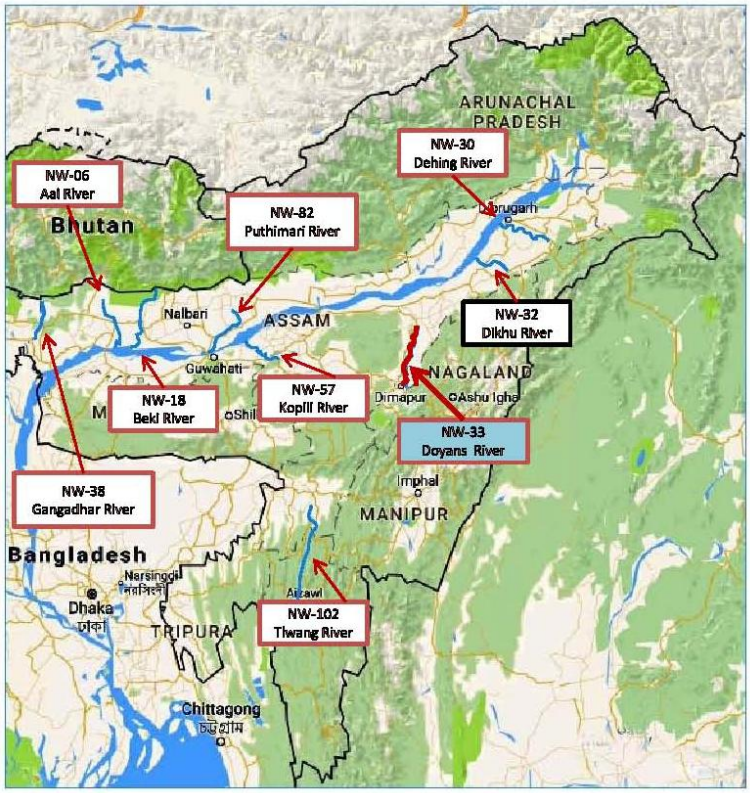
INLAND WATERWAYS AUTHORITY OF INDIA, A-13, SECTOR-1, NOIDA
DIST-GAUTAM BUDHA NAGAR, UTTAR PRADESH, PIN- 201 301(UP)
" FINAL FEASIBILITY REPORT ON HYDROGRAPHIC SURVEY

DOYANS RIVER (NW-33) (61.368 km)

FROM "CONFLUENCE OF DOYANS AND SUBANSIRI RIVER TO BRIDGE NEAR SIALMARI"

Survey Period from 01.12.15 to 22.12.15



FINAL REPORT ON HYDROGRAPHICAL SURVEY OF DOYANS RIVER, ASSAM

REPORT SUBMISSION DATE- 03.10.2018

SUBMITTED BY:

PRECISION SURVEY CONSULTANCY

"Vichitra" SP -45, (Kolkata West International City)
Salap Junction, Howrah Amta Road &
Bombay Road Crossing,
NH- 6, Howrah – 711 403
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Visit us –www.precisionsurvey.co.in

Acknowledgement

Precision Survey Consultancy (PSC), Salap, Howrah express its sincere gratitude to **IWAI** for awarding the work and guidance for completing this Project of detailed Hydrographic Survey and the Feasibility Report in **Region-II (Doyans River) from Confluence of Doyans and Subansiri River to Bridge near Sialmari (61.368 km) .**

We would like to use this opportunity to pen down our profound gratitude and appreciations to **Ms. Nutan Guha Biswas, IAS, Chairperson, IWAI** for spending their valuable time and guidance for compleing this project of " Detailed Hydrography and Topography survey in Doyans 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).**

PSC wishes to express their gratitude to **Cdr. P.K. Srivastava, Ex. Hydrographic Chief, Shri S.V.K. Reddy, Chief Engineer-I, IWAI** for his guidance and inspiration for this project. PSC would also like to thank **Shri Rajiv Singhal, A.H.S., IWAI** invaluable support and suggestions provided throughout the survey period. PSC is pleased to place on record our sincere thanks to other staff and officers of **IWAI** for their excellent support and co-operation throughout the survey period.

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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

Salient Features of Doyans River

<table>
<tr><th>Sl</th><th>Particulars</th><th>Details</th></tr>
<tr><td>1.</td><td>Name of Consultant</td><td>Precision Survey Consultancy</td></tr>
<tr><td>2.</td><td>Region number & State(s)</td><td>Region II, Assam</td></tr>
<tr><td>3.</td><td>a) Waterway name

b) NW #

c) Total Stretch and length of declared NW (from…. To….; total length)

d) Survey Period (… to …)</td><td>a) Doyans River

b) NW-33

c) From Confluence of Doyans and Subansiri River (Chainage-0.00 km) to Bridge near at Sialmari (Chainage-61.368 km).

d) 1st December to 22nd December, 2015</td></tr>
<tr><td>4.</td><td>Tidal & non tidal portions (from… to, length, average tidal variation)</td><td>There are no Tidal influence or portions found in this zone of River.</td></tr>
<tr><td>5.</td><td>LAD status (Least Available Depth)

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

i) < 1.2 m
ii) 1.2 m to 1.4 m
iii) 1.5 m to 1.7 m
iv) 1.8 m to 2.0 m
v) > 2.0 m</td><td>Observed Depth
<table>
<tr><th>Sub Stretch-1 (0.00-10.00 km)</th><th>Sub Stretch-2 (10.00-20.00 km)</th><th>Sub Stretch-3 (20.00 – 30.00 km)</th><th>Sub Stretch-4 (30.00-40.00 km)</th></tr>
<tr><td>5.7</td><td>5.5</td><td>7.8</td><td>10</td></tr>
<tr><td>2.2</td><td>3.1</td><td>2.2</td><td>0</td></tr>
<tr><td>2.1</td><td>1.4</td><td>0</td><td>0</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Total-10.0</td><td>Total-10.0</td><td>Total- 10.0</td><td>Total- 10.0</td></tr>
</table>
<table>
<tr><th>Sub Stretch-5 (40.00-50.00 km)</th><th>Sub Stretch-6 (50.00-61.368 km)</th><th>Total (km)</th></tr>
<tr><td>10</td><td>11.368</td><td>50.368</td></tr>
<tr><td>0</td><td>0</td><td>7.5</td></tr>
<tr><td>0</td><td>0</td><td>3.5</td></tr>
<tr><td>0</td><td>0</td><td>0</td></tr>
<tr><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Total- 10.0</td><td>Total- 11.368</td><td>Total- 61.368 km</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Sl</th><th>Particulars</th><th>Details</th></tr>
<tr><td></td><td>LAD status (Least Available Depth)

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

i) < 1.2 m
ii) 1.2 m to 1.4 m
iii) 1.5 m to 1.7 m
iv) 1.8 m to 2.0 m
v) > 2.0 m</td><td><u>Reduced Depth</u>
<table>
<tr><th>Sub Stretch-1 (0.00-10.00 km)</th><th>Sub Stretch-2 (10.00-20.00 km)</th><th>Sub Stretch-3 (20.00 – 30.00 km)</th><th>Sub Stretch-4 (30.00-40.00 km)</th></tr>
<tr><td>6.2</td><td>6.3</td><td>10</td><td>10</td></tr>
<tr><td>2.1</td><td>3.0</td><td>0</td><td>0</td></tr>
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<tr><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Total-10.0</td><td>Total-10.0</td><td>Total- 10.0</td><td>Total- 10.0</td></tr>
</table>
<table>
<tr><th>Sub Stretch-5 (40.00-50.00 km)</th><th>Sub Stretch-6 (50.00-61.368 km)</th><th>Total (km)</th></tr>
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<tr><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Total- 10.0</td><td>Total- 11.368</td><td>Total- 61.368 km</td></tr>
</table></td></tr>
<tr><td>6.</td><td>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</td><td>i) There are no Dams, weirs or Barrages found in this zone of river.

ii) Total number of RCC Bridges – 2 (Two), Wooden Bridge - 4 (Four) Bamboo Bridges – 3 (Three), Rail Bridge - (1) one
<table>
<tr><th>Clearance w.r.t H.F.L</th><th>Min (m)</th><th>Max (m)</th></tr>
<tr><td>Horizontal Clearance (m)</td><td>39.280</td><td>44.580</td></tr>
<tr><td>Vertical Clearance w.r.t. H.F.L (m)</td><td>2.056</td><td>3.160</td></tr>
</table>
iii) There is no power cables found in this zone of river.</td></tr>
</table>

<table>
<tr><th>Sl</th><th>Particulars</th><th>Details</th></tr>
<tr><td>7.</td><td>Slope</td><td>
<table>
<tr><th colspan="2">Reach</th><th>River / Canal Bed Level Change (m)</th><th>Distance (km)</th><th>Slope (m/km)</th><th>Slope (cm/km)</th></tr>
<tr><th>From</th><th>To</th><th></th><th></th><th></th><th></th></tr>
<tr><td>0.000</td><td>1.110</td><td>0.141</td><td>1.11</td><td>0.127</td><td>12.703</td></tr>
<tr><td>1.111</td><td>14.834</td><td>1.737</td><td>13.723</td><td>0.127</td><td>12.658</td></tr>
<tr><td>14.835</td><td>23.585</td><td>1.108</td><td>8.75</td><td>0.127</td><td>12.663</td></tr>
<tr><td>23.586</td><td>33.489</td><td>1.254</td><td>9.903</td><td>0.127</td><td>12.663</td></tr>
<tr><td>33.490</td><td>44.054</td><td>1.337</td><td>10.564</td><td>0.127</td><td>12.656</td></tr>
<tr><td>44.055</td><td>56.146</td><td>1.531</td><td>12.091</td><td>0.127</td><td>12.662</td></tr>
<tr><td>56.147</td><td>61.368</td><td>0.661</td><td>5.221</td><td>0.127</td><td>12.660</td></tr>
<tr><td colspan="3">Total</td><td>61.362</td><td>Avg-0.127</td><td>Avg-12.66</td></tr>
</table>
</td></tr>
<tr><td>8.</td><td>Discharge Report</td><td>
<table>
<tr><th>Sl. No</th><th>Chainage (km)</th><th>Discharge (Cubic meter/sec)</th><th rowspan="5">Dated 01.12.15 to 22.12.15</th></tr>
<tr><td>1</td><td>1.11</td><td>58.387</td></tr>
<tr><td>2</td><td>13.185</td><td>20.603</td></tr>
<tr><td>3</td><td>23.585</td><td>15.627</td></tr>
<tr><td colspan="2">Avg. Discharge</td><td>31.539</td></tr>
</table>
</td></tr>
<tr><td>9.</td><td>i) Present IWT operations

ii) Ferry services, tourism, cargo, if any</td><td>i) As Follows

ii) There is a passenger ferry service named Khatkhati ferry ghat (Chainage-3.200 km) available in this zone of river. There is no cargo available in this zone of river. Golaghat is the one of the major Communicative place located in this zone of river.</td></tr>
<tr><td>10.</td><td>Approx distance of Rail & Road from waterway</td><td>Nearest Railway station-
i) Oating Railway station (2.36 km approx from the waterway)
ii) Jamguri Railway Station (0.36 km approx from the waterway)
iii) Bhilgaon Railway Station (4.46 km approx from the waterway)
Name of the National highway close to the River-NH-36, NH-39, NH-61
Name of SH- SH-1, SH-4, SH-32, SH-33, SH-34, SH-35</td></tr>
<tr><td>11.</td><td>Any other information/ comment</td><td></td></tr>
</table>

Section-1: Introductory Considerations

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

Doyans is the longest river in the state originating from the Japfu Hill near the Southern slope of Mao in Manipur and moves in a south west direction passing through Kohima district and flows northward into Zunheboto and Wokha District. It passes through a great part of Wokha District and flows south westerly into Dhansiri in Sibsagar, District of Assam. The main tributaries of Doyang are Chubi River which flows southward from Mokokchung District and Nzhu River, originating from Nerhema area of Kohima district and flows through Miphong in Tseminyu area and finally pours itself to Doyans.

Doyans River is one of the biggest and longest rivers located in the Wokha District and is called Dzu or Dzulu by the local people. Tsui, Tullo and Tishi are the main tributaries of this river. The Doyans River originates from the north and then turns towards east and meets the Saju River.

Doyans River is one of the most important rivers in the district. It is the biggest and longest rivers which run near the state's southern boundary. The river first flows almost due north, slightly turn towards east when it received an addition of Saju, an eastward parallel tributary. The river then enters Zunheboto district still flowing north westward. It later on forms a boundary line between Sema and Lotha areas. In the west of Litami it makes westward bend and emerged in the western Lotha area in Wokha district, and proceeds to the southern border of the district, it suddenly turns westward and then debouches the hills for the plains west of Koro village and then finally falls in the Dhansiri river of Assam valleys. In the valley along the Doyans River the modern system of cultivation like terrace is being carried out successfully, especially in two particular areas near Pangti village called "Pofu hay" and "Tentsu hay". Besides vegetables, and fruits such as banana, pineapple papaya etc. is abundantly and luxuriantly grown in those two areas.

Figure 1- Doyans River Site Map

1.2 Tributaries / Network of River/ Basin:-

The three streams creates a river basin in this zone of river

i) Tsui

ii) Tullo

iii) Tishi

1.3State / District through which river passes:-

The river passes through the district of Kohima, Wokha and Zunheboto.

