8	1000	3625.27	553354.35	0.2	0.4	1000	28997.43	5847703.1
231	232	0.5	1.3	1000	3378.82	556733.17	0.3	0.5	1000	28312.38	5876015.5
232	233.040	0.5	0.7	1000	3954.63	560687.8	0.2	0.4	1000	21438.91	5897454.4
Total				112150	560687.8		Total		217200	5897454.4	

Table 21- Dredging Calculation for 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	9.25	12.02	0	0	0	8.14	10.38	0	0	0
1	2	11.24	29.77	0	0	0	10.38	23.59	0	0	0
2	3	6.91	14.53	0	0	0	4.35	12.3	0	0	0
3	4	6.11	11.33	0	0	0	2.2	5.72	0	0	0
4	5	3.12	12.27	0	0	0	0.01	10.28	1000	6399.89	6399.89
5	6	3.75	4.46	0	0	0	0.3	1.1	1000	47442.13	53842.02
6	7	4	8.75	0	0	0	0.4	1.3	1000	60699.93	114541.95
7	8	3.55	6.68	0	0	0	0.9	3.35	1000	42974.76	157516.71
8	9	2.55	7.64	0	0	0	0.2	2.25	500	721.6	158238.31
9	10	2.11	26.79	0	0	0	0.91	23.26	1000	2248.02	160486.33
10	11	2	8.18	0	0	0	0.08	5.94	1000	9784.53	170270.86
11	12	1.3	6.06	200	214.81	214.81	0.2	1.33	1000	47276.29	217547.15
12	13	3.09	7.57	0	0	214.81	0.29	1.21	1000	22290.63	239837.78
13	14	1.3	8.33	1000	2396.87	2611.68	0.2	1.3	1000	30763.19	270600.97
14	15	1.2	5.85	1000	1349.91	3961.59	0.1	2.43	1000	34705.83	305306.8
15	16	2	3.86	0	0	3961.59	0.2	1.56	1000	47028.03	352334.83
16	17	2.1	4.3	0	0	3961.59	0.2	1.3	1000	27375.82	379710.65
17	18	2.05	2.6	0	0	3961.59	-0.13	0.55	1000	29721.18	409431.83
18	19	1.05	7.55	1000	14126.14	18087.73	0.1	2.45	1000	58037.63	467469.46
19	20	1.1	1.35	1000	5445.58	23533.31	-0.19	0.73	1000	48095.97	515565.43
20	21	2.25	3.35	0	0	23533.31	0.2	0.66	1000	51964.47	567529.9
21	22	2.1	5.32	0	0	23533.31	0.4	1.3	1000	47304.58	614834.48
22	23	2.2	6.32	0	0	23533.31	0.25	1.2	1000	9608.6	624443.08
23	24	2	3.2	0	0	23533.31	0.29	0.46	1000	972.18	625415.26
24	25	2.3	2.32	0	0	23533.31	-0.14	1.06	1000	52922.38	678337.64
25	26	2.2	3.21	0	0	23533.31	0.1	0.65	1000	32114.52	710452.16
26	27	2.1	3.25	0	0	23533.31	0.2	0.8	1000	51218.99	761671.15
27	28	2	2.1	0	0	23533.31	0.1	0.65	1000	13213.69	774884.84
28	29	2.2	3.65	0	0	23533.31	0.3	0.95	1000	47246.34	822131.18
29	30	2.1	2.65	0	0	23533.31	0.29	1.01	1000	49731.66	871862.84
30	31	2.12	2.3	0	0	23533.31	0.2	0.64	1000	39417.21	911280.05
31	32	2.2	2.5	0	0	23533.31	0.2	0.66	1000	23102.44	934382.49
32	33	2.1	3.6	0	0	23533.31	1.99	2.65	0	0	934382.49
33	34	2.1	4.2	0	0	23533.31	0.1	1.2	1000	34771.35	969153.84
34	35	2	4.2	0	0	23533.31	0.1	0.5	1000	50241.16	1019395
35	36	2.3	4.5	0	0	23533.31	-0.24	2.36	1000	36160.18	1055555.2

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.)
36	37	2	4.6	0	0	23533.31	0.1	0.55	250	356.95	1055912.1
37	38	2.1	2.35	0	0	23533.31	0.1	1.2	1000	26124.12	1082036.3
38	39	2.2	3.45	0	0	23533.31	0.59	0.51	1000	53356.66	1135392.9
39	40	2	2.54	0	0	23533.31	0.29	1.01	1000	54381.59	1189774.5
40	41	1.7	4.14	0	0	23533.31	-0.03	1.07	1000	55579.73	1245354.2
41	42	2.1	5.45	0	0	23533.31	0.29	1.26	1000	43905.42	1289259.7
42	43	2	2.36	0	0	23533.31	0.2	1.09	1000	36098.64	1325358.3
43	44	2.1	3.54	0	0	23533.31	1.99	3.13	0	0	1325358.3
44	45	2.65	5.61	0	0	23533.31	-0.3	0.6	1000	32010.74	1357369
45	46	1.1	2.4	1000	11082.97	34616.28	0.2	2.09	1000	48372.89	1405741.9
46	47	2.1	4.15	0	0	34616.28	-0.3	0.65	1000	17097.32	1422839.2
47	48	2.65	2.14	0	0	34616.28	0.02	0.97	1000	33483.41	1456322.7
48	49	2.22	5.68	0	0	34616.28	1	3.41	1000	19804.15	1476126.8
49	50	2.92	3.32	0	0	34616.28	0.29	0.31	1000	15662.62	1491789.4
50	51	2.54	7.21	0	0	34616.28	1.16	6.32	400	453.33	1492242.8
51	52	2.2	4.2	0	0	34616.28	0.1	2.41	1000	1055.2	1493298
52	53	2.1	5.12	0	0	34616.28	0.4	3.2	1000	51660.06	1544958
53	54	2	3.61	0	0	34616.28	0.5	2.68	1000	50986.34	1595944.4
54	55	2	2.4	0	0	34616.28	-0.07	0.88	1000	9357.22	1605301.6
55	56	2.1	2.5	0	0	34616.28	-0.06	0.49	1000	55968.29	1661269.9
56	57	2.3	3.24	0	0	34616.28	0.1	0.98	1000	40879.98	1702149.8
57	58	2	2.91	0	0	34616.28	0.3	1.38	1000	12687.34	1714837.2
58	59	2.1	3.25	0	0	34616.28	0.99	2.66	1000	32983.77	1747821
59	60	2.3	5.63	0	0	34616.28	0.5	3.55	1000	13320.34	1761141.3
60	61	2.1	8.92	0	0	34616.28	0.36	6.75	1000	23915.62	1785056.9
61	62	2.3	7.32	0	0	34616.28	1.99	5.21	0	0	1785056.9
62	63	2.1	2.78	0	0	34616.28	0.2	1.4	1000	34907.67	1819964.6
63	64	2.2	3.75	0	0	34616.28	0.2	0.98	1000	31351.37	1851316
64	65	2	4.33	0	0	34616.28	0.2	1.41	1000	19902.09	1871218
65	66	2.1	3.22	0	0	34616.28	0.2	0.4	1000	50006.34	1921224.4
66	67	1.5	2.85	0	0	34616.28	-0.3	1.45	1000	43210.16	1964434.5
67	68	2	3.65	0	0	34616.28	-0.11	2.45	1000	2093.22	1966527.8
68	69	2.1	3.85	0	0	34616.28	0.1	0.5	1000	2071.68	1968599.4
69	70	2	3.69	0	0	34616.28	0.4	1.75	100	154.57	1968754
70	71	2.47	6.52	0	0	34616.28	1.8	4.64	0	0	1968754
71	72	2.2	4.21	0	0	34616.28	0.29	0.31	150	254.62	1969008.6
72	73	2.1	3.25	0	0	34616.28	0.1	0.7	1000	7171.62	1976180.3
73	74	2	2.31	0	0	34616.28	0.1	1.2	1000	55321.76	2031502
74	75	2.1	3.36	0	0	34616.28	0.2	0.55	1000	43817.56	2075319.6

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.)
75	76	2.1	10.21	0	0	34616.28	0.2	8.14	1000	1899.97	2077219.5
76	77	0.4	1.45	1000	3784.15	38400.43	0.2	0.88	1000	32636.35	2109855.9
77	78	0.99	2.27	1000	26228.81	64629.24	0.49	1.26	1000	49841.13	2159697
78	79	0.1	1.48	1000	12605.72	77234.96	0.4	0.98	1000	49851.65	2209548.7
79	80	1.1	2.7	1000	5191.22	82426.18	0.2	0.55	1000	59502.03	2269050.7
80	81	1.29	3.43	1000	18989.6	101415.78	0.39	0.65	1000	39828.32	2308879
81	82	1.15	2.41	1000	3468.11	104883.89	0.2	0.4	1000	59636.38	2368515.4
82	83	0.1	1.48	300	441.77	105325.66	-0.21	0.5	1000	50016.35	2418531.8
83	84	1.35	2.57	1000	1545.55	106871.21	0.49	0.86	1000	49630.51	2468162.3
84	85	0.68	1.99	1000	7511.72	114382.93	0.3	0.88	1000	49570.14	2517732.4
85	86	1.36	3.85	1000	9034.44	123417.37	0.8	2.3	1000	49566.74	2567299.1
86	87	2.1	3.6	0	0	123417.37	0.2	0.4	1000	50432.86	2617732
87	88	2	2.47	0	0	123417.37	0.11	1.3	1000	48248.41	2665980.4
88	89	0.2	4.76	700	841.35	124258.72	0.1	3.32	1000	44850.21	2710830.6
89	90	1.4	3.75	0	0	124258.72	0.1	2.41	1000	49470.8	2760301.4
90	91	2	7.45	0	0	124258.72	0.13	5.12	1000	18587.11	2778888.5
91	92	1.03	4.07	250	340.72	124599.44	0.1	2.3	1000	27944.33	2806832.9
92	93	0.59	2.88	1000	14350.24	138949.68	0.1	1.95	1000	49475	2856307.9
93	94	0.44	3.79	1000	11776.35	150726.03	0.11	2.05	1000	52587.91	2908895.8
94	95	0.2	0.88	100	45.12	150771.15	0.2	0.78	1000	48351.46	2957247.2
95	96	0.45	1.2	1000	13230.44	164001.59	-0.05	0.5	1000	49890.25	3007137.5
96	97	0.2	1.07	700	813.29	164814.88	-0.22	0.4	1000	49984.28	3057121.8
97	98	0.1	1.37	600	668.6	165483.48	-0.11	0.55	1000	49600.25	3106722
98	99	0.68	0.66	1000	4594.29	170077.77	0.2	0.4	1000	48883.41	3155605.4
99	100	1.05	3.05	1000	9748.93	179826.7	0.1	1.98	1000	55083.04	3210688.5
100	101	0.46	2.32	1000	1783.07	181609.77	0.29	1.54	1000	49935.76	3260624.2
101	102	0.77	2.75	1000	2703.73	184313.5	0.25	1.35	1000	59303.77	3319928
102	103	0.36	2.85	1000	8776.75	193090.25	0.08	1.77	1000	59587.77	3379515.8
103	104	0.43	5.87	100	4.43	193094.68	0.1	3.77	1000	49615.18	3429130.9
104	105	0.65	3.76	1000	1319.8	194414.48	0.1	2.52	1000	46218.37	3475349.3
105	106	0.2	2.66	1000	15293.01	209707.49	0.13	1.31	1000	56327.77	3531677.1
106	107	0.86	5.63	800	881.13	210588.62	0.25	3.69	1000	48579.31	3580256.4
107	108	0.2	0.88	1000	19436.46	230025.08	0.2	0.4	1000	44908.29	3625164.7
108	109	0.9	2.55	1000	4363.22	234388.3	0.46	1.68	1000	47430.98	3672595.7
109	110	1.27	3.6	1000	17700.09	252088.39	0.68	1.99	1000	49619.05	3722214.7
110	111	0.4	0.79	1000	4200.83	256289.22	-0.25	0.5	1000	49795.34	3772010.1
111	112	0.3	0.95	1000	1462.87	257752.09	0.2	0.4	1000	48189.98	3820200
112	113	0.45	1.48	1000	3093.69	260845.78	0.3	1.43	1000	47650.21	3867850.2
113	114	1.11	2.95	1000	27203.31	288049.09	0.68	1.66	1000	49933.57	3917783.8

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.)
114	115	0.2	1.85	1000	2293.63	290342.72	0.1	1.09	1000	51471.01	3969254.8
115	116	0.29	1.24	100	154.23	290496.95	-0.06	0.31	1000	38628.58	4007883.4
116	117	0.39	0.46	1000	8736.96	299233.91	0.29	0.16	1000	50909.17	4058792.6
117	118	0.1	2.76	1000	10178	309411.91	0.01	1.4	1000	51685.28	4110477.9
118	119	0.64	1.66	0	0	309411.91	0.31	0.97	1000	50753.2	4161231.1
119	120	0.25	0.55	1000	3723.3	313135.21	0.05	0.4	1000	49444.57	4210675.6
120	121	0.3	1.4	1000	11828.35	324963.56	-0.25	0.5	1000	61460.09	4272135.7
121	122	1.9	2.7	0	0	324963.56	0.1	0.6	1000	49995.31	4322131
122	123	1.3	2.1	1000	5718.22	330681.78	0.01	0.85	1000	50386.71	4372517.7
123	124	1.4	2.35	0	0	330681.78	0.2	1.3	1000	39552.86	4412070.6
124	125	0.84	3.46	750	804.42	331486.2	0.29	2.11	1000	52729.56	4464800.2
125	126	0.2	1.3	800	804.42	332290.62	-0.24	0.9	1000	48482.08	4513282.2
126	127	2.2	3.5	0	0	332290.62	0.05	1.3	1000	26650.38	4539932.6
127	128	2.1	3.2	0	0	332290.62	0.24	0.69	1000	58800.44	4598733.1
128	129	2	3.56	0	0	332290.62	0.1	1.4	1000	30809.15	4629542.2
129	130	2.1	4.68	0	0	332290.62	0.11	3.35	1000	36538.02	4666080.2
130	131	1.3	5.52	1000	11624.72	343915.34	0.01	2.43	1000	48073.22	4714153.4
131	132	0.9	2.4	1000	14584.12	358499.46	0.2	1.45	1000	50400.69	4764554.1
132	133	0.45	4.3	1000	8164.04	366663.5	0.25	2.74	1000	50073.79	4814627.9
133	134	0.29	5.61	1000	11528.23	378191.73	0.24	3.69	1000	48456.53	4863084.5
134	135	0.39	2.26	1000	15160.28	393352.01	0.29	1.29	1000	48037.97	4911122.4
135	136	0.1	3.84	1000	8820.28	402172.29	0.05	2.74	1000	49880.89	4961003.3
136	137	0.3	2.16	1000	4197.11	406369.4	0.1	2.07	1000	51391.07	5012394.4
137	138	0.39	1.01	1000	14318.5	420687.9	0.29	0.31	1000	60164.96	5072559.3
138	139	0.2	0.55	1000	24493.02	445180.92	-0.22	0.4	1000	49497.29	5122056.6
139	140	0.58	1.52	1000	25709.39	470890.31	0.1	0.65	1000	38619.3	5160675.9
140	141	0.2	4.66	1000	23637.12	494527.43	0.1	0.5	1000	48671.05	5209347
141	142	0.9	1.85	1000	33243.96	527771.39	0.2	0.85	1000	59222.86	5268569.8
142	143	0.6	2.55	1000	14353.75	542125.14	0.4	1.33	1000	50019.25	5318589.1
143	144	1.19	4.66	1000	9383.82	551508.96	0.59	2.57	1000	51332.69	5369921.8
144	145	0.58	5.65	1000	1095.08	552604.04	0.1	3.88	1000	36504.9	5406426.7
145	146	0.2	1.1	1000	9744.46	562348.5	-0.11	0.4	1000	49859.43	5456286.1
146	147	0.29	0.46	1000	9084.93	571433.43	-0.16	0.31	1000	59689.25	5515975.4
147	148	0.3	1.31	1000	9505.48	580938.91	0.2	0.4	1000	49845.77	5565821.1
148	149	1.01	1.89	1000	16746.29	597685.2	0.04	0.65	1000	48292	5614113.1
149	150	0.74	2.36	1000	12427.03	610112.23	0.64	1.26	1000	49292.01	5663405.1
150	151	0.55	1.75	1000	2488.83	612601.06	0.16	1.05	1000	48097.89	5711503
151	152	0.2	1.2	1000	9230.24	621831.3	0.1	0.78	1000	49493.76	5760996.8
152	153	0.5	0.92	1000	4724.61	626555.91	0.4	0.78	1000	41689.57	5802686.4

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.)
153	154	0.75	2.74	1000	25095.13	651651.04	0.5	1.75	1000	58453.44	5861139.8
154	155	0.8	1.7	1000	20335.54	671986.58	0.25	1.09	1000	50101.6	5911241.4
155	156	1.22	1.75	1000	2595.98	674582.56	-0.08	0.4	1000	37819.26	5949060.7
156	157	0.2	2.95	1000	42049.1	716631.66	0.2	1.33	1000	58383.95	6007444.6
157	158	0.4	1.2	1000	18982.66	735614.32	0.2	0.88	1000	49440.79	6056885.4
158	159	0.4	1.55	1000	10071.75	745686.07	0.2	1.28	1000	50026.12	6106911.5
159	160	0.9	2.75	1000	14732.62	760418.69	0.2	0.97	1000	40015.71	6146927.2
160	161	0.4	2.2	1000	6151.34	766570.03	0.2	0.4	1000	46369.04	6193296.3
161	162	0.1	2.85	1000	1237.1	767807.13	0.1	1.2	1000	49948.05	6243244.3
162	163	1.1	4.45	1000	2062	769869.13	0.4	2.66	1000	49834.23	6293078.6
163	164	1.1	5.46	1000	4085.45	773954.58	0.5	1.66	1000	49417.7	6342496.3
164	165	0.2	21.93	1000	4957.02	778911.6	-0.22	3.75	1000	49247.96	6391744.2
165	166	0.1	22.05	1000	4527.19	783438.79	-0.3	20.03	1000	49738.23	6441482.4
166	167	0.99	3.46	1000	16032.66	799471.45	0.29	2.13	1000	49962.46	6491444.9
167	168	0.6	0.97	1000	2624.61	802096.06	0.4	0.88	1000	26421.08	6517866
168	169	2.1	4.43	0	0	802096.06	0.1	0.74	1000	28247.4	6546113.4
169	170	0.8	1.7	250	368.54	802464.6	0.1	0.5	1000	32452.32	6578565.7
170	171	1.3	2.51	250	329.83	802794.43	-0.17	0.63	1000	48265.18	6626830.9
171	172	1.11	2.22	150	177.81	802972.24	0.2	0.55	1000	51127.8	6677958.7
172	173	0.29	3.66	1000	1870.83	804843.07	0.39	0.57	1000	43504.18	6721462.9
173	174	1.4	2.2	0	0	804843.07	0.5	1.1	1000	49147.69	6770610.6
174	175	1.18	3.79	1000	4768.68	809611.75	0.2	0.5	1000	43849.1	6814459.7
175	176	1.34	2.79	1000	9760.43	819372.18	0.02	1.52	1000	58639.84	6873099.5
176	177	0.1	1.4	1000	6058.33	825430.51	0.1	0.67	1000	48576.7	6921676.2
177	178	1.3	3.66	1000	12582.83	838013.34	0.14	1.1	1000	49383.49	6971059.7
178	179	0.1	2.8	1000	7239.94	845253.28	-0.05	0.5	1000	44170.15	7015229.8
179	180	1.3	3.6	1000	12317.92	857571.2	0.15	1.34	1000	49347.67	7064577.5
180	181	0.8	2.3	1000	16019.47	873590.67	0.1	0.5	1000	59131.47	7123709
181	182	0.29	3.61	1000	5269.39	878860.06	0.29	0.51	1000	49635.64	7173344.6
182	183	1.19	2.51	1000	1247.4	880107.46	0.19	0.61	1000	49342.31	7222686.9
183	184	0.8	2.5	400	382	880489.46	0.1	0.8	1000	49653.03	7272340
184	185	1.2	3.51	1000	9370.53	889859.99	0.19	0.51	1000	50030.2	7322370.2
185	186	0.22	2.2	1000	7250.61	897110.6	0.2	0.6	1000	59881.72	7382251.9
186	187	1.15	2.84	1000	7819.1	904929.7	0.1	0.5	1000	48872.79	7431124.7
187	188	0.1	0.5	1000	2973	907902.7	0	0.7	1000	47966.39	7479091.1
188	189	0.2	0.65	1000	16185.24	924087.94	-0.1	0.5	1000	49240.3	7528331.4
189	190	0.1	0.88	400	482.31	924570.25	-0.1	0.4	1000	49861.75	7578193.1
190	191	0.39	0.99	1000	7034.47	931604.72	0.19	0.41	1000	49558.57	7627751.7
191	192	1.26	3.3	1000	6675.09	938279.81	0.4	0.9	1000	42765.06	7670516.7

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.)
192	193	0.53	2.23	1000	4821.22	943101.03	0.2	0.5	1000	36532.65	7707049.4
193	194	0.61	3.66	1000	2341.62	945442.65	0.29	0.61	1000	35170.63	7742220
194	195	0.38	2.74	1000	3678.58	949121.23	-0.1	0.6	1000	38355.21	7780575.2
195	196	1.4	1.79	0	0	949121.23	0.2	0.6	1000	15625.36	7796200.6
196	197	1	2.74	1000	1360.54	950481.77	-0.3	0.7	1000	14414.03	7810614.6
197	198	0.9	2.61	1000	5075.46	955557.23	0.2	0.5	1000	41283.82	7851898.4
198	199	0.1	1.4	1000	10207.19	965764.42	0.1	0.7	1000	60160.99	7912059.4
199	200	1.24	2.76	800	812.54	966576.96	0.29	0.51	1000	46379.77	7958439.2
200	201	0.24	1.21	1000	7983.15	974560.11	0.29	0.51	1000	48538.89	8006978.1
201	202	0.31	2.7	100	1.24	974561.35	0.1	0.6	1000	49746.34	8056724.4
202	203	0.51	3.72	1000	2199.67	976761.02	0.2	0.5	1000	49914.89	8106639.3
203	204	0.06	2.3	1000	17857.98	994619	0.1	0.6	1000	49930.6	8156569.9
204	205	0.2	3.31	1000	13920.52	1008539.5	0.2	0.5	1000	49841.61	8206411.5
205	206	0.03	1.88	1000	3228.99	1011768.5	0.1	0.7	1000	69976.32	8276387.8
206	207	0.68	2.11	1000	17212.73	1028981.2	0.19	0.41	1000	30029.9	8306417.7
207	208	0.35	3.2	1000	20387.13	1049368.4	-0.30	0.4	1000	49761.88	8356179.6
208	209	0.4	2.8	100	131.5	1049499.9	-0.1	0.6	1000	43288.16	8399467.8
209	210	0.2	1.1	1000	7928.58	1057428.5	0.2	0.6	1000	50035.82	8449503.6
210	211	0.9	2.74	1000	1177.98	1058606.4	0.1	0.5	1000	47479.22	8496982.8
211	212	0.2	0.88	1000	8137.06	1066743.5	0.2	0.6	1000	49224.81	8546207.6
212	213	0.99	1.96	1000	7579.11	1074322.6	0.19	0.41	1000	48177.56	8594385.2
213	214	0.5	1.2	100	3735.44	1078058	0.1	0.7	1000	46354.21	8640739.4
214	215	1.1	2.2	1000	2980.47	1081038.5	0.1	0.6	1000	57974.67	8698714.1
215	216	0.64	1.21	1000	6403.81	1087442.3	0.29	0.61	1000	49992.78	8748706.9
216	217	0.88	2.41	1000	6652.3	1094094.6	0.1	0.5	1000	53406.85	8802113.7
217	218	0.8	3.4	1000	3077.9	1097172.5	-0.3	0.6	1000	50467.82	8852581.5
218	219	1.19	1.31	1000	7422.58	1104595.1	0.19	0.51	1000	40841.41	8893422.9
219	220	1.21	2.79	1000	29104.24	1133699.3	0.1	0.4	1000	57513.66	8950936.6
220	221	0.3	1.4	1000	14918.09	1148617.4	0.1	0.5	1000	41278.57	8992215.2
221	222	0.55	1.75	1000	2436.76	1151054.2	0.1	0.5	1000	30854.82	9023070
222	223	0.38	1.4	1000	22091.33	1173145.5	-0.3	0.4	1000	67695.46	9090765.4
223	224	0.12	1.45	1000	3655.39	1176800.9	0.1	0.7	1000	34092.35	9124857.8
224	225	0.11	2.55	1000	19702.42	1196503.3	0.1	0.6	1000	50903.29	9175761.1
225	226	0.11	3.55	1000	17211.69	1213715	0.29	0.61	1000	48316.54	9224077.6
226	227	0.55	1.1	1000	4148.06	1217863.1	0.1	0.5	1000	53669.73	9277747.4
227	228	0.8	1.7	1000	5187.11	1223050.2	0.1	0.7	1000	41062.96	9318810.3
228	229	1.13	2.2	1000	17330.45	1240380.6	0.1	0.5	1000	48336.25	9367146.6
229	230	0.55	1.1	1000	1199.55	1241580.2	0.2	0.6	1000	40638.84	9407785.4
230	231	0.5	1.8	1000	15167.08	1256747.3	-0.3	0.6	1000	54352.45	9462137.9

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.)
231	232	0.5	1.4	1000	3736.43	1260483.7	0.2	0.6	1000	30694.37	9492832.2
232	233.040	0.5	0.7	1000	6635.71	1267119.4	0.19	0.41	1000	20627.17	9513459.4
Total				135950	1267119.4		Total		221400	9513459.4	

Table 22- Dredging Calculation of Class-II

Class-III:-

Class -III											
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	9.15	12.12	0	0	0	8.04	10.48	0	0	0
1	2	11.23	29.78	0	0	0	10.37	23.6	0	0	0
2	3	6.61	14.83	0	0	0	4.05	12.6	0	0	0
3	4	6.01	11.43	0	0	0	2.1	5.82	0	0	0
4	5	2.35	12.28	0	0	0	2.1	10.29	0	0	0
5	6	3.55	4.66	0	0	0	0.1	1.3	1000	16125.96	16125.96
6	7	1.5	8.85	100	17.02	17.02	0.3	1.4	1000	76667.52	92793.48
7	8	3.45	6.78	0	0	17.02	0.8	3.45	1000	96140.81	188934.29
8	9	2.45	7.74	0	0	17.02	0.1	2.35	1000	71310.96	260245.25
9	10	2.1	26.8	0	0	17.02	0.9	23.27	1000	2544.45	262789.7
10	11	2	8.38	0	0	17.02	-0.12	6.14	1000	7000.55	269790.25
11	12	1.5	6.16	0	0	17.02	0.1	1.43	1000	17870.83	287661.08
12	13	1.5	7.58	1000	1311.51	1328.53	0.28	1.22	1000	75700.31	363361.39
13	14	1.7	8.43	0	0	1328.53	0.1	1.4	1000	38765.08	402126.47
14	15	1.4	6.05	1000	10873.32	12201.85	-0.1	2.63	1000	50424.39	452550.86
15	16	1.5	4.16	1000	6305.39	18507.24	-0.1	1.86	1000	56480.74	509031.6
16	17	2.1	4.4	0	0	18507.24	0.1	1.4	1000	77174.11	586205.71
17	18	2.04	2.7	0	0	18507.24	-0.23	0.65	1000	45162.96	631368.67
18	19	1.7	7.75	0	0	18507.24	-0.1	2.65	1000	50278.88	681647.55
19	20	1	1.45	1000	28003.84	46511.08	-0.29	0.83	1000	90922.42	772569.97
20	21	1.5	3.45	1000	11794.61	58305.69	0.1	0.76	1000	76541.97	849111.94
21	22	2.1	5.32	0	0	58305.69	0.3	1.4	1000	82805.49	931917.43
22	23	2.2	6.32	0	0	58305.69	0.05	1.4	1000	76718.9	1008636.3
23	24	2	3.2	0	0	58305.69	0.28	0.47	1000	23040.1	1031676.4
24	25	2.3	2.32	0	0	58305.69	-0.24	1.16	1000	3199.76	1034876.2
25	26	2.2	3.21	0	0	58305.69	-0.1	0.85	1000	83589.74	1118465.9
26	27	2.1	3.25	0	0	58305.69	0.3	1	1000	54242.38	1172708.3
27	28	2	2.1	0	0	58305.69	-0.1	0.85	1000	81036.85	1253745.2
28	29	2.2	3.65	0	0	58305.69	0.2	1.05	1000	21398.65	1275143.8
29	30	2.1	2.65	0	0	58305.69	0.28	1.02	1000	77096.35	1352240.2
30	31	2.12	2.3	0	0	58305.69	0.1	0.74	1000	79294.49	1431534.7
31	32	2.2	2.5	0	0	58305.69	0.1	0.76	1000	62982.46	1494517.1
32	33	2.1	3.6	0	0	58305.69	1.98	2.66	1000	36520.56	1531037.7
33	34	2.1	4.2	0	0	58305.69	1.7	2.3	0	0	1531037.7
34	35	2	4.2	0	0	58305.69	0.1	0.6	1000	55348.97	1586386.6
35	36	2.3	4.5	0	0	58305.69	-0.3	2.56	1000	80541.17	1666927.8

Class -III											
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	2	4.6	0	0	58305.69	0.2	0.65	1000	60594.39	1727522.2
37	38	2.1	2.35	0	0	58305.69	-0.1	1.4	1000	1830.78	1729353
38	39	2.2	3.45	0	0	58305.69	0.58	0.52	1000	46298.02	1775651
39	40	2	2.54	0	0	58305.69	0.28	1.02	1000	82835.49	1858486.5
40	41	1.7	4.34	0	0	58305.69	-0.23	1.27	1000	85030.82	1943517.3
41	42	1.6	5.45	300	488.52	58794.21	0.28	1.27	1000	89149.45	2032666.8
42	43	2	2.36	0	0	58794.21	0.3	1.29	1000	69933.45	2102600.2
43	44	2.1	3.54	0	0	58794.21	1.98	3.14	1000	59189.49	2161789.7
44	45	2.65	5.61	0	0	58794.21	1.7	2.4	0	0	2161789.7
45	46	1.7	2.5	0	0	58794.21	0.1	2.19	1000	48787.92	2210577.6
46	47	1.5	4.35	1000	19129.7	77923.91	-0.3	0.85	1000	77394.97	2287972.6
47	48	2.65	2.14	0	0	77923.91	-0.08	1.07	1000	30018.23	2317990.8
48	49	2.22	5.68	0	0	77923.91	0.8	3.61	1000	56741.73	2374732.6
49	50	2.92	3.32	0	0	77923.91	0.28	0.32	1000	32563.26	2407295.8
50	51	2.54	7.21	0	0	77923.91	1.06	6.42	100	28415.89	2435711.7
51	52	2.2	4.2	0	0	77923.91	-0.1	2.61	1000	1959.78	2437671.5
52	53	2.1	5.12	0	0	77923.91	0.3	3.3	1000	2865.99	2440537.5
53	54	2	3.61	0	0	77923.91	0.4	2.78	1000	83833.91	2524371.4
54	55	2	2.4	0	0	77923.91	-0.17	0.98	1000	81015.41	2605386.8
55	56	2.1	2.5	0	0	77923.91	-0.07	0.5	1000	18086.7	2623473.5
56	57	2.3	3.24	0	0	77923.91	-0.1	1.18	1000	86750.42	2710223.9
57	58	2	2.91	0	0	77923.91	0.2	1.48	1000	64445.92	2774669.8
58	59	2.1	3.25	0	0	77923.91	0.98	2.67	1000	23393.29	2798063.1
59	60	2.3	5.63	0	0	77923.91	0.4	3.65	1000	57190.27	2855253.4
60	61	2.1	8.92	0	0	77923.91	0.16	6.95	1000	28016.98	2883270.4
61	62	2.3	7.32	0	0	77923.91	1.98	5.22	1000	39892.65	2923163
62	63	2.1	2.78	0	0	77923.91	1.8	2.5	0	0	2923163
63	64	2.2	3.75	0	0	77923.91	0.5	1.18	1000	55822.07	2978985.1
64	65	2	4.43	0	0	77923.91	0.1	1.51	1000	51698.62	3030683.7
65	66	1.7	3.32	0	0	77923.91	0.1	0.5	1000	32610.77	3063294.5
66	67	1.1	3.05	100	18.4	77942.31	-0.3	1.65	1000	79730.94	3143025.4
67	68	1.6	3.65	100	18.44	77960.75	-0.21	2.55	1000	71141.93	3214167.4
68	69	2.1	3.85	0	0	77960.75	-0.1	0.7	1000	6340.36	3220507.7
69	70	2	3.69	0	0	77960.75	0.3	1.85	1000	8258.43	3228766.1
70	71	2.47	6.52	0	0	77960.75	1.6	4.84	1000	1078.77	3229844.9
71	72	2.2	4.21	0	0	77960.75	1.7	2.8	0	0	3229844.9
72	73	2.1	3.25	0	0	77960.75	0.6	0.8	1000	2305.23	3232150.1
73	74	2	2.31	0	0	77960.75	-0.1	1.4	1000	11866.78	3244016.9