1.4 Map:-

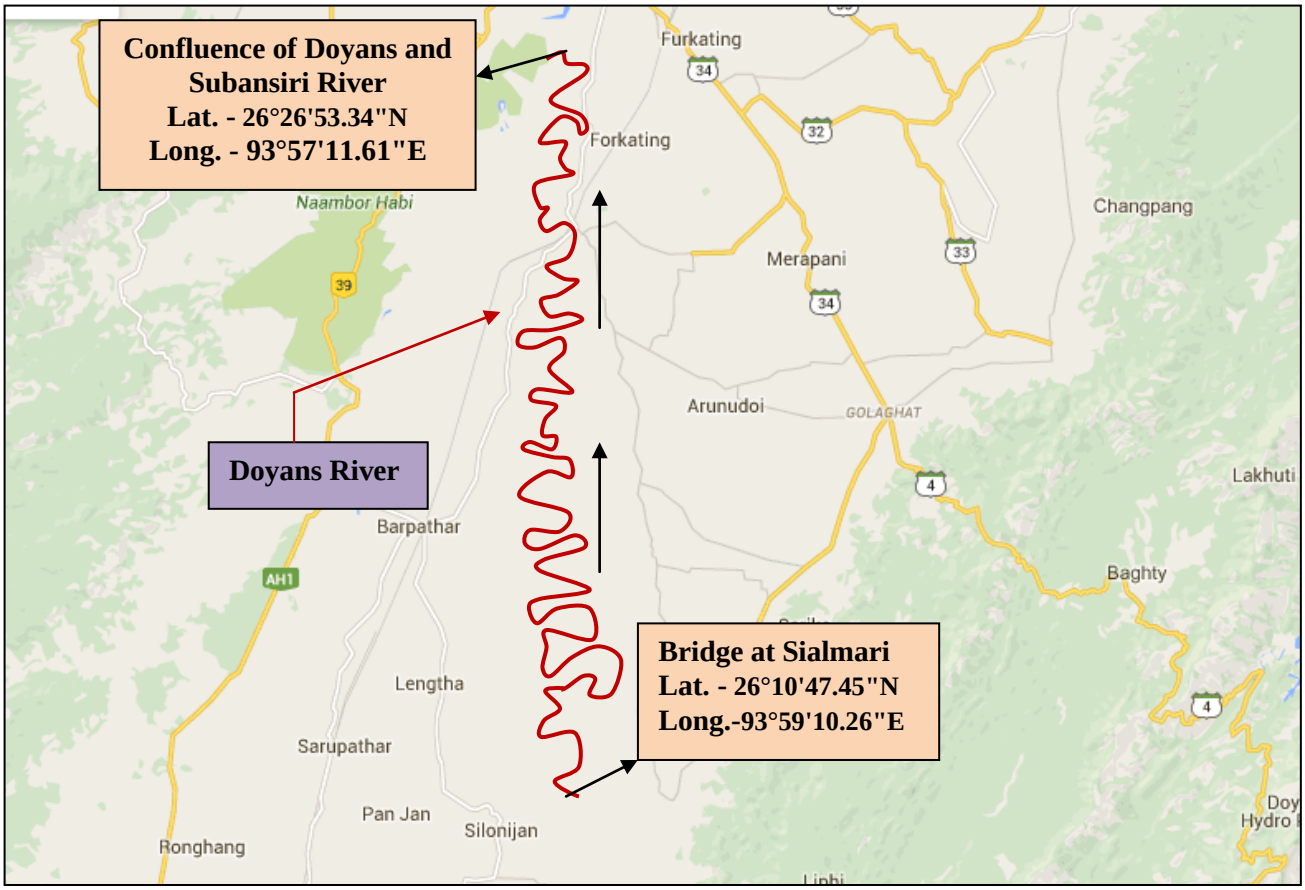

Figure 2 Project Site Location Map

1.5 River Key Map:-

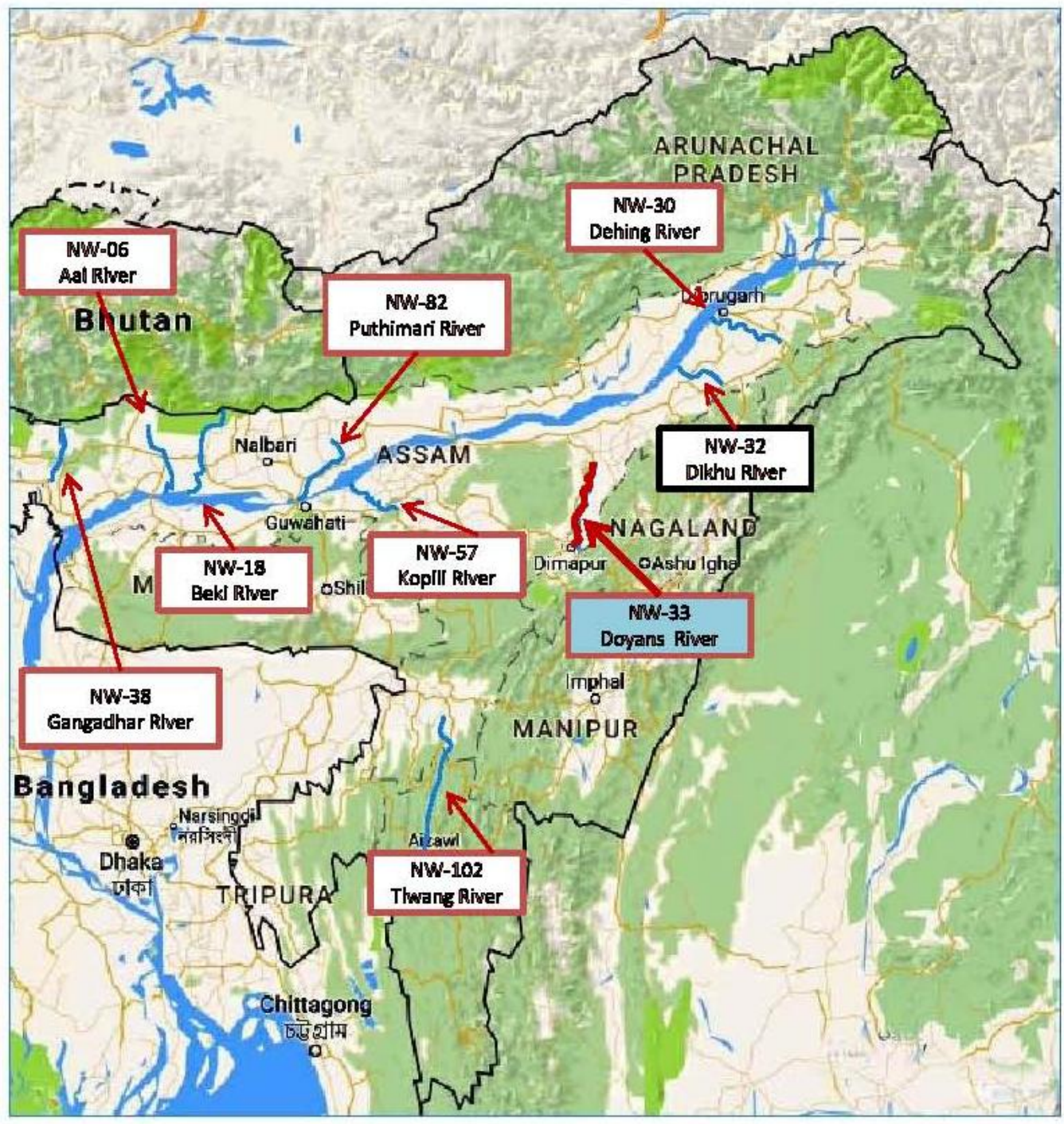

Figure 3-River Key Map

1.6 Scope of work

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

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

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

Section-2: Methodology Adopted to undertake Study

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

- **Equipment :-**

Following equipments were employed for the Bathymetric and Topographic survey:-

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

Table 1 - Details of Equipment list

- **Conduct of survey work**

Topographic Survey

The topography survey of Doyans river has been carried out from "Confluence of Doyans and Subansiri River (Lat 26°26'53.34"N, Long 93°57'11.61"E) to Bridge near at Sialmari (Lat- 26°10'47.45"N, Long- 93°59'10.26"E)". The Topography survey has been carried out form Chainage 0.00 km to Chainage 61.368 km. The Topographic survey was conducted to ascertain following in the survey area:-

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

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

Bathymetry Survey:-

The bathymetry survey has been carried out from Chainage 0.00 km to Chainage 23.380 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 Daily bar checks were done prior to the sounding operation and before the closing of the sounding operation for the day. Being very shallow depths, the echo sounder depths were also cross-checked in between by using demarcated sounding poles during the conduct of the survey. The sounding lines were run using Survey boat to identify the design line of the Doyans River for the possible stretch. The cross lines were run perpendicular to the orientation of river flow (i.e. perpendicular to the orientation of depth contours) in respective stretches. The spot sounding was also carried out in the area where the survey boat cannot be operated due to low depth. The hemisphere DGPS and Sounding Pole were used for Spot sounding at shallow locations in the Doyans River. The DGPS position along with water depths was recorded simultaneously and the tidal reduction was applied to the obtained depths.

Figure 4-Bathymetry survey work

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

For the Topographic Survey, the Horizontal control/Vertical control has been carried out from the Bench Mark no-CP-D24.This Bench Mark is located near at Hanhchora village. The Value of Bench mark is-

Location Name	Geographic position		UTM position		Elevation(m)
	Latitude (N)	Longitude (E)	Northing (m)	Easting (m)	
Hanhchora village.	26°26'55.47"	93°57'21.98"	2925735.209	595321.525	93.176 m. w.r.t. M.S.L

Figure 5- G.T.S Bench Mark location of Doyans River

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

There is no tidal Influence found in this part of the region of Assam.

2.4 Methodology to fix Chart Datum / Sounding Datum:-

IWAI has provided the Sounding Datum at Gelabil and at the confluence with Doyans and Subansiri River. The same was used to arrive the sounding datum values at BM pillars and tide gauges.

Sl. No	Place	Sounding Datum w.r.t M.S.L (Provided by IWAI)
1	Gelabil (Chainage-44.054 km)	92.817 meter
2	Doyans and Subansiri Confluence (Chainage-0.00 km)	87.240 meter

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

The CD levels of the Doyans River are: -

Gelabil - 92.817 metre (Chainage- 44.054 km)

Doyans and Subansiri Confluence- 87.240 metre (Chainage-0.000 km)

2.6 Transfer of Sounding Datum table for tidal rivers / canals:-

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

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

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

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

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

2.9 Description of erected Bench Mark Pillars:-

Sl. No	Station	Chainage (Km)	Latitude (N)	Longitude (E)	Easting	Northing	Height above M.S.L (m)	Height above SD (m)
1	BM 1	1.110	26°26'49.50"	93°57'49.08"	596073.791	2925557.044	93.225	5.854
2	BM 2	14.834	26°22'32.13"	93°56'57.72"	594709.002	2917628.172	104.520	14.3
3	BM 3	23.585	26°20'20.64"	93°58'23.33"	597112.17	2913600.368	101.660	10.749
4	BM 4	33.489	26°17'16.54"	93°58'46.50"	597797.662	2907941.727	101.670	10.126
5	BM 5	44.054	26°14'29.94"	93°58'34.79"	597511.115	2902813.916	111.605	19.428
6	BM 6	56.146	26°12'3.88"	93°58'24.82"	597268.87	2898317.169	106.920	14.11
7	BM 7	61.368	26°10'48.69"	93°59'8.57"	598500.983	2896013.567	112.530	19.087

Table 2 Bench Mark Details

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

Chainage (km)	Gauge station	Location	Easting	Northing	Latitude (N)	Longitude (E)	W.L w.r.t M.S.L (m)	Period of observations
1.038	GS-(TP)- 1	Hanhchora village	595999.47	2925552.80	26°26'49.36"	93°57'46.41"	88.397	24 hrs
23.542	GS-(TP)- 2	Naharjan Grant	597079.35	2913643.01	26°20'22.04"	93°58'22.16"	91.333	24 hrs
29.000	GS-(TP)- 3	Lakhibari T.E village	597614.310	2911387.781	26°19'8.59"	93°58'40.84"	92.497	24 hrs
34.000	GS-(TP)- 4	Jitpur Boraimari village	597252.926	2907698.266	26°17'8.78"	93°58'26.78"	92.811	24 hrs
39.000	GS-(TP)- 5	Amundoi village	597909.807	2905477.537	26°15'56.43"	93°58'49.86"	93.041	24 hrs
44.000	GS-(TP)- 6	Kachomari village	597592.081	2902717.791	26°14'26.80"	93°58'37.68"	93.587	24 hrs
49.000	GS-(TP)- 7	Tanajan Miching	597003.383	2900660.262	26°13'20.09"	93°58'15.90"	93.443	24 hrs
54.000	GS-(TP)- 8	Goroibil village	597938.445	2899537.396	26°12'43.36"	93°58'49.29"	94.614	24 hrs
59.000	GS-(TP)- 9	Sialmari village	597092.317	2896278.135	26°10'57.65"	93°58'17.92"	95.195	24 hrs

Table 3 Water level data of different Gauge stations

2.11 Chart Datum / Sounding Datum and Reductions details: -

Sl no	CWC gauge / Dam / Barrage / Weir / Anicut / Bench Mark / tide gauges	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	Gauge Station- (TP)- 9	59.000	56.5-61.368		94.709	-0.486	Topo Reduced Data of Doyans River
2	Gauge Station- (TP)- 8	54.000	51.5-56.5		94.076	-0.538	**Submitted in Soft Copy**
3	Gauge Station- (TP)- 7	49.000	46.5-51.5		93.443	-0.790	
4	Gelabil	44.054		92.817			
5	Gauge Station- (TP)- 6	44.000	41.5-46.5		92.810	-0.777	
6	Gauge Station- (TP)- 5	39.000	36.5-41.5		92.177	-0.864	
7	Gauge Station- (TP)- 4	34.000	31.5-36.5		91.544	-1.267	
8	Gauge Station- (TP)- 3	29.000	26.3-31.5		90.911	-1.586	
9	Gauge Station- (TP)- 2	23.542	12.3-26.3		90.220	-1.113	
10	Gauge Station- (TP)- 1	1.038	0.0-12.3		87.371	-1.026	
11	Confluence (93.841)	0.000		87.240			

Table 4-Chart Datum / Sounding Datum & Reduction Details

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

MHWS (Mean High Water Springs) is to be taken in tidal stretches and HFL in non-tidal stretches.

Sl no	Location and description of CWC gauge / Dam / Barrages / Weirs / Anicut / Locks / Aqueducts / BM	Cross-structure details	Chainage (km)	Established HFL / MHWS / FSL / MWL / FRL w.r.t. MSL (m)	Computed HFL at Cross-Structures w.r.t. MSL (m)
1	Gelabil		44.054	101.050	

Table 5 HFL Details

2.13 Average Bed Slope:-

Reach		River / Canal Bed Level Change (m)	Distance (km)	Slope (m/km)	Slope (cm/km)
From	**To**				
0.000	1.110	0.141	1.11	0.127	12.703
1.111	14.834	1.737	13.723	0.127	12.658
14.835	23.585	1.108	8.75	0.127	12.663
23.586	33.489	1.254	9.903	0.127	12.663
33.490	44.054	1.337	10.564	0.127	12.656
44.055	56.146	1.531	12.091	0.127	12.662
56.147	61.368	0.661	5.221	0.127	12.660
Total			61.362	Avg- 0.127	Avg- 12.66

Table 6-Average Bed Slope

2.14 Details of Dam/Barrage/Weirs/Anicut etc. w.r.t M.S.L:-

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

2.15 Details of Locks:-

There are no locks found in this river zone.

2.16 Details of Aqueducts:-

There are no aqueducts found in this river zone.

2.17 Details of existing Bridges and Crossing over waterway:-

There are two RCC Bridges, one Rail Bridge, four wooden bridges and six bamboo bridges found in this zone of river. The wooden Bridges and Bamboo bridges are not permanent structure and no. of piers. These wooden bridges and Bamboo bridges are communicated for the local villagers only. These bridges are also not linked with NH or SH. So these bridges have no horizontal and vertical clearances.

Sl .No	Structure Name	Chainage (km)	Location	Position		Position		Length (m)	Width (m)	Nos. of Piers	Horizontal Clearance (m)	Vertical Clearance w.r.t H.F.L (m)
				Latitude (N)	Longitude (E)	Easting	Northing					
1	Wooden Bridge	8.187	Gojalitup Village	26°24'52.35"	93°56'37.86"	594137.0910	2921962.4064	97.80	10.77	-	-	-
2	Bamboo Bridge	10.760	Garigaon Village	26°24'11.46"	93°57'18.03"	595249.6380	2920688.9310	114.99	1.865	-	-	-
3	Wooden Bridge	12.074	Oating Grant	26°23'33.98"	93°57'27.39"	595517.6452	2919537.3552	106.6	2.85	-	-	-
4	Rail Bridge	14.318	Aitonia Miri	26°22'44.46"	93°56'47.00"	594409.3316	2918005.0559	194.50	7.082	3	44.580	3.160
	RCC Bridge	14.775	Gualtup Village	26°22'33.20"	93°56'57.81"	594711.3032	2917661.2932	220.31	8.735	6	39.280	2.056
6	Wooden Bridge	30.940	Sarajmari Village	26°18'14.18"	93°59'8.33"	598389.7685	2909719.4204	140.81	3.727	-	-	-
7	Wooden Bridge	34.014	Jitpur Boraimari	26°17'9.17"	93°58'25.95"	597229.0418	2907710.1653	79.73	3.41	-	-	-
8	Bamboo Bridge	40.694	Chaodang Pothar	26°15'16.24"	93°58'29.12"	597343.5443	2904236.4755	124.56	1.354	-	-	-
9	Bamboo Bridge	41.335	Jutipur Village	26°15'7.06"	93°58'49.91"	597343.5443	2904236.4755	133.34	1.65	-	-	-
10	RCC Bridge	44.014	Sonapur Village	26°14'27.34"	93°58'37.31"	597581.53	2902733.40	260.72	9.025	7	42.212	2.394
11	Bamboo Bridge	56.145	Gorahgaon Village	26°12'6.63"	93°58'21.74"	597182.5205	2898401.5340	117.15	2.57	-	-	-
12	Bamboo Bridge	56.968	Zengani Pothar Village	26°11'49.25"	93°58'1.20"	596616.5740	2897862.8700	106.19	2.90	-	-	-
13	Bamboo Bridge	61.318	Kamalapur Village	26°10'46.36"	93°59'11.72"	598588.7790	2895942.4030	102.59	2.35	-	-	-

Table 7- Bridge Details

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

No other Cross structures, pipe lines and cables have been seen during the period of survey.

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

No Electric Lines or H.T.lines is found in this zone of river.

2.20 Current Meter and Discharge Details:-

Since water depth was too low between chainage 23.585 km and 61.368 km, no bathymetry survey, current or discharge measurements have been conducted. The data recorded for ch.-1.11 km, 13.185 km and 3.731 km are given below-

Stretch No.	Chainage (km)	Position				Observed Depth (m) (D)	Velocity (m/sec.)	Average Velocity (m/sec.)	X-Sectional area (sq. m.)	Discharge (Cu.m/sec)
		Latitude (N)	Longitude (E)	Easting (m)	Northing (m)		0.5 D			
1	1.11	26°26'49.414"	93°57'48.198"	596048.5438	2925554.041	0.7	0.219	0.219	266.61	58.387
2	13.185	26°23'29.651"	93°57'0.677"	594777.7805	2919398.2343	0.4	0.125	0.125	164.83	20.603
3	23.585	26°20'28.145"	93°58'19.128"	597007.5121	2913830.2807	0.3	0.112	0.112	139.53	15.627

Table 8- Details Current Meter List

2.21-a. Soil Sample Locations:-

Sample No.	Chainage (km)	Easting	Northing	Latitude (N)	Longitude (E)	Depth (m)
1	1.11	596054.54	2925504.79	26°26'47.812"	93°57'48.401"	0.7
2	23.585	597048.21	2913593.124	26°20'20.428"	93°58'21.032"	0.9
3	44.054	597576.38	2902737.13	26°14'27.462"	93°58'37.125"	1.3
4	61.368	598550.896	2895969.71	26°10'47.27"	93°59'10.393"	0.7

Table 9-Soil Sample Location

b. Water Sample Locations:-

Sample No.	Chainage (km)	Easting	Northing	Latitude (N)	Longitude (E)	Total Depth (d) (m)	Mid-Depth (0.5d) (m)
1	1.11	596054.54	2925504.79	26°26'47.812"	93°57'48.401"	0.7	0.35
2	23.585	597048.21	2913593.124	26°20'20.428"	93°58'21.032"	0.9	0.30
3	44.054	597576.38	2902737.13	26°14'27.462"	93°58'37.125"	1.3	0.65
4	61.368	598550.896	2895969.71	26°10'47.27"	93°59'10.393"	0.7	0.35

Table 10- Water Sample Location

Section-3: Description of Waterway- Stretch Wise

3.1 From Chainage 0.00 Km to Chainage 10.00 Km. (HanhchoraVillage to Borpothorua Village)

Figure 6- Chainage 0.00 km to Chainage 10.00 km

The River width of Doyans River from Chainage 0.00 km to Chainage 10.00 km is approximately 100 m to 71 m. The average width portion of the river is 65 metre.