Class -III											
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.)
74	75	2.1	3.36	0	0	77960.75	0.1	0.65	1000	85690.68	3329707.6
75	76	2.1	10.21	0	0	77960.75	0.1	8.24	1000	71161.41	3400869
76	77	1.7	1.55	0	0	77960.75	0.1	0.98	1000	5689.08	3406558.1
77	78	0.98	2.28	1000	10248.23	88208.98	0.48	1.27	1000	52969.34	3459527.4
78	79	0.1	1.68	1000	49523.85	137732.83	0.2	1.18	1000	79465.86	3538993.3
79	80	1	2.8	1000	31608.44	169341.27	0.1	0.65	1000	79484.24	3618477.5
80	81	1.28	3.44	1000	15140.63	184481.9	0.38	0.66	1000	94802.09	3713279.6
81	82	1.05	2.51	1000	36186.53	220668.43	0.1	0.5	1000	63501.44	3776781.1
82	83	0.1	1.68	1000	12936.28	233604.71	-0.3	0.7	1000	95085.13	3871866.2
83	84	1.34	2.58	1000	11406.38	245011.09	0.3	0.87	1000	79747.13	3951613.3
84	85	0.58	2.09	1000	11527.46	256538.55	0.2	0.98	1000	79129.99	4030743.3
85	86	1.16	4.05	1000	19433.3	275971.85	0.6	2.5	1000	79034.81	4109778.1
86	87	1.5	3.7	1000	23336.54	299308.39	0.1	0.5	1000	79098.53	4188876.7
87	88	1.7	2.57	0	0	299308.39	0.01	1.4	1000	80623.91	4269500.6
88	89	1.8	4.96	0	0	299308.39	-0.1	3.52	1000	77383.16	4346883.7
89	90	0.8	3.85	1000	3247.89	302556.28	0	2.51	1000	73144.15	4420027.9
90	91	1.9	7.55	100	35.48	302591.76	0.03	5.22	1000	78876.29	4498904.2
91	92	1.7	4.27	0	0	302591.76	-0.1	2.5	1000	30633.88	4529538
92	93	0.29	3.18	1000	4092.79	306684.55	-0.2	2.25	1000	44387.53	4573925.6
93	94	0.34	3.89	1000	32076.53	338761.08	0.01	2.15	1000	78883.3	4652808.9
94	95	0.1	0.98	1000	28141.98	366903.06	0.1	0.88	1000	84832.47	4737641.3
95	96	0.25	1.4	1000	3249.85	370152.91	-0.25	0.7	1000	72217.93	4809859.3
96	97	0.1	1.17	1000	28571.1	398724.01	-0.3	0.5	1000	78920.61	4888779.9
97	98	0.1	1.47	1000	4037.06	402761.07	-0.21	0.65	1000	79694.89	4968474.8
98	99	0.58	0.76	1000	3944.64	406705.71	0.1	0.5	1000	74126.23	5042601
99	100	0.85	3.25	1000	15328.43	422034.14	-0.2	2.18	1000	76772.95	5119374
100	101	0.45	2.33	1000	17951.38	439985.52	0.28	1.55	1000	84909.39	5204283.3
101	102	0.67	2.85	1000	3833.94	443819.46	0.15	1.45	1000	79618.6	5283901.9
102	103	0.16	3.05	1000	14133.32	457952.78	-0.12	1.97	1000	94554.18	5378456.1
103	104	0.23	6.07	1000	25548.66	483501.44	-0.2	3.97	1000	95007.94	5473464.1
104	105	0.45	3.96	1000	1378.8	484880.24	-0.1	2.72	1000	79183.27	5552647.3
105	106	0.1	2.76	1000	4157.64	489037.88	0.03	1.41	1000	75305.03	5627952.4
106	107	0.85	5.64	1000	30324.22	519362.1	0.24	3.7	1000	89526.61	5717479
107	108	0.1	0.98	1000	5737.5	525099.6	0.1	0.5	1000	77553.85	5795032.8
108	109	0.8	2.65	1000	36928.6	562028.2	0.36	1.78	1000	67653.4	5862686.2
109	110	1.26	3.61	1000	12196.75	574224.95	0.67	2	1000	74507.68	5937193.9
110	111	0.2	0.99	1000	34473.31	608698.26	-0.3	0.7	1000	79113.15	6016307.1
111	112	0.2	1.05	1000	11142.74	619841	0.1	0.5	1000	78989.24	6095296.3

Class -III											
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.)
112	113	0.25	1.68	1000	8299.87	628140.87	0.1	1.63	1000	76944.9	6172241.2
113	114	1.01	3.05	1000	9398.87	637539.74	0.58	1.76	1000	76099.89	6248341.1
114	115	0.1	2.05	1000	50052.71	687592.45	-0.1	1.29	1000	79844.79	6328185.9
115	116	0.28	1.25	850	5336.26	692928.71	-0.07	0.32	1000	81068.04	6409253.9
116	117	0.38	0.47	1000	1020.94	693949.65	0.28	0.17	1000	65086.59	6474340.5
117	118	0.1	2.96	1000	22374.32	716323.97	-0.19	1.6	1000	80415.83	6554756.3
118	119	0.63	1.67	1000	23299.04	739623.01	0.3	0.98	1000	81697.13	6636453.5
119	120	0.15	0.65	1000	2118.6	741741.61	-0.05	0.5	1000	79874.8	6716328.3
120	121	0.1	1.6	1000	15141.22	756882.83	-0.3	0.7	1000	78555.11	6794883.4
121	122	1.7	2.9	1000	22200.26	779083.09	-0.1	0.8	1000	96431.96	6891315.3
122	123	1.7	1.6	0	0	779083.09	-0.19	1.05	1000	79324.91	6970640.2
123	124	0.25	2.45	1000	15478.19	794561.28	0.1	1.4	1000	80722.81	7051363.1
124	125	0.83	3.47	250	387.17	794948.45	0.28	2.12	1000	66028.4	7117391.5
125	126	0.1	1.4	1000	2209.53	797157.98	-0.3	1	1000	83622.31	7201013.8
126	127	1.6	3.5	1000	2041.06	799199.04	-0.05	1.4	1000	77987.89	7279001.7
127	128	2.1	3.2	0	0	799199.04	0.23	0.7	1000	46010.4	7325012.1
128	129	2	3.56	0	0	799199.04	-0.1	1.6	1000	89561.52	7414573.6
129	130	2.1	4.68	0	0	799199.04	0.01	3.45	1000	54633.17	7469206.7
130	131	1.7	5.72	0	0	799199.04	-0.19	2.63	1000	60953.84	7530160.6
131	132	0.8	2.5	1000	23770.54	822969.58	0.1	1.55	1000	76964.18	7607124.8
132	133	0.25	4.5	1000	33125.98	856095.56	0.05	2.94	1000	80261.56	7687386.3
133	134	0.28	5.62	1000	23051.88	879147.44	0.23	3.7	1000	79360.9	7766747.2
134	135	0.38	2.27	1000	28770.2	907917.64	0.28	1.3	1000	77010.89	7843758.1
135	136	0.1	4.04	1000	31095.16	939012.8	-0.15	2.94	1000	76789.39	7920547.5
136	137	0.1	2.36	1000	22896.27	961909.07	-0.1	2.27	1000	79324.03	7999871.5
137	138	0.38	1.02	1000	12764.16	974673.23	0.28	0.32	1000	81564.71	8081436.2
138	139	0.1	0.65	1000	29060.32	1003733.6	-0.3	0.5	1000	95627.18	8177063.4
139	140	0.38	1.72	1000	47915.39	1051648.9	-0.1	0.85	1000	78917.59	8255981
140	141	0.1	4.76	1000	43948.23	1095597.2	-0.1	0.6	1000	61571.5	8317552.5
141	142	0.8	1.95	1000	40144.59	1135741.8	0.1	0.95	1000	77952.84	8395505.4
142	143	0.5	2.65	1000	59985.92	1195727.7	0.3	1.43	1000	94487.72	8489993.1
143	144	1.18	4.67	1000	31398.83	1227126.5	0.58	2.58	1000	79751.42	8569744.5
144	145	0.38	5.85	1000	20957.02	1248083.5	-0.1	4.08	1000	81315.21	8651059.7
145	146	0.1	1.2	1000	7498.48	1255582	-0.21	0.5	1000	59753.16	8710812.9
146	147	0.28	0.47	1000	20879.87	1276461.9	-0.17	0.32	1000	79201.12	8790014
147	148	0.2	1.41	1000	26460.7	1302922.6	0.1	0.5	1000	94996.39	8885010.4
148	149	0.81	2.09	1000	25231.16	1328153.7	-0.16	0.85	1000	79315.9	8964326.3
149	150	0.73	2.37	1000	33994.85	1362148.6	0.63	1.27	1000	77153.16	9041479.4

Class -III											
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.)
150	151	0.45	1.85	1000	31179.42	1393328	0.06	1.15	1000	78591.9	9120071.3
151	152	0.1	1.4	1000	6941.07	1400269.1	-0.1	0.98	1000	77065.93	9197137.3
152	153	0.4	1.02	1000	22084.64	1422353.7	0.3	0.88	1000	78818.73	9275956
153	154	0.65	2.84	1000	9338.1	1431691.8	0.4	1.85	1000	68836.43	9344792.4
154	155	0.6	1.9	1000	45129.19	1476821	0.05	1.29	1000	93200.72	9437993.1
155	156	1.12	1.85	1000	38157.55	1514978.6	-0.18	0.5	1000	78010.32	9516003.5
156	157	0.1	3.05	1000	6374.48	1521353	0.1	1.43	1000	53998.95	9570002.4
157	158	0.2	1.4	1000	72333.27	1593686.3	0.1	1.08	1000	93087.41	9663089.8
158	159	0.1	1.85	1000	39135.77	1632822.1	-0.1	1.58	1000	78828.52	9741918.3
159	160	0.8	2.85	1000	25706.42	1658528.5	0.1	1.07	1000	79761.28	9821679.6
160	161	0.3	2.3	1000	27206.46	1685735	0.1	0.5	1000	63812.94	9885492.6
161	162	0.1	3.05	1000	15138.74	1700873.7	-0.2	1.4	1000	72532.38	9958024.9
162	163	1	4.55	1000	5333.53	1706207.2	0.3	2.76	1000	79637.82	10037663
163	164	1	5.56	1000	8384.16	1714591.4	0.4	1.76	1000	81289.57	10118952
164	165	0.1	22.03	1000	10752.87	1725344.3	-0.3	3.85	1000	76924.19	10195877
165	166	0.1	22.25	1000	15991.7	1741336	-0.3	20.23	1000	78080.3	10273957
166	167	0.98	3.47	1000	13719.87	1755055.8	0.28	2.14	1000	79177.28	10353134
167	168	0.5	1.07	1000	33557.17	1788613	0.3	0.98	1000	79678.57	10432813
168	169	1.5	4.63	1000	6714.32	1795327.3	-0.2	0.94	1000	43103.1	10475916
169	170	1.7	1.9	0	0	1795327.3	-0.1	0.7	1000	43675.46	10519591
170	171	1.6	2.71	1000	2548.89	1797876.2	-0.37	0.83	1000	48339.04	10567930
171	172	1.01	2.32	1000	2562.49	1800438.7	0.1	0.65	1000	75963.28	10643894
172	173	0.28	3.67	1000	2276.38	1802715.1	0.38	0.58	1000	78990.75	10722884
173	174	1.12	2.3	1000	8094.9	1810810	0.4	1.2	1000	68445.45	10791330
174	175	1.08	3.89	100	31.84	1810841.8	0.1	0.6	1000	78354.91	10869685
175	176	1.33	2.8	1000	13272.95	1824114.8	0.01	1.53	1000	68595.38	10938280
176	177	0.1	1.6	1000	21700.95	1845815.7	-0.1	0.87	1000	93494.43	11031774
177	178	1.45	3.76	1000	16781.56	1862597.3	0.04	1.2	1000	77498.94	11109273
178	179	0.1	3	1000	28230.73	1890828	-0.25	0.7	1000	78794.01	11188067
179	180	1.42	3.7	1000	18667.66	1909495.7	0.05	1.44	1000	72313.9	11260381
180	181	0.6	2.5	1000	26352.1	1935847.8	-0.1	0.7	1000	78681.36	11339063
181	182	0.28	3.62	1000	35196.85	1971044.6	0.28	0.52	1000	94382.97	11433446
182	183	1.18	2.52	1000	15349.29	1986393.9	0.18	0.62	1000	79127.26	11512573
183	184	0.6	2.7	1000	5470.97	1991864.9	-0.1	1	1000	78680.52	11591253
184	185	1.78	3.52	1000	2686.41	1994551.3	0.18	0.52	1000	79166.4	11670420
185	186	0.12	2.3	1000	21808.9	2016360.2	0.1	0.7	1000	79763.6	11750183
186	187	0.95	3.04	1000	17678.82	2034039	-0.1	0.7	1000	95488.68	11845672
187	188	0.1	0.7	1000	17716.64	2051755.7	-0.2	0.9	1000	77676.38	11923348

Class -III											
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.)
188	189	0.2	0.85	1000	14786.61	2066542.3	-0.3	0.7	1000	76477.05	11999826
189	190	0.1	0.98	1000	31952.28	2098494.5	-0.1	0.5	1000	78541.67	12078367
190	191	0.38	1	1000	2409.39	2100903.9	0.18	0.42	1000	79499.58	12157867
191	192	1.16	3.4	1000	13972.86	2114876.8	0.3	1	1000	79017.48	12236884
192	193	0.43	2.33	1000	12146.27	2127023.1	0.1	0.6	1000	68088.73	12304973
193	194	0.6	3.67	1000	10183.24	2137206.3	0.28	0.62	1000	51118.41	12356091
194	195	0.18	2.94	1000	5037.48	2142243.8	-0.2	0.8	1000	48890.19	12404982
195	196	0.25	1.89	1000	12713.79	2154957.6	0.1	0.7	1000	56537.61	12461519
196	197	0.8	2.94	600	696.25	2155653.8	-0.2	0.9	1000	27887.67	12489407
197	198	0.8	2.71	1000	6903.14	2162557	0.1	0.6	1000	46648.73	12536056
198	199	0.1	1.6	1000	17336.84	2179893.8	-0.1	0.9	1000	66512.17	12602568
199	200	1.23	2.77	1000	20942.35	2200836.2	0.28	0.52	1000	92977.16	12695545
200	201	0.23	1.22	1000	7960.65	2208796.8	0.28	0.52	1000	72883.08	12768428
201	202	0.11	2.9	1000	17876.19	2226673	-0.1	0.8	1000	77389.85	12845818
202	203	0.41	3.82	1000	1015.57	2227688.6	0.1	0.6	1000	79316.59	12925134
203	204	0.05	2.5	1000	14034.45	2241723	-0.1	0.8	1000	79584.39	13004719
204	205	0.1	3.41	1000	37978.3	2279701.3	0.1	0.6	1000	79610.12	13084329
205	206	0.02	2.08	1000	20136.49	2299837.8	-0.1	0.9	1000	79467.95	13163797
206	207	0.67	2.12	1000	19554.5	2319392.3	0.18	0.42	1000	111570.46	13275367
207	208	0.25	3.3	1000	28470.74	2347863	-0.1	0.5	1000	47804.04	13323171
208	209	0.2	3.0	1000	31123.35	2378986.4	-0.2	0.8	1000	74658.63	13397830
209	210	0.1	1.2	1000	1345.86	2380332.3	0.1	0.7	1000	75040.09	13472870
210	211	0.8	2.84	1000	20578.31	2400910.6	0.1	0.6	1000	79772.96	13552643
211	212	0.1	0.98	1000	1842.35	2402752.9	0.1	0.7	1000	73883.03	13626526
212	213	0.98	1.97	1000	27000.3	2429753.2	0.18	0.42	1000	81555.3	13708081
213	214	0.3	1.4	1000	8199.77	2437953	-0.1	0.9	1000	71130.77	13779212
214	215	1	2.3	1000	11629.92	2449582.9	0.1	0.7	1000	76412.58	13855625
215	216	0.63	1.22	1000	7889.02	2457471.9	0.28	0.62	1000	92383.99	13948009
216	217	0.78	2.51	1000	17567.62	2475039.5	0.1	0.6	1000	79759.84	14027769
217	218	0.6	3.6	1000	19562.69	2494602.2	-0.2	0.8	1000	83400.36	14111169
218	219	1.18	1.32	1000	18177.63	2512779.9	0.18	0.52	1000	76816.33	14187985
219	220	1.11	2.89	1000	25872.6	2538652.5	0.1	0.5	1000	64317.93	14252303
220	221	0.1	1.6	1000	47982.24	2586634.7	-0.1	0.7	1000	86687.89	14338991
221	222	0.45	1.85	1000	28532.7	2615167.4	0.1	0.6	1000	75473.53	14414465
222	223	0.28	1.5	1000	9125.59	2624293	-0.1	0.5	1000	50820.57	14465285
223	224	0.08	1.65	1000	50686.38	2674979.4	-0.1	0.9	1000	105823.59	14571109
224	225	0.01	2.65	1000	4065.15	2679044.5	-0.3	0.7	1000	57849.95	14628959
225	226	0.1	3.56	1000	44227.18	2723271.7	0.28	0.62	1000	80905.4	14709864

Class -III											
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.)
226	227	0.45	1.2	1000	32515.76	2755787.5	-0.3	0.6	1000	77991.75	14787856
227	228	0.6	1.9	1000	8380.47	2764167.9	-0.1	0.9	1000	80313.69	14868170
228	229	1.03	2.3	1000	16701.14	2780869.1	-0.3	0.6	1000	70874.62	14939044
229	230	0.45	1.2	1000	35054.81	2815923.9	0.1	0.7	1000	77233.69	15016278
230	231	0.5	1.8	1000	10760.47	2826684.4	-0.2	0.8	1000	68008.25	15084286
231	232	0.5	1.4	1000	29240.44	2855924.8	0.1	0.7	1000	78286.44	15162573
232	233.040	0.5	0.7	1000	17248.48	2873173.3	0.18	0.42	1000	62446.61	15225019
Total				150500	2873173.3		Total		223100	15225019	

Table 23-Dredging Calculation of 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	9.05	12.22	0	0	0	7.94	10.58	0	0	0
1	2	11.22	29.79	0	0	0	10.36	23.61	0	0	0
2	3	6.31	15.13	0	0	0	3.75	12.9	0	0	0
3	4	5.91	11.53	0	0	0	2	5.92	0	0	0
4	5	2.12	12.29	0	0	0	-0.01	10.3	1000	24849.12	24849.12
5	6	3.35	4.86	0	0	0	-0.1	1.5	1000	95893.32	120742.44
6	7	3.8	8.95	0	0	0	0.2	1.5	1000	119900.1	240642.54
7	8	3.35	6.88	0	0	0	0.7	3.55	1000	91839.36	332481.9
8	9	2.35	7.84	0	0	0	0.1	2.45	1000	4289.96	336771.86
9	10	2.09	26.81	0	0	0	0.89	23.28	1000	13023.12	349794.98
10	11	2	8.58	0	0	0	-0.3	6.34	1000	24153.22	373948.2
11	12	1.4	6.26	1000	1187.89	1187.89	0.2	1.53	1000	94582.84	468531.04
12	13	3.07	7.59	0	0	1187.89	0.27	1.23	1000	53416.51	521947.55
13	14	1.4	8.53	1000	11068.86	12256.75	0.1	1.5	1000	64048.58	585996.13
14	15	1.2	6.25	1000	6307.33	18564.08	-0.3	2.83	1000	72789.21	658785.34
15	16	2	4.46	0	0	18564.08	-0.3	2.16	1000	99209.89	757995.23
16	17	2.1	4.5	0	0	18564.08	0.1	1.5	1000	53781.18	811776.41
17	18	2.03	2.8	0	0	18564.08	-0.3	0.75	1000	63268.85	875045.26
18	19	0.65	7.95	1000	27956.94	46521.02	-0.3	2.85	1000	112311.37	987356.63
19	20	0.9	1.55	1000	11932.36	58453.38	-0.3	0.93	1000	95504.98	1082861.6
20	21	2.05	3.55	0	0	58453.38	0.1	0.86	1000	102598.34	1185460
21	22	2.1	5.32	0	0	58453.38	0.2	1.5	1000	96231.39	1281691.3
22	23	2.2	6.32	0	0	58453.38	-0.15	1.6	1000	35695.61	1317387
23	24	2	3.2	0	0	58453.38	0.27	0.48	1000	7082.32	1324469.3
24	25	2.3	2.32	0	0	58453.38	-0.3	1.26	1000	103280.21	1427749.5
25	26	2.2	3.21	0	0	58453.38	-0.3	1.05	1000	69556.77	1497306.3
26	27	2.1	3.25	0	0	58453.38	-0.2	1.2	1000	100682.95	1597989.2
27	28	2	2.1	0	0	58453.38	-0.3	1.05	1000	26953.04	1624942.2
28	29	2.2	3.65	0	0	58453.38	0.1	1.15	1000	97639.65	1722581.9
29	30	2.1	2.65	0	0	58453.38	0.27	1.03	1000	98878.81	1821460.7
30	31	2.12	2.3	0	0	58453.38	0.1	0.84	1000	78543.41	1900004.1
31	32	2.2	2.5	0	0	58453.38	0.1	0.86	1000	45960.14	1945964.3
32	33	2.1	3.6	0	0	58453.38	2	2.67	0	0	1945964.3
33	34	2.1	4.2	0	0	58453.38	-0.3	1.6	1000	68947.25	2014911.5
34	35	2	4.2	0	0	58453.38	-0.1	0.7	1000	99926.31	2114837.8

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.)
35	36	2.3	4.5	0	0	58453.38	-0.3	2.76	1000	78469.71	2193307.5
36	37	2	4.6	0	0	58453.38	-0.1	0.75	1000	4536.53	2197844.1
37	38	2.1	2.35	0	0	58453.38	-0.3	1.6	1000	61515.63	2259359.7
38	39	2.2	3.45	0	0	58453.38	0.57	0.53	1000	102832.35	2362192
39	40	2	2.54	0	0	58453.38	0.27	1.03	1000	104591.18	2466783.2
40	41	0.05	4.54	500	526.7	58980.08	-0.3	1.47	1000	111903.75	2578687
41	42	2.1	5.45	0	0	58980.08	0.27	1.28	1000	88618.34	2667305.3
42	43	2	2.36	0	0	58980.08	-0.2	1.49	1000	74267.52	2741572.8
43	44	2.1	3.54	0	0	58980.08	2	3.15	0	0	2741572.8
44	45	2.65	5.61	0	0	58980.08	-0.3	1.2	1000	60603.21	2802176
45	46	0.9	2.6	1000	19214.16	78194.24	0.1	2.29	1000	96763.85	2898939.9
46	47	2	4.55	0	0	78194.24	-0.3	1.05	1000	42669.16	2941609
47	48	2.65	2.14	0	0	78194.24	-0.18	1.17	1000	73427.7	3015036.7
48	49	2.22	5.68	0	0	78194.24	0.6	3.81	1000	41490.31	3056527.1
49	50	2.92	3.32	0	0	78194.24	0.27	0.33	1000	39305.67	3095832.7
50	51	2.54	7.21	0	0	78194.24	0.96	6.52	1000	3986.23	3099819
51	52	2.2	4.2	0	0	78194.24	-0.3	2.81	1000	4455.59	3104274.5
52	53	2.1	5.12	0	0	78194.24	0.2	3.4	1000	105560.59	3209835.1
53	54	2	3.61	0	0	78194.24	0.3	2.88	1000	100446.48	3310281.6
54	55	2	2.4	0	0	78194.24	-0.27	1.08	1000	27259.37	3337541
55	56	2.1	2.5	0	0	78194.24	-0.08	0.51	1000	106488.35	3444029.3
56	57	2.3	3.24	0	0	78194.24	-0.3	1.38	1000	81543.24	3525572.6
57	58	2	2.91	0	0	78194.24	0.1	1.58	1000	31989.55	3557562.1
58	59	2.1	3.25	0	0	78194.24	0.97	2.68	1000	75492.11	3633054.2
59	60	2.3	5.63	0	0	78194.24	0.3	3.75	1000	40582.9	3673637.1
60	61	2.1	8.92	0	0	78194.24	-0.04	7.15	1000	52414.73	3726051.9
61	62	2.3	7.32	0	0	78194.24	2	5.23	0	0	3726051.9
62	63	2.1	2.78	0	0	78194.24	0.2	1.6	1000	68640.44	3794692.3
63	64	2.2	3.75	0	0	78194.24	-0.2	1.38	1000	65220.61	3859912.9
64	65	0.1	4.53	100	1.27	78195.51	0.1	1.61	1000	41190.38	3901103.3
65	66	0.9	3.42	100	44.43	78239.94	0.2	0.6	1000	99363.98	4000467.3
66	67	0.72	3.25	100	43.31	78283.25	-0.3	1.85	1000	90810.06	4091277.3
67	68	2	3.65	0	0	78283.25	-0.3	2.65	1000	10785.47	4102062.8
68	69	2.1	3.85	0	0	78283.25	-0.3	0.9	1000	15589.1	4117651.9
69	70	2	3.69	0	0	78283.25	0.2	1.95	1000	2229.12	4119881
70	71	2.47	6.52	0	0	78283.25	2	5.04	0	0	4119881
71	72	2.2	4.21	0	0	78283.25	0.27	0.33	1000	7700.28	4127581.3
72	73	2.1	3.25	0	0	78283.25	-0.1	0.9	1000	16684.2	4144265.5
73	74	2	2.31	0	0	78283.25	-0.3	1.6	1000	105554.6	4249820.1

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.)
74	75	2.1	3.36	0	0	78283.25	0.1	0.75	1000	89942.67	4339762.8
75	76	2.1	10.21	0	0	78283.25	-0.3	8.34	1000	9614.49	4349377.3
76	77	0.2	1.65	1000	9993	88276.25	-0.3	1.08	1000	67294.01	4416671.3
77	78	0.97	2.29	1000	49619.56	137895.81	0.47	1.28	1000	99033.81	4515705.1
78	79	0.3	1.88	1000	31341.9	169237.71	-0.3	1.38	1000	99056.07	4614761.2
79	80	0.9	2.9	1000	15914.69	185152.4	-0.3	0.75	1000	118073.88	4732835
80	81	1.27	3.45	1000	36043	221195.4	0.37	0.67	1000	79139.24	4811974.3
81	82	0.95	2.61	1000	12813.07	234008.47	-0.3	0.6	1000	118498.81	4930473.1
82	83	0.3	1.88	1000	10525.57	244534.04	-0.3	0.9	1000	99383.33	5029856.4
83	84	1.33	2.59	1000	11774.35	256308.39	0.47	0.88	1000	98616.25	5128472.7
84	85	0.48	2.19	1000	19668.56	275976.95	0.1	1.08	1000	98496.61	5226969.3
85	86	0.96	4.25	1000	22987.96	298964.91	0.4	2.7	1000	98623.51	5325592.8
86	87	2	3.8	0	0	298964.91	0.2	0.6	1000	100306.25	5425899
87	88	2.1	2.67	0	0	298964.91	-0.09	1.5	1000	96525.85	5522424.9
88	89	0.2	5.16	1000	2810.35	301775.26	-0.3	3.72	1000	92152.67	5614577.6
89	90	0.7	3.95	100	17.41	301792.67	-0.1	2.61	1000	98299.37	5712876.9
90	91	2.1	7.65	0	0	301792.67	-0.07	5.32	1000	38850.26	5751727.2
91	92	0.63	4.47	1000	3789.04	305581.71	-0.3	2.7	1000	55654.1	5807381.3
92	93	0.01	3.48	1000	31762.36	337344.07	-0.3	2.55	1000	98307.95	5905689.2
93	94	0.24	3.99	1000	27013.18	364357.25	-0.09	2.25	1000	104588.61	6010277.8
94	95	0.1	1.08	1000	3236.15	367593.4	-0.3	0.98	1000	89771.54	6100049.4
95	96	0.05	1.6	1000	28615.57	396208.97	-0.3	0.9	1000	97457.64	6197507
96	97	0.1	1.27	1000	4319.75	400528.72	-0.3	0.6	1000	99197.14	6296704.2
97	98	0.1	1.57	1000	4371.92	404900.64	-0.3	0.75	1000	94559.81	6391264
98	99	0.48	0.86	1000	16190.96	421091.6	-0.3	0.6	1000	94634.21	6485898.2
99	100	0.65	3.45	1000	16704.81	437796.41	-0.4	2.38	1000	105201.3	6591099.5
100	101	0.44	2.34	1000	3772.8	441569.21	0.27	1.56	1000	99223.79	6690323.3
101	102	0.57	2.95	1000	13933.06	455502.27	0.05	1.55	1000	117836.44	6808159.7
102	103	0.04	3.25	1000	25740.73	481243	-0.3	2.17	1000	118402.63	6926562.3
103	104	0.03	6.27	1000	1353.75	482596.75	-0.4	4.17	1000	98752.48	7025314.8
104	105	0.25	4.16	1000	4572.06	487168.81	-0.3	2.92	1000	94229.77	7119544.6
105	106	0.1	2.86	1000	30826.17	517994.98	-0.07	1.51	1000	111240.19	7230784.8
106	107	0.84	5.65	1000	6630.49	524625.47	0.23	3.71	1000	96831.67	7327616.5
107	108	0.1	1.08	1000	36460.11	561085.58	-0.3	0.6	1000	82503.93	7410120.4
108	109	0.7	2.75	1000	12751.58	573837.16	0.26	1.88	1000	92847.18	7502967.6
109	110	1.25	3.62	1000	34319.15	608156.31	0.66	2.01	1000	98698.28	7601665.8
110	111	0.1	1.19	1000	10799.67	618955.98	-0.3	0.9	1000	98634.15	7700300
111	112	0.1	1.15	1000	8459.51	627415.49	-0.3	0.6	1000	96328.92	7796628.9
112	113	0.05	1.88	1000	9425.43	636840.92	-0.1	1.83	1000	95766.14	7892395.1

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.)
113	114	0.91	3.15	1000	50596.4	687437.32	0.48	1.86	1000	99277.4	7991672.5
114	115	0.2	2.25	1000	5556.63	692993.95	-0.3	1.49	1000	101012.98	8092685.4
115	116	0.27	1.26	1000	1094.82	694088.77	-0.08	0.33	1000	83139.66	8175825.1
116	117	0.37	0.48	1000	22975.63	717064.4	0.27	0.18	1000	99639.08	8275464.2
117	118	0.3	3.16	1000	23128.18	740192.58	-0.39	1.8	1000	100593.81	8376058
118	119	0.62	1.68	1000	2579.46	742772.04	0.29	0.99	1000	99698.73	8475756.7
119	120	0.05	0.75	1000	15573.95	758345.99	-0.15	0.6	1000	97903.63	8573660.3
120	121	0.1	1.8	1000	22058.29	780404.28	-0.3	0.9	1000	120013.56	8693673.9
121	122	2	3.1	0	0	780404.28	-0.3	1	1000	98810.21	8792484.1
122	123	1.4	1.8	1000	15383.65	795787.93	-0.3	1.25	1000	100373.55	8892857.7
123	124	0.15	2.55	300	339.34	796127.27	-0.3	1.5	1000	84942.34	8977800
124	125	0.82	3.48	1000	2229.99	798357.26	0.27	2.13	1000	101367.98	9079168
125	126	0.2	1.5	1000	1914.13	800271.39	-0.44	1.1	1000	96809.44	9175977.4
126	127	2.2	3.5	0	0	800271.39	-0.15	1.5	1000	62467.33	9238444.8
127	128	2.1	3.2	0	0	800271.39	0.22	0.71	1000	109833.02	9348277.8
128	129	2	3.56	0	0	800271.39	-0.3	1.8	1000	73348.84	9421626.6
129	130	2.1	4.68	0	0	800271.39	-0.09	3.55	1000	80383.39	9502010
130	131	0.9	5.92	1000	23237.23	823508.62	-0.3	2.83	1000	96586	9598596
131	132	0.7	2.6	1000	32689.13	856197.75	-0.3	1.65	1000	99821.15	9698417.2
132	133	0.05	4.7	1000	21723.4	877921.15	-0.15	3.14	1000	98834.44	9797251.6
133	134	0.27	5.63	1000	27806.54	905727.69	0.22	3.71	1000	96352.93	9893604.5
134	135	0.37	2.28	1000	31032.41	936760.1	0.27	1.31	1000	95714.16	9989318.7
135	136	0.3	4.24	1000	22842.38	959602.48	-0.3	3.14	1000	98771.59	10088090
136	137	0.1	2.56	1000	12954.11	972556.59	-0.3	2.47	1000	100951.74	10189042
137	138	0.37	1.03	1000	29603.08	1002159.7	0.27	0.33	1000	118610.75	10307653
138	139	0.1	0.75	1000	47871.36	1050031	-0.3	0.6	1000	98350.63	10406003
139	140	0.18	1.92	1000	43264.22	1093295.3	-0.3	1.05	1000	76814.1	10482817
140	141	0.1	4.86	1000	39774.78	1133070	-0.2	0.7	1000	97495.54	10580313
141	142	0.7	2.05	1000	59285.41	1192355.4	-0.3	1.05	1000	117910.79	10698224
142	143	0.4	2.75	1000	31099.33	1223454.8	0.2	1.53	1000	99388.85	10797613
143	144	1.17	4.68	1000	21362	1244816.8	0.57	2.59	1000	101169.86	10898783
144	145	0.18	6.05	1000	7179.8	1251996.6	-0.3	4.28	1000	73902.97	10972686
145	146	0.1	1.3	1000	21569.51	1273566.1	-0.3	0.6	1000	98342	11071028
146	147	0.27	0.48	1000	25263.88	1298830	-0.18	0.33	1000	118219.27	11189247
147	148	0.1	1.51	1000	25777.05	1324607	-0.3	0.6	1000	98700.5	11287947
148	149	0.61	2.29	1000	34161.78	1358768.8	-0.3	1.05	1000	95957.05	11383904
149	150	0.72	2.38	1000	31190.9	1389959.7	0.62	1.28	1000	97944.08	11481848
150	151	0.35	1.95	1000	6733.51	1396693.2	-0.04	1.25	1000	96379.63	11578228
151	152	0.2	1.6	1000	21852.73	1418545.9	-0.3	1.18	1000	98279.79	11676508

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.)
152	153	0.3	1.12	1000	9228.95	1427774.9	0.2	0.98	1000	87940.45	11764448
153	154	0.55	2.94	1000	44965.65	1472740.5	0.3	1.95	1000	116152.36	11880601
154	155	0.4	2.1	1000	38838.96	1511579.5	-0.15	1.49	1000	95852.16	11976453
155	156	1.02	1.95	1000	6713.49	1518293	-0.28	0.6	1000	67623.19	12044076
156	157	0.1	3.15	1000	72213.71	1590506.7	-0.3	1.53	1000	116009.21	12160085
157	158	0.1	1.6	1000	38822.74	1629329.4	-0.2	1.28	1000	98240.14	12258325
158	159	0.2	2.15	1000	25361.73	1654691.2	-0.4	1.88	1000	99401.72	12357727
159	160	0.7	2.95	1000	27397.58	1682088.7	-0.3	1.17	1000	79918.56	12437646
160	161	0.2	2.4	1000	14754.77	1696843.5	-0.3	0.6	1000	90390.07	12528036
161	162	0.3	3.25	1000	5389.61	1702233.1	-0.4	1.6	1000	99247.98	12627284
162	163	0.9	4.65	1000	8895.16	1711128.3	0.2	2.86	1000	99103.37	12726387
163	164	0.9	5.66	1000	10997.52	1722125.8	0.3	1.86	1000	95059.21	12821446
164	165	0.1	22.13	1000	15782.25	1737908.1	-0.3	3.95	1000	97137.7	12918584
165	166	0.3	22.45	1000	13447.68	1751355.7	-0.3	20.43	1000	98705.19	13017289
166	167	0.97	3.48	1000	32729.81	1784085.5	0.27	2.15	1000	99302.11	13116591
167	168	0.4	1.17	1000	6719.32	1790804.9	0.2	1.08	1000	40373.33	13156965
168	169	2	4.83	0	0	1790804.9	-0.3	1.14	1000	54085.55	13211050
169	170	0.4	2.1	500	602.57	1791407.4	-0.3	0.9	1000	53061.52	13264112
170	171	1.4	2.91	1000	3532.58	1794940	-0.57	1.03	1000	89560.24	13353672
171	172	0.91	2.42	1000	2225.44	1797165.5	-0.3	0.75	1000	106122.72	13459795
172	173	0.27	3.68	1000	7812.5	1804978	0.37	0.59	1000	77104.04	13536899
173	174	1.02	2.4	500	555.81	1805533.8	0.3	1.3	1000	97553.58	13634452
174	175	0.98	3.99	1000	9394.41	1814928.2	-0.3	0.7	1000	87459.79	13721912
175	176	1.32	2.81	1000	25147.84	1840076	-0.3	1.54	1000	114761.49	13836674
176	177	0.3	1.8	1000	17931.91	1858007.9	-0.3	1.07	1000	98655.23	13935329
177	178	1.35	3.86	1000	22004.16	1880012.1	-0.06	1.3	1000	95522.79	14030852
178	179	0.3	3.2	1000	17986.8	1897998.9	-0.3	0.9	1000	91994.26	14122846
179	180	1.32	3.8	1000	31604.06	1929602.9	-0.05	1.54	1000	98087.97	14220934
180	181	0.4	2.7	1000	30544.31	1960147.3	-0.3	0.9	1000	117520.77	14338455
181	182	0.27	3.63	1000	13313.24	1973460.5	0.27	0.53	1000	98238.77	14436693
182	183	1.17	2.53	1000	12221.47	1985682	0.17	0.63	1000	98044.09	14534737
183	184	0.4	2.9	1000	1083.15	1986765.1	-0.3	1.2	1000	99194.02	14633931
184	185	1.77	3.53	1000	21587.8	2008352.9	0.17	0.53	1000	98897.01	14732828
185	186	0.02	2.4	1000	11003.31	2019356.2	-0.3	0.8	1000	118977.06	14851805
186	187	0.75	3.24	1000	20116.23	2039472.5	-0.3	0.9	1000	96863.52	14948669
187	188	0.3	0.9	1000	15614.23	2055086.7	-0.3	1.1	1000	95330.97	15044000
188	189	0.4	1.05	1000	31238.22	2086324.9	-0.3	0.9	1000	98276.62	15142277
189	190	0.2	1.08	1000	5306.5	2091631.4	-0.2	0.6	1000	98994.96	15241272
190	191	0.37	1.01	1000	13259.58	2104891	0.17	0.43	1000	98247.49	15339519

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.)
191	192	1.06	3.5	1000	14063.73	2118954.7	0.2	1.1	1000	94797.46	15434316
192	193	0.33	2.43	1000	7991.03	2126945.7	-0.3	0.7	1000	67158.69	15501475
193	194	0.59	3.68	1000	3288.28	2130234	0.27	0.63	1000	53282.46	15554758
194	195	0.02	3.14	1000	14210.2	2144444.2	-0.3	1	1000	65327.82	15620085
195	196	0.15	1.99	1000	1235.39	2145679.6	-0.3	0.8	1000	48751.93	15668837
196	197	0.6	3.14	1000	3484.03	2149163.6	-0.3	1.1	1000	37676.49	15706514
197	198	0.7	2.81	1000	14974.54	2164138.2	-0.3	0.7	1000	80487.26	15787001
198	199	0.3	1.8	1000	26661.78	2190800	-0.3	1.1	1000	115032.47	15902034
199	200	1.22	2.78	1000	3328.42	2194128.4	0.27	0.53	1000	86706.73	15988740
200	201	0.22	1.23	1000	22444.47	2216572.9	0.27	0.53	1000	96447	16085187
201	202	0.09	3.1	1000	884.63	2217457.5	-0.3	1	1000	98847.45	16184035
202	203	0.31	3.92	1000	9437.63	2226895.1	-0.3	0.7	1000	99181.28	16283216
203	204	0.03	2.7	1000	35509.75	2262404.9	-0.3	1	1000	99212.91	16382429
204	205	0.1	3.51	1000	28490.88	2290895.7	-0.3	0.7	1000	99035.94	16481465
205	206	0.02	2.28	1000	7851.15	2298746.9	-0.3	1.1	1000	139043.01	16620508
206	207	0.66	2.13	1000	30932.67	2329679.6	0.17	0.43	1000	59669.73	16680178
207	208	0.15	3.4	1000	39009.34	2368688.9	-0.2	0.6	1000	98877.72	16779055
208	209	0.1	3.2	800	884.73	2369573.6	-0.4	1	1000	88566.07	16867621
209	210	0.1	1.3	1000	18591.11	2388164.7	-0.3	0.8	1000	99421.1	16967043
210	211	0.7	2.94	1000	5159.13	2393323.9	-0.1	0.7	1000	96442.66	17063485
211	212	0.1	1.08	1000	18187.28	2411511.2	-0.3	0.8	1000	97846.77	17161332
212	213	0.97	1.98	1000	16588.39	2428099.5	0.17	0.43	1000	95657.98	17256990
213	214	0.1	1.6	1000	11137.74	2439237.3	-0.3	1.1	1000	89729.08	17346719
214	215	0.9	2.4	1000	8441.4	2447678.7	-0.1	0.8	1000	115197.07	17461916
215	216	0.62	1.23	1000	15502.28	2463181	0.27	0.63	1000	99336.17	17561252
216	217	0.68	2.61	1000	18599.35	2481780.3	-0.1	0.7	1000	102253.41	17663506
217	218	0.4	3.8	1000	16303.34	2498083.7	-0.3	1	1000	98295.09	17761801
218	219	1.17	1.33	1000	20569.36	2518653	0.17	0.53	1000	80273.83	17842075
219	220	1.01	2.99	1000	55066.22	2573719.2	-0.1	0.6	1000	115032.89	17957108
220	221	0.1	1.8	1000	30422.89	2604142.1	-0.3	0.9	1000	87614.65	18044722
221	222	0.35	1.95	1000	7959.85	2612102	-0.1	0.7	1000	63849.64	18108572
222	223	0.18	1.6	1000	45723.55	2657825.5	-0.2	0.6	1000	132396.67	18240968
223	224	0.06	1.85	1000	8342.03	2666167.6	-0.3	1.1	1000	76374.06	18317343
224	225	0.01	2.75	1000	39360.93	2705528.5	-0.1	0.8	1000	99071.86	18416414
225	226	0.09	3.57	1000	35338.91	2740867.4	0.27	0.63	1000	96670.99	18513085
226	227	0.35	1.3	1000	12149	2753016.4	-0.1	0.7	1000	104677.13	18617763
227	228	0.4	2.1	1000	13691.34	2766707.7	-0.3	1.1	1000	84869.96	18702632
228	229	0.93	2.4	1000	35630.41	2802338.1	-0.1	0.7	1000	96326.22	18798959
229	230	0.35	1.3	1000	7682.43	2810020.6	-0.3	0.8	1000	87559.44	18886518

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.)
230	231	0.5	1.8	1000	33572.57	2843593.1	-0.3	1	1000	110574.02	18997092
231	232	0.5	1.4	1000	10006.44	2853599.6	-0.3	0.8	1000	69558.11	19066650
232	233.040	0.5	0.7	1000	13641.48	2867241.1	0.17	0.43	1000	44496.34	19111147
Total				152000	2867241.1		Total		225000	19111147	

Table 24- Dredging Calculationof 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. Read-ing (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
07.12.16	GS-(TP)- 11	233.035	24 hrs	0.30	73.617	73.917	71.723	-2.194
07.12.16	GS-(TP)- 12	223	24 hrs	0.27	67.606	67.876	65.679	-2.197
08.12.16	GS-(TP)- 13	211.53	24 hrs	0.31	64.152	64.462	58.771	-5.691
09.12.16	GS-(TP)- 15	210.707	24 hrs	0.42	63.69	64.11	58.275	-5.835
10.12.16	GS-(TP)- 14	189.9	24 hrs	0.56	50.032	50.592	45.743	-4.849
11.12.16	GS-(TP)- 16	159.451	24 hrs	0.65	44.867	45.517	41.137	-4.380
30.11.16	GS-(TP)- 5	145.668	24 hrs	0.45	41.81	42.26	39.223	-3.037
02.12.16	GS-(TP)- 4	140.795	24 hrs	0.50	40.892	41.392	38.542	-2.85
07.10.16	GS-(TP)- 3	130.831	24 hrs	0.55	39.768	40.318	37.149	-3.169
14.07.16	GS-(TP)- 17	121.612	24 hrs	0.60	38.735	39.335	35.86	-3.475
24.11.16	GS-(TP)- 19	120.516	24 hrs	0.65	37.967	38.617	35.707	-2.91
28.11.16	GS-(TP)- 20	91.279	24 hrs	0.50	35.677	36.177	31.62	-4.557
22.11.16	GS-(TP)- 18	80.253	24 hrs	0.56	34.228	34.788	30.078	-4.71
20.11.16	GS-(TP)- 8	75.789	24 hrs	0.58	33.575	34.155	29.459	-4.696
05.10.16	GS-(TP)- 7	62.637	24 hrs	0.44	32.66	33.1	28.354	-4.746
06.10.16	GS-(TP)- 9	62.359	24 hrs	0.41	32.726	33.136	28.331	-4.805
03.10.16	GS-(TP)- 6	52.723	24 hrs	0.49	32.239	32.729	27.522	-5.207
06.10.16	GS-(TP)- 10	51.793	24 hrs	0.52	32.169	32.689	27.443	-5.246
28.09.16	GS-(TP)- 22	27.565	24 hrs	0.54	31.125	31.665	25.407	-6.258
29.09.16	GS-(TP)- 21	18.453	24 hrs	0.57	28.967	29.537	24.641	-4.896
30.09.16	GS-(TP)- 2	8.458	24 hrs	0.61	27.917	28.527	23.801	-4.726
01.10.16	GS-(TP)- 1	2.131	24 hrs	0.59	27.493	28.083	23.27	-4.813

Table 25-Details of water level at different Gauge Stations

Annexure-4 Details of Bathymetry survey/Topography Survey carried out:-

Date of Survey	Type of survey	Chainage	
		From (km)	To (km)
14.07.16	Bathymetry Survey/Topography Survey	0.00	14.3
16.07.16	Bathymetry Survey/Topography Survey	14.3	25.00
25.07.16	Bathymetry Survey/Topography Survey	25.00	39.00
27.07.16	Bathymetry Survey/Topography Survey	39.00	51.00
11.08.16	Bathymetry Survey/Topography Survey	51.00	65.00
28.09.16	Bathymetry Survey/Topography Survey	65.00	75.00
29.09.16	Bathymetry Survey/Topography Survey	75.00	82.00
20.11.16	Bathymetry Survey/Topography Survey	82.77	83.20
27.11.16	Bathymetry Survey/Topography Survey	83.2	88.7
27.12.16	Bathymetry Survey/Topography Survey	98.4	101.9
26.11.16	Bathymetry Survey/Topography Survey	101.9	109
25.11.16	Bathymetry Survey/Topography Survey	111.0	120.0
29.11.16	Bathymetry Survey/Topography Survey	120.0	128.0
28.11.16	Bathymetry Survey/Topography Survey	129.10	134.70
02.12.16	Bathymetry Survey/Topography Survey	137.0	146.0
01.12.16	Bathymetry Survey/Topography Survey	139.0	153.0
30.11.16	Bathymetry Survey/Topography Survey	153.0	166.0
11.12.16	Bathymetry Survey/Topography Survey	167.0	173.0
10.12.16	Bathymetry Survey/Topography Survey	173.00	191.00
09.12.16	Bathymetry Survey/Topography Survey	191.0	213.0
08.12.16	Bathymetry Survey/Topography Survey	213.0	223.0
07.12.16	Bathymetry Survey/Topography Survey	223.0	233.040

Table 26-Details of Bathymetry Survey/Topography Survey

Annexure-5 Details of Bank protection along the Bank: -

The River Bank side are well protected by bolder pitching and embankment. Due to flood, the bank sides are damaged in many places. NH-31 is along the bank, protecting the bank. The embankment is noticed almost on both bank side of the river. Bolder Pitching are there close to Benchmark number 12, 13, 15, 20, 24.

Annexure-6 Details of Features across the Bank: -

The River Bank are includes with Kosi Barrage, Ferry Ghats, Embankments on both banks, RCC Bridges, Rail Bridges, H.T.lines. In the rainy season, the water level has been raised and as a result the both bank side will be flooded. Kosi Barrage takes a major role for the cultivation through the irrigation canal and outlets. Some major places like Saharsa, Naugachia, Baltara, Birpur has been located near the bank of river Kosi.

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

Establishment of Horizontal Control:-

The Horizontal control for Topography survey: - High precision RTK DGPS in fix mode is using UHF Radio Modem with IHO accuracy standards, with minimum 24 hours observations at some permanent platform/base with Topographic survey Equipments like Spectra Precision (SP-80), Trimble (SPS-855) RTK, Total Station was used for conducting the topographic survey on UTM Projection at Zone 45R as directed in the contract specifications.

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

Establishment of Vertical Control:-

Vertical control has been carried out from G.T.S level at kosi Barrage, C.W.C gauge is used for the entire Survey work. Its value is 78.760 m w.r.t. M.S.L has been considered for calculating the vertical levels. Total 24 no. of BM was established along the 233.040 kms stretch of the Kosi River with the reference of G.T.S Level, which was fixed near Kosi Barrage. The vertical control has been established with respect to the chart datum / sounding datum from the following methods:-

i. Chart datum/ sounding datum already established by Port Authorities (Chart Datum), Central Water Commission (Average of last six years minimum Water Level) / State Irrigation Department (Full Supply Level (FSL) and at their gauge stations along the river/canal.

- **Topography Survey:-**

The survey was commenced on 14th May 2016 and completed on 29th September 2016. Then the days become Rainy Season and 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 plotting of the chart was done on UTM Projection at Zone 45R 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: Spectra Precision (SP-80), Trimble (SPS-855) RTK, Total Station was used for conducting the topographic survey.

Spectra Precision (SP-80) satellite navigation is a technique used in land survey and in hydro graphic 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 centimetre-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. Spectra Precision (SP-80) & Trimble (SPS-855) RTK that used for the survey contains dual-frequency requires antenna and controller to suit any surveying task with a wide range of functionality. Trimble –Becon Rover SPS 361& 356 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 47-Spectra Precision (SP-80)

Annexure-8 Photographs of Equipment:-

Equipment:-

Following equipments were employed for the bathymetric and topographic survey:-

Equipment	Make	Version	Qty Em-ployed
Echo sounder	Bathy MF 500	-	1
Current Meter	JFE, AEM 213-D	-	1
Tide Gauge	Manual (Pole type)	-	4
RTK	Spectra Precision SP-80, Trimble SPS-855	-	3
GPS Sets	Trimble –Becon Rover SPS 361& 356	-	1
Software	HYPACK data acquisition	Version 14	1
Software	AUTOCAD	2015	1
Software	Microsoft Office	2013	1

Table 27 – Equipments

Survey Vessel:-

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

Figure 48 Survey Boat

Positioning System:-

1 no Trimble DGPS system (SPS361)

Figure 49 DGPS System Instrument

Navigation & Data Logging System:-

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

1 no. DELL Laptop

1 no. Hypack version 2014 Navigation & Data Logging Software

1 no. Positioning & sensor interfaces

Sufficient Paper Rolls

Single Beam Echo Sounder System:-

1 no. Bathy 500MF multi frequency Echo sounder

1 no. transducer 210 kHz + mounting bracket & base plate

Figure 50 Echo Sounder Instrument

Current Meter:-

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

Figure 51 -Current Meter

Calibration:-

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

Annexure-9 Bench Mark Forms:-

BM Name	Northing (m)	Easting (m)	Latitude (N)	Longitude (E)	Height Above M.S.L (m)	Height Above S.D (m)
BM 1	2811997.512	523548.217	25°25'28.963"	87°14'03.013"	34.013	10.7
Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal; Date of establishment: - 19.05.16						
Station Description :-						
Benchmark is located near Patther Tola village near Kursela-Naugachia RCC and Rail bridge 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", "PSC" and BM No. can be seen on the face of the pillar. The measurements of the bench mark pillar from notable locations / edges as follows:						
Life of Station : 15Yrs	**Datum: - WGS 84**		**ZONE : 45 N**			

Figure 52 -Google Image view of BM- 1

BM Name	Northing (m)	Easting (m)	Latitude (N)	Longitude (E)	Height Above M.S.L (m)	Height Above S.D (m)
BM 2	2811148.197	517575.414	25°25'01.65"	87°10'29.151"	32.921	9.12
Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal; Date of establishment: -27.05.16						
Station Description :-						
Benchmark is located near Madrauni Pachhiarital village. The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm. The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar. The measurements of the bench mark pillar from notable locations / edges as follows: West from NH-31 –3144m						
Life of Station : 15Yrs	**Datum: - WGS 84**		**ZONE : 45 N**			

Figure 53-Google image view of BM-2

BM Name	Northing (m)	Easting (m)	Latitude (N)	Longitude (E)	Height Above M.S.L (m)	Height Above S.D (m)
BM 3	2812758.097	512676.384	25°25'54.167"	87°07'33.834"	31.552	6.91

Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal;
Date of establishment: - 29.05.16

Station Description :-

Benchmark is located near Baisi Jahangirpur village. The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.
The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar.
The measurements of the bench mark pillar from notable locations / edges as follows:
West from NH-31 –6931m.

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

Figure 54- Google image view of BM-3

BM Name	Northing (m)	Easting (m)	Latitude (N)	Longitude (E)	Height Above M.S.L (m)	Height Above S.D (m)
BM 4	2810204.329	505611.933	25°24'31.3"	87°03'20.878"	38.654	13.2

Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal;
Date of establishment: - 11.06.16

Station Description :-

Benchmark is located near Dadpur village near the RCC Bridge near Garia.The Bench mark is situated in the south Portion from the Barpeta Railway Station.
The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.
The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar.
The measurements of the bench mark pillar from notable locations / edges as follows:
West from Naugachia village –6790m

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

Figure 55-Google image view of BM-4

BM Name	Northing (m)	Easting (m)	Latitude (N)	Longitude (E)	Height Above M.S.L (m)	Height Above S.D (m)
BM 5	2813097.572	495696.428	25°26'05.375"	86°57'25.921"	33.498	6.77

Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal;
Date of establishment: - 13.06.16

Station Description :-

Benchmark is located near Gobindpur Gobind village. The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.
The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar.
The measurements of the bench mark pillar from notable locations / edges as follows:
East from Naugachia village–15570m

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

Figure 56- Google image view of BM-5

BM Name	Northing (m)	Easting (m)	Latitude (N)	Longitude (E)	Height Above M.S.L (m)	Height Above S.D (m)
BM 6	2812473.913	488003.513	25°25'44.948"	86°52'50.516"	37.154	9.63
Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal; Date of establishment: -21.06.16						
Station Description :-						
Benchmark is located near Nagarpara Arazi Milik village. The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm. The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar. The measurements of the bench mark pillar from notable locations / edges as follows: west from NH-31-9902m						
Life of Station : 15Yrs	**Datum: - WGS 84**		**ZONE :45 N**			

Figure 57- Google image view of BM-6

BM Name	Northing (m)	Easting (m)	Latitude (N)	Longitude (E)	Height Above M.S.L (m)	Height Above S.D (m)
BM 7	2816123.682	478912.828	25°27'43.237"	86°47'24.858"	38.946	10.5
Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal; Date of establishment: - 25.06.16						
Station Description :-						
Benchmark is located near Bhimri village nar NH-31.The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm. The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar. The measurements of the bench mark pillar from notable locations / edges as follows: west from NH-31—7784m						
Life of Station : 15Yrs	**Datum: - WGS 84**		**ZONE :45 N**			

Figure 58- Google image view of BM-7

BM Name	Northing (m)	Easting (m)	Latitude (N)	Longitude (E)	Height Above M.S.L (m)	Height Above S.D (m)
BM 8	2822143.877	472234.489	25°30'58.554"	86°43'25.258"	40.233	10.7
Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal; Date of establishment: - 27.06.16						
Station Description :-						
Benchmark is located near Pachaut villageThe BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm. The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar. The measurements of the bench mark pillar from notable locations / edges as follows: East from NH-106—21,101m						
Life of Station : 15Yrs	**Datum: - WGS 84**		**ZONE :45 N**			

Figure 59-Google image view of BM-8

BM Name	Northing (m)	Easting (m)	Latitude (N)	Longitude (E)	Height Above M.S.L (m)	Height Above S.D (m)
BM 9	2828293.564	469877.05	25°34'18.309"	86°42'00.303"	39.108	9.03
Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal; Date of establishment: - 29.06.16						
Station Description :-						
Benchmark is located near Murus village The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm. The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar. The measurements of the bench mark pillar from notable locations / edges as follows: East from NH-106–23019m						
Life of Station : 15Yrs	**Datum: - WGS 84**		**ZONE :45 N**			

Figure 60- Google image view of BM-9

BM Name	Northing (m)	Easting (m)	Latitude (N)	Longitude (E)	Height Above M.S.L (m)	Height Above S.D (m)
BM 10	2833506.799	460304.62	25°37'06.969"	86°36'16.647"	40.648	9.02
Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal; Date of establishment: - 03.07.16						
Station Description :-						
Benchmark is located near Dhamara Ghat village near phango Railway station.The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm. The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar. The measurements of the bench mark pillar from notable locations / edges as follows: North from Railway Bridge–1075m						
Life of Station : 15Yrs	**Datum: - WGS 84**		**ZONE :45 N**			

Figure 61-Google image view of BM-10

BM Name	Northing (m)	Easting (m)	Latitude (N)	Longitude (E)	Height Above M.S.L (m)	Height Above S.D (m)
BM 11	2836743.48	454700.462	25°38'51.605"	86°32'55.309"	38.811	5.84

Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal;
Date of establishment: - 08.07.16

Station Description :-

Benchmark is located near Murla village near kosi embankment road.The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.
The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar.
The measurements of the bench mark pillar from notable locations / edges as follows:
West from NH-106–36484m

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

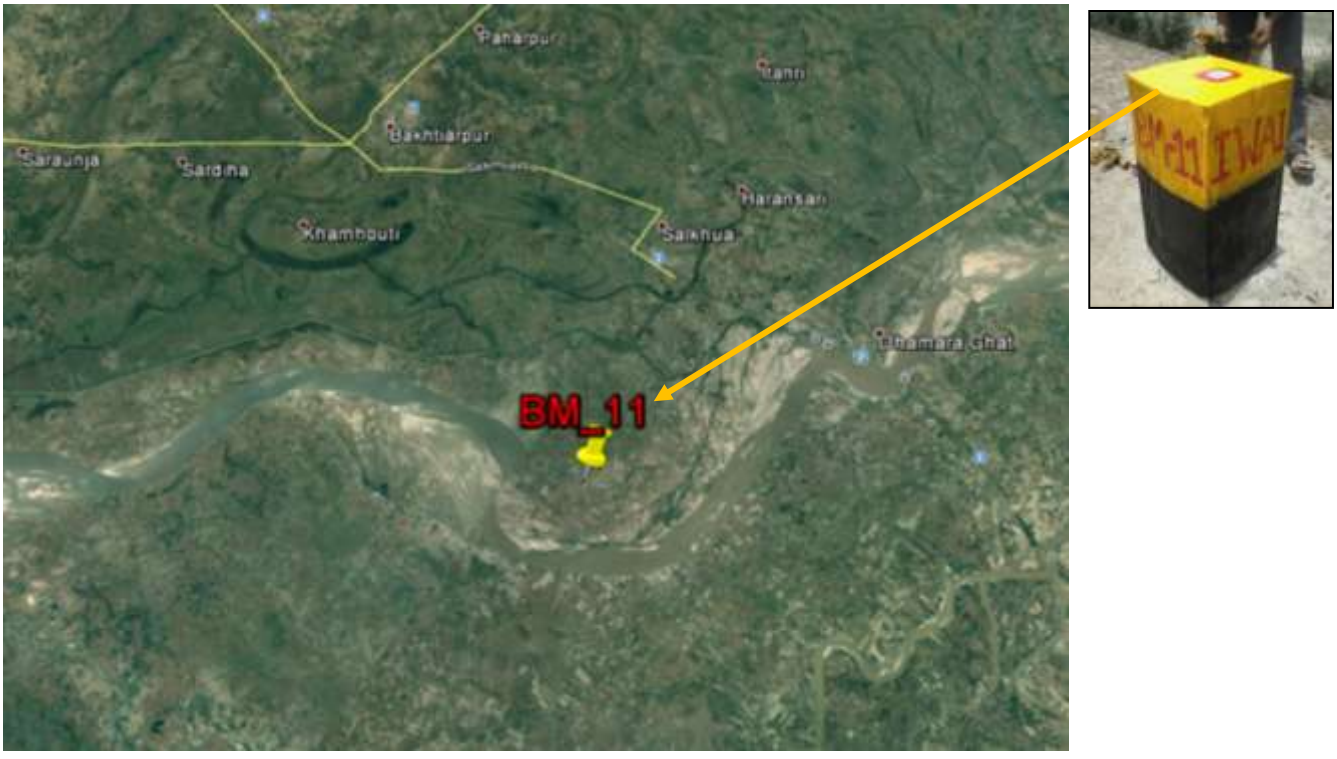


Figure 62-Google image view of BM-11

BM Name	Northing (m)	Easting (m)	Latitude (N)	Longitude (E)	Height Above M.S.L (m)	Height Above S.D (m)
BM 12	2845564.108	451273.403	25°43'37.95"	86°30'51.236"	42.412	8.26

Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal;
Date of establishment: - 11.07.16

Station Description :-

Benchmark is located near Khochardawa village near kosi embankment road.The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.
The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar.
The measurements of the bench mark pillar from notable locations / edges as follows:
South-west from saharsa village –17413m

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

Figure 63- Google image view of BM-12

BM Name	Northing (m)	Easting (m)	Latitude (N)	Longitude (E)	Height Above M.S.L (m)	Height Above S.D (m)
BM 13	2852483.863	445816.782	25°47'22.202"	86°27'34.39"	44.248	8.38

Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal;
Date of establishment: - 15.07.16

Station Description :-

Benchmark is located near Baghva village near kosi embankment road.The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.
The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar.
The measurements of the bench mark pillar from notable locations / edges as follows:
East from saharsa village -17365m

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

Figure 64- Google image view of BM-13

BM Name	Northing (m)	Easting (m)	Latitude (N)	Longitude (E)	Height Above M.S.L (m)	Height Above S.D (m)
BM 14	2862561.189	445326.342	25°52'49.717"	86°27'15.278"	42.832	5.68
Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal; Date of establishment: - 18.07.16						
Station Description :-						
Benchmark is located near Baluaha village near saharsa- patna RCC 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", "PSC" and BM No. can be seen on the face of the pillar. The measurements of the bench mark pillar from notable locations / edges as follows: East from saharsa village–11422m						
Life of Station : 15Yrs	Datum: - WGS 84		ZONE :45 N			

Figure 65- Google image view of BM-14

BM Name	Northing (m)	Easting (m)	Latitude (N)	Longitude (E)	Height Above M.S.L (m)	Height Above S.D (m)
BM 15	2871845.571	444933.804	25°57'51.465"	86°26'59.773"	47.783	9.24

Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal;
Date of establishment: - 21.07.16

Station Description :-

Benchmark is located near Akardh village near kosi embankment road.The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.
The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar.
The measurements of the bench mark pillar from notable locations / edges as follows:
South -East from Saharsa village–18587m

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

Figure 66-google image view of BM-15

BM Name	Northing (m)	Easting (m)	Latitude (N)	Longitude (E)	Height Above M.S.L (m)	Height Above S.D (m)
BM 16	2880835.612	448239.805	26°02'44.135"	86°28'57.375"	45.981	5.98
Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal; Date of establishment: - 25.07.16						
Station Description :-						
Benchmark is located near Kathwar Arazi village. The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm. The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar. The measurements of the bench mark pillar from notable locations / edges as follows: North from supaul village–9907m						
Life of Station : 15Yrs	**Datum: - WGS 84**		**ZONE :45 N**			

Figure 67-Google iage view of BM-16

BM Name	Northing (m)	Easting (m)	Latitude (N)	Longitude (E)	Height Above M.S.L (m)	Height Above S.D (m)
BM 17	2886655.487	451887.674	26°05'53.77"	86°31'07.869"	50.854	9.71
Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal; Date of establishment: - 29.07.16						
Station Description :-						
Benchmark is located near Baspiti village near kosi embankment Road. The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm. The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar. The measurements of the bench mark pillar from notable locations / edges as follows: East from NH-106-20,000m						
Life of Station : 15Yrs	**Datum: - WGS 84**		**ZONE :45 N**			

Figure 68- Google image view of BM-17

BM Name	Northing (m)	Easting (m)	Latitude (N)	Longitude (E)	Height Above M.S.L (m)	Height Above S.D (m)
BM 18	2892550.394	459731.141	26°09'06.255"	86°35'49.585"	52.771	10.15

Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal;
Date of establishment: - 04.08.16

Station Description :-

Benchmark is located near Mahuwa village near kosi embankment road. The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.
The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar.
The measurements of the bench mark pillar from notable locations / edges as follows:
North from NH-57–8797m

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

Figure 69-Google image view of BM-18

BM Name	Northing (m)	Easting (m)	Latitude (N)	Longitude (E)	Height Above M.S.L (m)	Height Above S.D (m)
BM 19	2900140.792	465384.581	26°13'13.519"	86°39'12.479"	53.730	9.58

Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal;
Date of establishment: - 08.08.16

Station Description :-

Benchmark is located near Tharbitia village near kosi embankment road. The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.
The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar.
The measurements of the bench mark pillar from notable locations / edges as follows:
North from NH-57–6797m

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

Figure 70- Google image view of BM-19

BM Name	Northing (m)	Easting (m)	Latitude (N)	Longitude (E)	Height Above M.S.L (m)	Height Above S.D (m)
BM 20	2906619.366	465841.677	26°16'44.149"	86°39'28.336"	62.646	16.90

Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal;
Date of establishment: - 12.08.116

Station Description :-

Benchmark is located near Itahari village near the RCC bridge near Near NH-57. The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.
The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar.
The measurements of the bench mark pillar from notable locations / edges as follows:
South from RCC Bridge–476m

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

Figure 71- Google image view of BM-20

BM Name	Northing (m)	Easting (m)	Latitude (N)	Longitude (E)	Height Above M.S.L (m)	Height Above S.D (m)
BM 21	2912440.679	476401.496	26°19'54.143"	86°45'48.71"	62.978	9.08
Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal; Date of establishment: - 15.08.16						
Station Description :-						
Benchmark is located near Kaleanpur village near NH-57 & NH- 106. The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm. The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar. The measurements of the bench mark pillar from notable locations / edges as follows: North from NH-57–3621m						
Life of Station : 15Yrs	**Datum: - WGS 84**		**ZONE :45 N**			

Figure 72- Google image view of BM-21

BM Name	Northing (m)	Easting (m)	Latitude (N)	Longitude (E)	Height Above M.S.L (m)	Height Above S.D (m)
BM 22	2918997.722	482668.308	26°23'27.608"	86°49'34.459"	67.243	8.47
Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal; Date of establishment: - 21.08.16						
Station Description :-						
Benchmark is located near Gopalpur village near NH-106.The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm. The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar. The measurements of the bench mark pillar from notable locations / edges as follows: West from BM-22–5492m						
Life of Station : 15Yrs	**Datum: - WGS 84**		**ZONE : 45 N**			

Figure 73-Google image view of BM-22

BM Name	Northing (m)	Easting (m)	Latitude (N)	Longitude (E)	Height Above M.S.L (m)	Height Above S.D (m)
BM 23	2925264.473	490294.521	26°26'51.573"	86°54'09.535"	72.078	6.39
Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal; Date of establishment: - 26.08.16						
Station Description :- 08.09.16						
Benchmark is located near Piprahipatti Golari village near NH-106.The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm. The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar. The measurements of the bench mark pillar from notable locations / edges as follows: West from NH-106–1420.76m.						
Life of Station : 15Yrs	**Datum: - WGS 84**		**ZONE :45 N**			

Figure 74-Google image view of BM-23

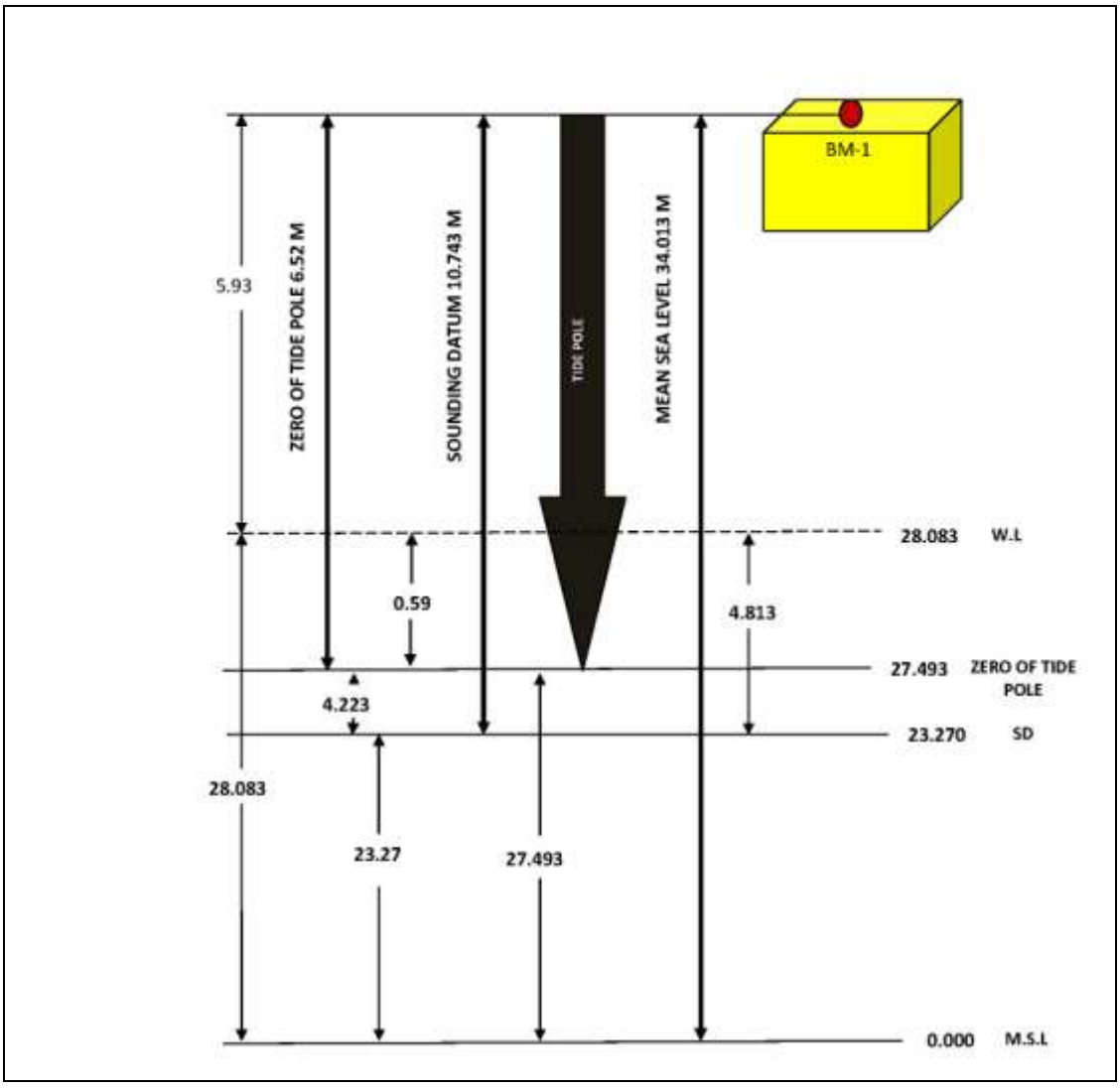
BM Name	Northing (m)	Easting (m)	Latitude (N)	Longitude (E)	Height Above M.S.L (m)	Height Above S.D (m)
BM 24	2933595.121	493237.562	26°31'22.424"	86°55'55.649"	79.572	7.84
Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal; Date of establishment: - 29.08.16						
Station Description :-						
Benchmark is located near Bhantabari village beside Indo-Nepal Border area, near kosi Barrage. The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm. The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar. The measurements of the bench mark pillar from notable locations / edges as follows: North from east west highway-12.19m						
Life of Station : 15Yrs	**Datum: - WGS 84**		**ZONE :45 N**			

Figure 75-Google image view of BM-24

Annexure-10 Levelling Calculations and Levelling Diagram:-

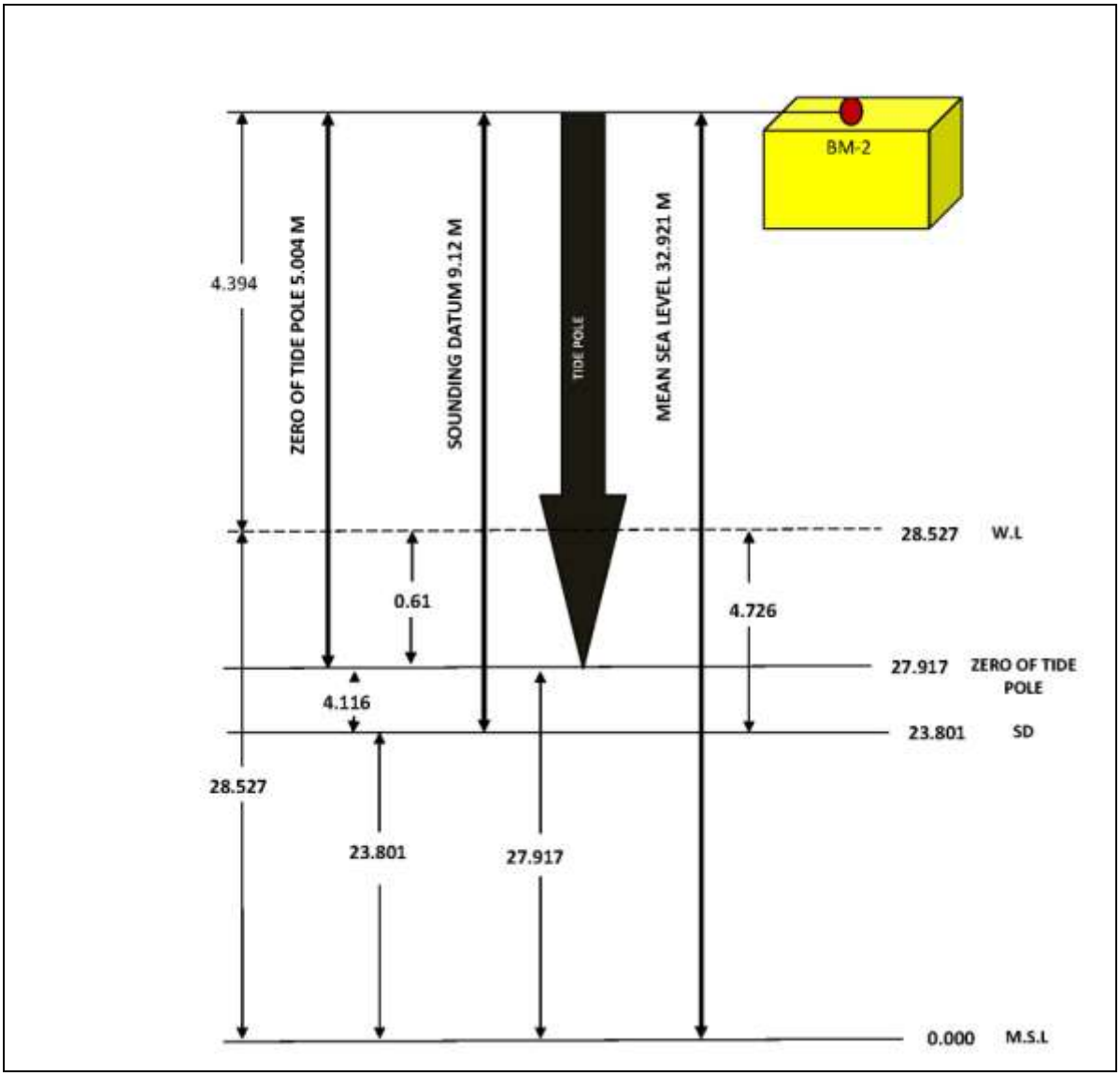
Levelling from GS-1 to BM-1

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.920					34.013	BM-1
	1.960			1.040	32.973	
0.680		2.030		0.070	32.903	
	1.825			1.145	31.758	
	2.295			0.470	31.288	
0.365		2.655		0.360	30.928	
	1.550			1.185	29.743	
0.495		1.985		0.435	29.308	
		1.720		1.225	28.083	GAUGE STATION-1



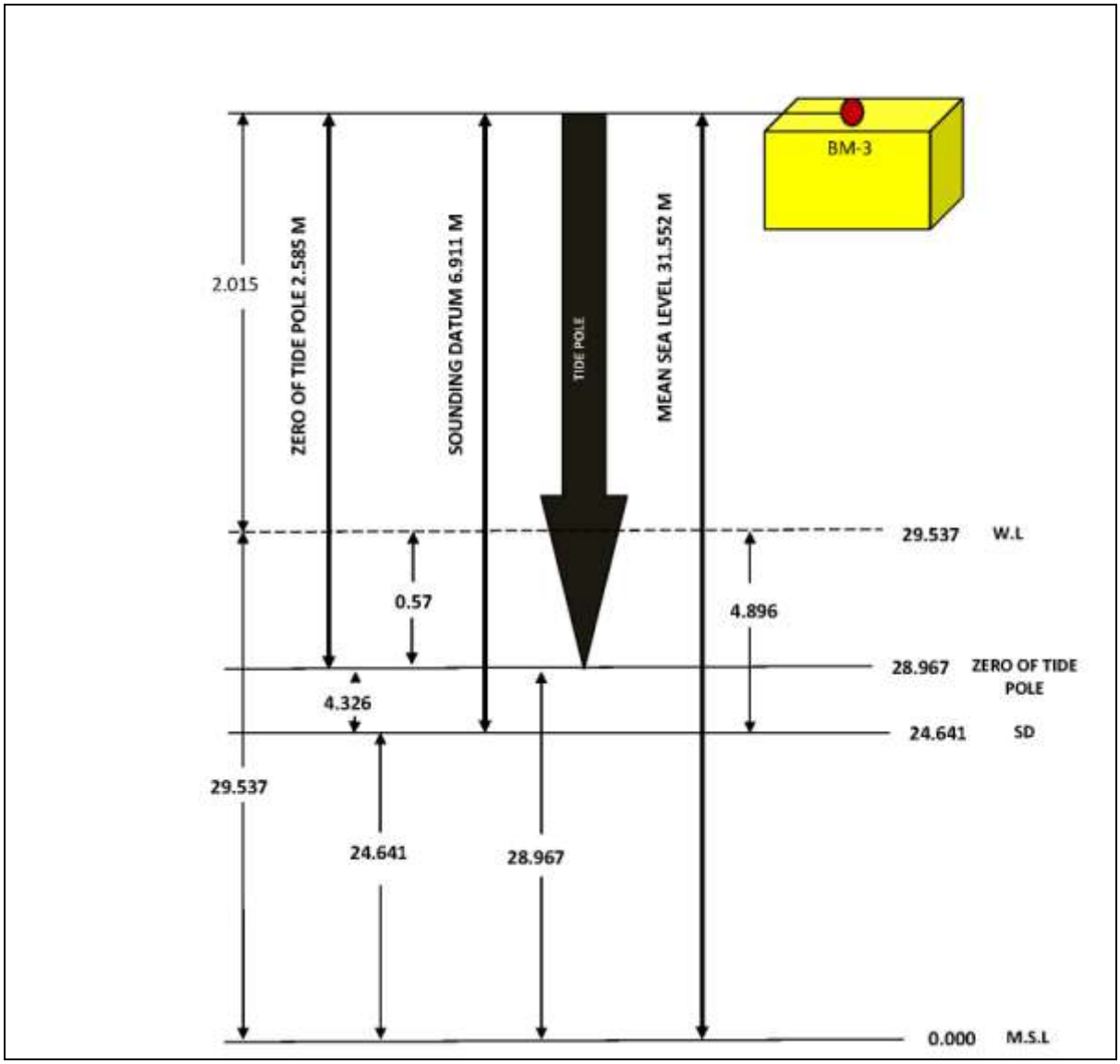
Levelling from GS-2 to BM-2

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
1.230					32.921	BM-2
	1.982			0.752	32.169	
0.367		2.366		0.384	31.785	
	1.875			1.508	30.277	
0.590		1.995		0.120	30.157	
		2.220		1.630	28.527	GAUGE STATION-2



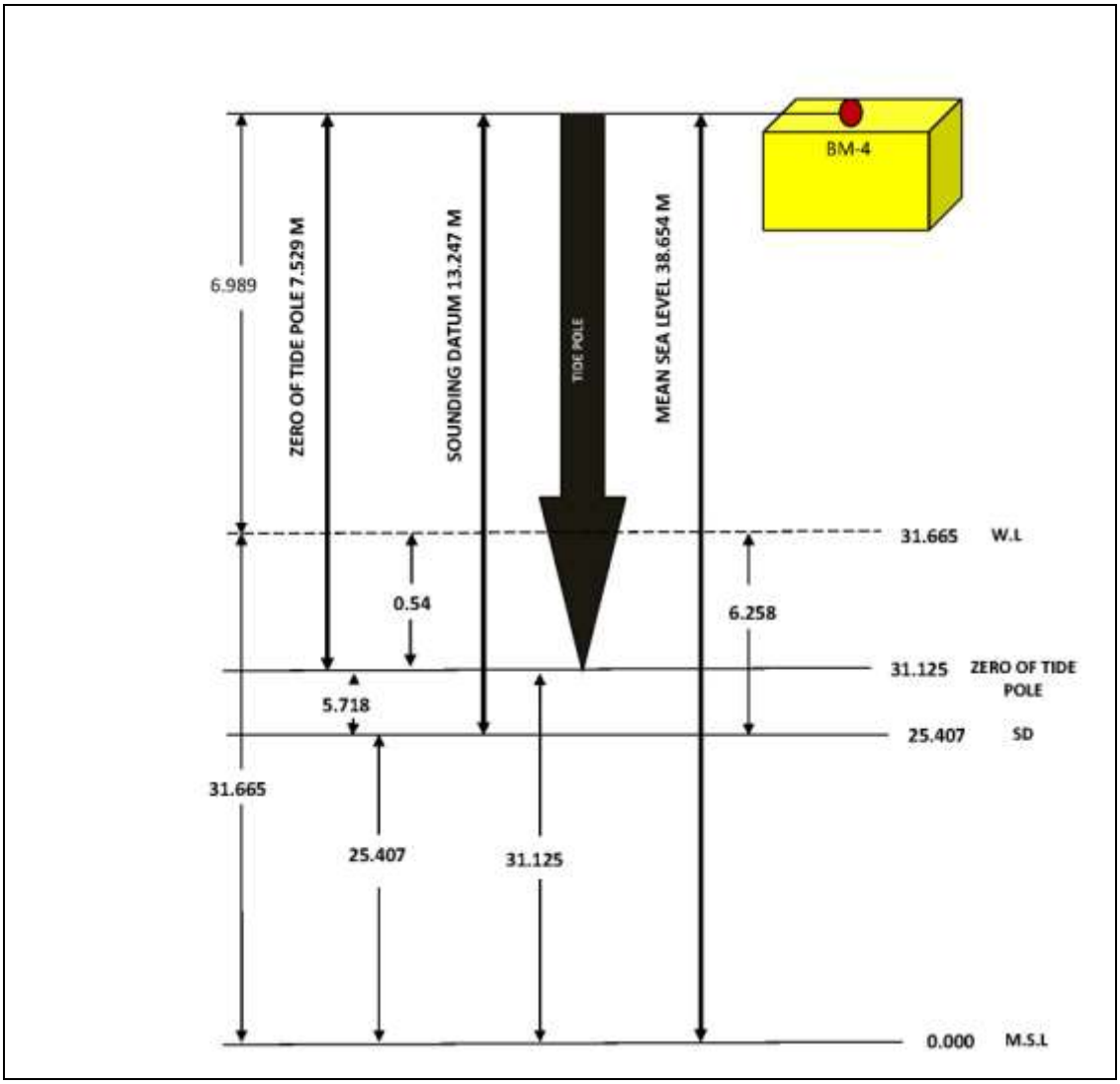
Levelling from GS-21 to BM-3

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.430					31.552	BM-3
0.945		1.115		0.685	30.867	
0.890		0.385	0.560		31.427	
0.355		1.562		0.672	30.755	
0.162		0.765		0.410	30.345	
		0.970		0.808	29.537	GAUGE STATION-21



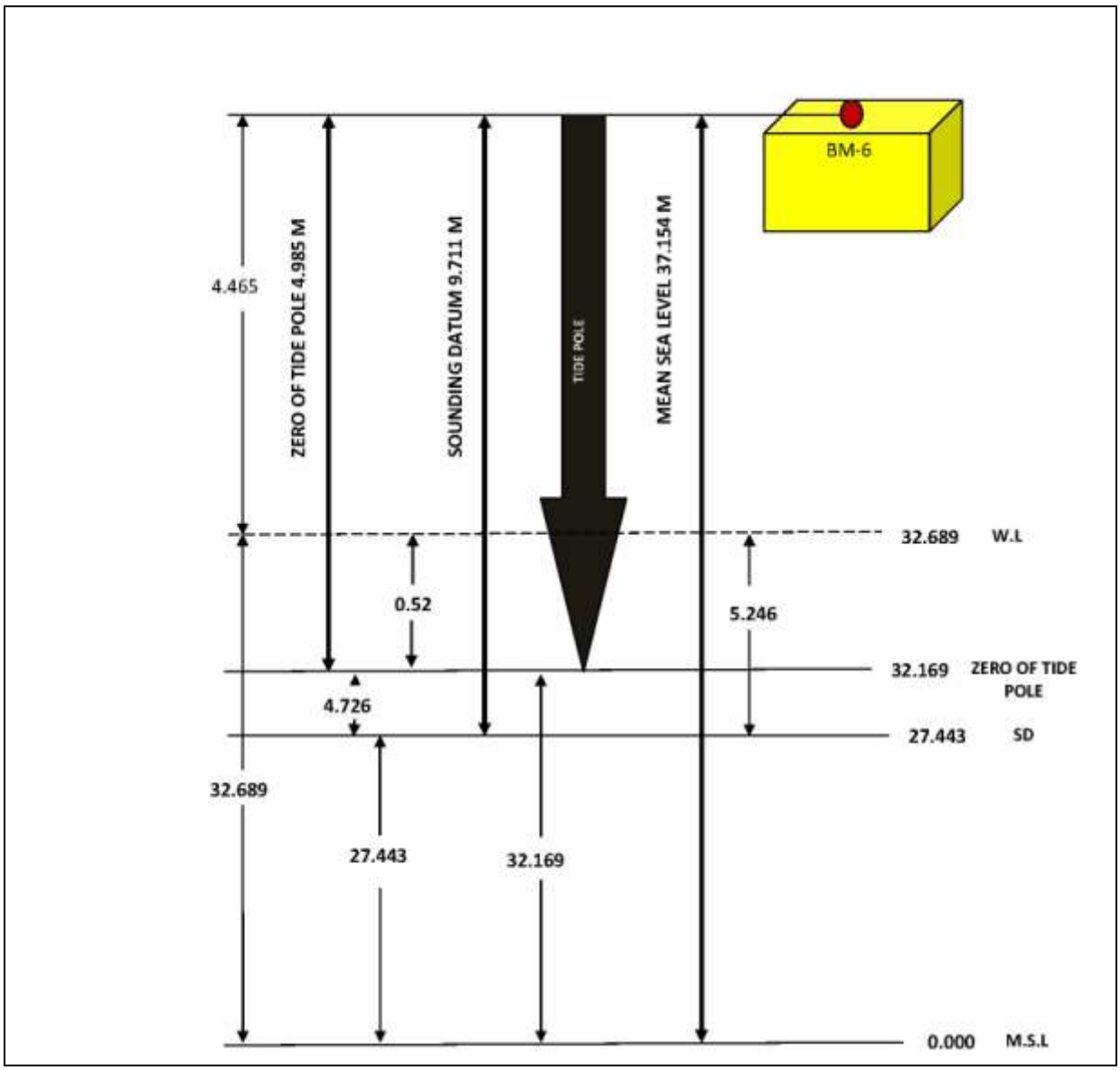
Levelling from GS-22 to BM-4

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.375					38.654	BM-4
	0.955			0.580	38.074	
1.185		1.295		0.340	37.734	
1.725		1.648		0.463	37.271	
0.254		1.765		0.040	37.231	
	2.850			2.596	34.635	
	3.026			0.176	34.459	
0.286		3.756		0.730	33.729	
		2.350		2.064	31.665	GAUGE STATION-22



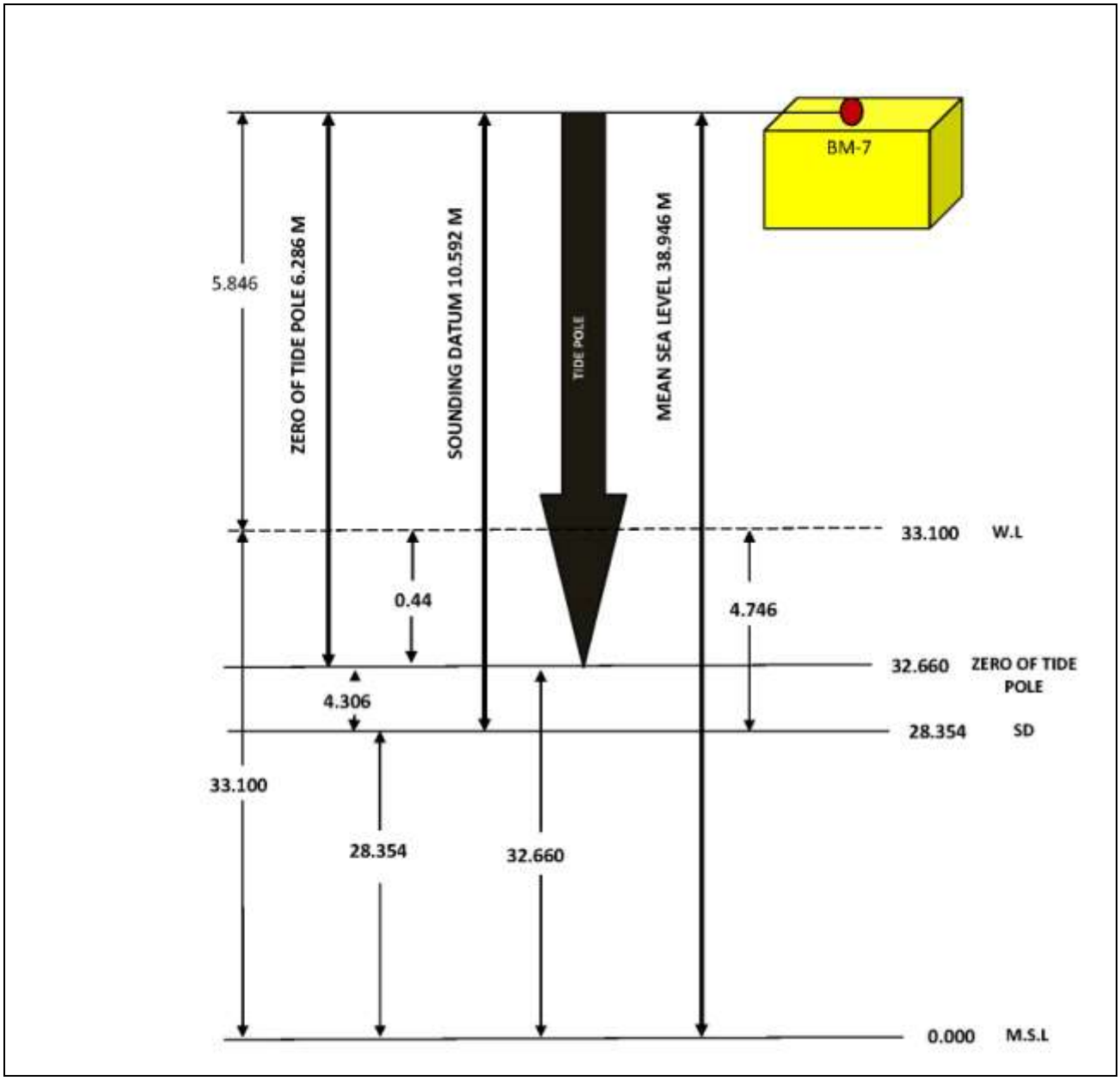
Levelling from GS-10 to BM-6

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.775					37.154	BM-6
	1.685			0.910	36.244	
0.380		2.355		0.670	35.574	
	1.650			1.270	34.304	
0.980		2.885		1.235	33.069	
		1.360		0.380	32.689	GAUGE STATION-10



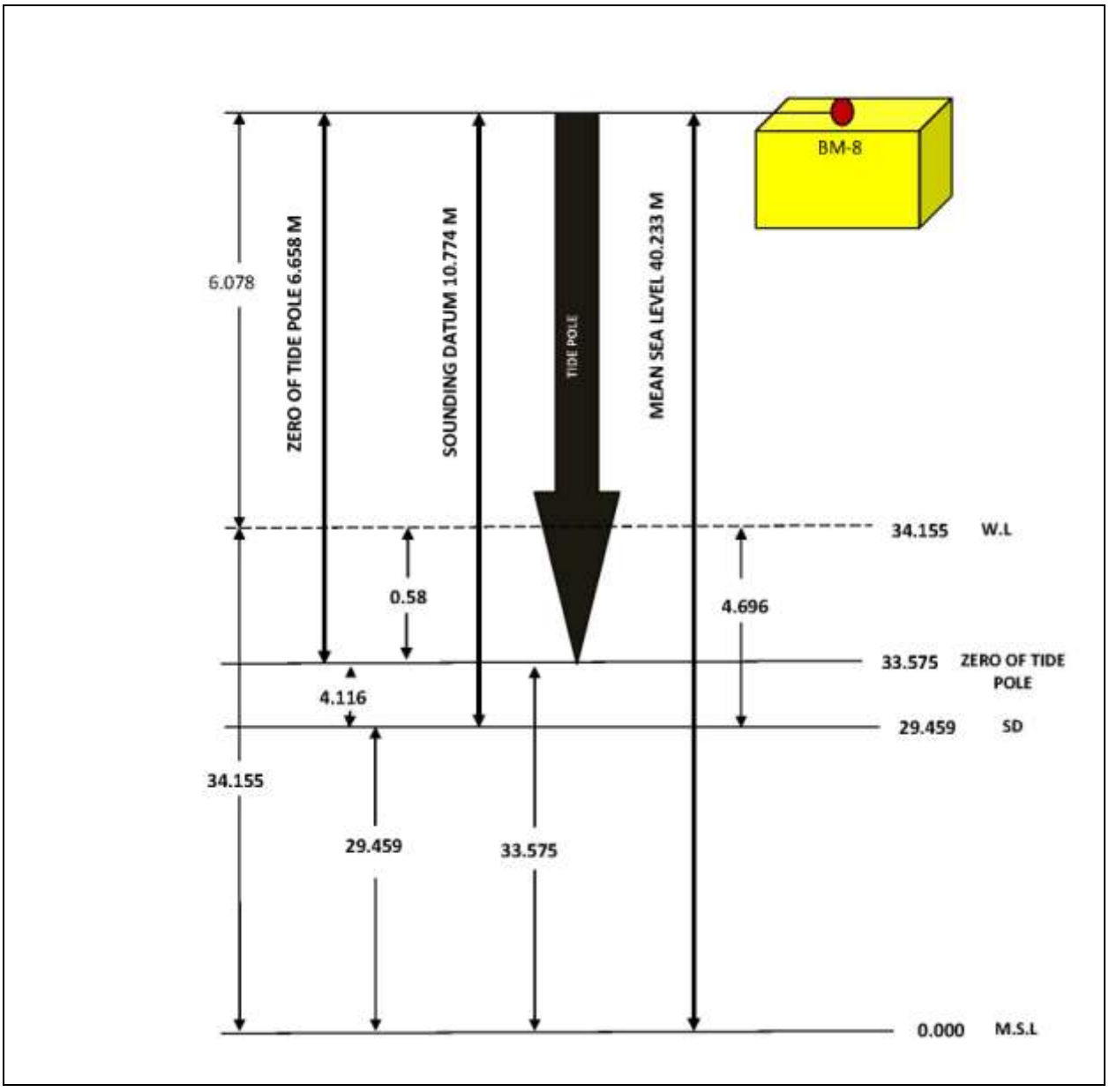
Levelling from GS-7 to BM-7

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.785					38.946	BM-7
0.993		2.726		1.941	37.005	CP1
0.580		2.153		1.160	35.845	CP2
1.070		2.262		1.682	34.163	CP3
		2.133		1.063	33.100	GAUGE STATION-7