During the Survey it was noticed that BM 1 is situated near at chainage of 1.110 km at the left bank portion of the river. Tarphat village, Furkating village, Tirual Gaon village, Bamborahi village, Borahi village, Doloujan village, Athgaon village, Do Gaon village, Da Samua village, Borpothorua village, Sokorohara village are situated at the left bank side of the river and Gojalitup village is situated at the right bank side of the river. Khatkhati Ferry Ghat is found near at chainage of 3.190 km. Both side paddy lands are also found during the survey. A wooden Bridge has been also situated near at chainage of 8.187 km. NH-39 is located right bank side of the river. Agricultural land and plants have been found in this stretch. Khatkhati Ferry Ghat is found near at chainage of 3.190 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	0.00	10.00	0.2	1.6	10000	223189.82	-0.3	1.0	10000	361354.09
II	0.00	10.00	0.1	1.6	10000	356039.09	-0.3	1.0	10000	532635.87
III	0.00	10.00	0.03	1.6	10000	567006.51	-0.3	1.0	10000	782372.3
IV	0.00	10.00	0.02	1.6	10000	730188.05	-0.3	1.0	10000	956606.69

3.2 From Chainage 10.00 Km to Chainage 20.00 Km. (Borpothorua Village to Nogora gaon Village)

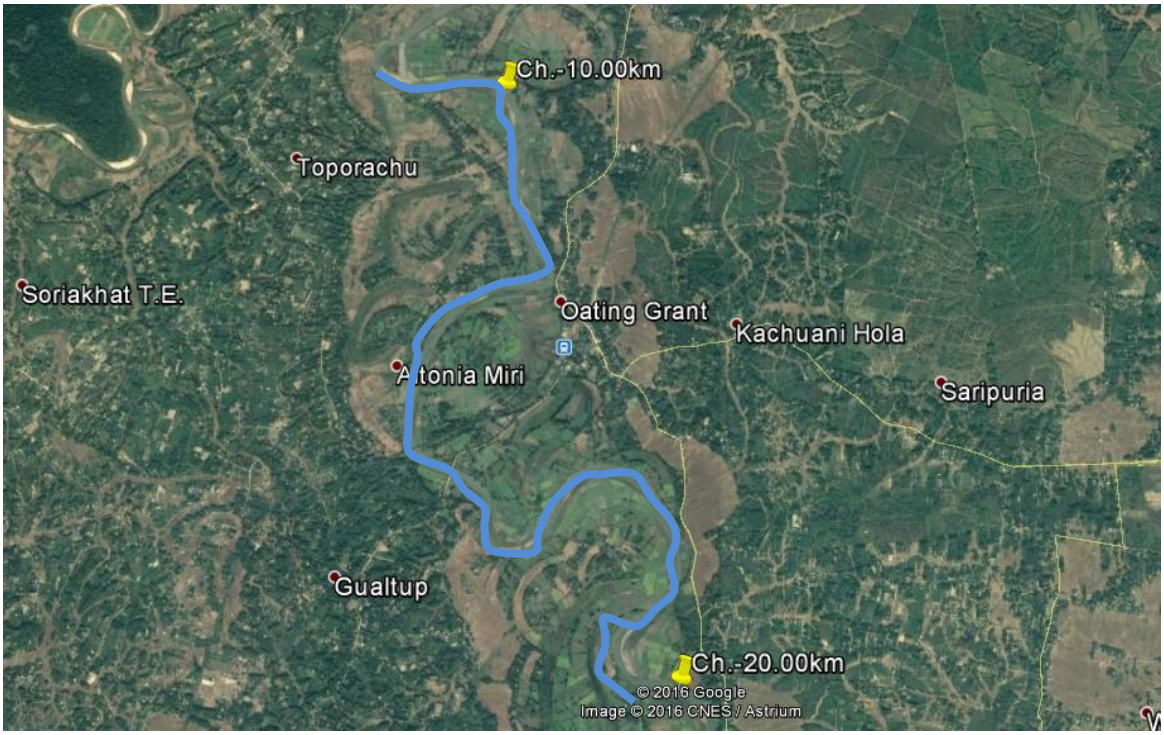

Figure 7- Chainage 10.00 km to Chainage 20.00 km

The River width of Doyans River from Chainage 10.00 km to Chainage 20.00 km is approximately 71m to 81 m. The average width portion of the river is 50 metre.

During the survey it was noticed that Rupkotia village, No-1 Kochari village, Khatwal village, Oating grant village, Kachuani hola village, Balijan Grant village, Saripuria village, Chigaijan village, Nugura Grant village are situated at the left bank side of the river and Aitonia Miri, Dolonjan village, Gualtup village, Konwari Pathar village, Toporachu village, Garigaon village, Dayang T.E village are situated at the right bank side of the river. One RCC Bridge which communicates between Gualtup villages to Saripuria village is situated near at chainage of 14.775 km. BM 2 is also situated near at the chainage of 14.834 km. An important Railway Bridge (Bhilgaon Railway Station -- Golaghat Railway Station) is crossed over the river near at chainage of 14.318km. Two wooden Bridges are also located near at chainage of 10.76km and 12.074 km respectively.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	10.00	20.00	0.2	1.4	10000	244187.95	-0.3	0.9	10000	438398.29
II	10.00	20.00	0.1	1.5	10000	393569.27	-0.3	0.9	10000	637476.33
III	10.00	20.00	0.1	1.5	10000	624951.64	-0.3	0.9	10000	914624.18
IV	10.00	20.00	0.03	1.5	10000	797036.62	-0.3	0.9	10000	1097409.4

Figure 8- Rail Bridge (Chainage -14.318 km)

Figure 9- RCC Bridge (Chainage-14.775km)

3.3 From Chainage 20.00 Km to Chainage 30.00 Km (Nogora gaon Village to Jamuguri village)

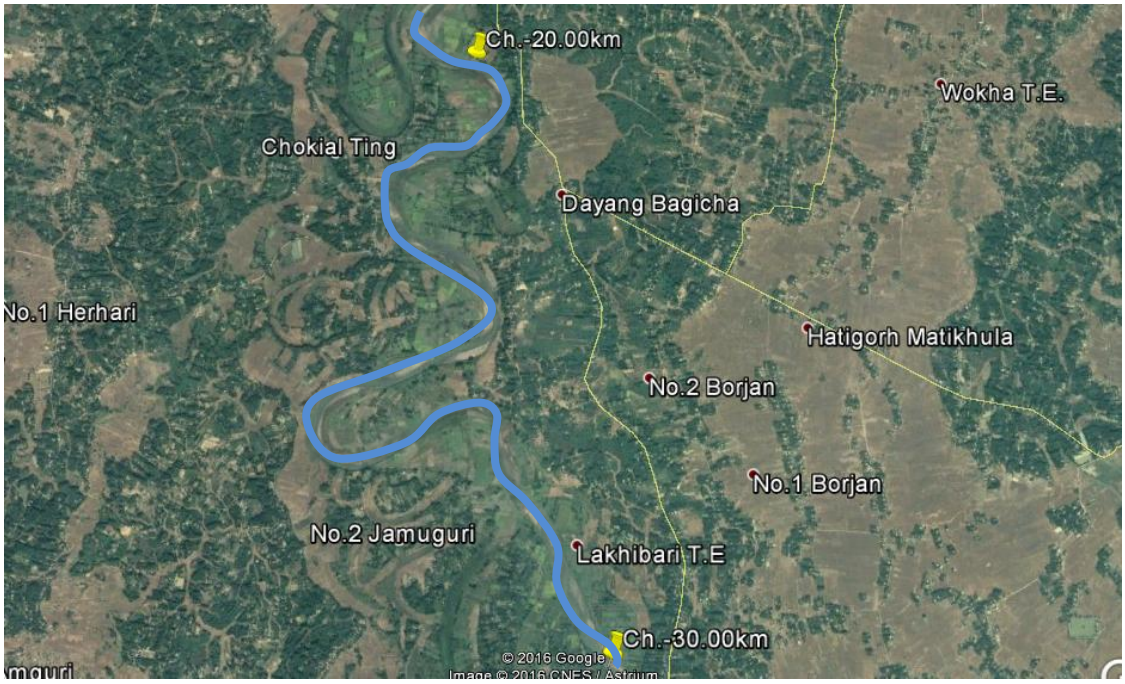

Figure 10 Chainage 20.00 km to Chainage 30.00 km

The River width of Doyans River from Chainage 20.00 km to Chainage 30.00 km is approximately 70 m to 141m.The average width portion of the river is 60 metre.

During the Survey it was noticed that Nogora gaon village, Chokial ting village, Gelapani village, Chipahibari village, Kalujan village, Naharjan Grant village, Ghogora pathar village, Kocharisuk village, Bhagadabari village, Gelapani village, Molohanitup village, No 2 Jamuguri village are situated at the right bank side of the river and Lakhibari T.E.village, Dayang Bagicha village are situated at the left bank side of the river. BM- 3 is situated at the left bank side of the river near at chainage of 23.585 km.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	20.00	30.00	0.01	1.4	10000	326366.24	-0.3	0.4	10000	440290.63
II	20.00	30.00	0.01	1.4	10000	497354.47	-0.3	0.4	10000	638122.2
III	20.00	30.00	0.01	1.6	10000	750099.55	-0.3	0.4	10000	913378.5
IV	20.00	30.00	0.01	1.6	10000	925581.78	-0.3	0.4	10000	1094113.5

3.4 From Chainage 30.00km to Chainage 40.00km (Jamuguri village to Santipur Village)

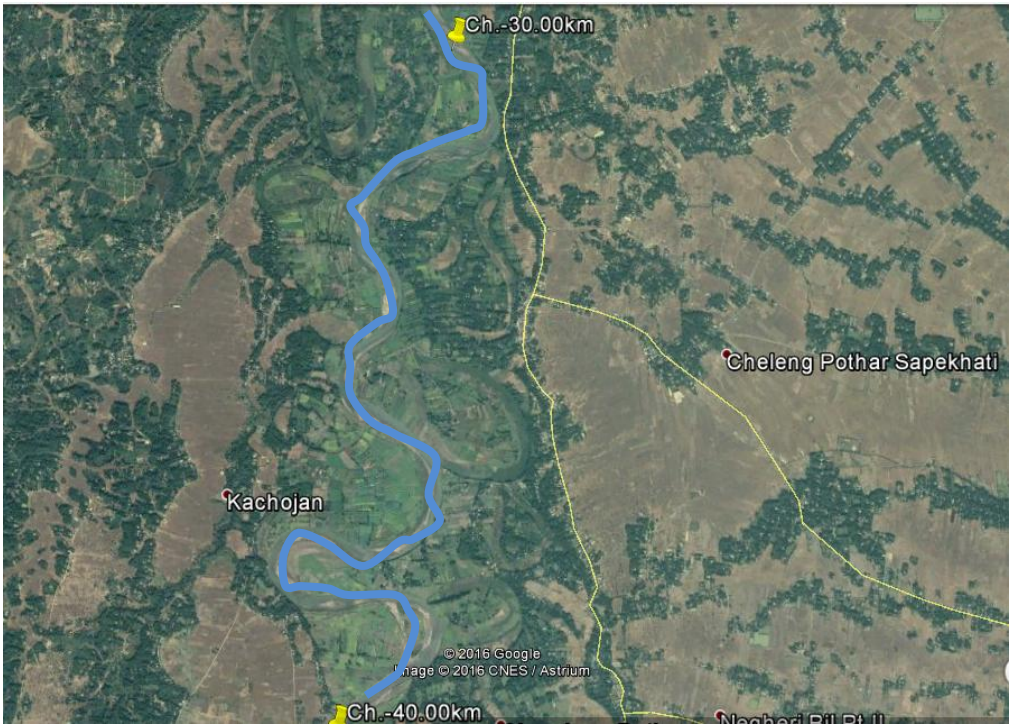

Figure 11 Chainage 30.00 km to Chainage 40.00 km

The River width of Doyans River from Chainage 30.00 km to Chainage 40.00 km is approximately 134 m to 70 m. The average width portion of the river is 65 metre.

During the Survey it was noticed that Narayonpur village, Sarajmari village, Upper jaroni village, Chawdanag pothar village, Chalang pathar village, cheleng pothar Sapekhati village, Janata Pothar village, Suban gaon no1 village, Amundoi village, Terenga Pothar village, Negheri Bill Pt-1 village are situated at the left bank side of the river and Guwal Gaon village, Milonpur no 2 village, Muchor Bhango village, Jitpur Boraimari village, Kachojan village, Borichowa Pothar village, Soraimari no 2 village are situated at the right bank side of the river. The Two wooden Bridges are also situated near at chainage of 30.940km and 34.014km. BM-4 is situated near at chainage of 33.489 km left bank side of the river.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	30.00	40.00	0.01	0.4	10000	390515.49	-0.3	0	10000	475054.86
II	30.00	40.00	0.01	0.4	10000	571062.77	-0.3	0	10000	667751.5
III	30.00	40.00	0.01	0.5	10000	824502.08	-0.3	0	10000	929215.46
IV	30.00	40.00	0.01	0.5	10000	998554.95	-0.3	0	10000	1104291

3.5 From Chainage 40.00 km to Chainage 50.00 km (Santipur Village to Doimuguri Village)

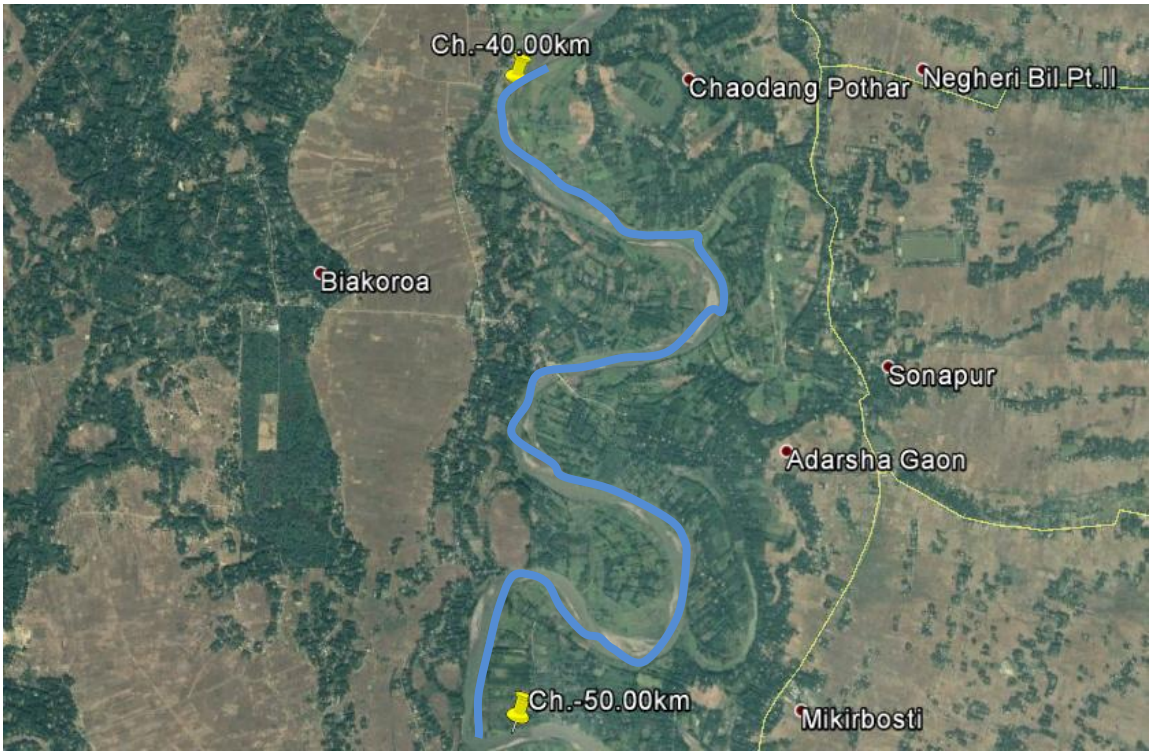

Figure 12- Chainage 40.00 km to 50.00 km

The River width of Doyans River from Chainage 40.00 km to Chainage 50.00 km is approximately 68 metre to 102 metre. The average width portion of the river is 62metre.

During the Survey it was noticed that chaodang Pothar village, Jutipur no1 village, Dineshpur village, Panbari village, Mayajan village, Sonapur village, Ratanpur village, Kachomari village, Adarsha Gaon village, Odalipothar village, Chandanpur village, Doimuguri village, Dighal pani miching, Sissupani village, Lakhi Pothar no -2 village have been situated at the left bank side of the river and Bil Gaon village, Kachomari Bagan village, Biakoroa village, Janata Pothar village, Rongagorah village, Rengma Bagan village, Devidpur village, Doldoli village, Sukanbil village, Tanajan Miching village, Bishrampur village, Gelabil village, Khoura village, Na Bill Village, Sarupavojan village, Biakoroa village have been situated at the right bank side of the river. BM -5 is situated at the right bank side of the river near at chainage of 44.054 km. The Two wooden Bridges are also situated near at chainage of 40.694 km and 41.335 km. An RCC Bridge (Biakoroa village –Adarsha Gaon village) has been also situated near at chainage of 44.014 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	40.00	50.00	0.02	0.3	10000	360689.06	-0.3	0	10000	414801.69
II	40.00	50.00	0.01	0.5	10000	530971.95	-0.3	0	10000	591215.5
III	40.00	50.00	0.01	0.5	10000	769742.74	-0.3	0	10000	833331.03
IV	40.00	50.00	0.01	0.6	10000	939771.36	-0.3	0	10000	1003939.6

Figure 13 RCC Bridge (Chainage-44.014 km)

3.6 From Chainage 50.00 km to Chainage 61.368km (Doimuguri Village to Sialmari Village)

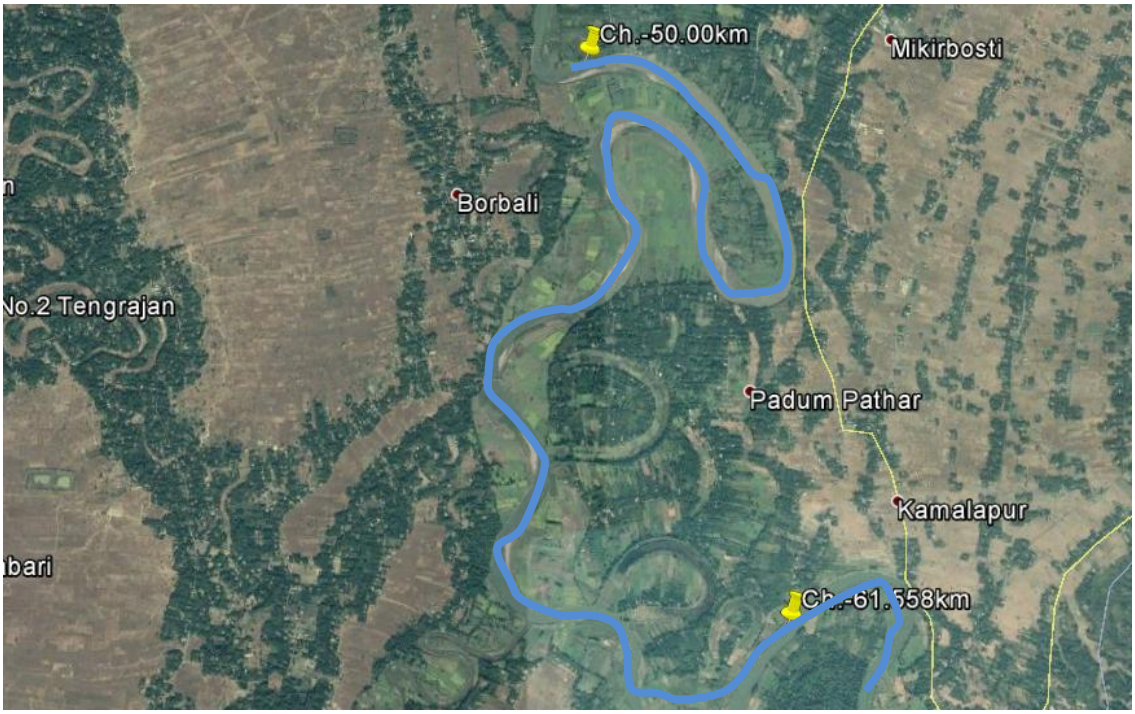

Figure 14- Chainage 50.00 km to Chainage 61.368 km

The River width of Doyans River from Chainage 50.00 km to 61.368 km is approximately 100 metre to 109metre. The average width portion of the river is 75 metre.