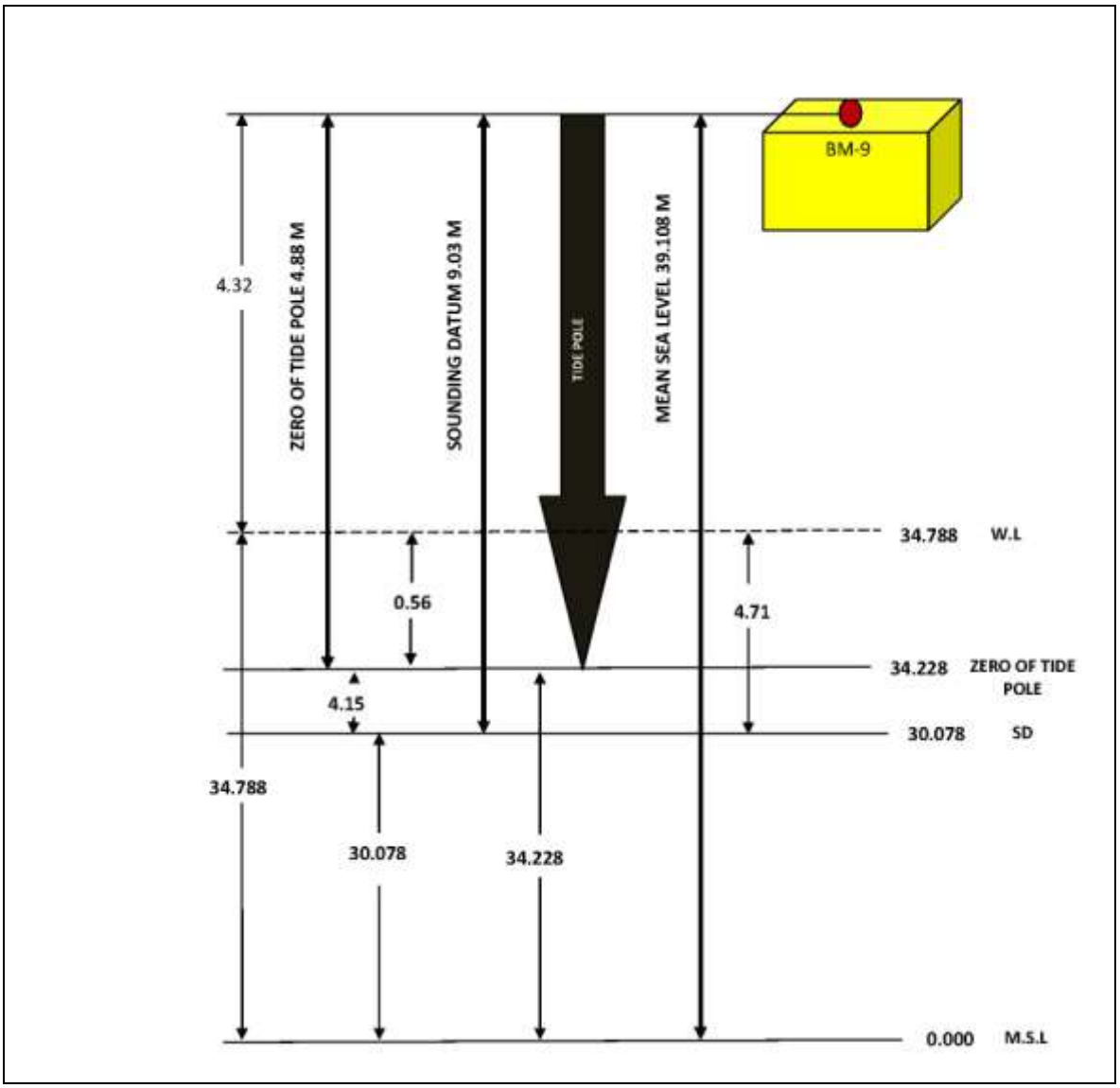
Levelling from GS-8 to BM-8

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.683					40.233	BM-8
0.497		2.974		2.291	37.942	
0.582		2.123		1.626	36.316	
		2.743		2.161	34.155	GAUGE STATION-8



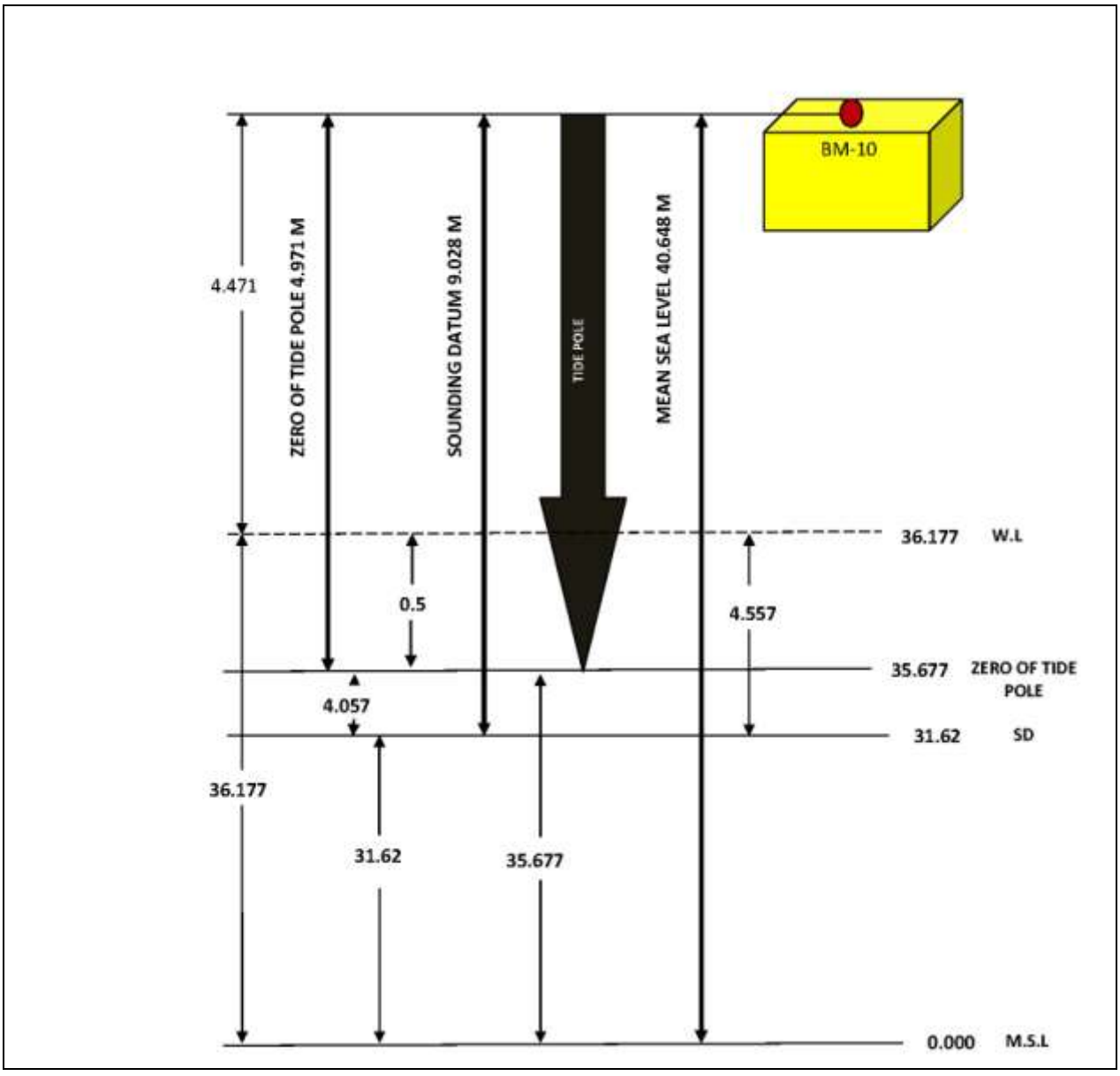
Levelling from GS-18 to BM-9

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.530					39.108	BM-9
	1.920			1.390	37.718	
0.680		2.340		0.420	37.298	
	1.750			1.070	36.228	
1.890		1.990		0.240	35.988	
	2.160			0.270	35.718	
	2.500			0.340	35.378	
0.910		2.550		0.050	35.328	
		1.450		0.540	34.788	GAUGE STATION-18



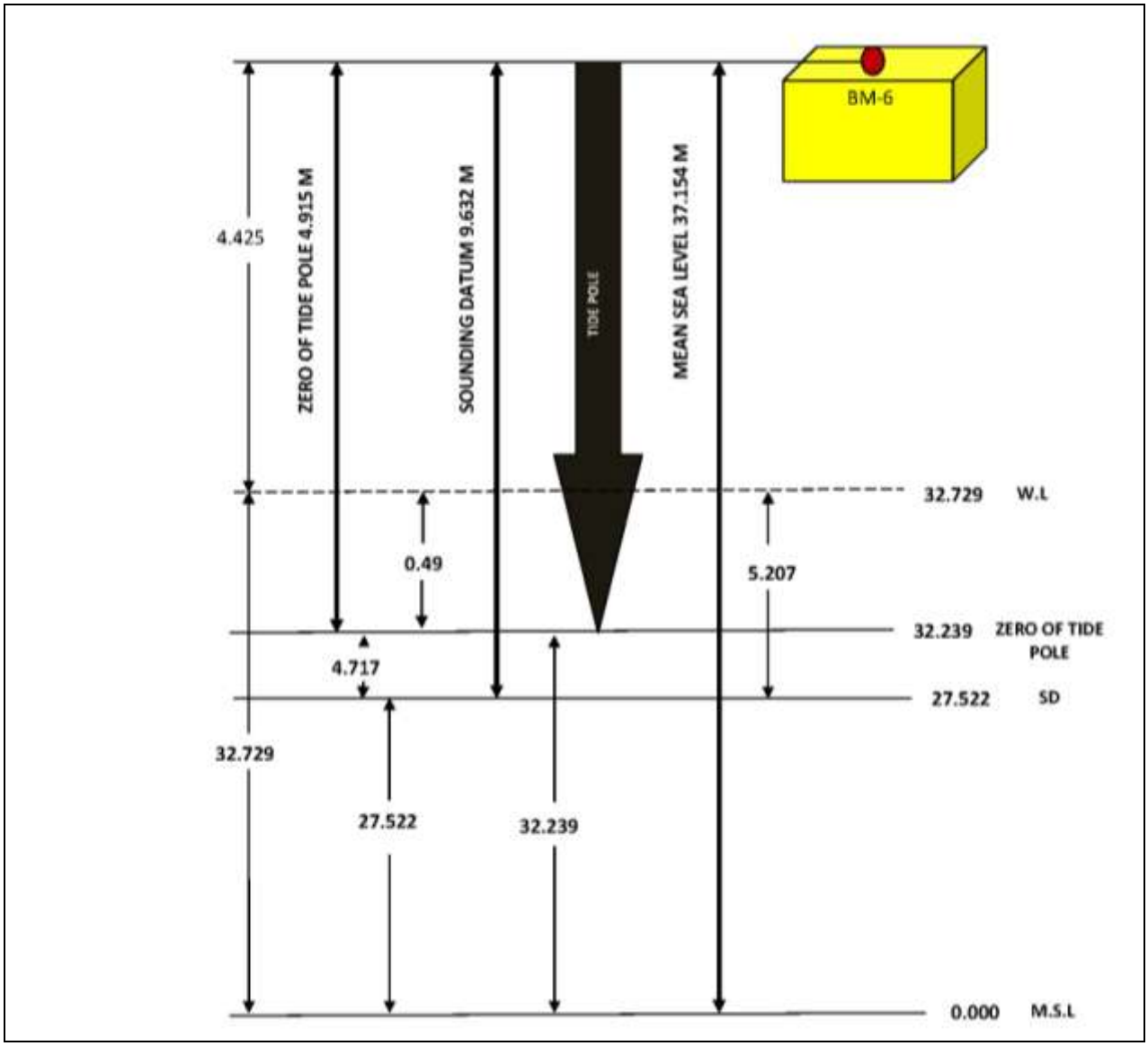
Levelling from GS-20 to BM-10

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.284					40.648	BM-10
0.863		2.350		2.066	38.582	
0.584		1.982		1.119	37.463	
		1.870		1.286	36.177	GAUGE STATION-20



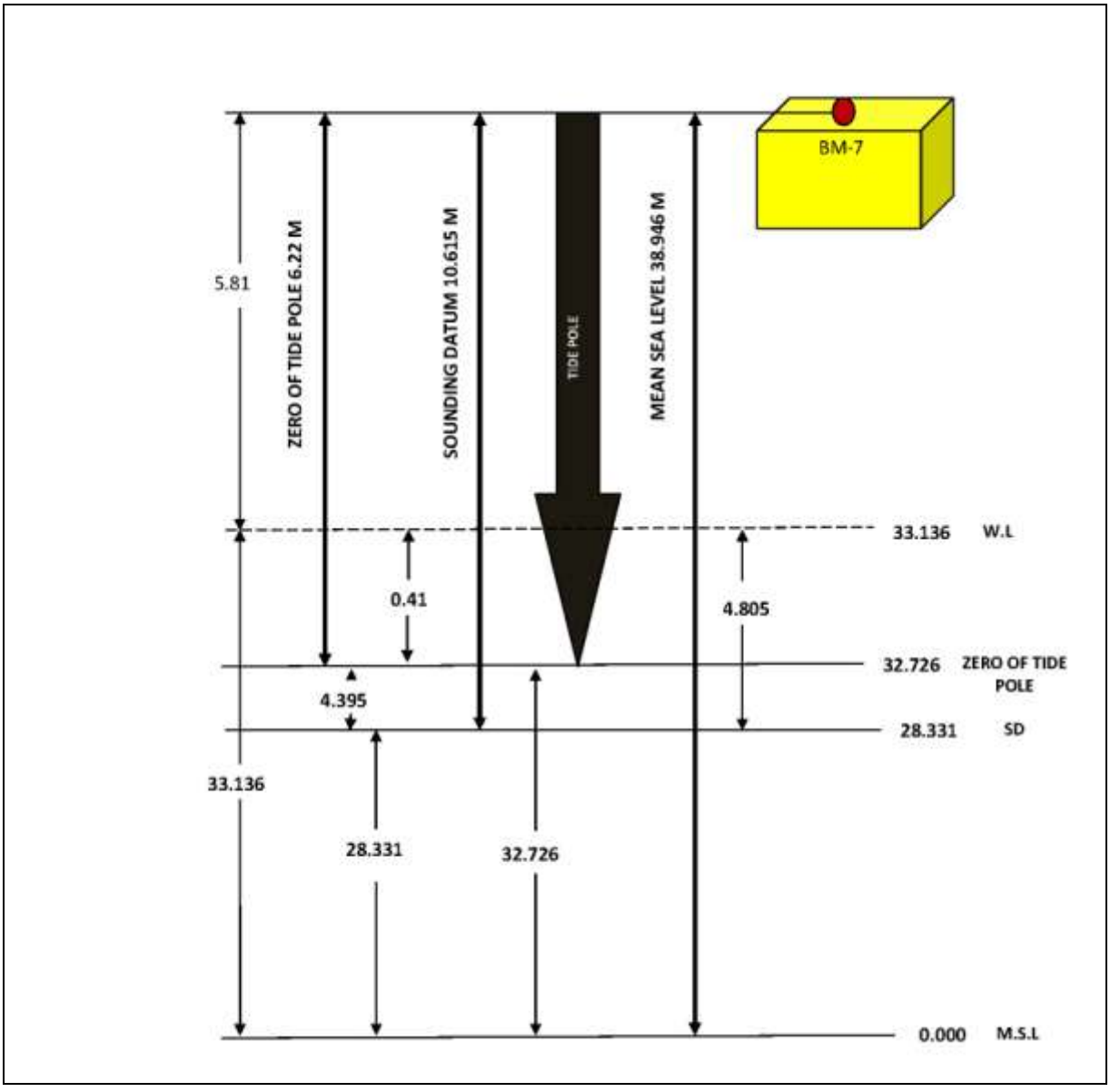
Levelling from GS-6 to BM-6

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.330					37.154	BM-6
	1.675			1.345	35.809	
0.625		1.920		0.245	35.564	
	1.860			1.235	34.329	
0.970		1.990		0.130	34.199	
0.520		1.565		0.595	33.604	
		1.395		0.875	32.729	GAUGE STATION-6



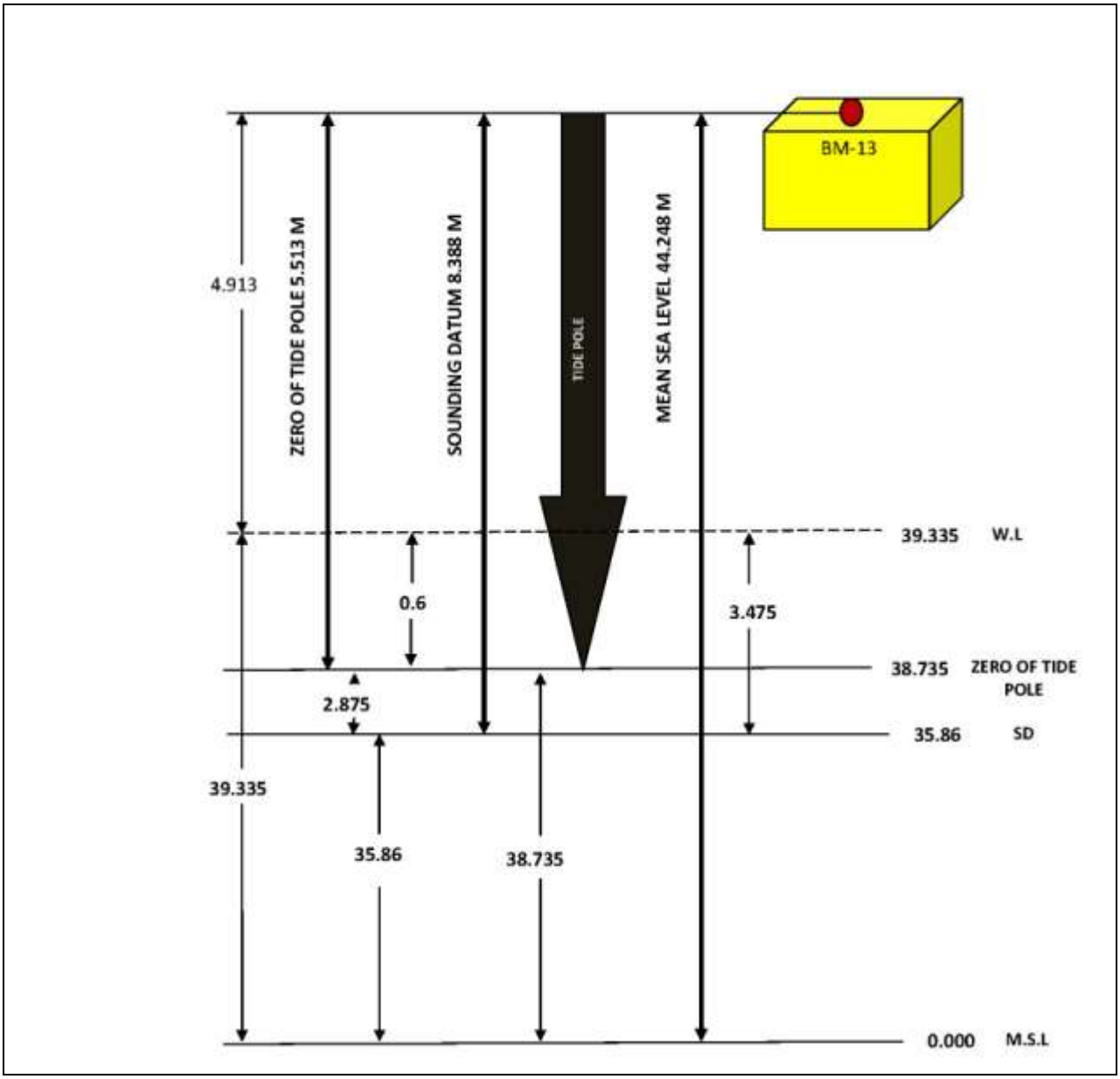
Levelling from GS-9 to BM-7

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.547					38.946	BM-7
0.963		2.050		1.503	37.443	CP1
1.121		3.030		2.067	35.376	CP2
1.345		3.250		2.129	33.247	CP3
		1.456		0.111	33.136	GAUGE STATION-9



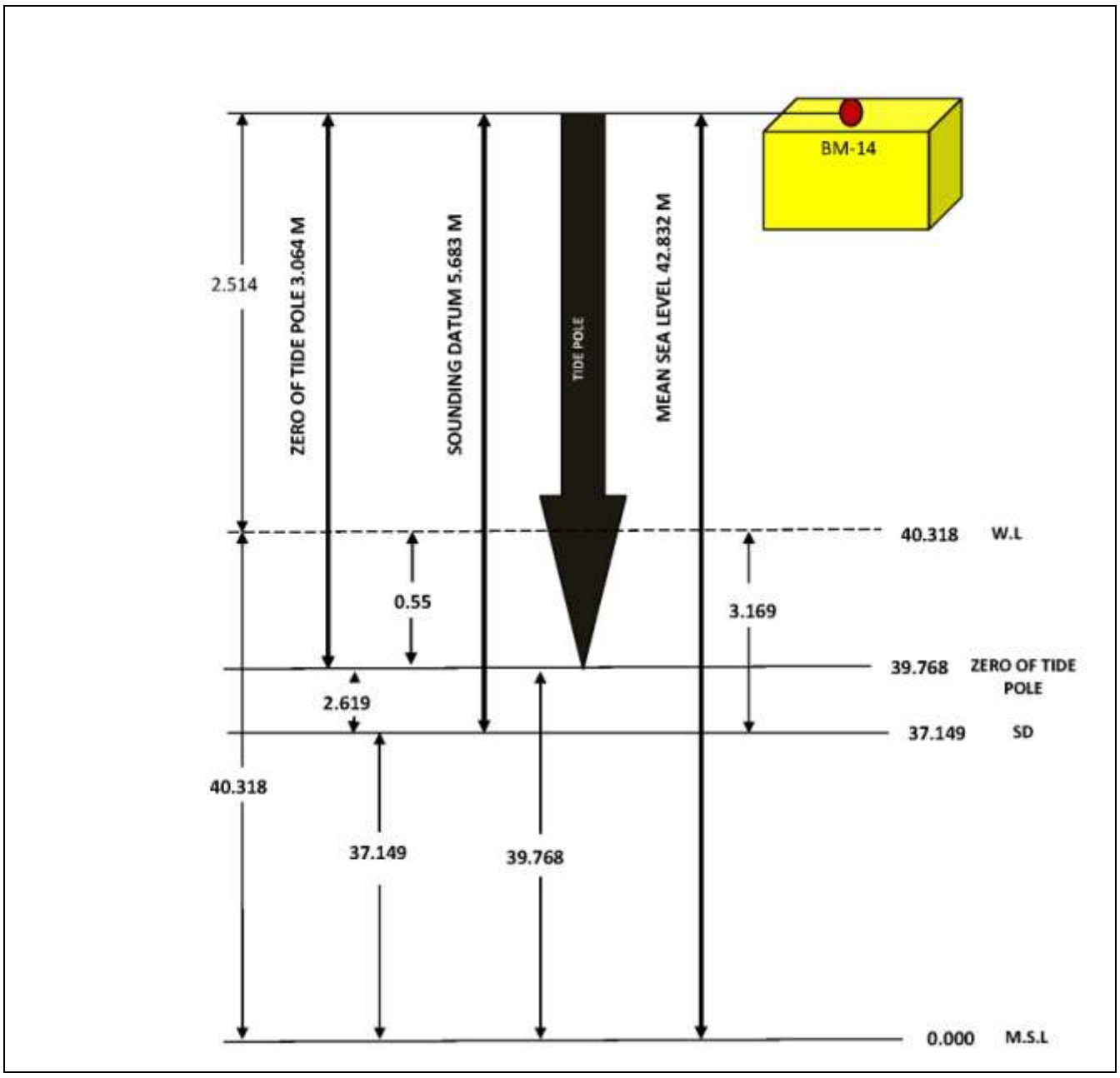
Levelling from GS-17 to BM-13

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.512					44.248	BM-13
0.348		1.853		1.341	42.907	
0.243		2.188		1.840	41.067	
		1.975		1.732	39.335	GAUGE STATION-17



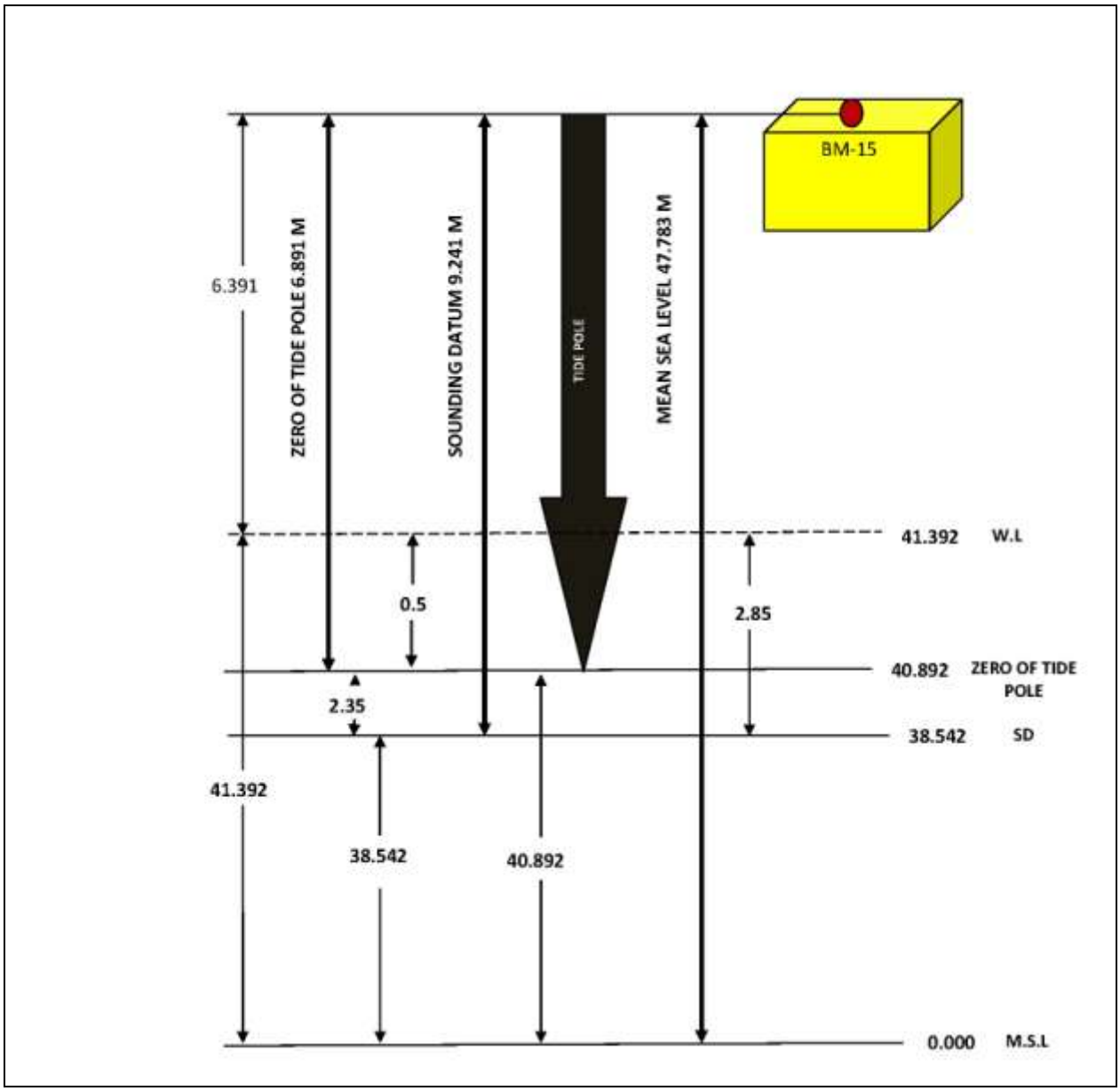
Levelling from GS-3 to BM-14

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
1.159					42.832	BM-14
1.053		2.286		1.127	41.705	CP1
0.979		1.840		0.787	40.918	CP2
		1.579		0.600	40.318	GAUGE STATION-3



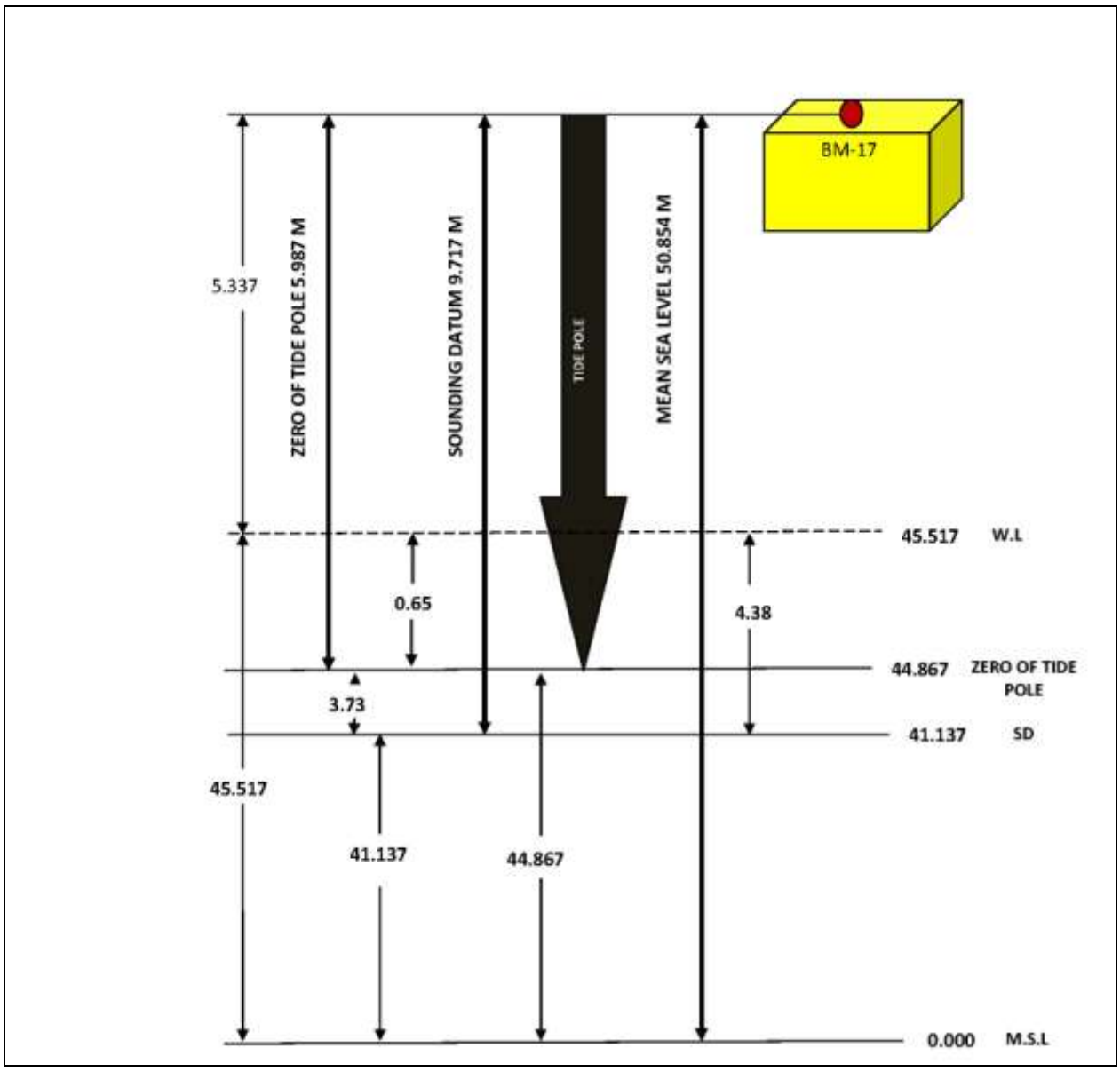
Levelling from GS-4 to BM-15

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.685					47.783	BM-15
0.330		1.339		0.654	47.129	
0.590		2.582		2.252	44.877	
0.987		1.632		1.042	43.835	
0.433		1.963		0.976	42.859	
		1.900		1.467	41.392	GAUGE STATION-4