During the Survey it was noticed that Bordubi village, chandanpur no-2 village, Goroibil village, Dharampur village, Borbali village, Adarsha Gaon village, Nagpur Village, Zengani pothar village, Boroghoria village, Tengabari village, Gobinpur village, Panbari No-1 village, santipur No-2 village, Pathori Miching gaon village are situated at the right bank side of the river and Kalyanpur No-2 village, Jyoti Pothar village, New Roni Bosti village, Milonpur villge, Mikirbosti village, Sonali pothar No-2 village, Hirimbapur No-1 village, Joypukhuri no-2 village, bijaypur Sissupani village, kamalapur village are situated at the right bank side of the river. BM 6 is situated near at chainage of 56.146km at the left bank side of the river. Both sides Paddy land are also noticed during the survey. The Three Bamboo Bridges are also situated near at chainage of 56.145km, 56.968km and 61.318km 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	61.368	0.03	0.4	11000	417796.16	-0.3	0	11000	478507.05
II	50	61.368	0.01	0.5	11000	624391.81	-0.3	0	11000	692732.52
III	50	61.368	0.01	0.6	11000	919012.03	-0.3	0	11000	992271.71
IV	50	61.368	0.01	0.6	11000	1124210.84	-0.3	0	11000	1198383.62

Figure 15- Bamboo Bridge (Chainage- 56.145 km and 56.968 km)

Figure 16- Bamboo Bridge (Chainage – 61.318 km)

- **Bathymetry Survey**

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

The layer of water in the river Doyans is not sufficient for carrying out the Bathymetric survey. The Bathymetry survey has been carried out near at chainage of 0.00 km to 23.380 km.

Date of Survey	Type of survey	Chainage	
		From (km)	To (km)
10.12.15	Bathymetry Survey	0.00	12.3
12.12.15	Bathymetry Survey	12.3	23.380

- **Topographic Survey**

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

The Topography survey has been carried out from confluence with Doyans and Subansiri River to Bridge near Sialmari. The length of the Topography Survey is 0.00 km to 61.368 km.

a) Prominent Dams / Barrage:-

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

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

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

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

Doyans 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. From Chainage 0.00km to 18.500 km are highly protected by Bituminus Road in the left bank side of the river.

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

The river Doyans is too close with the border of India and Bhutan. Nagaland is also close to the river Doyans. So there were some security clearance will need for the water ways development and as well as the security or other clearance will need for the vicinity of the Naambor Habi Park is situated near the bank side of the river.

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

The river Doyans is too close with the border of India and Bhutan. Nagaland is also close to the river Doyans. So there were some security clearance will need for the water ways development and as well as the security or other clearance will need for the vicinity of the Naambor Habi Park is situated near the backsides of the river.

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

The NH-36, NH-39, NH-61 have been found in this zone of river. Besides SH-1, SH-4, SH- 32, SH-33, SH-34, SH- 35 have been available in this zone of river. These state Highways take important role for daily commuters.

g) Railway Line and Stations in the vicinity:-

An important Railway Bridge (Bhilgaon- Golaghat) has been found near at chainage of 14.318 km. The Railway communication helps the native villagers and tourist to go another state very smoothly. Golaghat, Bhilgaon Railway Station are situated in this zone of river.

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

The major portion of the right bank of the river is occupied by agriculture. Some Major crops like rice, tea, mustard, sugarcane, Black Dhal, vegetables like, Radish, Cabbage, Cauliflower, etc are found in this zone of river. The left bank mostly occupied with scattered forest area and agriculture. The most important forest products are timber, bamboo and firewood.

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

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

j) Availability of Bulk / Construction Material:-

The Cement Factories, Brick field and Sand are available near the bank side of the river. These materials are easily got to construct Building or Industries.

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

Though the industries are not developed in this zone of river but some cement, wood and other small industries like small foundries are located in this zone of river .

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

A passenger ferry service named Khatkhati ferry ghat is located near at Chainage of 3.200 km.

m) Existing Cargo Movement:-

There is no cargo available in this zone of river.

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

Golaghat, Gelabil, Bhilgaon, The Prominent city situated near the river are Gualtup, Chokial Ting, Dayang Bagicha, Saripuria, Oating Grant, Aitonia Miri, Lakhibari T.E, Kamalapur, Padum pathar, Mikirbosti, Adarsa Gaon etc are important places in this zone of river.

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

Bordubi village, chandanpur no-2 village, Goroibil village, Dharampur village, Borbali village, Adarsha Gaon village, Nagpur Village, Narayonpur village, Sarajmari village, Upper jaroni village, Chawdanag pothar village, Chalang pathar village, cheleng pothar Sapekhati village, Janata Pothar village, Suban gaon no1 village, Amundoi village, Terenga Pothar village, Negheri Bill Pt-1 village etc have been located in this zone of river.

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

A passenger ferry service named Khatkhati ferry ghat is located near at chainage of 3.200 km.

q) Available and probable Water Sport Recreational Facilities:-

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

r) Fishing activities:-

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

s) Sand mining:-

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

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t) Tributaries:-

The three streams create a river basin in this zone of river –

i) Tsui

ii) Tullo

iii) Tishi

u)Details of Irrigation Canals and Outlets:-

The Irrigation Canal and Outlets have been found near at chainage of 2 km, 9.6 km left bank side of the river.

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

There is no Nala found in this zone of river.

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

In Recent time's man avoid to drink the water of the river. The water of the river has been used mainly for agriculture purposes. The essential water has been supplied through irrigation canal. Besides, the industrial hubs take the essential water from the river for its daily productivity purposes. The irrigation canal supplies the valuable water to the agricultural land which grows the crops regularly.

Section 4: Terminals

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

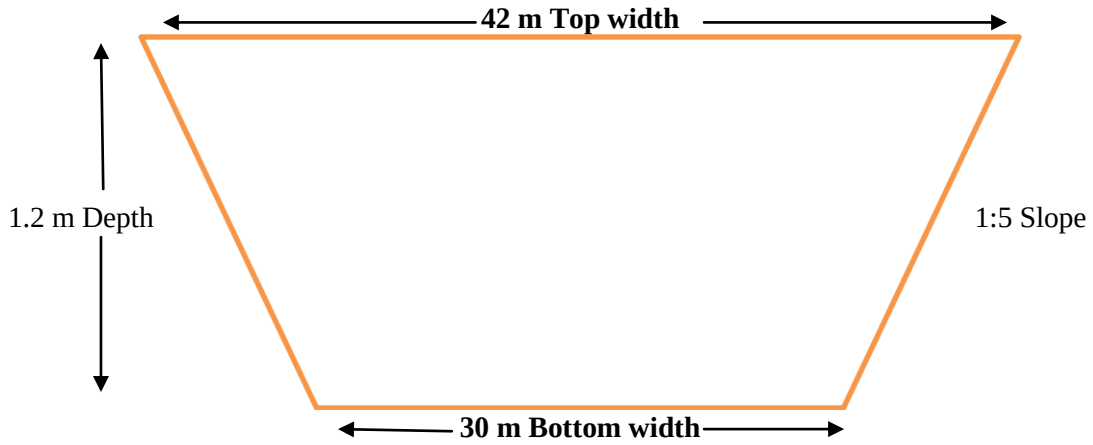
4.4 Details of Land use, owner etc.:-

The both sides bank of the River Doyans used for cultivation. The Farmers are cultivated their crops with using this fertile land and grows a huge amount of crops every year. Besides, some portions of the land are surrounded by small industries and Forests. Though bolder pitching is found in some places, But in Recent times, the bank of the river has been worn away in some places for lack of trees. 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 sides of the river bank.

Section-5 Fairway Development:

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

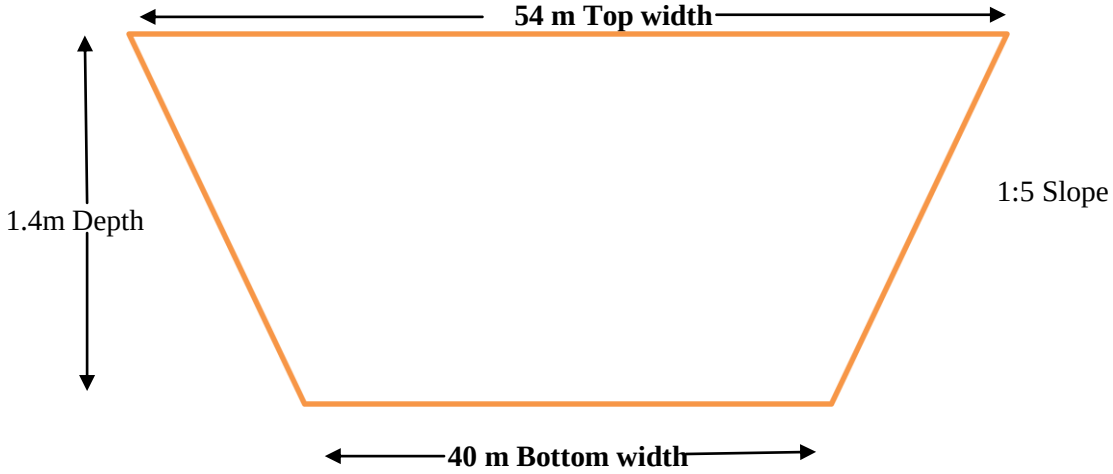
Class-I: - (Channel design: - Bottom width- 30 meter, Top width- 42 meter)



Location		Chainage (km)		As per Observed Soundings						As per Reduced Soundings					
From	To	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Avg Depth of Cut (m)	Dredging Qty. (cubic meter)	Cumulative Dredging Qty. (cubic meter)	Min. Depth (m)	Max Depth (m)	Length of Shoal (m)	Avg Depth of Cut (m)	Dredging Qty. (cubic meter)	Cumulative Dredging Qty. (cubic meter)
Hanhchora Village	Borpothorua Village	0.00	10.00	0.2	1.6	10000	0.676	223189.82	223189.82	-0.3	1.0	10000	1.094	361354.09	361354.09
Borpothorua Village	Nagora Gaon	10.00	20.00	0.2	1.4	10000	0.739	244187.95	467377.77	-0.3	0.9	10000	1.327	438398.29	799752.38
Nagora Gaon	Jamuguri Village	20.00	30.00	0.01	1.4	10000	0.988	326366.24	793744.01	-0.3	0.4	10000	1.333	440290.63	1240043.01
Jamuguri Village	Santipur Village	30.00	40.00	0.01	0.4	10000	1.182	390515.49	1184259.5	-0.3	0	10000	1.438	475054.86	1715097.87
Santipur Village	Doimuguri Village	40.00	50.00	0.02	0.3	10000	1.092	360689.06	1544948.56	-0.3	0	10000	1.256	414801.69	2129899.56
Doimuguri Village	Sialmari Village	50.00	61.368	0.03	0.4	11000	1.14	417796.16	1962744.72	-0.3	0	11000	1.31	478507.05	2608406.61
Total						61000		1962744.72		Total		61000		2608406.61	

Table 11- Dredging Quantity for Class-I

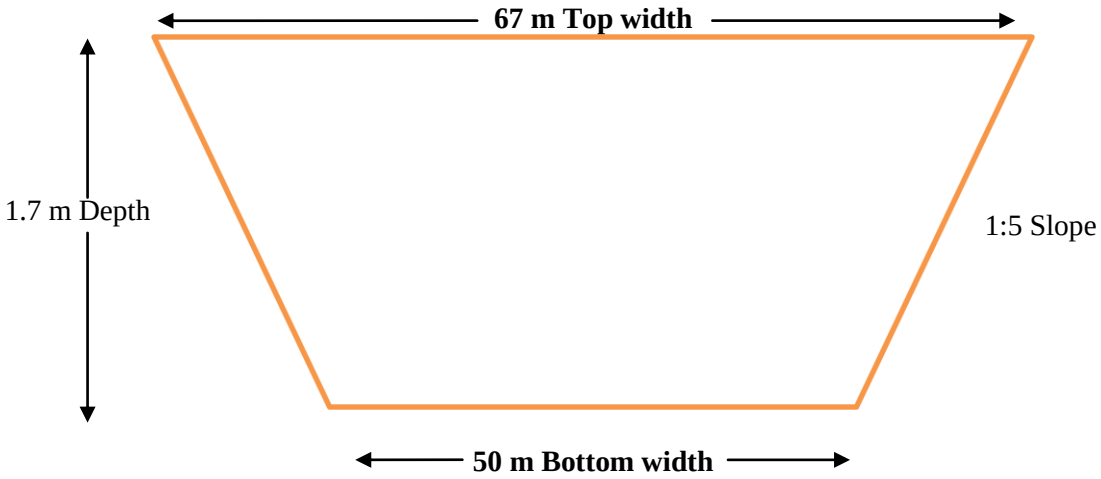
Class-II: - **(Channel design: - Bottom width- 40 meter, Top width- 54 meter)**



Location		Chainage (km)		As per Observed Soundings						As per Reduced Soundings					
From	To	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Avg Depth of Cut (m)	Dredging Qty. (cubic meter)	Cumulative Dredging Qty. (cubic meter)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Avg Depth of Cut (m)	Dredging Qty. (cubic meter)	Cumulative Dredging Qty. (cubic meter)
Hanhchora Village	Borpothorua Village	0.00	10.00	0.1	1.6	10000	0.807	356039.09	356039.09	-0.3	1.0	10000	1.208	532635.87	532635.87
Borpothorua Village	Nagora Gaon	10.00	20.00	0.1	1.5	10000	0.893	393569.27	749608.36	-0.3	0.9	10000	1.446	637476.33	1170112.2
Nagora Gaon	Jamuguri Village	20.00	30.00	0.01	1.4	10000	1.128	497354.47	1246962.83	-0.3	0.4	10000	1.447	638122.2	1808234.4
Jamuguri Village	Santipur Village	30.00	40.00	0.01	0.4	10000	1.295	571062.77	1818025.6	-0.3	0	10000	1.514	667751.5	2475985.9
Santipur Village	Doimuguri Village	40.00	50.00	0.01	0.5	10000	1.204	530971.95	2348997.55	-0.3	0	10000	1.341	591215.5	3067201.4
Doimuguri Village	Sialmari Village	50.00	61.368	0.01	0.5	11000	1.28	624391.81	2973389.36	-0.3	0	11000	1.42	692732.52	3759933.92
Total						61000		2973389.36		Total		61000		3759933.92	

Table 12-Dredging Quantity for Class-II

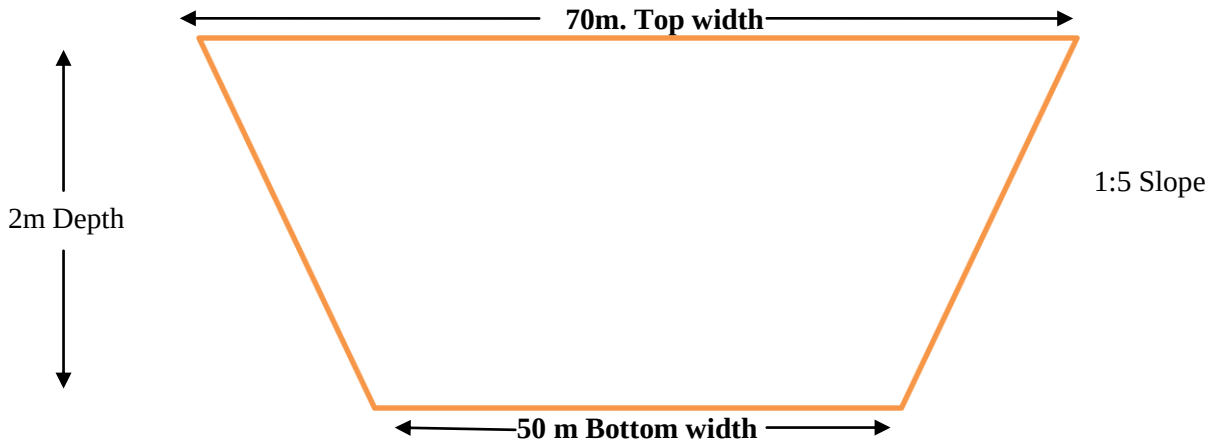
Class-III: - (Channel design: - Bottom width- 50 meter, Top width- 67 meter)



Location		Chainage (km)		As per Observed Soundings						As per Reduced Soundings					
From	To	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Avg Depth of Cut (m)	Dredging Qty. (cubic meter)	Cumulative Dredging Qty. (cubic meter)	Min Depth (m)	Max Depth (m)	Length of Shoal (m)	Avg Depth of Cut (m)	Dredging Qty. (cubic meter)	Cumulative Dredging Qty. (cubic meter)
Hanhchora Village	Borpothorua Village	0.00	10.00	0.03	1.6	10000	1.027	567006.51	567006.51	-0.3	1.0	10000	1.417	782372.3	782372.3
Borpothorua Village	Nagora Gaon	10.00	20.00	0.1	1.5	10000	1.132	624951.64	1191958.15	-0.3	0.9	10000	1.657	914624.18	1696996.48
Nagora Gaon	Jamuguri Village	20.00	30.00	0.01	1.6	10000	1.359	750099.55	1942057.7	-0.3	0.4	10000	1.655	913378.5	2610374.98
Jamuguri Village	Santipur Village	30.00	40.00	0.01	0.5	10000	1.494	824502.08	2766559.78	-0.3	0	10000	1.684	929215.46	3539590.44
Santipur Village	Doimuguri Village	40.00	50.00	0.01	0.5	10000	1.395	769742.74	3536302.52	-0.3	0	10000	1.510	833331.03	4372921.47
Doimuguri Village	Sialmari Village	50.00	61.368	0.01	0.6	11000	1.513	919012.03	4455314.55	-0.3	0	11000	1.634	992271.71	5365193.18
Total						61000		4455314.55		Total		61000		5365193.18	

Table 13- Dredging Quantity for Class-III

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



Location		Chainage (km)		As per Observed Soundings						As per Reduced Soundings					
From	To	From	To	Min depth (m)	Max. depth (m)	Length of Shoal (m)	Avg Depth of Cut (m)	Dredging Qty. (cubic meter)	Cumulative Dredging Qty. (cubic meter)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Avg Depth of Cut (m)	Dredging Qty. (cubic meter)	Cumulative Dredging Qty. (cubic meter)
Hanchora Village	Borpothorua Village	0.00	10.00	0.02	1.6	10000	1.329	730188.05	730188.05	-0.3	1.0	10000	1.741	956606.69	956606.69
Borpothorua Village	Nagora Gaon	10.00	20.00	0.03	1.5	10000	1.451	797036.62	1527224.67	-0.3	0.9	10000	1.997	1097409.41	2054016.1
Nagora Gaon	Jamuguri Village	20.00	30.00	0.01	1.6	10000	1.685	925581.78	2452806.45	-0.3	0.4	10000	1.991	1094113.5	3148129.6
Jamuguri Village	Santipur Village	30.00	40.00	0.01	0.5	10000	1.817	998554.95	3451361.4	-0.3	0	10000	2.010	1104291.04	4252420.64
Santipur Village	Doimuguri Village	40.00	50.00	0.01	0.6	10000	1.710	939771.36	4391132.76	-0.3	0	10000	1.827	1003939.62	5256360.26
Doimuguri Village	Sialmari Village	50.00	61.368	0.01	0.6	11000	1.86	1124210.84	5515343.60	-0.3	0	11000	1.98	1198383.62	6454743.88
Total						61000		5515343.60		Total		61000		6454743.88	

Table 14- Dredging Quantity for Class-IV

Section 6: Conclusion:

The surveyed stretch of Doyans River is 61.368 km in length and was not explored for any navigational possibility in earlier time. The right bank of the river is moderately connected with roads and Railways and other infrastructures than the left bank. A passenger ferry service named Khatkhati ferry ghat is located near at chainage of 3.200 km.

Total 07 nos. of Bench mark have been established throughout the survey Period. During the period of the survey we found some bent curve in the river. Some sand char a also found in the way of the river, for this reason the river water is flown by some channels and get narrower in some places. There is no Dam, Barrages, weirs, Anicut, Locks, Aqueduct found in this zone of river. The River Doyans has couple of RCC Bridges which are situated near at chainage of 14.775 km and 44.014 km. An important Rail Bridge is also situated near at chainage of 14.318 km which is communicated through Golaghat and Bhilgaon Railway Station. The bridges have a good Vertical and Horizontal clearance for the development of the water ways. RCC and Railway communication has been really very favorable for this region and also for the tourist. Besides Four numbers of Wooden Bridges and Three numbers of Bamboo Bridges are also located in this zone of river for daily communication system. The historical and Tourist places like Golaghat, Bhilgaon etc have been located in this region of River. Both side plants are also protected the bank of the river side.

6.1 Dredging volume:-

Class Details	As per Observed Soundings (Cubic meter)	As per Reduced Soundings (Cubic meter)
Class I	1962744.72	2608406.61
Class II	2973389.36	3759933.92
Class III	4455314.55	5365193.18
Class IV	5515343.60	6454743.88

Annexure:-

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

The Chart Datum value and HFL values of Gelabil and Confluence of Doyans and Subansiri River have been provided by IWAI office.

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

Class-I:

Class -I											
Chainage (km)		As per Observed Soundings (Cubic meter)					As per Reduced Soundings (Cubic meter)				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (Cubic meter)	Cumulative Dredging Qty. (Cubic meter)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (Cubic meter)	Cumulative Dredging Qty. (Cubic meter)
0	1	0.2	1.3	1000	33578.07	33578.07	-0.3	0.3	1000	45331.14	45331.14
1	2	0.3	1.3	1000	31539	65117.07	-0.3	0.3	1000	47393.91	92725.05
2	3	0.3	1.3	1000	19710.13	84827.2	-0.3	0.3	1000	32178.19	124903.24
3	4	0.5	1.3	1000	14079.62	98906.82	-0.3	0.8	1000	28484.61	153387.85
4	5	0.4	1.3	1000	15481.78	114388.6	-0.3	0.8	1000	33470.72	186858.57
5	6	0.3	1.3	1000	28515.2	142903.8	-0.3	0.3	1000	41818.4	228676.97
6	7	0.3	1.3	1000	26250.03	169153.83	-0.3	0.7	1000	38205.91	266882.88
7	8	0.3	0.9	1000	21515.17	190669	-0.3	0.3	1000	37991.85	304874.73
8	9	0.4	1.8	1000	7097.49	197766.49	-0.3	0.8	1000	22248.11	327122.84
9	10	0.3	1.8	1000	25423.33	223189.82	-0.3	1	1000	34231.25	361354.09
10	11	0.3	1.2	1000	17015.53	240205.35	-0.3	0.2	1000	30047.51	391401.6
11	12	0.3	1.4	1000	17615.3	257820.65	-0.3	0.9	1000	34818.69	426220.29
12	13	0.3	1.4	1000	20243.3	278063.95	-0.3	0.8	1000	37107.95	463328.24
13	14	0.3	1.3	1000	32479.26	310543.21	-0.3	0.2	1000	54387.36	517715.6
14	15	0.3	1.3	1000	25775.24	336318.45	-0.3	0.8	1000	48641.09	566356.69
15	16	0.4	1.3	1000	20754.1	357072.55	-0.3	0.8	1000	41743.41	608100.1
16	17	0.2	1.3	1000	32156.69	389229.24	-0.3	0.2	1000	50677.31	658777.41
17	18	0.3	1.4	1000	27122.05	416351.29	-0.3	0.2	1000	47462.48	706239.89
18	19	0.2	1	1000	22788.2	439139.49	-0.3	0.3	1000	43954.76	750194.65
19	20	0.3	1.3	1000	28238.28	467377.77	-0.3	0.2	1000	49557.73	799752.38
20	21	0.3	1.3	1000	30738.65	498116.42	-0.3	0.2	1000	50513.97	850266.35
21	22	0.3	1.3	1000	28719.71	526836.13	-0.3	0.4	1000	50934.68	901201.03
22	23	0.3	1.3	1000	31796.29	558632.42	-0.3	0.2	1000	48425.66	949626.69
23	24	0.03	1.4	1000	36059.08	594691.5	-0.3	0.3	1000	49053.88	998680.57
24	25	0.03	0.3	1000	41707.6	636399.1	-0.3	0	1000	47880.38	1046560.95
25	26	0.03	0.3	1000	9548.61	645947.71	-0.3	0	1000	10540.22	1057101.17
26	27	0.03	0.3	1000	20287.94	666235.65	-0.3	0	1000	22941.7	1080042.87

Class -I											
Chainage (km)		As per Observed Soundings (Cubic meter)					As per Reduced Soundings (Cubic meter)				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (Cubic meter)	Cumulative Dredging Qty. (Cubic meter)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (Cubic meter)	Cumulative Dredging Qty. (Cubic meter)
27	28	0.03	0.3	1000	42264.87	708500.52	-0.3	0	1000	54135.36	1134178.23
28	29	0.03	0.3	1000	42205.68	750706.2	-0.3	0	1000	52614.08	1186792.31
29	30	0.01	0.3	1000	43037.81	793744.01	-0.3	0	1000	53250.7	1240043.01
30	31	0.01	0.3	1000	40007.94	833751.95	-0.3	0	1000	48910.65	1288953.66
31	32	0.03	0.2	1000	41657.3	875409.25	-0.3	0	1000	51943.65	1340897.31
32	33	0.03	0.3	1000	37083.2	912492.45	-0.3	0	1000	46111.33	1387008.64
33	34	0.04	0.3	1000	41125.33	953617.78	-0.3	0	1000	51974.14	1438982.78
34	35	0.03	0.4	1000	38961.04	992578.82	-0.3	0	1000	48369.85	1487352.63
35	36	0.03	0.2	1000	40724.34	1033303.16	-0.3	0	1000	50312.54	1537665.17
36	37	0.05	0.3	1000	38267.7	1071570.86	-0.3	0	1000	47041.24	1584706.41
37	38	0.03	0.3	1000	38415.97	1109986.83	-0.3	0	1000	43765.28	1628471.69
38	39	0.03	0.3	1000	36716.07	1146702.9	-0.3	0	1000	43767.6	1672239.29
39	40	0.03	0.3	1000	37556.6	1184259.5	-0.3	0	1000	42858.58	1715097.87
40	41	0.03	0.3	1000	33452.87	1217712.37	-0.3	0	1000	35183.35	1750281.22
41	42	0.05	0.3	1000	27145.51	1244857.88	-0.3	0	1000	27639.46	1777920.68
42	43	0.03	0.3	1000	39227.45	1284085.33	-0.3	0	1000	45520.14	1823440.82
43	44	0.03	0.3	1000	32957.38	1317042.71	-0.3	0	1000	35899	1859339.82
44	45	0.04	0.3	1000	38405.76	1355448.47	-0.3	0	1000	45057.47	1904397.29
45	46	0.02	0.3	1000	36302.49	1391750.96	-0.3	0	1000	40808.46	1945205.75
46	47	0.04	0.3	1000	36093.94	1427844.9	-0.3	0	1000	42285.33	1987491.08
47	48	0.03	0.3	1000	39137.23	1466982.13	-0.3	0	1000	48032.12	2035523.2
48	49	0.03	0.3	1000	39506.58	1506488.71	-0.3	0	1000	48503.52	2084026.72
49	50	0.03	0.3	1000	38459.85	1544948.56	-0.3	0	1000	45872.84	2129899.56
50	51	0.1	0.3	1000	35718.41	1580666.97	-0.3	0	1000	40436.65	2170336.21
51	52	0.04	0.3	1000	32714.8	1613381.77	-0.3	0	1000	36113.93	2206450.14
52	53	0.03	0.3	1000	34861.26	1648243.03	-0.3	0	1000	36595.96	2243046.1
53	54	0.05	0.3	1000	37215.5	1685458.53	-0.3	0	1000	39328	2282374.1
54	55	0.04	0.3	1000	33204.95	1718663.48	-0.3	0	1000	36106.11	2318480.21
55	56	0.05	0.3	1000	31475.93	1750139.41	-0.3	0	1000	34526.51	2353006.72
56	57	0.03	0.4	1000	38103.21	1788242.62	-0.3	0	1000	45241.58	2398248.3
57	58	0.05	0.4	1000	41941.49	1830184.11	-0.3	0	1000	51887.95	2450136.25
58	59	0.04	0.4	1000	42492.65	1872676.76	-0.3	0	1000	53195.51	2503331.76
59	60	0.05	0.3	1000	39231.26	1911908.02	-0.3	0	1000	47592.49	2550924.25
60	61.37	0.04	0.3	1000	50836.7	1962744.72	-0.3	0	1000	57482.36	2608406.61
Total				61000	1962744.72				61000	2608406.61	

Table 15 - Minimum & Maximum Depth for Class- I

Class-II:

Class -II												
Chainage (km)		As per Observed Soundings					As per Reduced Soundings					
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (Cubic meter)	Cumulative Dredging Qty. (Cubic meter)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (Cubic meter)	Cumulative Dredging Qty. (Cubic meter)
0	1	0.1	1.5	1000	49091.54	49091.54	-0.3	0.3	1000	63138.8	63138.8
1	2	0.1	1.4	1000	48792.44	97883.98	-0.3	0.3	1000	68720.43	131859.23
2	3	0.2	1.3	1000	33329.7	131213.68	-0.3	0.3	1000	49842.15	181701.38
3	4	0.4	1.3	1000	23629.08	154842.76	-0.3	0.8	1000	42433.41	224134.79
4	5	0.3	1.3	1000	26939.96	181782.72	-0.3	0.8	1000	49933.22	274068.01
5	6	0.2	1.3	1000	43904.68	225687.4	-0.3	0.3	1000	60385.24	334453.25
6	7	0.2	1.3	1000	41726.77	267414.17	-0.3	0.7	1000	57212.55	391665.8
7	8	0.29	1	1000	35812.18	303226.35	-0.3	0.3	1000	56425.21	448091.01
8	9	0.3	1.6	1000	12935.14	316161.49	-0.3	0.8	1000	32890.47	480981.48
9	10	0.2	1.6	1000	39877.6	356039.09	-0.3	1	1000	51654.39	532635.87
10	11	0.1	1.3	1000	29755.22	385794.31	-0.3	0.2	1000	47722.08	580357.95
11	12	0.1	1.4	1000	28758.02	414552.33	-0.3	0.9	1000	49940.75	630298.7
12	13	0.2	1.4	1000	33806.43	448358.76	-0.3	0.8	1000	55511.73	685810.43
13	14	0.2	1.3	1000	51708.19	500066.95	-0.3	0.2	1000	79397.84	765208.27
14	15	0.29	1.3	1000	42253.62	542320.57	-0.3	0.8	1000	70259.2	835467.47
15	16	0.3	1.3	1000	34124.14	576444.71	-0.3	0.8	1000	59857.27	895324.74
16	17	0.1	1.3	1000	49378.83	625823.54	-0.3	0.2	1000	72324.87	967649.61
17	18	0.2	1.5	1000	42781.93	668605.47	-0.3	0.2	1000	68313.59	1035963.2
18	19	0.18	1.1	1000	36707.58	705313.05	-0.3	0.3	1000	63007.3	1098970.5
19	20	0.2	1.2	1000	44295.31	749608.36	-0.3	0.2	1000	71141.7	1170112.2
20	21	0.2	1.3	1000	48267.03	797875.39	-0.3	0.2	1000	73035.2	1243147.4
21	22	0.2	1.4	1000	45678.67	843554.06	-0.3	0.4	1000	73426.3	1316573.7
22	23	0.1	1.4	1000	49760.93	893314.99	-0.3	0.2	1000	71064.7	1387638.4
23	24	0.03	1.4	1000	53779.55	947094.54	-0.3	0.3	1000	69325.6	1456964
24	25	0.01	0.3	1000	61978.04	1009072.58	-0.3	0	1000	69028.4	1525992.4
25	26	0.02	0.3	1000	13863.98	1022936.56	-0.3	0	1000	14845.1	1540837.5
26	27	0.02	0.3	1000	32094.1	1055030.66	-0.3	0	1000	35324.8	1576162.3
27	28	0.02	0.3	1000	63238.75	1118269.41	-0.3	0	1000	77710.1	1653872.4
28	29	0.01	0.4	1000	63217.65	1181487.06	-0.3	0	1000	76044.9	1729917.3
29	30	0.01	0.4	1000	65475.77	1246962.83	-0.3	0	1000	78317.1	1808234.4
30	31	0.01	0.3	1000	59517.4	1306480.23	-0.3	0	1000	70002	1878236.4
31	32	0.01	0.3	1000	61197.52	1367677.75	-0.3	0	1000	73149.9	1951386.3

Class -II												
Chainage (km)		As per Observed Soundings					As per Reduced Soundings					
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (Cubic meter)	Cumulative Dredging Qty. (Cubic meter)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (Cubic meter)	Cumulative Dredging Qty. (Cubic meter)
32	33	0.01	0.4	1000	54448.33	1422126.08	-0.3	0	1000	64784.2	2016170.5
33	34	0.02	0.4	1000	60449.8	1482575.88	-0.3	0	1000	72972.2	2089142.7
34	35	0.01	0.4	1000	57172.25	1539748.13	-0.3	0	1000	68129	2157271.7
35	36	0.01	0.3	1000	59167.69	1598915.82	-0.3	0	1000	69887.6	2227159.3
36	37	0.03	0.4	1000	55908.98	1654824.8	-0.3	0	1000	66291	2293450.3
37	38	0.02	0.3	1000	56267.59	1711092.39	-0.3	0	1000	62315.8	2355766.1
38	39	0.02	0.3	1000	51707.41	1762799.8	-0.3	0	1000	59208.8	2414974.9
39	40	0.02	0.4	1000	55225.8	1818025.6	-0.3	0	1000	61011	2475985.9
40	41	0.02	0.4	1000	49812.69	1867838.29	-0.3	0	1000	51714.9	2527700.8
41	42	0.02	0.3	1000	41581.32	1909419.61	-0.3	0	1000	42086.4	2569787.2
42	43	0.02	0.4	1000	55812.75	1965232.36	-0.3	0	1000	62125.3	2631912.5
43	44	0.02	0.4	1000	51295.64	2016528	-0.3	0	1000	54672.7	2686585.2
44	45	0.03	0.3	1000	54766.46	2071294.46	-0.3	0	1000	62104.6	2748689.8
45	46	0.02	0.5	1000	53759.09	2125053.55	-0.3	0	1000	58682	2807371.8
46	47	0.02	0.5	1000	54332.71	2179386.26	-0.3	0	1000	61365.8	2868737.6
47	48	0.02	0.4	1000	57122.14	2236508.4	-0.3	0	1000	67532	2936269.6
48	49	0.01	0.4	1000	57442.12	2293950.52	-0.3	0	1000	67691.7	3003961.3
49	50	0.01	0.4	1000	55047.03	2348997.55	-0.3	0	1000	63240.1	3067201.4
50	51	0.03	0.4	1000	53715.65	2402713.2	-0.3	0	1000	58771.4	3125972.8
51	52	0.02	0.4	1000	51382.07	2454095.27	-0.3	0	1000	55416.9	3181389.7
52	53	0.01	0.4	1000	52143.88	2506239.15	-0.3	0	1000	53939.8	3235329.5
53	54	0.02	0.5	1000	56172.79	2562411.94	-0.3	0	1000	58447.5	3293777
54	55	0.03	0.4	1000	48669.41	2611081.35	-0.3	0	1000	51697.7	3345474.7
55	56	0.03	0.4	1000	45955.93	2657037.28	-0.3	0	1000	49095	3394569.7
56	57	0.02	0.4	1000	55982.76	2713020.04	-0.3	0	1000	63847.8	3458417.5
57	58	0.04	0.5	1000	62648.56	2775668.6	-0.3	0	1000	74179.9	3532597.4
58	59	0.03	0.5	1000	63969.72	2839638.32	-0.3	0	1000	76871.3	3609468.7
59	60	0.03	0.4	1000	57690.04	2897328.36	-0.3	0	1000	66873.9	3676342.6
60	61.37	0.02	0.3	1000	76061	2973389.36	-0.3	0	1000	83591.32	3759933.92
Total				61000	2973389.36				61000	3759933.92	