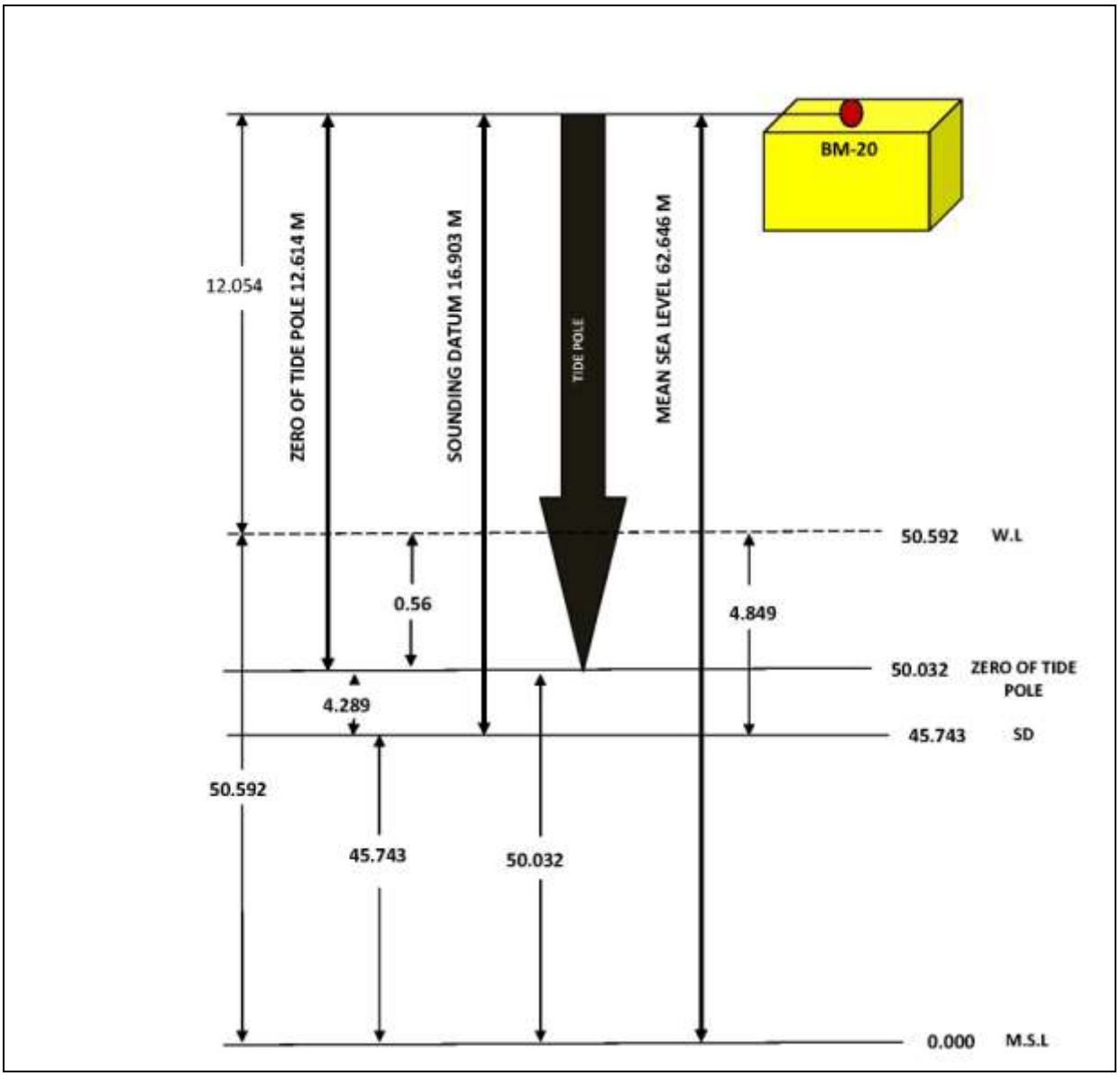
Levelling from GS-16 to BM-17

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.867					50.854	BM-17
0.415		1.692		0.825	50.029	
0.879		1.395		0.980	49.049	
0.725		1.983		1.104	47.945	
0.324		2.032		1.307	46.638	
		1.445		1.121	45.517	GAUGE STATION-16



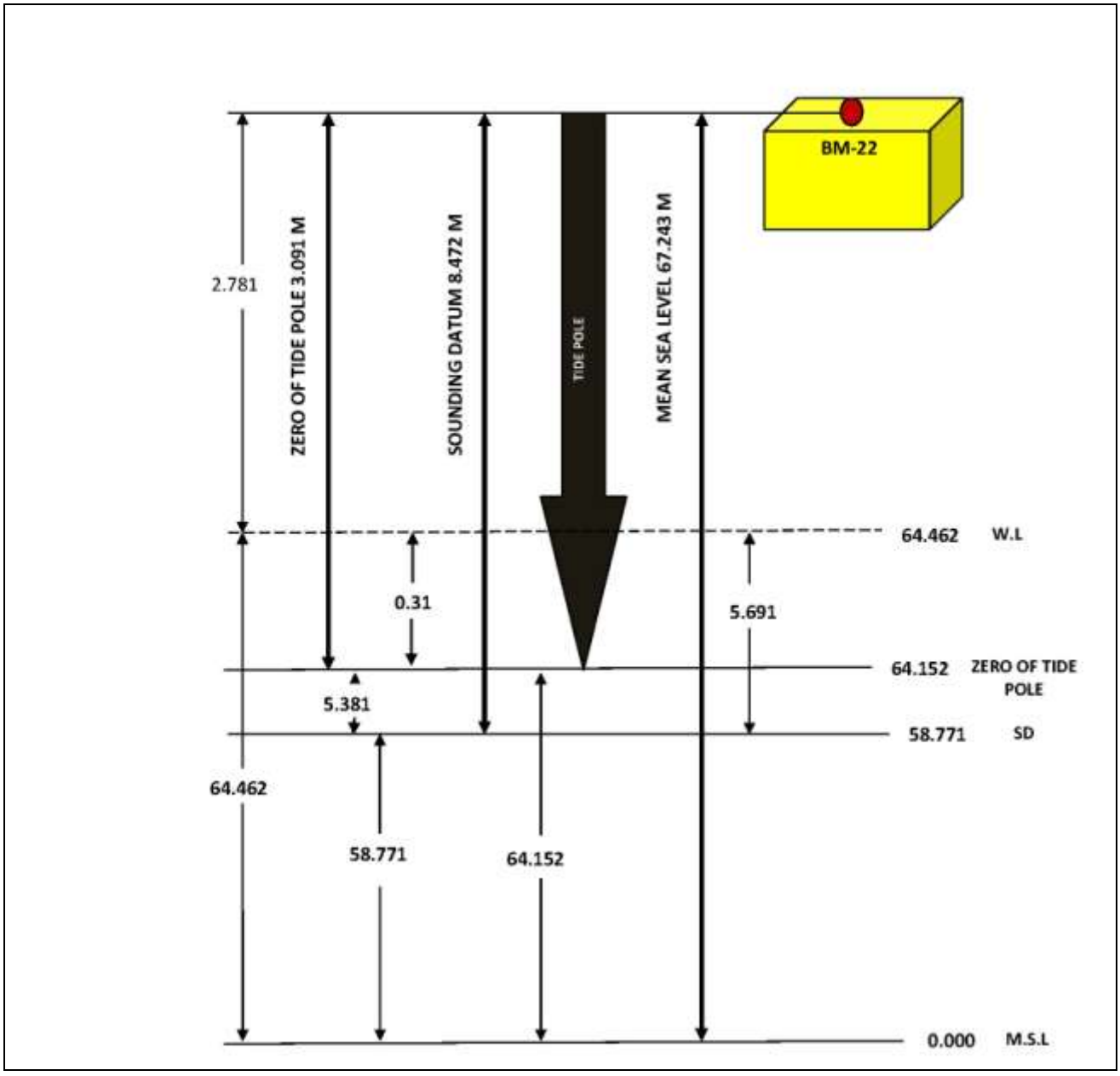
Levelling from GS-14 to BM-20

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.265					62.646	BM-20
0.490		2.958		2.693	59.953	
0.875		3.554		3.064	56.889	
0.387		2.384		1.509	55.380	
0.482		3.177		2.790	52.590	
		2.480		1.998	50.592	GAUGE STATION-14



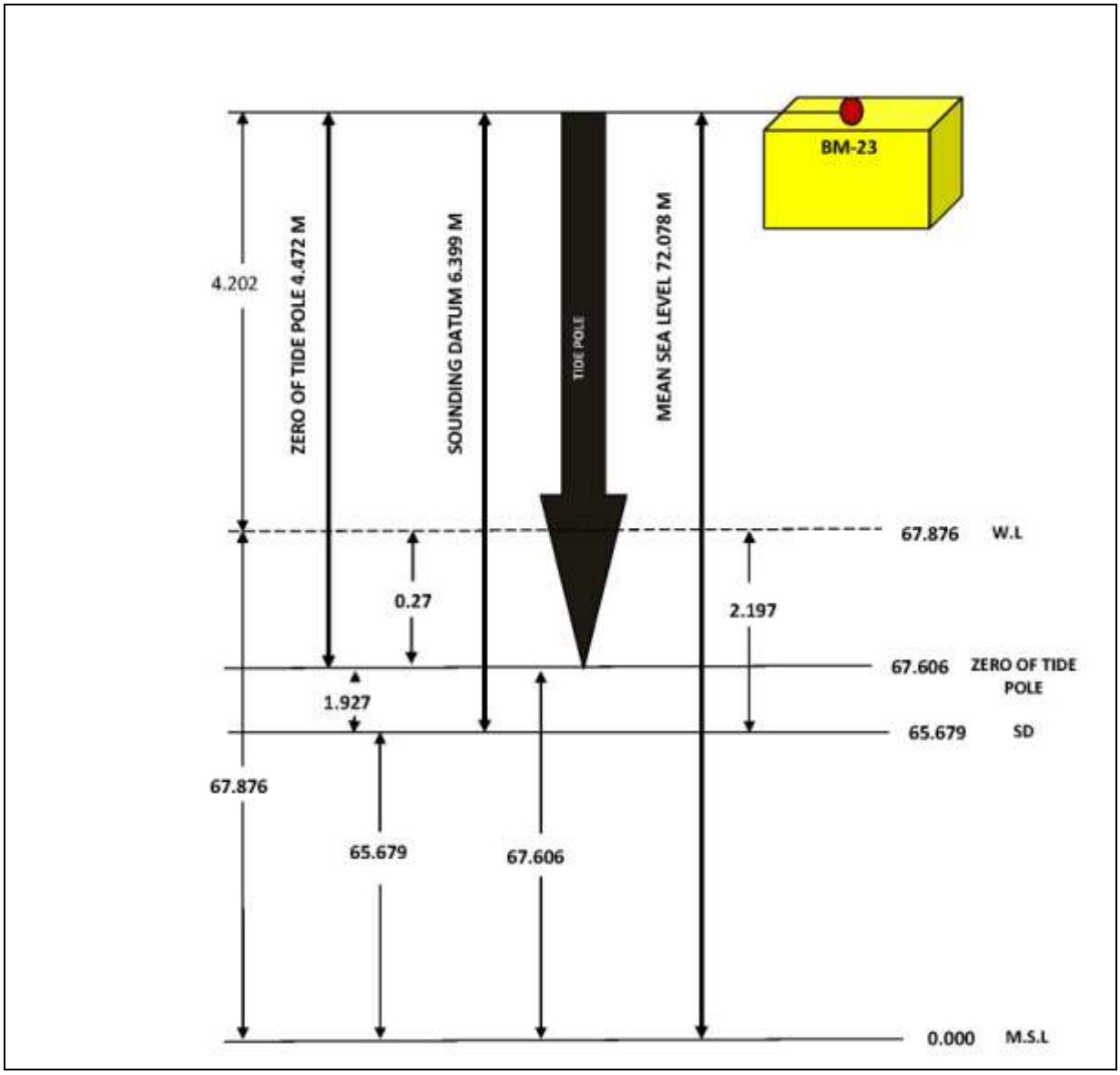
Levelling from GS-13 to BM-22

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.874					67.243	BM-22
0.344		1.985		1.111	66.132	
0.853		1.362		1.018	65.114	
		1.505		0.652	64.462	GAUGE STATION-13



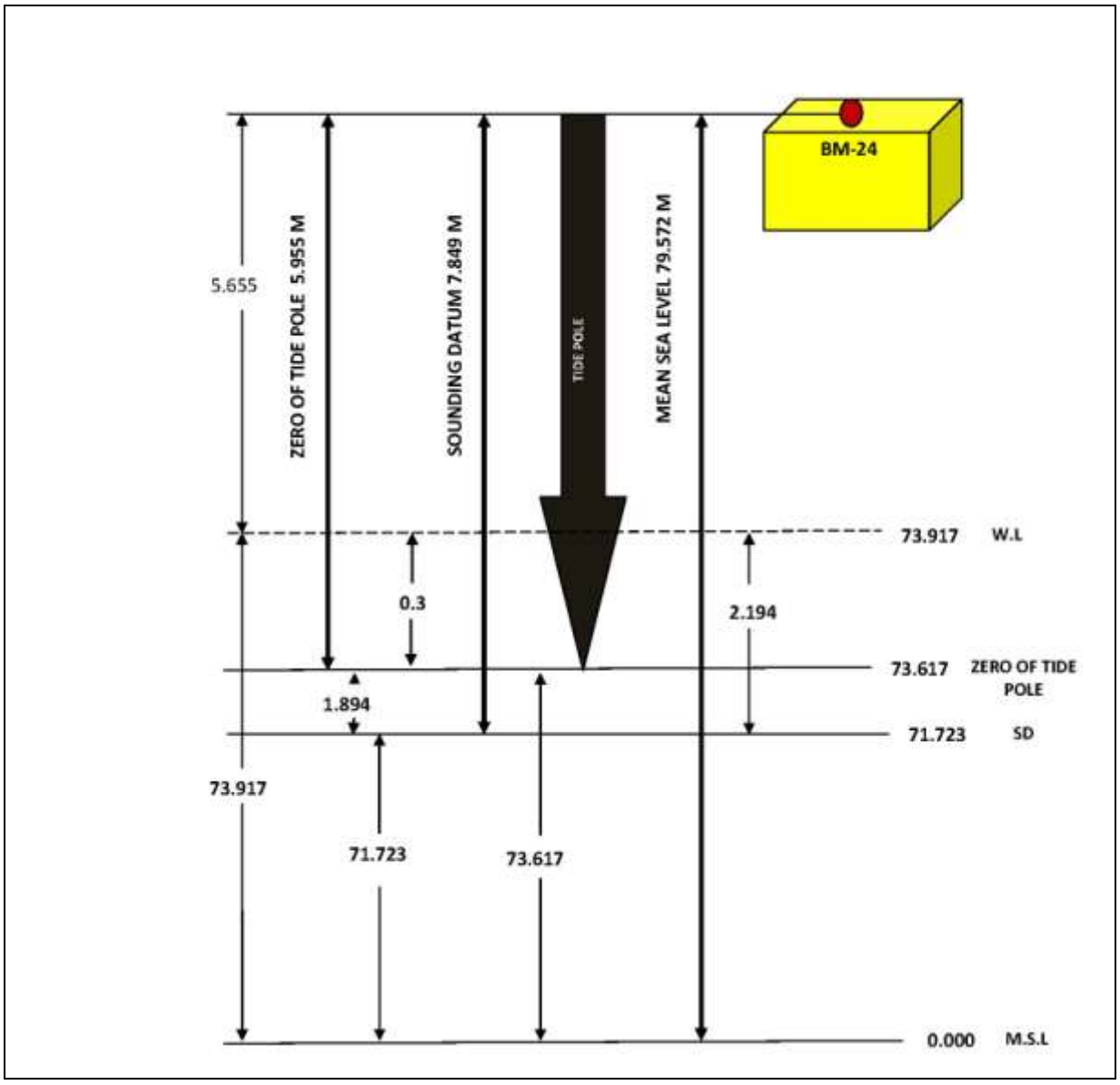
Levelling from GS-12 to BM-23

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.557					72.078	BM-23
0.328		1.983		1.426	70.652	
0.255		1.682		1.354	69.298	
		1.677		1.422	67.876	GAUGE STATION-12



Levelling from GS-11 to BM-24

BS	IS	FS	RISE(+)	FALL(-)	RL	REMARKS
0.284					79.572	BM-24
0.673		1.882		1.598	77.974	
0.495		2.318		1.645	76.329	
0.574		1.938		1.443	74.886	
		1.543		0.969	73.917	GAUGE STATION-11



Annexure-11 Soil Sample Report:-

SITE: KOSI RIVER

RESULTS OF TEST OF SOIL SAMPLES

SITE – KOSI RIVER

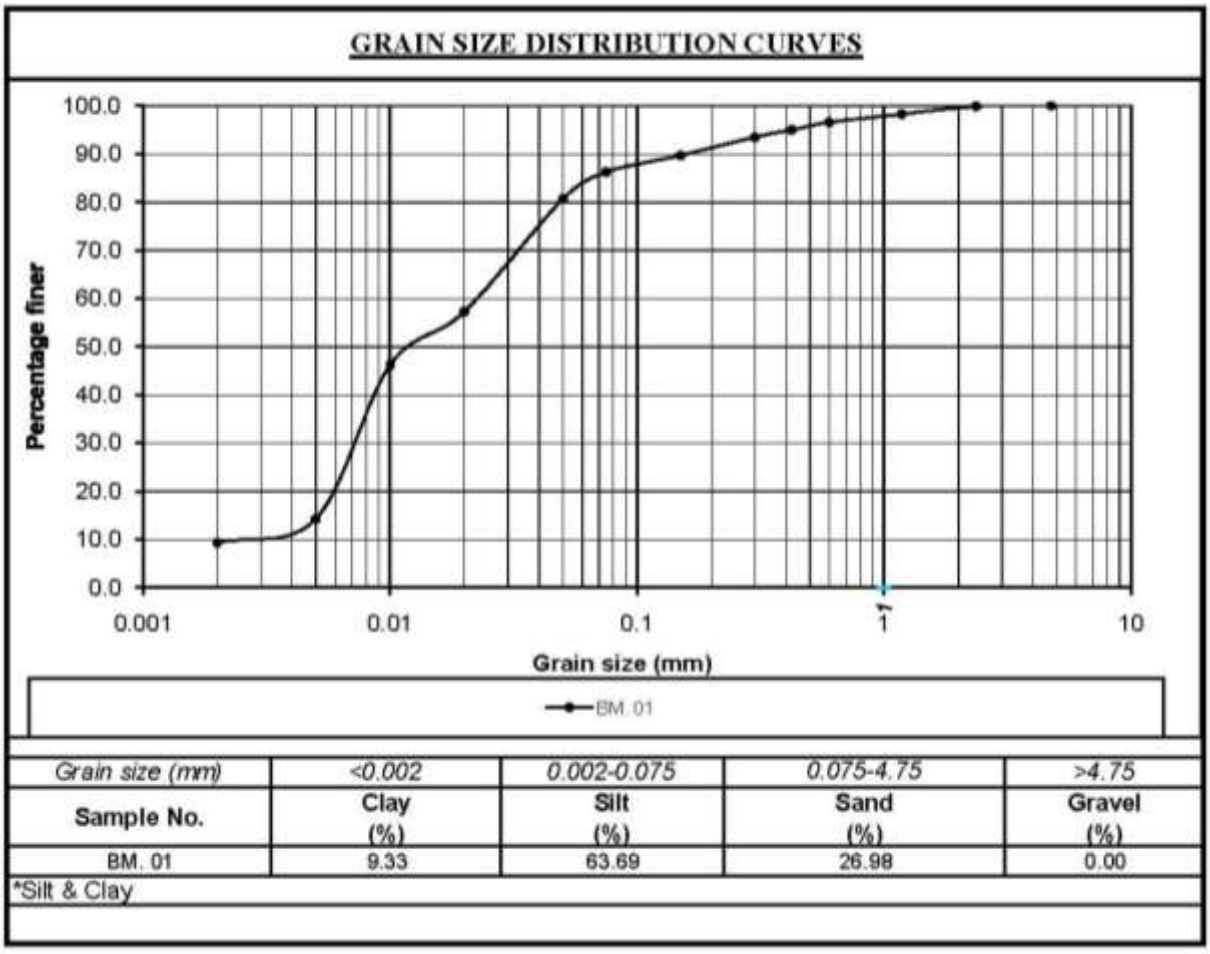
PHYSICAL ANALYSIS OF SOIL

Sl.No.	BM.	GRAVEL (%)	SAND (%)	SILT+CLAY (%)	SPECIFIC GRAVITY	pH VALUE	SILT (%)	CLAY (%)	Cu	Cc
1	BM - 1	0.00	26.98	73.02	2.63	7.20	63.69	9.33	6.22	0.61
2	BM - 2	0.00	24.51	75.49	2.61	7.20	65.82	9.67	7.27	2.30
3	BM - 3	0.00	27.41	72.59	2.62	7.10	66.00	6.59	6.71	1.01
4	BM - 4	3.87	19.86	76.27	2.62	7.30	67.86	8.41	5.71	1.50
5	BM - 5	0.00	23.75	76.25	2.63	7.40	67.15	9.10	5.63	1.28
6	BM - 6	1.24	22.96	75.80	2.62	7.10	65.81	9.99	9.16	1.75
7	BM - 7	0.00	27.14	72.86	2.61	7.50	63.80	9.06	6.13	1.11
8	BM - 8	0.98	23.14	75.88	2.62	6.90	66.08	9.80	6.00	1.05
9	BM - 9	0.00	27.10	72.90	2.63	7.80	65.36	7.54	6.10	1.09
10	BM - 10	3.01	20.97	76.02	2.61	7.70	67.01	9.01	5.63	1.23
11	BM - 11	2.64	22.46	74.90	2.62	7.50	64.95	9.95	7.08	1.51
12	BM - 12	0.00	24.57	75.43	2.63	7.60	65.82	9.61	4.49	1.29
13	BM - 13	0.00	27.68	72.32	2.61	7.30	64.86	7.46	4.79	1.19
14	BM - 14	1.47	20.98	77.55	2.62	7.20	67.59	9.96	7.73	1.74
15	BM - 15	0.00	25.02	74.98	2.62	7.10	65.59	9.39	5.68	1.09
16	BM - 16	1.11	23.98	74.91	2.61	7.20	65.25	9.66	7.26	1.36
17	BM - 17	0.00	28.12	71.88	2.63	7.30	64.76	7.12	5.88	1.33
18	BM - 18	2.87	21.71	75.42	2.61	7.40	66.23	9.19	8.25	1.94
19	BM - 19	0.00	25.77	74.23	2.62	6.90	64.96	9.27	12.61	2.90
20	BM - 20	4.05	19.08	76.87	2.61	7.30	67.87	9.00	8.99	0.83
21	BM - 21	0.00	24.05	75.95	2.62	7.20	66.60	9.35	11.21	1.84
22	BM - 22	2.02	22.10	75.88	2.63	7.10	67.22	8.66	8.40	1.16
23	BM - 23	0.00	24.87	75.13	2.62	7.30	67.15	7.98	8.57	1.30
24	BM - 24	1.94	22.81	75.25	2.61	7.40	65.34	9.91	13.76	2.03

Note: - The soil sample positions have been shown in the next page no-214

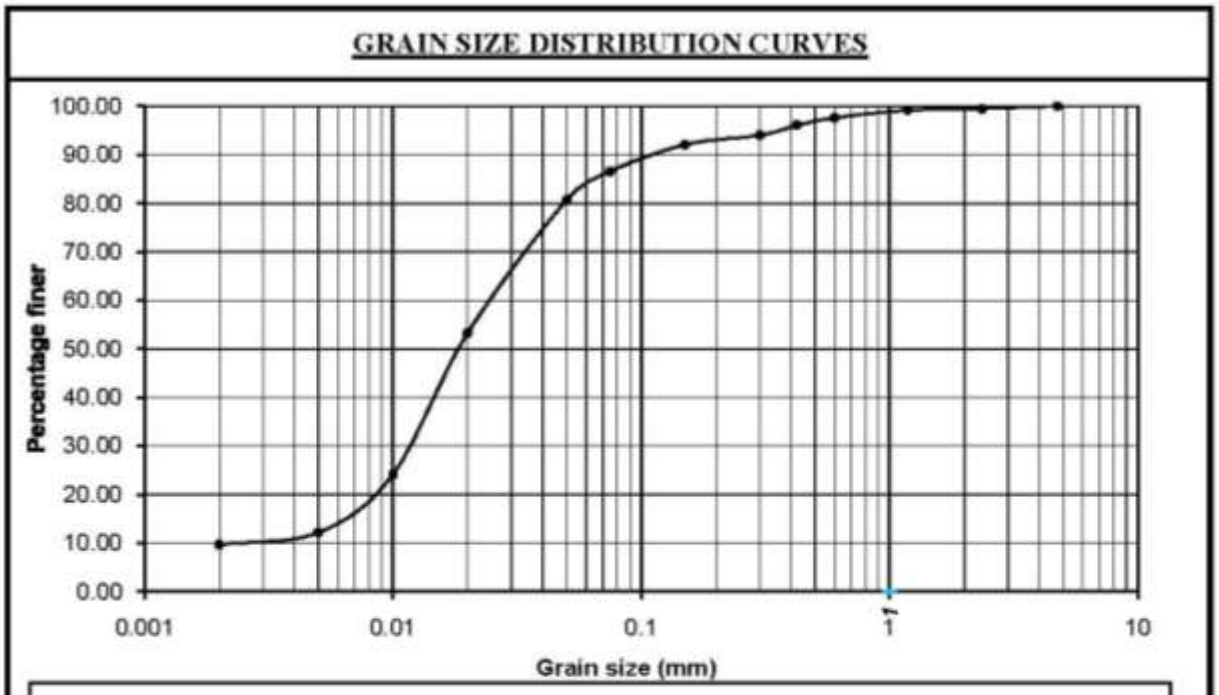
Soil Sample positions:-

Sample No.	Chainage (km)	Easting (m)	Northing (m)	Latitude (N)	Longitude (E)	Depth (m)
1	2.122	523428.5286	2811901.921	25°25'25.862"	87°13'58.722"	2.3
2	8.533	517525.8022	2811379.648	25°25'09.176"	87°10'27.386"	2.0
3	21.232	512641.3092	2814087.31	25°26'37.381"	87°07'32.623"	1.3
4	28.039	505571.1389	2810527.453	25°24'41.806"	87°03'19.422"	0.6
5	43.254	495474.286	2814736.392	25°26'58.651"	86°57'17.948"	0.9
6	51.476	479409.1334	2816328.877	25°27'49.933"	86°47'42.62"	1.2
7	62.547	473464.3037	2822243.043	25°31'01.859"	86°44'09.311"	2.5
8	72.573	472271.5547	2824978.02	25°32'30.693"	86°43'26.375"	3.0
9	79.752	469328.6863	2827961.564	25°34'07.475"	86°41'40.676"	0.5
10	91.252	460046.18	2833503.69	25°37'06.843"	86°36'07.381"	0.6
11	100.936	453711.15	2837247.66	25°39'07.884"	86°32'19.764"	1.5
12	109.343	450442.3214	2843897.187	25°42'43.662"	86°30'21.634"	1.2
13	120.670	445117.982	2852356.946	25°47'17.982"	86°27'09.318"	0.7
14	130.974	444755.5903	2862449.591	25°52'46.012"	86°26'54.786"	0.9
15	140.884	444362.7185	2871965.533	25°57'55.286"	86°26'39.218"	0.6
16	151.166	446647.6732	2881074.348	26°02'51.687"	86°28'00.048"	1.3
17	159.357	451347.2378	2886967.822	26°06'03.857"	86°30'48.371"	1.1
18	169.973	454162.88	2893831.07	26°09'47.285"	86°32'28.868"	2.1
19	180.856	459125.9312	2902733.173	26°14'37.193"	86°35'26.63"	1.3
20	189.271	464498.165	2907626.415	26°17'16.766"	86°38'39.793"	0.3
21	203.440	475798.6728	2912656.931	26°20'01.136"	86°45'26.949"	0.8
22	211.736	482478.5588	2919219.956	26°23'34.824"	86°49'27.599"	1.2
23	223.069	489998.2818	2925609.762	26°27'02.789"	86°53'58.828"	2.1
24	233.040	492511.17	2933981.58	26°31'34.973"	86°55'29.394"	0.6



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	Clay (%)	Silt (%)	Sand (%)	Gravel (%)
BM. 01	9.33	63.69	26.98	0.00

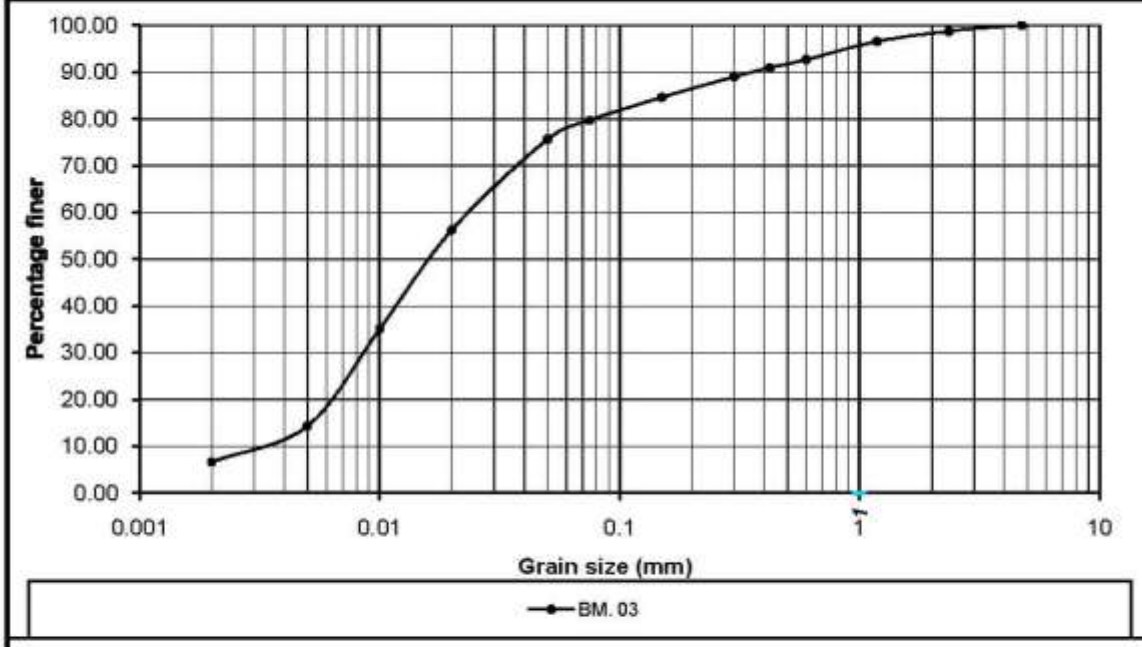
*Silt & Clay



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	Clay (%)	Silt (%)	Sand (%)	Gravel (%)
BM. 02	9.67	65.82	24.51	0.00

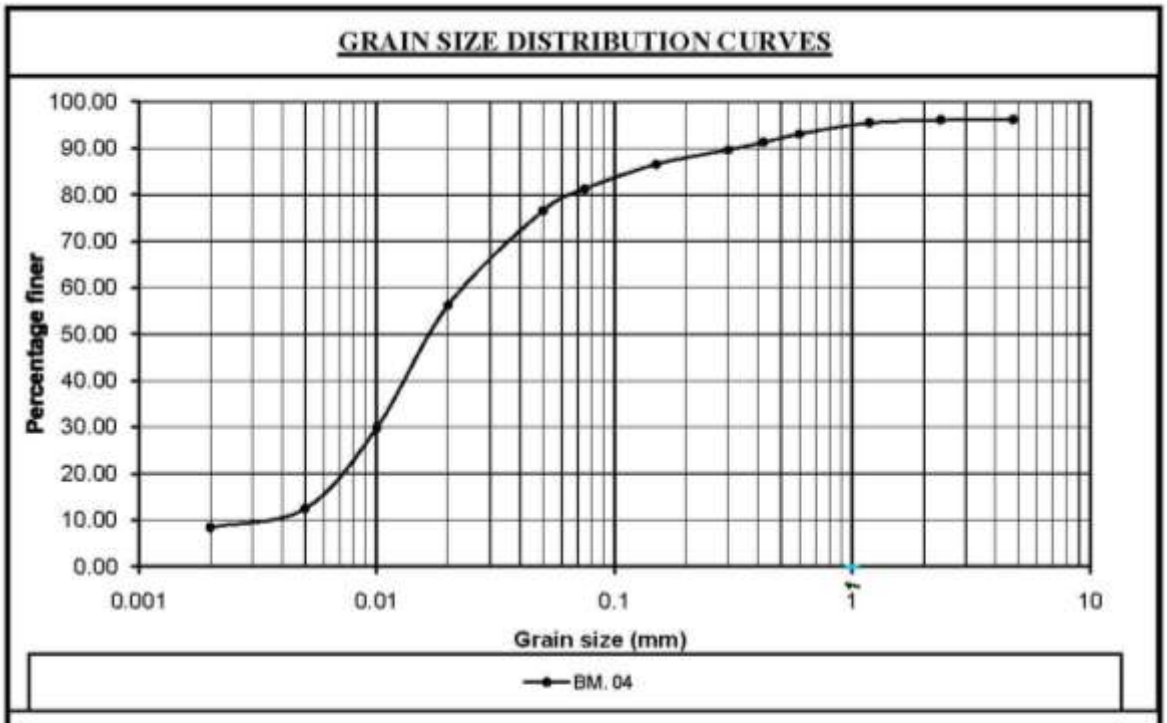
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	Clay (%)	Silt (%)	Sand (%)	Gravel (%)
BM. 03	6.59	66.00	27.41	0.00