Table 16- Minimum & Maximum Depth for Class- II

Class-III:

Class -III											
Chainage (km)		As per Observed Soundings					As per Reduced Soundings				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (Cubic meter)	Cumulative Dredging Qty. (Cubic meter)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (Cubic meter)	Cumulative Dredging Qty. (Cubic meter)
0	1	0.03	1.6	1000	71367.86	71367.86	-0.3	0.3	1000	87407.58	87407.58
1	2	0.1	1.5	1000	74649.55	146017.41	-0.3	0.3	1000	98930.79	186338.37
2	3	0.1	1.3	1000	57087.89	203105.3	-0.3	0.3	1000	78085.78	264424.15
3	4	0.3	1.3	1000	40454.68	243559.98	-0.3	0.8	1000	63943.39	328367.54
4	5	0.2	1.3	1000	46037.99	289597.97	-0.3	0.8	1000	73572.04	401939.58
5	6	0.1	1.3	1000	66878.9	356476.87	-0.3	0.3	1000	86037.25	487976.83
6	7	0.1	1.3	1000	65801.18	422278.05	-0.3	0.7	1000	84587.98	572564.81
7	8	0.2	1.2	1000	58645.59	480923.64	-0.3	0.3	1000	83240.57	655805.38
8	9	0.2	1.5	1000	23915.67	504839.31	-0.3	0.8	1000	49048.75	704854.13
9	10	0.1	1.5	1000	62167.2	567006.51	-0.3	1	1000	77518.17	782372.3
10	11	0.1	1.2	1000	51798.71	618805.22	-0.3	0.2	1000	74237.56	856609.86
11	12	0.1	1.4	1000	46388.23	665193.45	-0.3	0.9	1000	70601.7	927211.56
12	13	0.1	1.4	1000	55556.91	720750.36	-0.3	0.8	1000	82170.59	1009382.15
13	14	0.1	1.4	1000	80110.92	800861.28	-0.3	0.2	1000	113221.16	1122603.31
14	15	0.2	1.4	1000	66633.01	867494.29	-0.3	0.8	1000	98355.87	1220959.18
15	16	0.2	1.4	1000	54491.9	921986.19	-0.3	0.8	1000	84997.7	1305956.88
16	17	0.1	1.3	1000	74656.13	996642.32	-0.3	0.2	1000	101817.19	1407774.07
17	18	0.1	1.5	1000	67350.03	1063992.35	-0.3	0.2	1000	98481.74	1506255.81
18	19	0.1	1.2	1000	58855.57	1122847.92	-0.3	0.3	1000	89666.7	1595922.51
19	20	0.1	1.3	1000	69110.23	1191958.15	-0.3	0.2	1000	101073.97	1696996.48
20	21	0.1	1.3	1000	74208.9	1266167.05	-0.3	0.2	1000	103185.28	1800181.76
21	22	0.1	1.4	1000	71185.92	1337352.97	-0.3	0.4	1000	103728.56	1903910.32
22	23	0.1	1.5	1000	76801.77	1414154.74	-0.3	0.2	1000	102479.33	2006389.65
23	24	0.01	1.6	1000	78792.99	1492947.73	-0.3	0.3	1000	95991.96	2102381.61
24	25	0.01	0.4	1000	90479.07	1583426.8	-0.3	0	1000	98153.67	2200535.28
25	26	0.01	0.4	1000	21787.3	1605214.1	-0.3	0	1000	22753.88	2223289.16
26	27	0.01	0.4	1000	53299.05	1658513.15	-0.3	0	1000	57046.07	2280335.23
27	28	0.01	0.4	1000	91960.55	1750473.7	-0.3	0	1000	108268.83	2388604.06
28	29	0.01	0.5	1000	93018.07	1843491.77	-0.3	0	1000	107758.14	2496362.2
29	30	0.01	0.4	1000	98565.93	1942057.7	-0.3	0	1000	114012.78	2610374.98
30	31	0.01	0.4	1000	86154.28	2028211.98	-0.3	0	1000	97804.06	2708179.04
31	32	0.01	0.4	1000	88532.72	2116744.7	-0.3	0	1000	101652.93	2809831.97
32	33	0.01	0.5	1000	78873.45	2195618.15	-0.3	0	1000	90118.45	2899950.42
33	34	0.01	0.4	1000	87372.33	2282990.48	-0.3	0	1000	101007.54	3000957.96
34	35	0.01	0.4	1000	83191.04	2366181.52	-0.3	0	1000	95017.29	3095975.25

Class -III											
Chainage (km)		As per Observed Soundings					As per Reduced Soundings				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (Cubic meter)	Cumulative Dredging Qty. (Cubic meter)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (Cubic meter)	Cumulative Dredging Qty. (Cubic meter)
35	36	0.01	0.4	1000	84996.32	2451177.84	-0.3	0	1000	96422.12	3192397.37
36	37	0.03	0.4	1000	80723.41	2531901.25	-0.3	0	1000	92214.15	3284611.52
37	38	0.01	0.4	1000	81658.63	2613559.88	-0.3	0	1000	88148.28	3372759.8
38	39	0.01	0.4	1000	72279	2685838.88	-0.3	0	1000	79885.36	3452645.16
39	40	0.01	0.5	1000	80720.9	2766559.78	-0.3	0	1000	86945.28	3539590.44
40	41	0.01	0.5	1000	72636.61	2839196.39	-0.3	0	1000	74579.51	3614169.95
41	42	0.01	0.4	1000	63058.49	2902254.88	-0.3	0	1000	63578.71	3677748.66
42	43	0.02	0.4	1000	78214.15	2980469.03	-0.3	0	1000	84585.91	3762334.57
43	44	0.02	0.4	1000	78884.7	3059353.73	-0.3	0	1000	82595.89	3844930.46
44	45	0.03	0.4	1000	76493.04	3135846.77	-0.3	0	1000	84145.9	3929076.36
45	46	0.01	0.5	1000	77942.86	3213789.63	-0.3	0	1000	83069.51	4012145.87
46	47	0.01	0.5	1000	80924.15	3294713.78	-0.3	0	1000	88541.84	4100687.71
47	48	0.01	0.4	1000	81953.62	3376667.4	-0.3	0	1000	92984.46	4193672.17
48	49	0.01	0.5	1000	81541.33	3458208.73	-0.3	0	1000	92458.77	4286130.94
49	50	0.01	0.4	1000	78093.79	3536302.52	-0.3	0	1000	86790.53	4372921.47
50	51	0.03	0.5	1000	79725.19	3616027.71	-0.3	0	1000	85064.61	4457986.08
51	52	0.02	0.5	1000	80211.17	3696238.88	-0.3	0	1000	84869.7	4542855.78
52	53	0.01	0.5	1000	77351.6	3773590.48	-0.3	0	1000	79172.56	4622028.34
53	54	0.02	0.6	1000	83606.33	3857196.81	-0.3	0	1000	85837.77	4707866.11
54	55	0.02	0.5	1000	70196.1	3927392.91	-0.3	0	1000	73232.87	4781098.98
55	56	0.03	0.5	1000	66099.04	3993491.95	-0.3	0	1000	69282.06	4850381.04
56	57	0.01	0.5	1000	80851.26	4074343.21	-0.3	0	1000	89192.25	4939573.29
57	58	0.03	0.5	1000	91461.71	4165804.92	-0.3	0	1000	104152.93	5043726.22
58	59	0.03	0.5	1000	94554.37	4260359.29	-0.3	0	1000	109075.08	5152801.3
59	60	0.01	0.4	1000	82174.37	4342533.66	-0.3	0	1000	91888.21	5244689.51
60	61.368	0.02	0.4	1000	112780.89	4455314.55	-0.3	0	1000	120503.67	5365193.18
Total				61000	4455314.55				61000	5365193.18	

Table 17- Minimum & Maximum Depth for Class- III

Class-IV:

Class -IV											
Chainage (km)		As per Observed Soundings					As per Reduced Soundings				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (Cubic meter)	Cumulative Dredging Qty. (Cubic meter)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (Cubic meter)	Cumulative Dredging Qty. (Cubic meter)
0	1	0.03	1.6	1000	87551.57	87551.57	-0.3	0.6	1000	103827.6	103827.6
1	2	0.02	1.5	1000	92510.63	180062.2	-0.3	0.3	1000	117663.02	221490.62
2	3	0.04	1.3	1000	74635.15	254697.35	-0.3	0.3	1000	96687.26	318177.88
3	4	0.2	1.3	1000	54884.51	309581.86	-0.3	0.8	1000	80227.98	398405.86
4	5	0.1	1.3	1000	62494.13	372075.99	-0.3	0.8	1000	91310.68	489716.54
5	6	0.03	1.3	1000	83468.49	455544.48	-0.3	0.3	1000	103254.69	592971.23
6	7	0.03	1.4	1000	83351.7	538896.18	-0.3	0.7	1000	102689.12	695660.35
7	8	0.1	1.3	1000	76130.62	615026.8	-0.3	0.3	1000	101509.38	797169.73
8	9	0.1	1.5	1000	35879.42	650906.22	-0.3	0.8	1000	63881.54	861051.27
9	10	0.03	1.5	1000	79281.83	730188.05	-0.3	1	1000	95555.42	956606.69
10	11	0.05	1.3	1000	69316.46	799504.51	-0.3	0.2	1000	92571.4	1049178.09
11	12	0.03	1.4	1000	61909.94	861414.45	-0.3	0.9	1000	86870.63	1136048.72
12	13	0.05	1.4	1000	72252.46	933666.91	-0.3	0.8	1000	99962.1	1236010.82
13	14	0.04	1.5	1000	98792.92	1032459.8	-0.3	0.2	1000	133305.52	1369316.34
14	15	0.1	1.4	1000	84228.22	1116688.1	-0.3	0.8	1000	116499.36	1485815.7
15	16	0.1	1.4	1000	70563.09	1187251.1	-0.3	0.8	1000	102467.93	1588283.63
16	17	0.03	1.3	1000	92769.46	1280020.6	-0.3	0.2	1000	120957.57	1709241.2
17	18	0.03	1.3	1000	84949.44	1364970	-0.3	0.2	1000	117406.86	1826648.06
18	19	0.03	1.4	1000	75504.14	1440474.2	-0.3	0.3	1000	107526.05	1934174.11
19	20	0.03	1.4	1000	86750.49	1527224.7	-0.3	0.2	1000	119841.99	2054016.1
20	21	0.03	1.2	1000	92466.59	1619691.3	-0.3	0.2	1000	122380.36	2176396.46
21	22	0.03	1.4	1000	89142.41	1708833.7	-0.3	0.4	1000	122963.28	2299359.74
22	23	0.03	1.5	1000	94962.46	1803796.1	-0.3	0.2	1000	121751.76	2421111.5
23	24	0.01	1.5	1000	96398.19	1900194.3	-0.3	0.3	1000	114045.3	2535156.8
24	25	0.01	0.5	1000	109240.82	2009435.1	-0.3	0	1000	116987.68	2652144.48
25	26	0.01	0.5	1000	32220.48	2041655.6	-0.3	0	1000	33197.15	2685341.63
26	27	0.01	0.5	1000	69773.53	2111429.2	-0.3	0	1000	73657.98	2758999.61
27	28	0.01	0.5	1000	110632.09	2222061.2	-0.3	0	1000	127247.39	2886247
28	29	0.01	0.5	1000	111904.42	2333965.7	-0.3	0	1000	127018.23	3013265.23
29	30	0.01	0.5	1000	118840.79	2452806.5	-0.3	0	1000	134864.37	3148129.6
30	31	0.01	0.5	1000	104163.35	2556969.8	-0.3	0	1000	115988.28	3264117.88
31	32	0.01	0.5	1000	106606.48	2663576.3	-0.3	0	1000	119810.01	3383927.89
32	33	0.01	0.5	1000	95711.54	2759287.8	-0.3	0	1000	107073.91	3491001.8
33	34	0.01	0.4	1000	105252.94	2864540.8	-0.3	0	1000	119064.96	3610066.76
34	35	0.01	0.4	1000	100743.72	2965284.5	-0.3	0	1000	112685.53	3722752.29

Class -IV											
Chainage (km)		As per Observed Soundings					As per Reduced Soundings				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (Cubic meter)	Cumulative Dredging Qty. (Cubic meter)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (Cubic meter)	Cumulative Dredging Qty. (Cubic meter)
35	36	0.01	0.5	1000	103045.99	3068330.5	-0.3	0	1000	114654.58	3837406.87
36	37	0.02	0.5	1000	97629.05	3165959.5	-0.3	0	1000	109196.04	3946602.91
37	38	0.01	0.5	1000	99138.27	3265097.8	-0.3	0	1000	105689.51	4052292.42
38	39	0.01	0.5	1000	87662.28	3352760.1	-0.3	0	1000	95191.07	4147483.49
39	40	0.01	0.5	1000	98601.33	3451361.4	-0.3	0	1000	104937.15	4252420.64
40	41	0.01	0.4	1000	89562.31	3540923.7	-0.3	0	1000	91491.47	4343912.11
41	42	0.01	0.5	1000	79181.5	3620105.2	-0.3	0	1000	79716.89	4423629
42	43	0.02	0.4	1000	94951.48	3715056.7	-0.3	0	1000	101423.11	4525052.11
43	44	0.02	0.4	1000	97237.15	3812293.8	-0.3	0	1000	100892.74	4625944.85
44	45	0.03	0.5	1000	92691.21	3904985.1	-0.3	0	1000	100404.05	4726348.9
45	46	0.01	0.6	1000	94993.71	3999978.8	-0.3	0	1000	100134.17	4826483.07
46	47	0.01	0.5	1000	99155.38	4099134.1	-0.3	0	1000	106858.76	4933341.83
47	48	0.01	0.5	1000	99286.26	4198420.4	-0.3	0	1000	110416.3	5043758.13
48	49	0.01	0.5	1000	98486.85	4296907.3	-0.3	0	1000	109482.85	5153240.98
49	50	0.01	0.5	1000	94225.51	4391132.8	-0.3	0	1000	103119.28	5256360.26
50	51	0.03	0.5	1000	98174.48	4489307.2	-0.3	0	1000	103601.63	5359961.89
51	52	0.02	0.5	1000	99548.76	4588856	-0.3	0	1000	104289.11	5464251
52	53	0.01	0.5	1000	95163.82	4684019.8	-0.3	0	1000	97018.23	5561269.23
53	54	0.02	0.6	1000	102129.63	4786149.5	-0.3	0	1000	104406.82	5665676.05
54	55	0.02	0.5	1000	86381.54	4872531	-0.3	0	1000	89456.84	5755132.89
55	56	0.02	0.5	1000	81916.34	4954447.3	-0.3	0	1000	85081.15	5840214.04
56	57	0.01	0.5	1000	98528.3	5052975.6	-0.3	0	1000	107007.56	5947221.6
57	58	0.03	0.5	1000	110379.72	5163355.4	-0.3	0	1000	123232.83	6070454.43
58	59	0.03	0.5	1000	114036.48	5277391.8	-0.3	0	1000	128740.63	6199195.06
59	60	0.01	0.5	1000	99765.27	5377157.1	-0.3	0	1000	109637.89	6308832.95
60	61.368	0.02	0.5	1000	138186.5	5515343.6	-0.3	0	1000	145910.93	6454743.88
Total				61000	5515343.6		Total		61000	6454743.88	

Table 18- Minimum & Maximum Depth for Class- IV

Annexure-3:- Observed Depth in Four Classes (Class-I, II, III and Class-IV) in 200 meter intervals:-

Chainage (meter)	Class-I		Class-II		Class-III		Class-IV	
	Observed		Observed		Observed		Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
0	0.2	0.6	0.19	0.7	0.18	0.9	0.17	1
200	0.2	0.7	0.1	0.8	0.03	0.8	0.03	0.9
400	0.2	0.9	0.1	1	0.05	1.2	0.03	1.5
600	0.7	1.3	0.68	1.5	0.66	1.6	0.64	1.6
800	0.5	1.2	0.5	1.2	0.5	1.2	0.5	1.2
1000	0.8	1.3	0.79	1.4	0.78	1.5	0.77	1.5
1200	0.3	0.4	0.2	0.6	0.1	0.9	0.02	1.1
1400	0.3	0.4	0.1	0.9	0.1	1.2	0.05	1.3
1600	0.3	1.2	0.2	1.3	0.1	1.4	0.03	1.5
1800	0.7	1.3	0.69	1.3	0.68	1.3	0.67	1.3
2000	0.3	0.7	0.2	0.8	0.1	1.2	0.04	1.3
2200	0.8	1.3	0.6	1.3	0.4	1.3	0.2	1.3
2400	0.4	0.8	0.39	0.7	0.38	0.9	0.37	1.2
2600	0.4	0.8	0.38	0.9	0.36	1.1	0.34	1.3
2800	0.7	1.2	0.6	1.2	0.5	1.2	0.4	1.2
3000	0.5	1.3	0.4	1.2	0.3	1.3	0.2	1.3
3200	0.5	1.2	0.48	1.3	0.46	1.3	0.44	1.3
3400	0.7	1.3	0.69	1.3	0.68	1.3	0.67	1.3
3600	0.8	1.1	0.78	1.2	0.76	1.2	0.74	1.2
3800	0.8	1	0.79	1.1	0.78	1.2	0.77	1.2
4000	0.5	1.2	0.4	1.2	0.3	1.2	0.2	1.2
4200	0.4	1.1	0.3	1.2	0.2	1.2	0.1	1.2
4400	0.8	1.2	0.78	1.2	0.76	1.2	0.74	1.2
4600	1	1.2	0.99	1.2	0.98	1.3	0.97	1.3
4800	0.5	1.3	0.4	1.3	0.3	1.3	0.2	1.3
5000	0.8	1.3	0.7	1.3	0.6	1.3	0.5	1.3
5200	0.3	0.8	0.28	0.9	0.26	1	0.24	1.3
5400	0.3	1.2	0.29	1.3	0.28	1.2	0.27	1.3
5600	0.5	0.8	0.49	0.9	0.48	1.1	0.47	1.2
5800	0.3	1.3	0.2	1.3	0.1	1.3	0.05	1.3
6000	0.3	1.2	0.2	1.2	0.1	1.3	0.03	1.2
6200	0.4	1.3	0.38	1.3	0.36	1.3	0.34	1.3
6400	0.7	1.1	0.69	1.1	0.68	1.2	0.67	1.2
6600	0.3	1.2	0.28	1.2	0.26	1.2	0.24	1.2
6800	0.3	1.3	0.2	1.2	0.1	1.3	0.05	1.4
7000	0.5	0.8	0.4	0.9	0.3	1	0.2	1.3
7200	0.4	0.8	0.38	0.9	0.36	1.1	0.34	1.1
7400	0.3	0.9	0.29	0.8	0.28	0.9	0.27	1
7600	0.4	0.9	0.3	1	0.2	1.2	0.1	1.3

Chainage (meter)	Class-I		Class-II		Class-III		Class-IV	
	Observed		Observed		Observed		Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
7800	0.4	0.8	0.3	0.9	0.2	1.1	0.1	0.9
8000	0.7	0.9	0.68	1	0.66	1.2	0.64	1.3
8200	0.5	1.7	0.49	1.3	0.48	1.4	0.47	1.5
8400	0.8	1.7	0.7	1.4	0.6	1.5	0.5	1.5
8600	0.5	0.8	0.48	1	0.46	1.2	0.44	1.3
8800	0.7	1.1	0.69	1.5	0.68	1.4	0.67	1.5
9000	0.4	1.8	0.3	1.6	0.2	1.5	0.1	1.5
9200	0.3	0.6	0.2	0.9	0.1	1	0.03	1.2
9400	0.3	1.4	0.28	1.4	0.26	1.4	0.24	1.4
9600	0.5	1.2	0.49	1.3	0.48	1.3	0.47	1.3
9800	0.8	1.1	0.7	1.1	0.6	1.1	0.5	1.2
10000	0.4	1.1	0.3	0.8	0.2	0.8	0.1	1.3
10200	0.3	0.9	0.29	1	0.28	0.9	0.27	1.2
10400	0.7	1	0.68	0.9	0.66	1	0.64	1
10600	0.3	0.8	0.29	0.9	0.28	1	0.27	1.1
10800	0.7	1.2	0.6	1.3	0.5	1.1	0.4	1.2
11000	0.3	0.8	0.1	1.2	0.1	1.2	0.05	1.3
11200	0.7	1.3	0.68	1.4	0.66	1.4	0.64	1.4
11400	0.4	0.8	0.39	0.9	0.38	1	0.37	1.1
11600	0.3	0.7	0.2	0.9	0.1	1	0.03	1.2
11800	0.3	1.4	0.2	1.4	0.1	1.4	0.05	1.4
12000	0.7	1.3	0.68	1.3	0.66	1.4	0.64	1.4
12200	0.3	0.9	0.29	1.1	0.28	1.3	0.27	1.4
12400	0.5	1.3	0.48	1.4	0.46	1.4	0.44	1.4
12600	0.3	1.2	0.29	1.3	0.28	1.3	0.27	1.3
12800	0.5	1.4	0.4	1.4	0.3	1.4	0.2	1.4
13000	0.3	1	0.2	1.2	0.1	1.3	0.05	1.3
13200	0.3	1.2	0.28	1.3	0.26	1.3	0.24	1.4
13400	0.3	0.8	0.29	0.9	0.28	1.1	0.27	1.2
13600	0.3	0.9	0.2	0.8	0.1	0.9	0.04	1
13800	0.7	1.2	0.6	1.3	0.5	1.4	0.4	1.5
14000	0.3	0.8	0.29	1.1	0.28	1.2	0.27	1.3
14200	0.7	1.3	0.68	1.3	0.66	1.3	0.64	1.3
14400	1	1.2	0.99	1.3	0.98	1.3	0.97	1.3
14600	0.4	1.2	0.3	1.3	0.2	1.3	0.1	1.3
14800	0.7	1	0.5	1.2	0.3	1.4	0.1	1.4
15000	1	1.3	0.98	1.3	0.96	1.3	0.94	1.3
15200	0.8	1.2	0.79	1.3	0.78	1.4	0.77	1.4
15400	0.4	1.3	0.3	1.3	0.2	1.3	0.1	1.3
15600	0.7	1	0.6	1.2	0.5	1.4	0.4	1.4
15800	0.9	1.3	0.88	1.3	0.86	1.3	0.84	1.3
16000	0.8	1.3	0.79	1.3	0.78	1.3	0.77	1.3

Chainage (meter)	Class-I		Class-II		Class-III		Class-IV	
	Observed		Observed		Observed		Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
16200	0.3	0.8	0.2	1.3	0.1	1.3	0.04	1.3
16400	0.2	0.8	0.1	1.2	0.1	1.3	0.03	1.3
16600	0.3	0.8	0.28	0.9	0.26	1.1	0.24	1.2
16800	0.5	0.8	0.49	1.1	0.48	1.2	0.47	1.3
17000	0.3	1	0.2	1	0.1	1.2	0.05	1.3
17200	0.3	1	0.2	1.1	0.1	1.3	0.03	1.2
17400	0.8	1	0.78	1.2	0.76	1.4	0.74	1.2
17600	0.3	1.4	0.29	1.5	0.28	1.5	0.27	1.3
17800	0.4	0.8	0.39	0.9	0.38	1	0.37	1.1
18000	0.4	0.8	0.3	1.1	0.2	1.2	0.1	1.3
18200	0.7	1	0.6	1	0.5	1	0.4	1.2
18400	0.7	0.9	0.68	1.1	0.66	1.2	0.64	1.3
18600	0.3	0.7	0.29	0.9	0.28	1.2	0.27	1.3
18800	0.2	0.6	0.18	0.8	0.16	1.1	0.14	1.2
19000	0.3	0.8	0.2	0.9	0.1	1	0.03	1.4
19200	0.5	1	0.4	1	0.3	1.1	0.2	1
19400	0.5	1	0.48	1.1	0.46	1.2	0.44	1
19600	0.8	1.2	0.79	1.2	0.78	1.3	0.77	1.1
19800	0.4	1.3	0.3	1	0.2	1.1	0.1	1
20000	0.3	1.2	0.2	1.1	0.1	1.3	0.03	1.1
20200	0.3	1	0.28	1.1	0.26	1.2	0.24	1.2
20400	0.3	0.8	0.29	0.9	0.28	1	0.27	1.1
20600	0.5	0.8	0.4	0.9	0.3	1	0.2	1
20800	0.4	1.3	0.39	1.2	0.38	1.2	0.37	1.1
21000	0.5	1.2	0.4	1.3	0.3	1.3	0.2	1.2
21200	0.5	1.3	0.4	1.4	0.3	1.4	0.2	1.4
21400	0.3	0.8	0.28	0.9	0.26	1	0.24	1.2
21600	0.8	1.2	0.7	1.2	0.6	1.2	0.5	1.2
21800	0.3	0.8	0.29	0.9	0.28	1.1	0.27	1.3
22000	0.3	1.2	0.2	1.2	0.1	1.2	0.03	1.2
22200	0.7	1.3	0.5	1.3	0.3	1.3	0.1	1.3
22400	0.4	0.8	0.3	1.2	0.2	1.2	0.1	1.2
22600	0.7	1.3	0.69	1.4	0.68	1.5	0.67	1.5
22800	0.3	0.5	0.2	0.8	0.1	0.9	0.03	1.2
23000	0.3	0.5	0.1	0.9	0.1	1.1	0.03	1.5
23200	0.5	1.1	0.49	1.2	0.48	1.3	0.47	1.4
23400	0.6	1.4	0.58	1.4	0.56	1.4	0.54	1.4
23600	0.1	0.3	0.1	0.4	0.1	0.4	0.03	0.5
23800	0.03	0.2	0.03	0.3	0.02	0.3	0.02	0.3
24000	0.05	0.3	0.03	0.3	0.01	0.3	0.01	0.4
24200	0.1	0.3	0.09	0.2	0.08	0.3	0.07	0.3
24400	0.1	0.3	0.08	0.3	0.06	0.4	0.04	0.5

Chainage (meter)	Class-I		Class-II		Class-III		Class-IV	
	Observed		Observed		Observed		Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
24600	0.1	0.2	0.1	0.3	0.03	0.3	0.03	0.4
24800	0.03	0.1	0.01	0.2	0.01	0.3	0.01	0.4
25000	0.04	0.3	0.03	0.3	0.02	0.3	0.01	0.3
25200	0.05	0.3	0.04	0.3	0.03	0.4	0.02	0.5
25400	0.1	0.1	0.1	0.2	0.03	0.3	0.03	0.4
25600	0.2	0.3	0.1	0.3	0.05	0.3	0.03	0.4
25800	0.04	0.2	0.02	0.3	0.02	0.3	0.02	0.4
26000	0.03	0.3	0.02	0.3	0.01	0.3	0.01	0.3
26200	0.1	0.2	0.08	0.3	0.06	0.3	0.04	0.4
26400	0.05	0.1	0.03	0.2	0.03	0.3	0.03	0.4
26600	0.04	0.2	0.04	0.3	0.03	0.3	0.03	0.3
26800	0.1	0.2	0.08	0.3	0.06	0.3	0.04	0.4
27000	0.1	0.3	0.09	0.3	0.08	0.4	0.07	0.5
27200	0.03	0.1	0.03	0.2	0.03	0.3	0.03	0.4
27400	0.1	0.2	0.1	0.3	0.03	0.4	0.02	0.4
27600	0.1	0.3	0.08	0.3	0.06	0.4	0.04	0.5
27800	0.03	0.1	0.02	0.2	0.01	0.3	0.01	0.4
28000	0.1	0.2	0.04	0.3	0.04	0.4	0.03	0.5
28200	0.1	0.2	0.09	0.3	0.08	0.4	0.07	0.4
28400	0.1	0.2	0.03	0.3	0.03	0.4	0.03	0.4
28600	0.1	0.2	0.03	0.4	0.03	0.5	0.03	0.5
28800	0.03	0.3	0.01	0.3	0.01	0.4	0.01	0.5
29000	0.05	0.3	0.01	0.4	0.01	0.4	0.01	0.4
29200	0.1	0.2	0.09	0.3	0.08	0.4	0.07	0.5
29400	0.1	0.2	0.1	0.3	0.02	0.3	0.02	0.5
29600	0.1	0.2	0.1	0.3	0.03	0.4	0.02	0.5
29800	0.1	0.2	0.04	0.3	0.04	0.3	0.04	0.4
30000	0.01	0.3	0.01	0.3	0.01	0.3	0.01	0.4
30200	0.1	0.2	0.05	0.3	0.03	0.4	0.03	0.4
30400	0.03	0.2	0.03	0.2	0.03	0.3	0.03	0.4
30600	0.1	0.3	0.09	0.3	0.08	0.3	0.07	0.4
30800	0.1	0.3	0.08	0.3	0.06	0.3	0.04	0.4
31000	0.03	0.2	0.03	0.3	0.02	0.4	0.02	0.5
31200	0.05	0.1	0.05	0.2	0.03	0.3	0.03	0.4
31400	0.03	0.1	0.01	0.2	0.01	0.3	0.01	0.4
31600	0.05	0.2	0.04	0.3	0.03	0.4	0.02	0.5
31800	0.04	0.1	0.02	0.2	0.02	0.3	0.02	0.4
32000	0.03	0.2	0.01	0.3	0.01	0.4	0.01	0.3
32200	0.04	0.3	0.03	0.4	0.02	0.5	0.01	0.5
32400	0.03	0.2	0.03	0.3	0.03	0.3	0.03	0.3
32600	0.05	0.2	0.03	0.3	0.03	0.3	0.03	0.3
32800	0.03	0.3	0.02	0.4	0.01	0.5	0.01	0.5

Chainage (meter)	Class-I		Class-II		Class-III		Class-IV	
	Observed		Observed		Observed		Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
33000	0.1	0.2	0.08	0.3	0.06	0.3	0.04	0.3
33200	0.1	0.3	0.09	0.4	0.08	0.4	0.07	0.4
33400	0.05	0.2	0.02	0.2	0.02	0.3	0.02	0.4
33600	0.04	0.3	0.02	0.2	0.02	0.3	0.02	0.3
33800	0.05	0.3	0.03	0.3	0.01	0.3	0.01	0.4
34000	0.1	0.3	0.09	0.3	0.08	0.3	0.07	0.4
34200	0.1	0.2	0.1	0.3	0.05	0.4	0.03	0.4
34400	0.1	0.3	0.1	0.3	0.04	0.3	0.04	0.3
34600	0.03	0.4	0.01	0.4	0.01	0.4	0.01	0.4
34800	0.05	0.1	0.04	0.2	0.03	0.3	0.02	0.3
35000	0.04	0.1	0.03	0.3	0.02	0.4	0.02	0.3
35200	0.03	0.2	0.02	0.3	0.02	0.4	0.02	0.5
35400	0.03	0.1	0.01	0.2	0.01	0.3	0.01	0.4
35600	0.05	0.1	0.04	0.3	0.03	0.4	0.02	0.5
35800	0.04	0.2	0.03	0.3	0.02	0.4	0.02	0.4
36000	0.05	0.1	0.04	0.3	0.03	0.3	0.02	0.4
36200	0.1	0.2	0.1	0.3	0.03	0.3	0.03	0.4
36400	0.05	0.1	0.03	0.4	0.03	0.4	0.03	0.5
36600	0.1	0.2	0.08	0.3	0.06	0.4	0.04	0.3
36800	0.1	0.3	0.09	0.3	0.08	0.4	0.07	0.3
37000	0.1	0.3	0.05	0.3	0.03	0.4	0.03	0.3
37200	0.05	0.1	0.04	0.2	0.03	0.3	0.02	0.5
37400	0.05	0.2	0.03	0.3	0.03	0.3	0.03	0.4
37600	0.1	0.3	0.04	0.3	0.03	0.3	0.03	0.4
37800	0.04	0.1	0.02	0.2	0.01	0.3	0.01	0.4
38000	0.03	0.1	0.03	0.3	0.03	0.3	0.03	0.4
38200	0.04	0.1	0.03	0.2	0.02	0.3	0.01	0.5
38400	0.1	0.2	0.05	0.3	0.03	0.3	0.03	0.4
38600	0.1	0.3	0.03	0.2	0.03	0.3	0.02	0.4
38800	0.1	0.2	0.04	0.3	0.04	0.4	0.04	0.5
39000	0.03	0.3	0.02	0.3	0.01	0.4	0.01	0.5
39200	0.1	0.2	0.03	0.3	0.03	0.4	0.03	0.5
39400	0.05	0.1	0.03	0.2	0.03	0.3	0.03	0.4
39600	0.1	0.2	0.09	0.3	0.08	0.3	0.07	0.4
39800	0.1	0.3	0.08	0.3	0.06	0.4	0.04	0.5
40000	0.1	0.3	0.03	0.4	0.03	0.5	0.03	0.4
40200	0.1	0.3	0.05	0.3	0.03	0.4	0.03	0.4
40400	0.1	0.2	0.08	0.3	0.06	0.2	0.04	0.4
40600	0.03	0.1	0.02	0.2	0.01	0.3	0.01	0.3
40800	0.04	0.1	0.02	0.2	0.02	0.3	0.02	0.4
41000	0.05	0.1	0.03	0.3	0.01	0.3	0.01	0.4
41200	0.1	0.2	0.09	0.3	0.08	0.3	0.07	0.4

Chainage (meter)	Class-I		Class-II		Class-III		Class-IV	
	Observed		Observed		Observed		Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
41400	0.1	0.2	0.02	0.3	0.02	0.3	0.02	0.5
41600	0.1	0.3	0.03	0.3	0.03	0.4	0.03	0.5
41800	0.1	0.2	0.08	0.3	0.06	0.3	0.04	0.4
42000	0.05	0.1	0.04	0.2	0.03	0.3	0.02	0.4
42200	0.04	0.1	0.04	0.2	0.04	0.3	0.04	0.4
42400	0.05	0.1	0.03	0.2	0.03	0.3	0.03	0.4
42600	0.04	0.2	0.02	0.2	0.02	0.3	0.02	0.4
42800	0.05	0.2	0.04	0.2	0.03	0.3	0.02	0.4
43000	0.03	0.3	0.03	0.4	0.03	0.4	0.03	0.4
43200	0.1	0.2	0.09	0.3	0.08	0.4	0.07	0.4
43400	0.1	0.3	0.04	0.3	0.04	0.3	0.03	0.4
43600	0.05	0.2	0.03	0.3	0.03	0.3	0.03	0.4
43800	0.04	0.2	0.02	0.3	0.02	0.3	0.02	0.4
44000	0.1	0.3	0.09	0.3	0.08	0.2	0.07	0.3
44200	0.04	0.1	0.03	0.2	0.03	0.3	0.03	0.4
44400	0.1	0.2	0.09	0.3	0.08	0.3	0.07	0.3
44600	0.1	0.3	0.03	0.3	0.03	0.4	0.03	0.5
44800	0.04	0.1	0.03	0.2	0.03	0.3	0.03	0.4
45000	0.1	0.2	0.08	0.3	0.06	0.3	0.04	0.4
45200	0.1	0.3	0.05	0.3	0.03	0.4	0.03	0.5
45400	0.1	0.3	0.09	0.5	0.08	0.5	0.07	0.6
45600	0.02	0.1	0.02	0.2	0.02	0.3	0.02	0.4
45800	0.03	0.2	0.02	0.3	0.01	0.4	0.01	0.5
46000	0.04	0.1	0.02	0.2	0.01	0.3	0.01	0.4
46200	0.1	0.2	0.03	0.3	0.03	0.3	0.03	0.3
46400	0.05	0.1	0.03	0.3	0.03	0.4	0.03	0.5
46600	0.1	0.3	0.08	0.5	0.06	0.5	0.04	0.5
46800	0.1	0.2	0.09	0.3	0.08	0.3	0.07	0.4
47000	0.1	0.3	0.08	0.4	0.06	0.4	0.04	0.5
47200	0.05	0.1	0.03	0.3	0.01	0.3	0.01	0.5
47400	0.1	0.2	0.09	0.3	0.08	0.4	0.07	0.5
47600	0.1	0.2	0.03	0.3	0.03	0.4	0.03	0.5
47800	0.1	0.3	0.03	0.3	0.03	0.4	0.03	0.5
48000	0.03	0.2	0.02	0.2	0.01	0.3	0.01	0.4
48200	0.1	0.3	0.08	0.4	0.06	0.5	0.04	0.5
48400	0.1	0.2	0.09	0.3	0.08	0.4	0.07	0.5
48600	0.03	0.1	0.03	0.2	0.03	0.3	0.03	0.3
48800	0.1	0.2	0.05	0.3	0.03	0.4	0.03	0.4
49000	0.03	0.1	0.01	0.2	0.01	0.3	0.01	0.4
49200	0.1	0.2	0.09	0.3	0.08	0.4	0.07	0.4
49400	0.03	0.1	0.01	0.3	0.01	0.3	0.01	0.4
49600	0.03	0.1	0.03	0.2	0.03	0.3	0.02	0.4