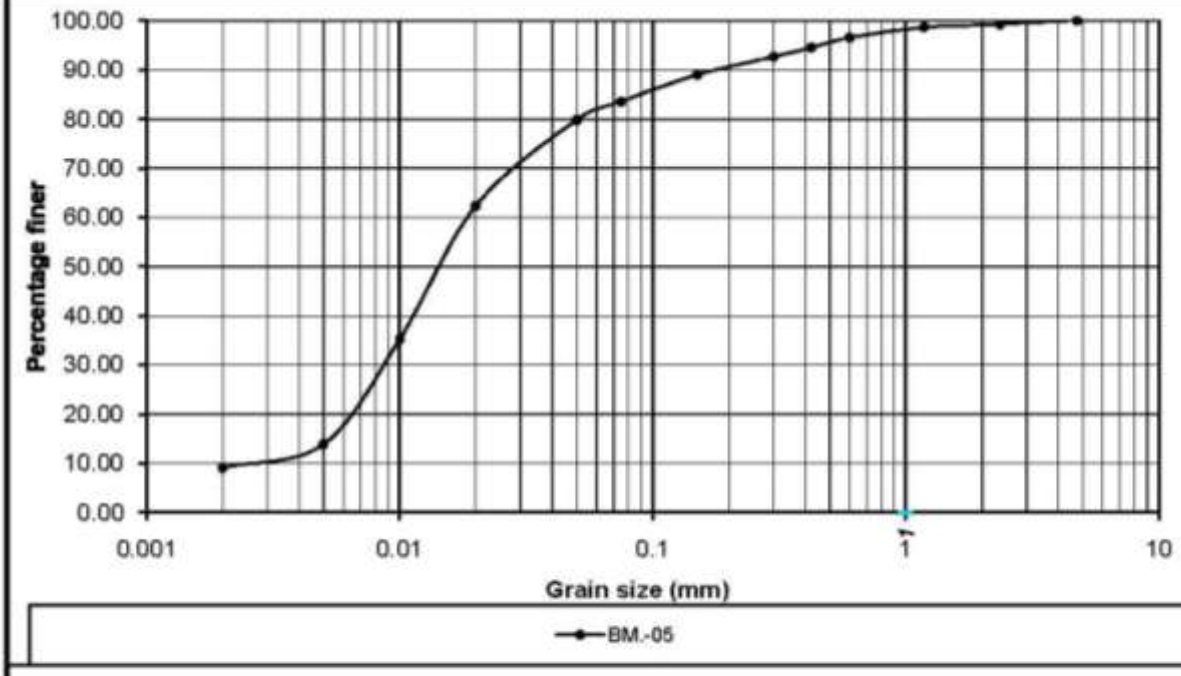
*Silt & Clay



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BM. 04	8.41	67.86	19.86	3.87

*Silt & Clay

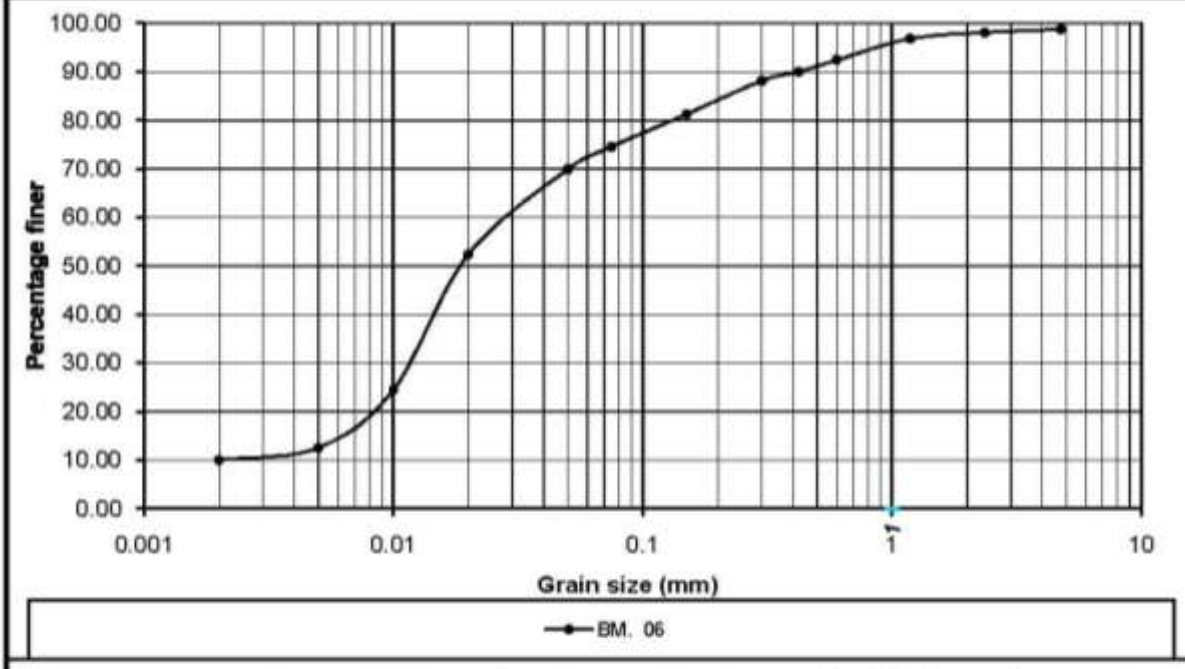
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BM.-05	9.10	67.15	23.75	0.00

*Silt & Clay

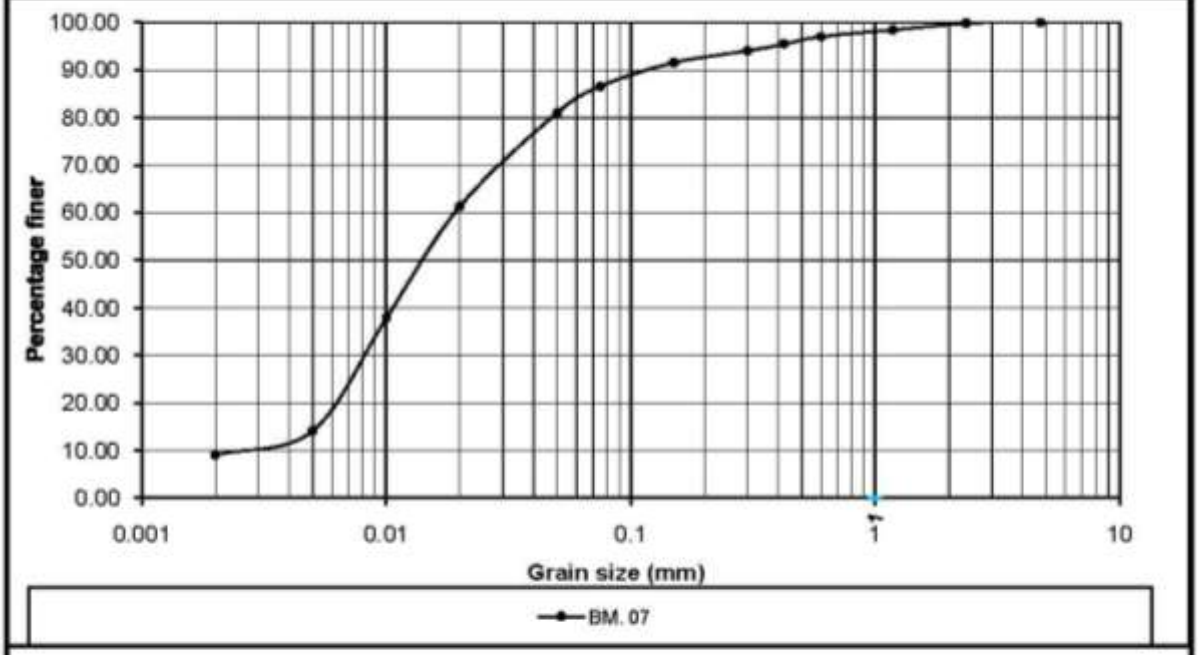
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BM. 06	9.99	65.81	22.96	1.24

*Silt & Clay

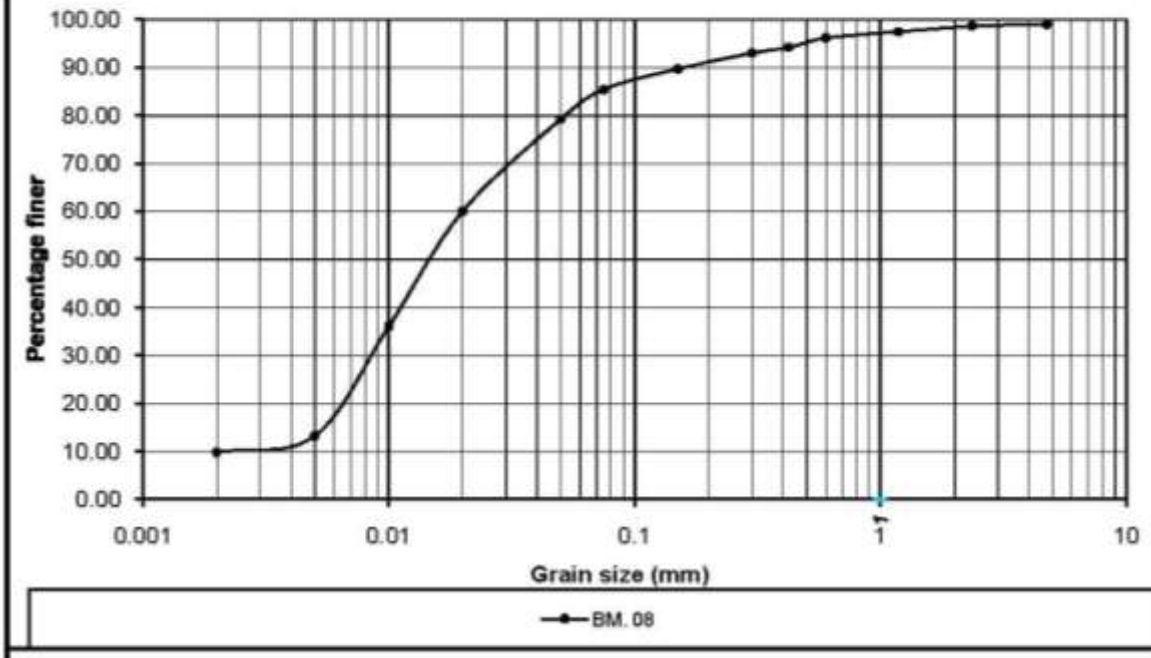
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BM. 07	9.06	63.80	27.14	0.00

*Silt & Clay

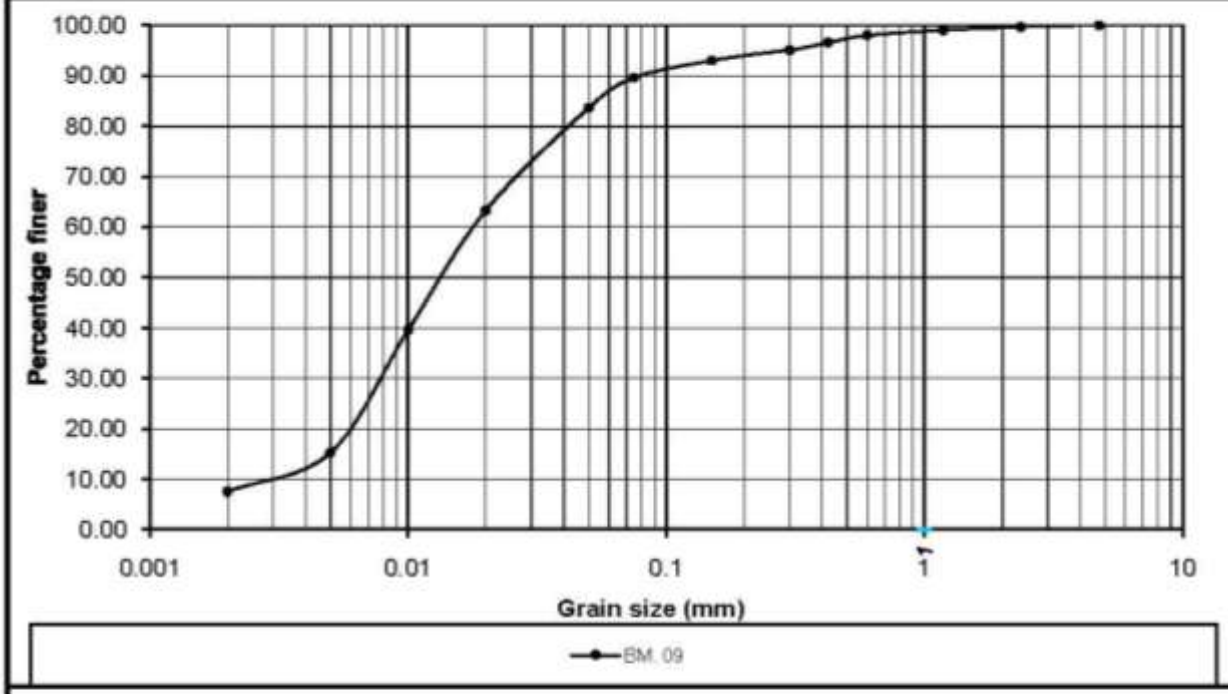
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BM. 08	9.80	66.08	23.14	0.98

*Silt & Clay

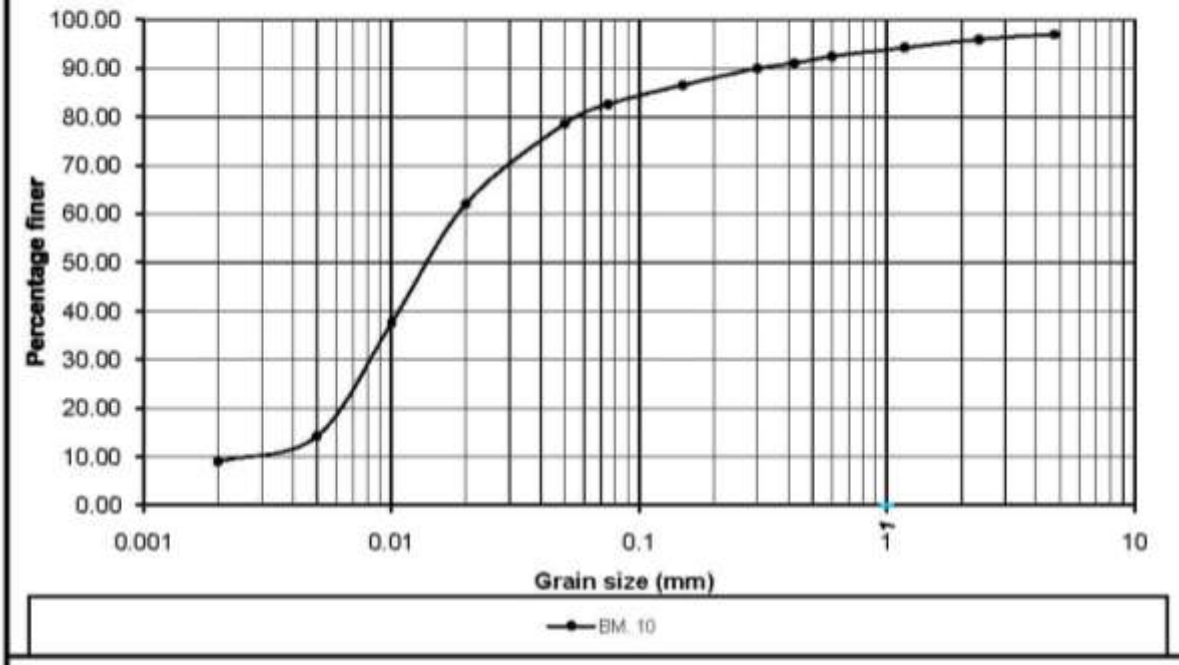
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BM. 09	7.54	65.36	27.10	0.00

*Silt & Clay

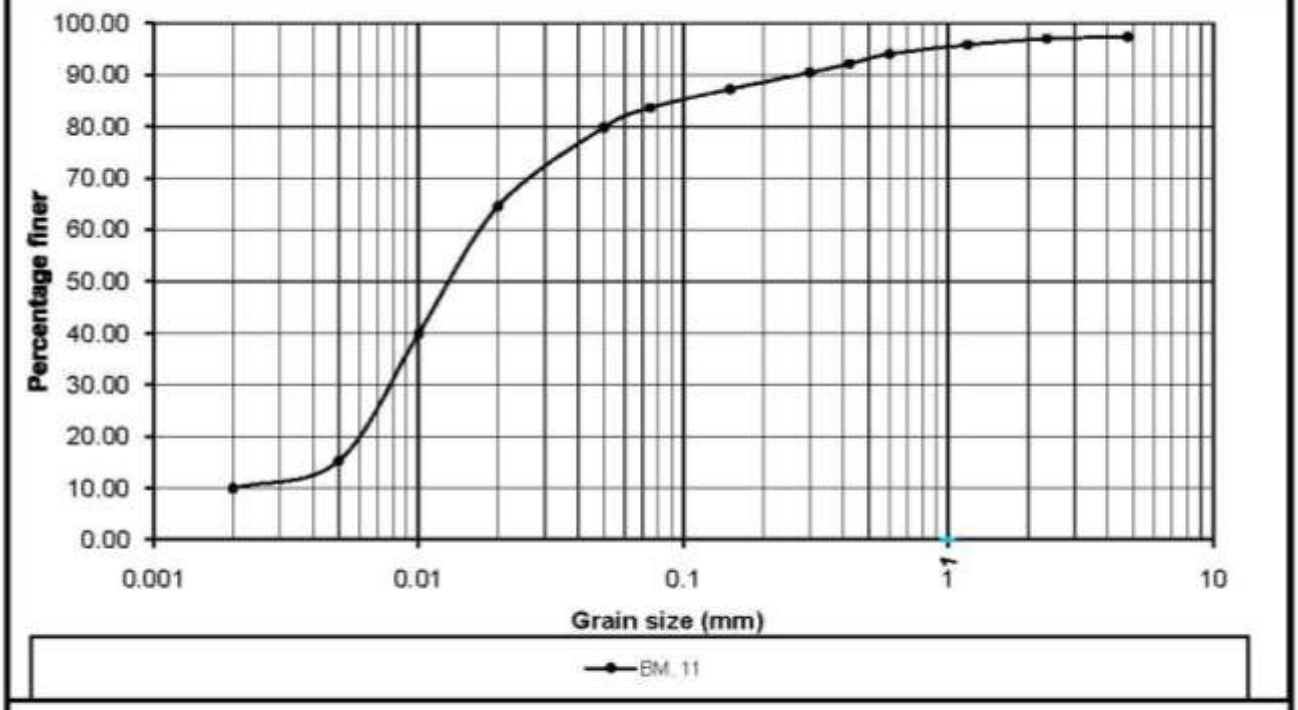
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BM. 10	9.01	67.01	20.97	3.01

*Silt & Clay

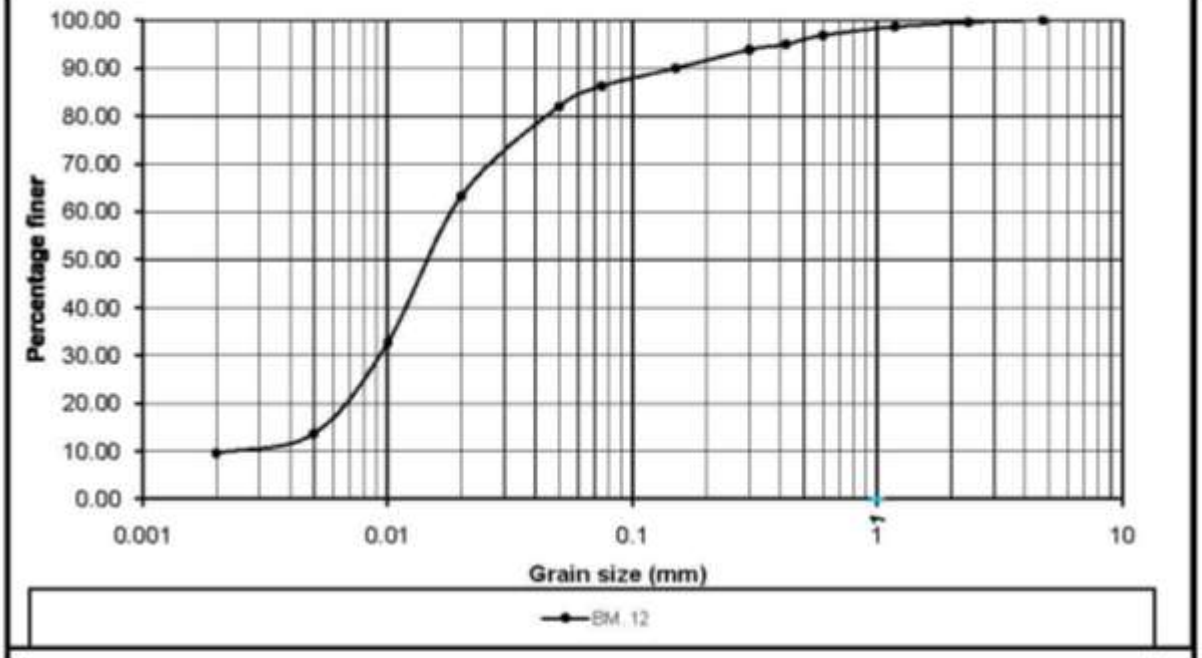
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BM. 11	9.95	64.95	22.46	2.64

*Silt & Clay

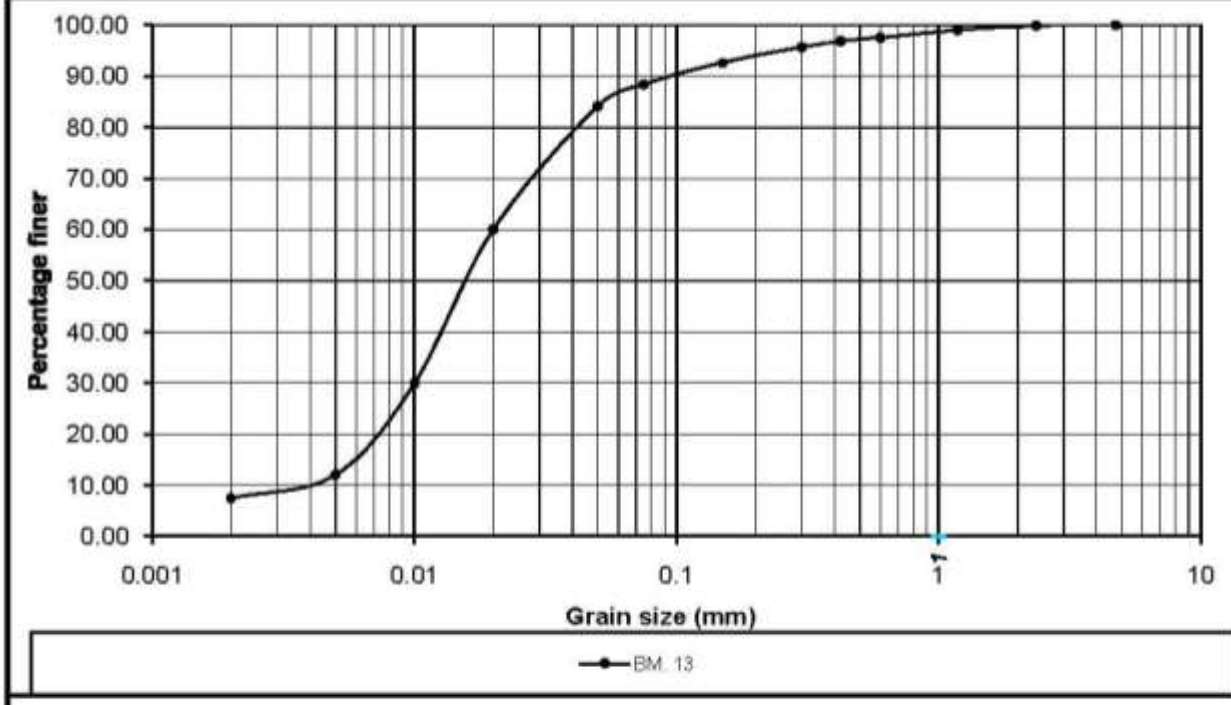
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BM. 12	9.61	65.82	24.57	0.00

*Silt & Clay

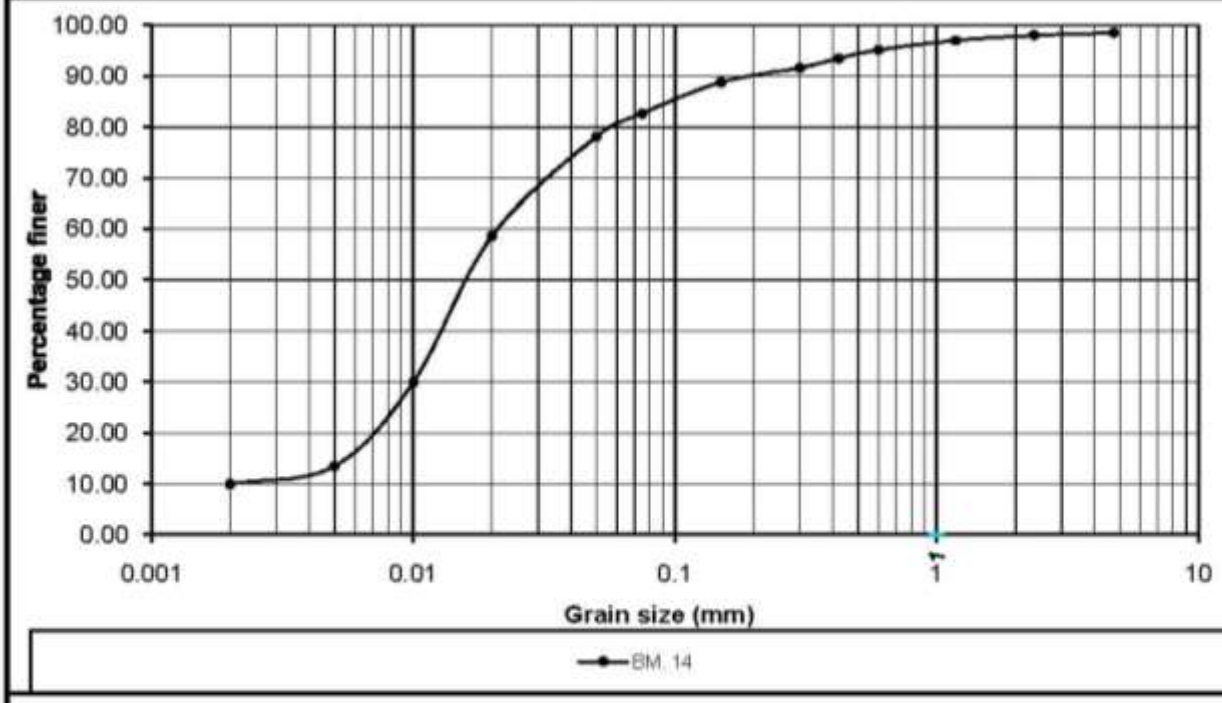
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	Clay (%)	Silt (%)	Sand (%)	Gravel (%)
BM. 13	7.46	64.86	27.68	0.00

*Silt & Clay

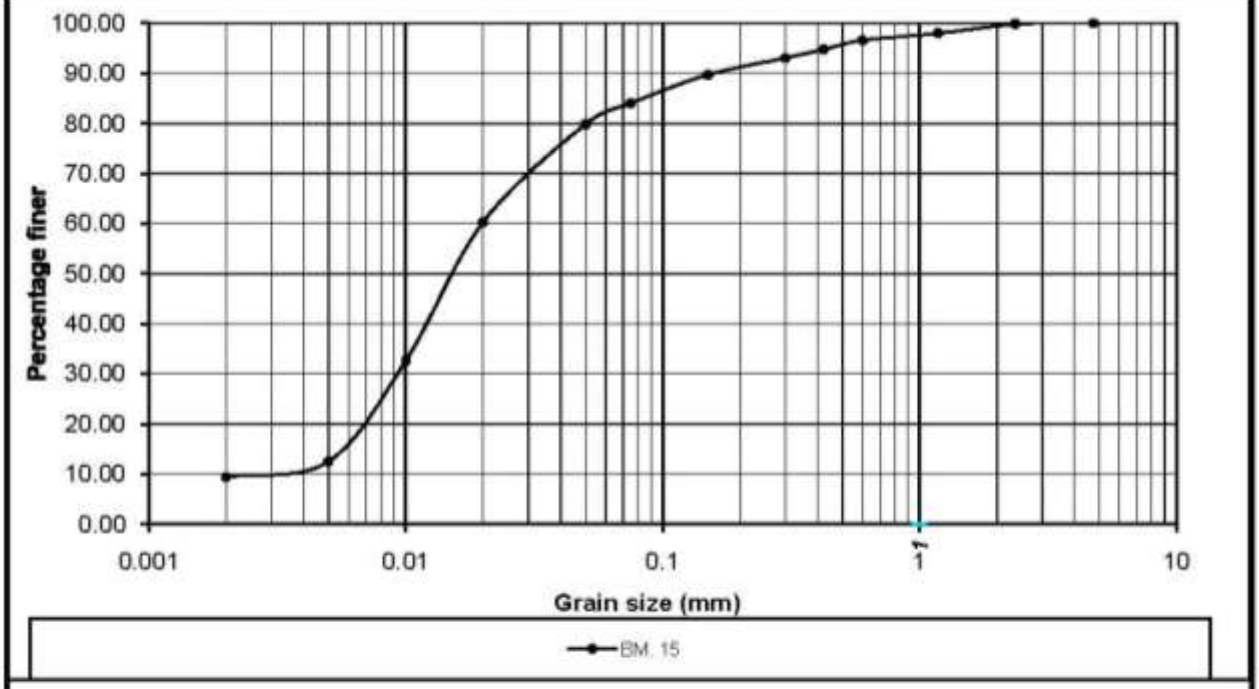
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BM. 14	9.96	67.59	20.98	1.47

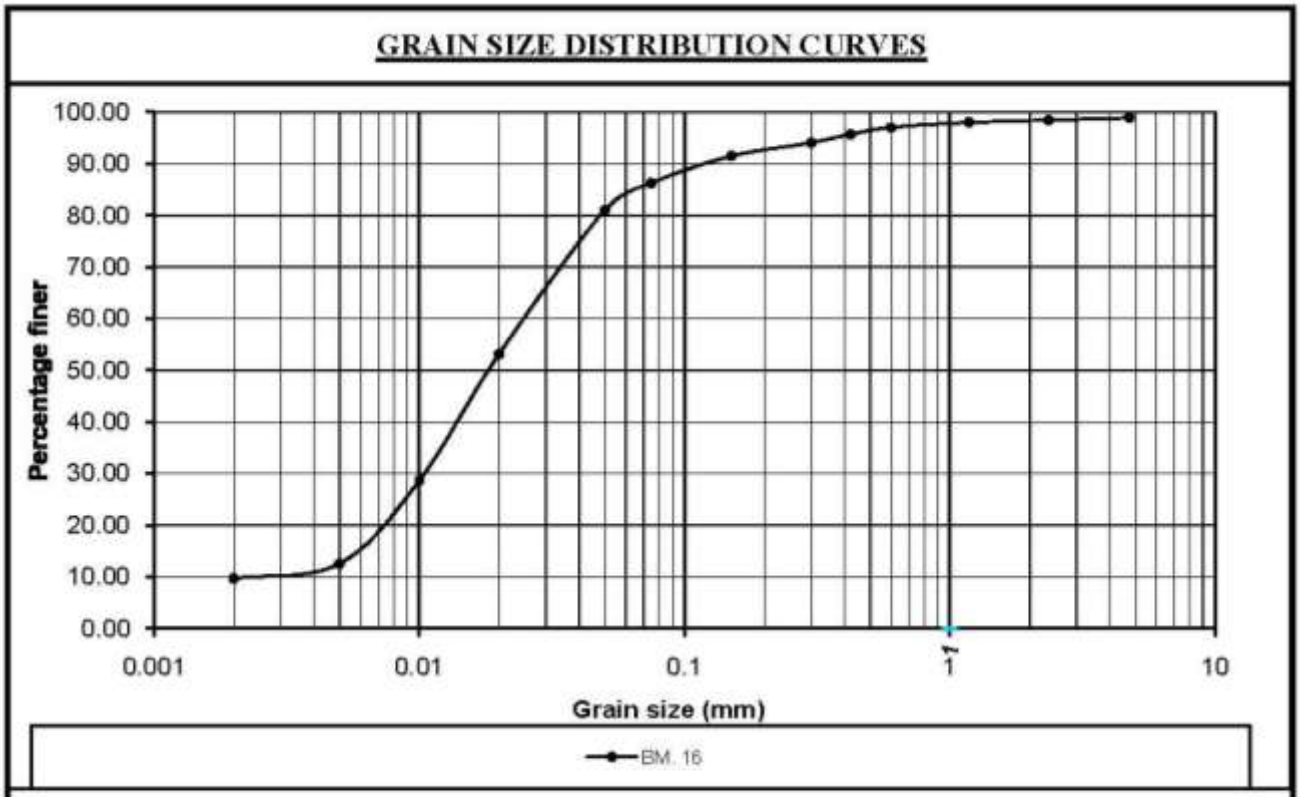
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BM. 15	9.39	65.59	25.02	0.00

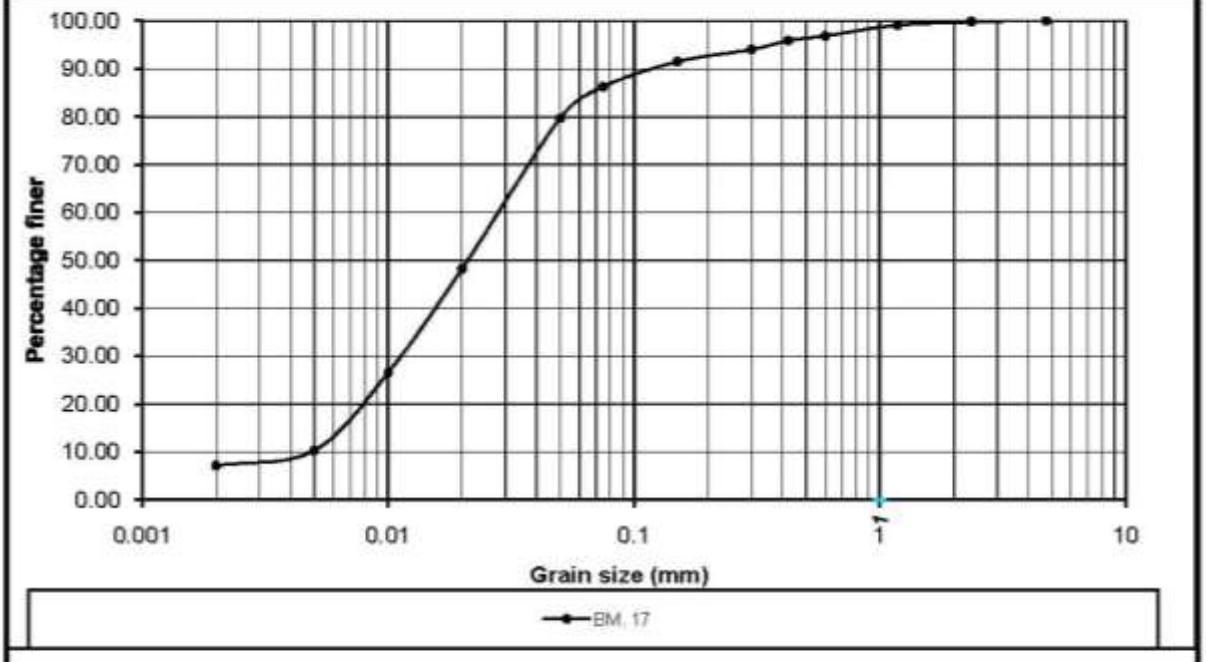
*Silt & Clay



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BM. 16	9.66	65.25	23.98	1.11

*Silt & Clay

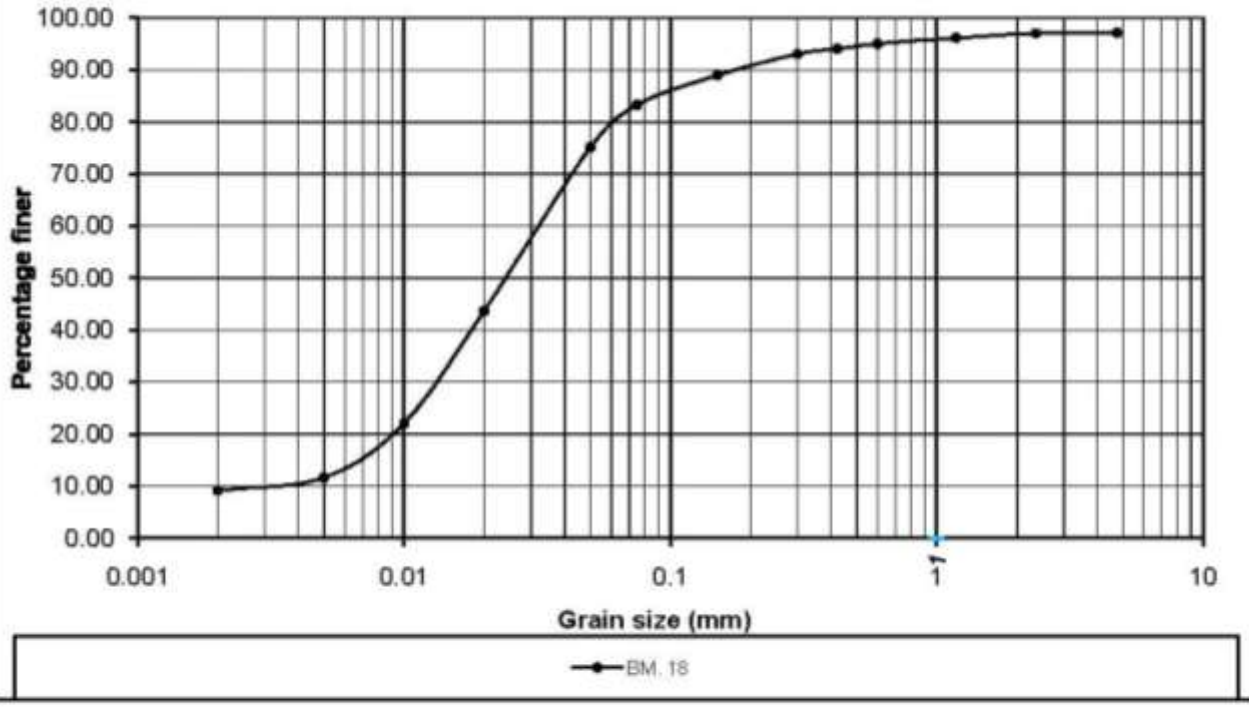
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BM. 17	7.12	64.76	28.12	0.00

*Silt & Clay

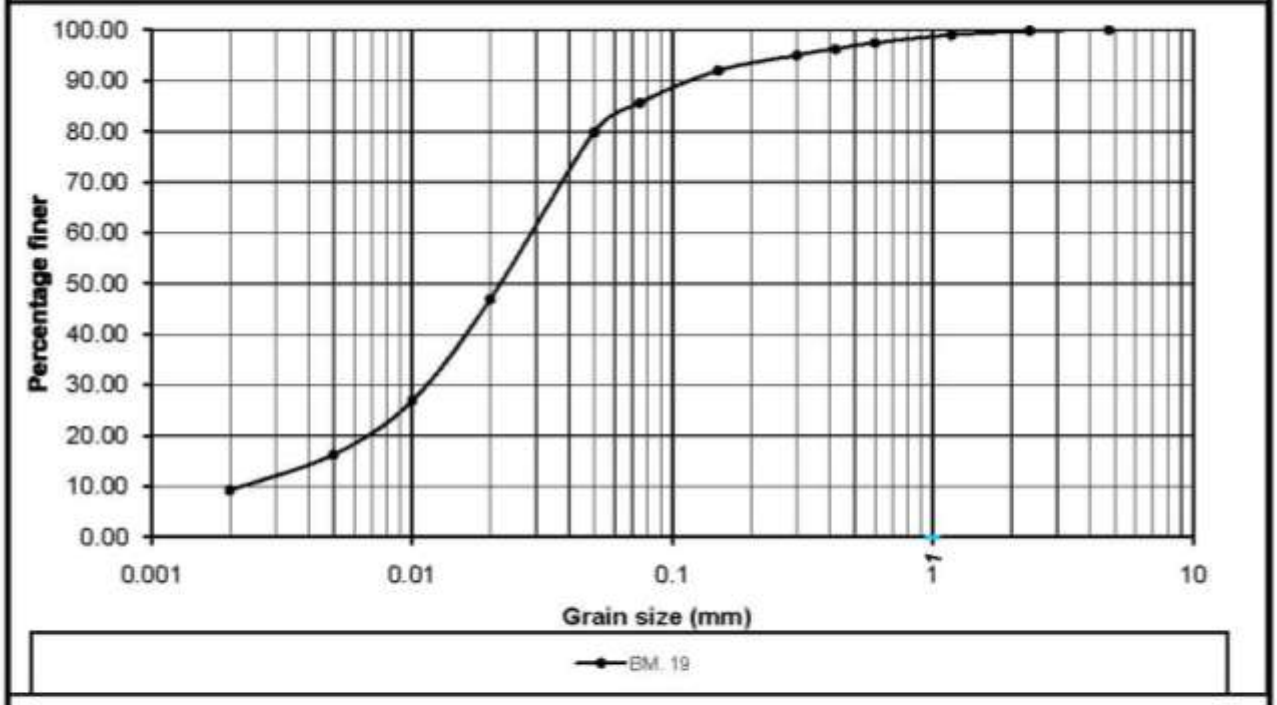
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BM. 18	9.19	66.23	21.71	2.87

*Silt & Clay

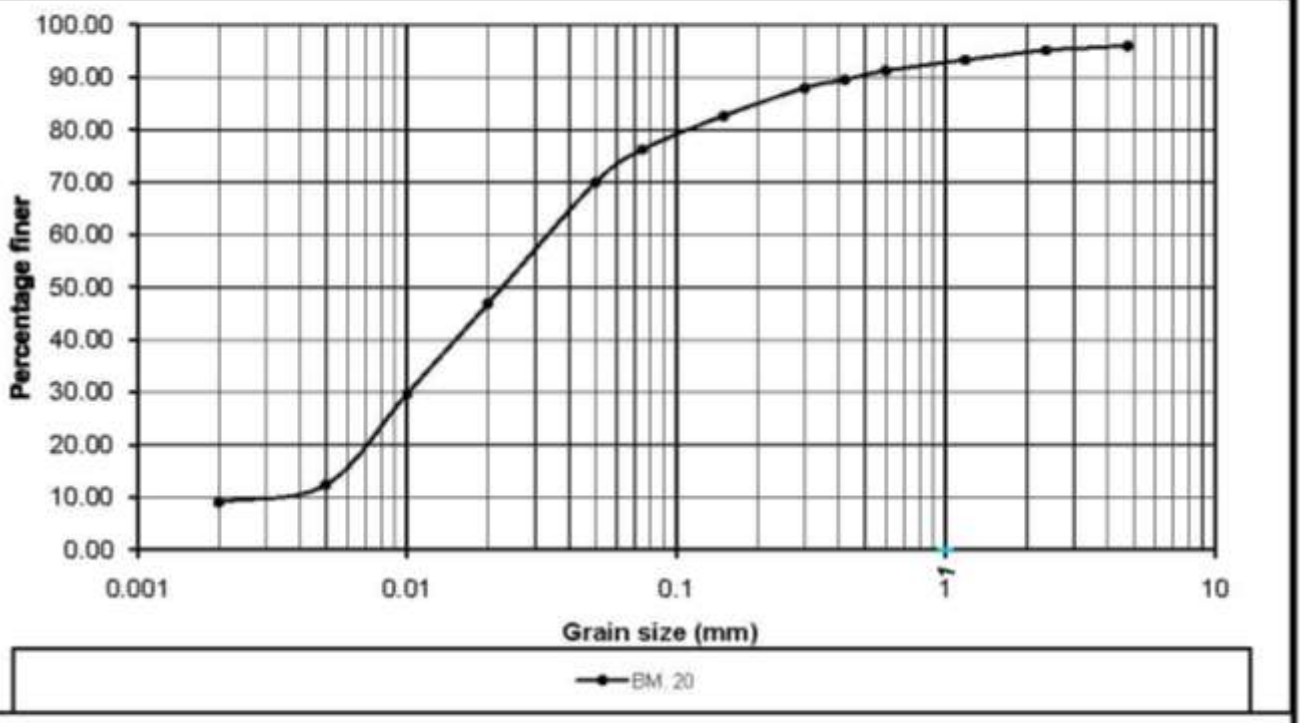
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BM. 19	9.27	64.96	25.77	0.00

*Silt & Clay

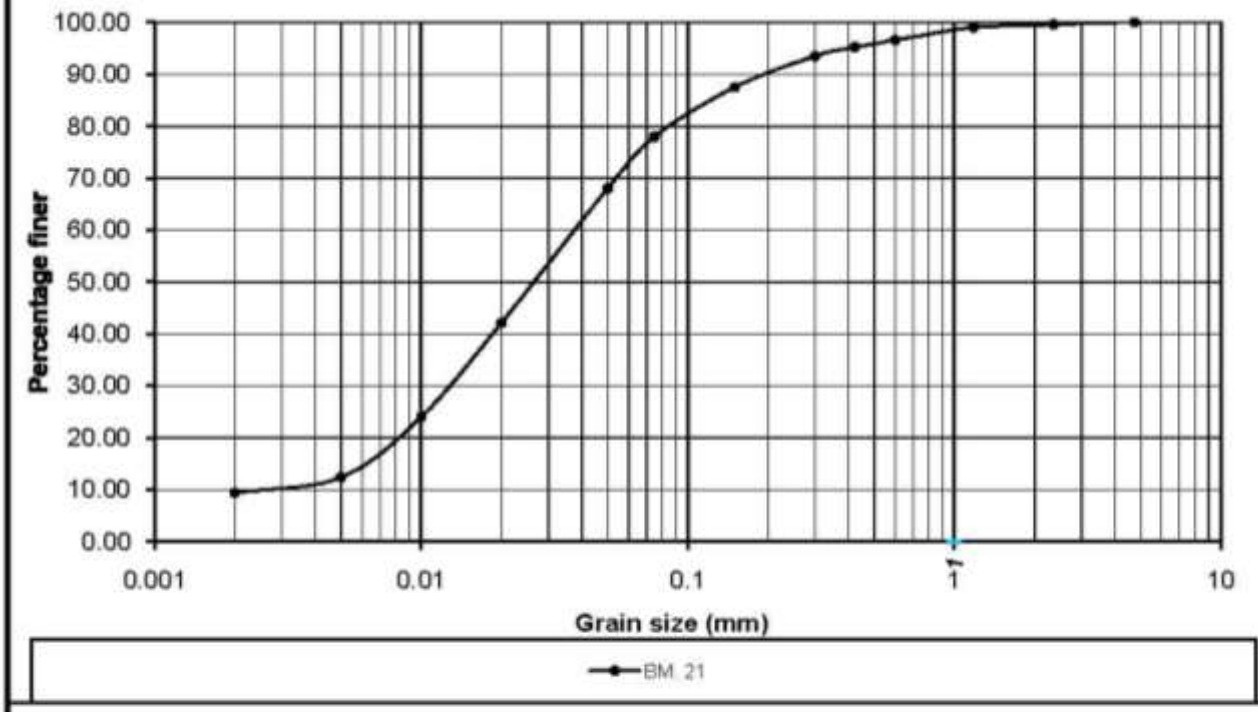
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BM. 20	9.00	67.87	19.08	4.05

*Silt & Clay

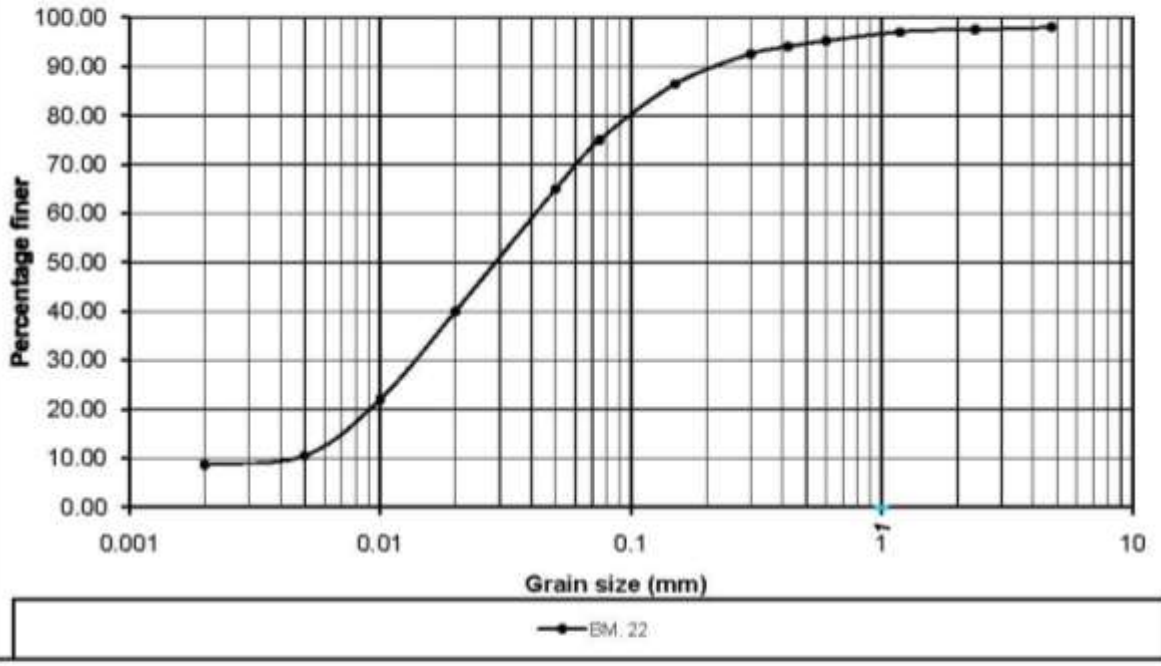
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BM. 21	9.35	66.60	24.05	0.00

*Silt & Clay

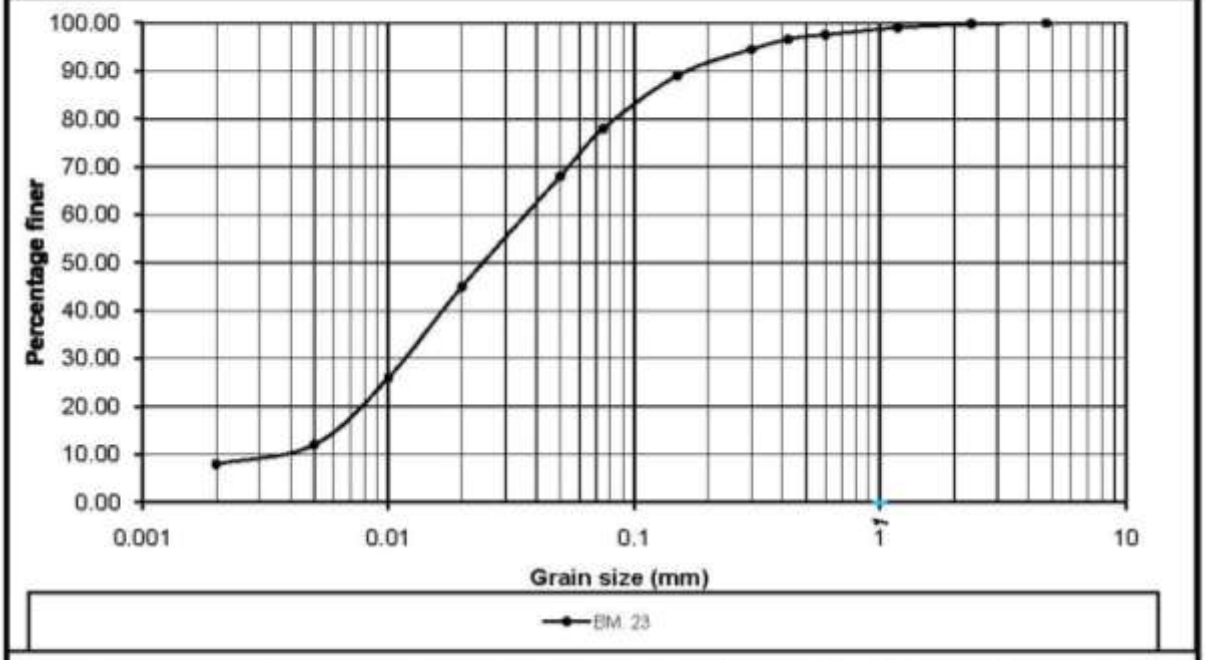
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BM. 22	8.66	67.22	22.10	2.02

*Silt & Clay

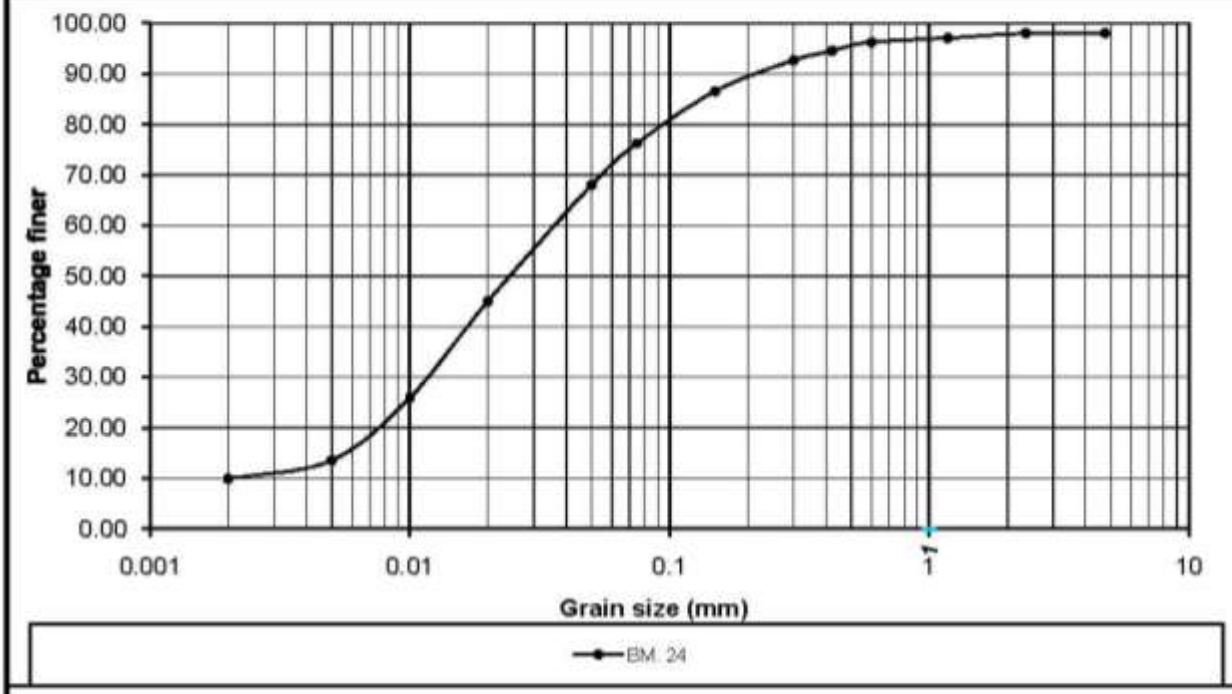
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BM. 23	7.98	67.15	24.87	0.00

*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BM. 24	9.91	65.34	22.81	1.94

*Silt & Clay

Annexure-12 Water Sample Report:-

RESULTS OF EXAMINATION OF SAMPLES OF WATER

SITE:RIVER KOSI

PARAMETER - **pH Value at 25°C**

SL. NO.	B.M.	LOCATION	PARAMETER	WATER SAMPLE RESULTS	PERMISSIBLE LIMITS IS: 456-2000
1	1	.....	pH at 25°C	7.3	6.5-8.5
2	2	.....		7.1	
3	3	.....		8.2	
4	4	.....		6.9	
5	5	.....		6.8	
6	6	.....		6.9	
7	7	.....		7.1	
8	8	.....		7.7	
9	9	.....		7.9	
10	10	.....		6.3	
11	11	.....		8.3	
12	12	.....		8.4	
13	13	.....		7.2	
14	14	.....		7.6	
15	15	.....		6.6	
16	16	.....		6.6	
17	17	.....		6.9	
18	18	.....		7.3	
19	19	.....		7.4	
20	20	.....		7.7	
21	21	.....		7.2	
22	22	.....		6.5	
23	23	.....		6.7	
24	24	.....		6.6	

Note: - The Water sample positions have been shown in the next page no-240

Water Sample Positions

Sample No.	Chain-age (km)	Easting (m)	Northing (m)	Latitude (N)	Longitude (E)	Total Depth (d) (m)	Mid-Depth (0.5d) (m)
1	2.122	523428.5286	2811901.921	25°25'25.862"	87°13'58.722"	2.3	1.15
2	8.533	517525.8022	2811379.648	25°25'09.176"	87°10'27.386"	2.0	1.0
3	21.232	512641.3092	2814087.31	25°26'37.381"	87°07'32.623"	1.3	0.65
4	28.039	505571.1389	2810527.453	25°24'41.806"	87°03'19.422"	0.6	0.30
5	43.254	495474.286	2814736.392	25°26'58.651"	86°57'17.948"	0.9	0.45
6	51.476	479409.1334	2816328.877	25°27'49.933"	86°47'42.62"	1.2	0.60
7	62.547	473464.3037	2822243.043	25°31'01.859"	86°44'09.311"	2.5	1.25
8	72.573	472271.5547	2824978.02	25°32'30.693"	86°43'26.375"	3.0	1.50
9	79.752	469328.6863	2827961.564	25°34'07.475"	86°41'40.676"	0.5	0.25
10	91.252	460046.18	2833503.69	25°37'06.843"	86°36'07.381"	0.6	0.30
11	100.936	453711.15	2837247.66	25°39'07.884"	86°32'19.764"	1.5	0.75
12	109.343	450442.3214	2843897.187	25°42'43.662"	86°30'21.634"	1.2	0.60
13	120.670	445117.982	2852356.946	25°47'17.982"	86°27'09.318"	0.7	0.35
14	130.974	444755.5903	2862449.591	25°52'46.012"	86°26'54.786"	0.9	0.45
15	140.884	444362.7185	2871965.533	25°57'55.286"	86°26'39.218"	0.6	0.30
16	151.166	446647.6732	2881074.348	26°02'51.687"	86°28'00.048"	1.3	0.65
17	159.357	451347.2378	2886967.822	26°06'03.857"	86°30'48.371"	1.1	0.55
18	169.973	454162.88	2893831.07	26°09'47.285"	86°32'28.868"	2.1	1.05
19	180.856	459125.9312	2902733.173	26°14'37.193"	86°35'26.63"	1.3	0.65
20	189.271	464498.165	2907626.415	26°17'16.766"	86°38'39.793"	0.3	0.15
21	203.440	475798.6728	2912656.931	26°20'01.136"	86°45'26.949"	0.8	0.40
22	211.736	482478.5588	2919219.956	26°23'34.824"	86°49'27.599"	1.2	0.60
23	223.069	489998.2818	2925609.762	26°27'02.789"	86°53'58.828"	2.1	1.05
24	233.040	492511.17	2933981.58	26°31'34.973"	86°55'29.394"	0.6	0.30

RESULTS OF EXAMINATION OF SAMPLES OF WATER

SITE:RIVER KOSI

PARAMETER - **Chloride as Cl(mg/l)**

SL. NO.	B.M.	LOCATION	PARAMETER	WATER SAMPLE RESULTS	PERMISSIBLE LIMITS IS: 456-2000
1	1	.....	Chloride as Cl(mg/l)	8	2000mg/l for concrete not containing embedded steel and 500 Mg/l for reinforced concrete work
2	2	.....		12	
3	3	.....		10	
4	4	.....		12	
5	5	.....		8	
6	6	.....		6	
7	7	.....		6	
8	8	.....		8	
9	9	.....		6	
10	10	.....		8	
11	11	.....		6	
12	12	.....		8	
13	13	.....		8	
14	14	.....		6	
15	15	.....		10	
16	16	.....		6	
17	17	.....		8	
18	18	.....		10	
19	19	.....		8	
20	20	.....		12	
21	21	.....		6	
22	22	.....		8	
23	23	.....		12	
24	24	.....		8	

RESULTS OF EXAMINATION OF SAMPLES OF WATER

SITE :RIVER KOSI

PARAMETER - **Sulphates as SO_4(mg/l)**

SL. NO.	B.M.	LOCATION	PARAMETER	WATER SAMPLE RESULTS(mg/l)	PERMISSIBLE LIMITS IS: 456-2000
1	1	.....	Sulphates as SO_4(mg/l)	140	400(mg/l)
2	2	.....		135	
3	3	.....		146	
4	4	.....		155	
5	5	.....		157	
6	6	.....		162	
7	7	.....		188	
8	8	.....		170	
9	9	.....		165	
10	10	.....		198	
11	11	.....		174	
12	12	.....		148	
13	13	.....		156	
14	14	.....		194	
15	15	.....		158	
16	16	.....		192	
17	17	.....		185	
18	18	.....		190	
19	19	.....		175	
20	20	.....		184	
21	21	.....		182	
22	22	.....		160	
23	23	.....		180	
24	24	.....		174	

RESULTS OF EXAMINATION OF SAMPLES OF WATER

SITE:RIVER KOSI

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

SL. NO.	B.M.	LOCATION	PARAMETER	WATER SAMPLE RESULTS	PERMISSIBLE LIMITS IS:456-2000
1	1	.....	Sediment Concentration (mg/l)	170	2000(mg/l)
2	2	.....		160	
3	3	.....		165	
4	4	.....		176	
5	5	.....		185	
6	6	.....		187	
7	7	.....		194	
8	8	.....		218	
9	9	.....		200	
10	10	.....		232	
11	11	.....		204	
12	12	.....		178	
13	13	.....		187	
14	14	.....		226	
15	15	.....		188	
16	16	.....		220	
17	17	.....		215	
18	18	.....		224	
19	19	.....		206	
20	20	.....		208	
21	21	.....		214	
22	22	.....		190	
23	23	.....		212	
24	24	.....		198	

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, 2342680, CIN - U74899DL1985PTC021177
e-mail : pale@panindiagroup.com, pale@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	:	02/02/2016
VALIDITY	:	02/02/2017

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

For **PAN INDIA CONSULTANTS PVT. LTD.**

AUTHORISED SIGNATORY

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

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 2346546, 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	:	02/02/2016
VALIDITY	:	02/02/2017

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

for PAN INDIA CONSULTANTS PVT. LTD.

Pan India Consultants Pvt. Ltd. Gurgaon

AUTHORISED SIGNATORY

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

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	:	02/02/2016
VALID UPTO	:	02/02/2017
ISSUED TO	:	PRECISION SURVEY CONSULTANCY

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

Authorised Signatory

Annexure-14 Field Photographs:-

Figure 76- Kosi Barrage view (Chainage-233.040 km)

Figure 77- Paddy land

Figure 78- Maize land

Figure 79- Mustard land

Figure 80- Topographical Survey Instrument

Figure 81-Installed temporary Tide Gauge

Figure 82- During the Bathymetry Survey

Figure 83- Boulder pitching protect the river side

Figure 84- River bank erosion

Annexure-15 Survey Charts:-

Sl. No.	Chart No.	Chainage (from ..... km to .... km)	Location (from .... to .....)	Scale	Size of the Chart
1	1	0.000 km to 8.00 km	Kursela to Madrauni pachhiarital	1:10000	A-1
2	2	8.00 km to 23.00 km	Madrauni pachhiarital to Nagrah	1:10000	A-1
3	3	23.00 km to 31.00 km	Nagrah to Dhodhia	1:10000	A-1
4	4	31.00 km to 41.00 km	Dhodhia to Gobindpur Gobind	1:10000	A-1
5	5	41.00 km to 52.00 km	Gobindpur Gobind to Bainadih	1:10000	A-1
6	6	52.00 km to 60.00 km	Bainadih to Kapasia	1:10000	A-1
7	7	60.00 km to 70.00 km	Kapasia to Baltara	1:10000	A-1
8	8	70.00 km to 75.00 km	Baltara to Dumri	1:10000	A-1
9	9	75.00 km to 83.00 km	Dumri to Kharaita	1:10000	A-1
10	10	83.00 km to 90.00 km	Kharaita to Dhamara ghat	1:10000	A-1
11	11	90.00 km to 98.00 km	Dhamara ghat to Tajpur	1:10000	A-1
12	12	98.00 km to 106.00 km	Tajpur to Sahuria	1:10000	A-1
13	13	106.00 km to 114.00 km	Sahuria to Khochardewa	1:10000	A-1
14	14	114.00 km to 124.00 km	Khochardewa to Sirwar	1:10000	A-1
15	15	124.00 km to 131.00 km	Sirwar to Baluaha	1:10000	A-1
16	16	131.00 km to 139.00 km	Baluaha to Narainpur	1:10000	A-1
17	17	139.00 km to 147.00 km	Narainpur to Majhaul	1:10000	A-1
18	18	147.00 km to 153.00 km	Majhaul to Murlipur	1:10000	A-1
19	19	153.00 km to 160.00 km	Murlipur to Bagewa	1:10000	A-1
20	20	160.00 km to 166.00 km	Bagewa to Asurgarh	1:10000	A-1
21	21	166.00 km to 173.00 km	Asurgarh to Ghogkaria	1:10000	A-1
22	22	167.00 km to 174.00 km	Asurgarh to Ghogkaria	1:10000	A-1

Sl. No.	Chart No.	Chainage (from ..... km to .... km)	Location (from .... to .....)	Scale	Size of the Chart
23	23	174.00km to 180.00 km	Barahra to parsa Madho	1:10000	A-1
24	24	180.00 km to 184.00 km	parsa Madho to Raharia	1:10000	A-1
25	25	184.00 km to 191.00 km	Raharia to Dudhaila	1:10000	A-1
26	26	191.00 km to 195.00 km	Dudhaila to Uganipatti	1:10000	A-1
27	27	195.00 km to 202.00 km	Uganipatti to Parsahi	1:10000	A-1
28	28	202.00 km to 207.00 km	Kaleanpur to Baisa	1:10000	A-1
29	29	207.00 km to 216.00 km	Baisa to Narpat patti	1:10000	A-1
30	30	216.00 km to 222.00 km	Narpat patti to Saranpur	1:10000	A-1
31	31	222.00 km to 227.00 km	Saranpur to Dubiahi	1:10000	A-1
32	32	227.00 km to 233.040 km	Dubiahi to Kosi Barrage	1:10000	A-1

Table 28-Survey Charts