Chainage (meter)	Class-I		Class-II		Class-III		Class-IV	
	Observed		Observed		Observed		Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
49800	0.05	0.2	0.03	0.3	0.01	0.4	0.01	0.5
50000	0.1	0.3	0.09	0.4	0.08	0.4	0.05	0.4
50200	0.1	0.3	0.09	0.3	0.08	0.3	0.05	0.4
50400	0.1	0.2	0.05	0.3	0.03	0.4	0.03	0.4
50600	0.1	0.3	0.03	0.4	0.03	0.5	0.03	0.5
50800	0.1	0.2	0.08	0.3	0.06	0.4	0.04	0.4
51000	0.1	0.3	0.09	0.4	0.08	0.5	0.06	0.5
51200	0.04	0.2	0.02	0.3	0.02	0.4	0.02	0.4
51400	0.05	0.1	0.02	0.2	0.02	0.3	0.02	0.3
51600	0.1	0.2	0.03	0.3	0.03	0.3	0.03	0.3
51800	0.1	0.2	0.08	0.3	0.06	0.4	0.03	0.4
52000	0.1	0.3	0.09	0.3	0.08	0.4	0.05	0.4
52200	0.03	0.1	0.03	0.2	0.03	0.3	0.03	0.3
52400	0.05	0.2	0.03	0.3	0.03	0.4	0.03	0.4
52600	0.03	0.1	0.01	0.2	0.01	0.3	0.01	0.3
52800	0.04	0.2	0.03	0.3	0.02	0.3	0.02	0.3
53000	0.05	0.3	0.04	0.4	0.04	0.5	0.03	0.5
53200	0.1	0.2	0.09	0.3	0.08	0.4	0.05	0.4
53400	0.1	0.3	0.02	0.5	0.02	0.6	0.02	0.6
53600	0.1	0.2	0.04	0.3	0.04	0.4	0.04	0.4
53800	0.1	0.3	0.08	0.4	0.06	0.4	0.04	0.4
54000	0.1	0.2	0.05	0.3	0.03	0.3	0.03	0.3
54200	0.04	0.1	0.03	0.3	0.02	0.4	0.02	0.4
54400	0.05	0.2	0.03	0.3	0.03	0.4	0.03	0.4
54600	0.1	0.3	0.03	0.4	0.03	0.5	0.03	0.5
54800	0.1	0.2	0.04	0.3	0.03	0.4	0.03	0.4
55000	0.05	0.1	0.04	0.3	0.03	0.4	0.03	0.4
55200	0.1	0.2	0.05	0.3	0.04	0.4	0.02	0.4
55400	0.1	0.2	0.03	0.3	0.03	0.4	0.03	0.4
55600	0.1	0.3	0.09	0.4	0.08	0.5	0.05	0.5
55800	0.1	0.2	0.08	0.3	0.06	0.4	0.04	0.4
56000	0.1	0.3	0.05	0.4	0.03	0.5	0.03	0.5
56200	0.1	0.4	0.06	0.4	0.04	0.5	0.03	0.5
56400	0.1	0.3	0.08	0.3	0.06	0.4	0.03	0.4
56600	0.03	0.3	0.02	0.3	0.01	0.4	0.01	0.4
56800	0.05	0.2	0.03	0.3	0.01	0.4	0.01	0.5
57000	0.1	0.3	0.08	0.4	0.06	0.4	0.03	0.4
57200	0.1	0.3	0.09	0.3	0.08	0.4	0.05	0.4
57400	0.1	0.3	0.06	0.3	0.04	0.4	0.03	0.4
57600	0.05	0.4	0.04	0.5	0.03	0.5	0.03	0.5
57800	0.1	0.3	0.08	0.3	0.06	0.3	0.04	0.4
58000	0.1	0.3	0.05	0.3	0.03	0.3	0.03	0.3

Chainage (meter)	Class-I		Class-II		Class-III		Class-IV	
	Observed		Observed		Observed		Observed	
	Min	Max	Min	Max	Min	Max	Min	Max
58200	0.04	0.2	0.03	0.3	0.03	0.4	0.03	0.4
58400	0.1	0.4	0.08	0.4	0.06	0.5	0.04	0.5
58600	0.1	0.4	0.09	0.5	0.08	0.5	0.06	0.5
58800	0.04	0.3	0.04	0.3	0.03	0.4	0.03	0.5
59000	0.1	0.3	0.03	0.4	0.03	0.4	0.03	0.4
59200	0.1	0.2	0.09	0.3	0.08	0.4	0.06	0.4
59400	0.05	0.2	0.03	0.2	0.01	0.3	0.01	0.4
59600	0.1	0.3	0.04	0.3	0.04	0.4	0.02	0.5
59800	0.1	0.3	0.03	0.3	0.03	0.3	0.03	0.4
60000	0.1	0.2	0.09	0.3	0.08	0.4	0.06	0.4
60200	0.1	0.3	0.08	0.3	0.06	0.4	0.04	0.4
60400	0.1	0.2	0.02	0.3	0.02	0.4	0.02	0.5
60600	0.04	0.2	0.03	0.3	0.02	0.3	0.02	0.5
60800	0.1	0.2	0.05	0.2	0.03	0.3	0.03	0.3
61000	0.1	0.3	0.09	0.3	0.06	0.4	0.04	0.4
61200	0.1	0.3	0.08	0.3	0.06	0.3	0.05	0.4
61368	0.1	0.2	0.06	0.3	0.04	0.4	0.03	0.5

Figure 17- 200 meter interval depth (observed)

Annexure-4:- Reduced Depth in Four Classes (Class-I, II, III and Class-IV) in 200 meter intervals:-

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Reduced		Reduced		Reduced		Reduced	
	Min	Max	Min	Max	Min	Max	Min	Max
0	-0.2	0.2	-0.2	0.2	-0.2	0.3	-0.2	0.2
200	-0.3	0.2	-0.3	0.2	-0.3	0.2	-0.3	0.3
400	-0.3	0.1	-0.3	0.2	-0.3	0.1	-0.3	0.5
600	-0.2	0.3	-0.2	0.2	-0.2	0.3	-0.2	0.6
800	-0.3	0.3	-0.3	0.3	-0.3	0.3	-0.3	0.3
1000	-0.3	0.3	-0.3	0.2	-0.3	0.2	-0.3	0.3
1200	-0.3	0.2	-0.3	0	-0.3	0.1	-0.3	0.1
1400	-0.3	0.1	-0.3	0	-0.3	0	-0.3	0.2
1600	-0.3	0.2	-0.3	0.3	-0.3	0.4	-0.3	0.5
1800	-0.2	0.2	-0.2	0	-0.2	0	-0.2	0.2
2000	-0.3	0.1	-0.3	0	-0.3	0.3	-0.3	0.1
2200	-0.1	0.3	-0.1	0.3	-0.1	0.5	-0.1	0.7
2400	-0.3	0.2	-0.3	0	-0.3	0.2	-0.3	0.2
2600	-0.3	0.1	-0.3	0	-0.3	0	-0.3	0.4
2800	-0.1	0.2	-0.1	0	-0.1	0.1	-0.1	0.5
3000	-0.2	0.2	-0.2	0	-0.2	0.2	-0.2	0.2
3200	-0.2	0.3	-0.2	0.1	-0.2	0.2	-0.2	0.4
3400	-0.2	0.4	-0.2	0.3	-0.2	0.4	-0.2	0.5
3600	0.5	0.8	0.5	0.7	0.5	0.7	0.5	0.6
3800	-0.2	0.2	-0.2	0.3	-0.2	0.5	-0.2	0.5
4000	-0.3	0.1	-0.3	0.5	-0.3	0.7	-0.3	0.4
4200	-0.2	0.1	-0.2	0.4	-0.2	0.6	-0.2	0.5
4400	0.2	0.5	0.2	0.8	0.2	0.5	0.2	0.6
4600	0.2	0.8	0.2	0.7	0.2	0.7	0.2	0.8
4800	-0.3	0.2	-0.3	0.3	-0.3	0.4	-0.3	0.5
5000	-0.1	0.1	-0.1	0.5	-0.1	0.5	-0.1	0.6
5200	-0.3	0.1	-0.3	0.2	-0.3	0.3	-0.3	0.4
5400	-0.2	0.2	-0.2	0.3	-0.2	0.2	-0.2	0.3
5600	-0.3	0.1	-0.3	0.4	-0.3	0.5	-0.3	0.5
5800	-0.3	0.3	-0.3	0.5	-0.3	0.4	-0.3	0.9
6000	-0.3	0.2	-0.3	0.7	-0.3	0.5	-0.3	0.6
6200	-0.3	0.3	-0.3	0.3	-0.3	0.6	-0.3	0.5
6400	-0.3	0.1	-0.3	0.2	-0.3	0.4	-0.3	0.5
6600	0.1	0.7	0.1	0.5	0.1	0.2	0.1	0.1
6800	-0.3	0.2	-0.3	0.4	-0.3	0.5	-0.3	0.8
7000	-0.3	0.3	-0.3	0.3	-0.3	0.4	-0.3	0.2
7200	-0.3	0.1	-0.3	0.1	-0.3	0.3	-0.3	0.3

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Reduced		Reduced		Reduced		Reduced	
	Min	Max	Min	Max	Min	Max	Min	Max
7400	-0.3	0.2	-0.3	0	-0.3	0.1	-0.3	0.2
7600	-0.3	0.1	-0.3	0.2	-0.3	0.2	-0.3	0.1
7800	-0.3	0.3	-0.3	0.2	-0.3	0.1	-0.3	0.2
8000	-0.2	0.2	-0.2	0	-0.2	0.3	-0.2	0.3
8200	-0.3	0.1	-0.3	0.5	-0.3	0.3	-0.3	0.5
8400	-0.3	0.2	-0.3	0.3	-0.3	0.4	-0.3	0.1
8600	-0.3	0.2	-0.3	0.5	-0.3	0.5	-0.3	0.2
8800	-0.2	0.2	-0.2	0.6	-0.2	0.6	-0.2	0.7
9000	0.2	0.8	0.2	0.8	0.2	0.7	0.2	0.2
9200	-0.3	0.1	-0.3	0	-0.3	0.5	-0.3	0.5
9400	-0.3	0.2	-0.3	0	-0.3	1	-0.3	0.6
9600	-0.2	0.1	-0.2	1	-0.2	1.1	-0.2	1.2
9800	0.4	1	0.4	1.2	0.4	1	0.4	0.5
10000	-0.2	0.1	-0.2	0	-0.2	0.2	-0.2	0.3
10200	-0.3	0.2	-0.3	0.3	-0.3	0.2	-0.3	0.2
10400	-0.2	0.1	-0.2	0.2	-0.2	0.4	-0.2	0.4
10600	-0.3	0.2	-0.3	0	-0.3	0.3	-0.3	0.2
10800	-0.3	0.1	-0.3	0.1	-0.3	0.1	-0.3	0.3
11000	-0.3	0.2	-0.3	0	-0.3	0.2	-0.3	0.2
11200	-0.3	0.1	-0.3	0.9	-0.3	0.1	-0.3	0.4
11400	-0.3	0.2	-0.3	0.5	-0.3	1	-0.3	1.1
11600	-0.3	0.1	-0.3	0.8	-0.3	0.5	-0.3	0.5
11800	-0.3	0.9	-0.3	0.6	-0.3	0.2	-0.3	0.6
12000	-0.2	0.1	-0.2	0	-0.2	0.1	-0.2	0.3
12200	-0.2	0.2	-0.2	0	-0.2	0.4	-0.2	0.4
12400	0.3	0.8	0.3	0.6	0.3	0.5	0.3	0.3
12600	-0.1	0.1	-0.1	0.8	-0.1	0.9	-0.1	0.9
12800	-0.2	0.2	-0.2	0	-0.2	0.2	-0.2	0.5
13000	-0.3	0.2	-0.3	0.1	-0.3	0.2	-0.3	0.2
13200	-0.3	0.1	-0.3	0	-0.3	0.3	-0.3	0.8
13400	-0.3	0.1	-0.3	0.1	-0.3	0.8	-0.3	0.5
13600	-0.3	0.2	-0.3	0	-0.3	0.4	-0.3	0.6
13800	-0.2	0.1	-0.2	0	-0.2	0.2	-0.2	0.3
14000	-0.3	0.1	-0.3	0.1	-0.3	0.1	-0.3	0.4
14200	-0.3	0.2	-0.3	0	-0.3	0.1	-0.3	0.3
14400	0.2	0.8	0.2	0.3	0.2	0.6	0.2	0.5
14600	-0.3	0.2	-0.3	0.6	-0.3	0.5	-0.3	0.7
14800	-0.2	0.1	-0.2	0.5	-0.2	0.7	-0.2	0.2
15000	0.2	0.8	0.2	0.8	0.2	0.5	0.2	0.3
15200	-0.1	0.2	-0.1	0.2	-0.1	0.6	-0.1	0.6
15400	-0.3	0.4	-0.3	0.5	-0.3	0.8	-0.3	0.6
15600	-0.2	0.1	-0.2	0.1	-0.2	0.5	-0.2	0.8

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Reduced		Reduced		Reduced		Reduced	
	Min	Max	Min	Max	Min	Max	Min	Max
15800	-0.1	0.2	-0.1	0	-0.1	0.2	-0.1	0.2
16000	-0.1	0.1	-0.1	0.1	-0.1	0.1	-0.1	0.1
16200	-0.3	0.2	-0.3	0	-0.3	0.2	-0.3	0.4
16400	-0.3	0.2	-0.3	0	-0.3	0.2	-0.3	0.1
16600	-0.3	0.1	-0.3	0	-0.3	0.1	-0.3	0.1
16800	-0.3	0.2	-0.3	0	-0.3	0.4	-0.3	0.3
17000	-0.3	0.1	-0.3	0.1	-0.3	0.3	-0.3	0.2
17200	-0.3	0.1	-0.3	0	-0.3	0.2	-0.3	0.5
17400	-0.2	0.2	-0.2	0.1	-0.2	0.1	-0.2	0.2
17600	-0.3	0.1	-0.3	0	-0.3	0.2	-0.3	0.3
17800	-0.3	0.2	-0.3	0.1	-0.3	0.5	-0.3	0.2
18000	-0.3	0.2	-0.3	0.2	-0.3	0.1	-0.3	0.2
18200	-0.1	0.1	-0.1	0	-0.1	0.2	-0.1	0.4
18400	-0.3	0.1	-0.3	0.1	-0.3	0.1	-0.3	0.1
18600	-0.3	0.3	-0.3	0.3	-0.3	0.2	-0.3	0.2
18800	-0.3	0.2	-0.3	0.2	-0.3	0.4	-0.3	0.3
19000	-0.3	0.1	-0.3	0.1	-0.3	0.3	-0.3	0.2
19200	-0.3	0.1	-0.3	0	-0.3	0.1	-0.3	0.4
19400	-0.3	0.2	-0.3	0.1	-0.3	0.2	-0.3	0.3
19600	-0.2	0.1	-0.2	0	-0.2	0.1	-0.2	0.2
19800	-0.3	0.2	-0.3	0.2	-0.3	0.4	-0.3	0.1
20000	-0.3	0.1	-0.3	0.1	-0.3	0.2	-0.3	0.2
20200	-0.3	0.2	-0.3	0.1	-0.3	0.1	-0.3	0.1
20400	-0.3	0.1	-0.3	0	-0.3	0.3	-0.3	0.2
20600	-0.3	0.2	-0.3	0.1	-0.3	0.2	-0.3	0.3
20800	-0.3	0.1	-0.3	0.1	-0.3	0.1	-0.3	0.2
21000	-0.3	0.2	-0.3	0	-0.3	0.1	-0.3	0.4
21200	-0.3	0.2	-0.3	0.1	-0.3	0.2	-0.3	0.5
21400	-0.3	0.1	-0.3	0	-0.3	0.4	-0.3	1.2
21600	-0.2	0.4	-0.2	0.2	-0.2	0.2	-0.2	0.5
21800	-0.3	0.2	-0.3	0.1	-0.3	0.1	-0.3	0.4
22000	-0.3	0.1	-0.3	0.2	-0.3	0.2	-0.3	0.4
22200	-0.2	0.2	-0.2	0	-0.2	0	-0.2	0.2
22400	-0.3	0.1	-0.3	0.1	-0.3	0.3	-0.3	0.3
22600	-0.3	0.2	-0.3	0.2	-0.3	0.1	-0.3	1.2
22800	-0.3	0.1	-0.3	0.3	-0.3	0.2	-0.3	1
23000	-0.3	0.2	-0.3	0	-0.3	0.1	-0.3	0.2
23200	0.1	0.3	0.1	0.3	0.1	0.3	0.1	0.3
23400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
23600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
23800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
24000	-0.3	0	-0.3	0	-0.3	0	-0.3	0

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Reduced		Reduced		Reduced		Reduced	
	Min	Max	Min	Max	Min	Max	Min	Max
24200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
24400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
24600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
24800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
25000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
25200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
25400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
25600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
25800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
26000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
26200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
26400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
26600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
26800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
27000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
27200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
27400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
27600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
27800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
28000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
28200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
28400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
28600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
28800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
29000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
29200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
29400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
29600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
29800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
30000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
30200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
30400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
30600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
30800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
31000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
31200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
31400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
31600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
31800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
32000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
32200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
32400	-0.3	0	-0.3	0	-0.3	0	-0.3	0

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Reduced		Reduced		Reduced		Reduced	
	Min	Max	Min	Max	Min	Max	Min	Max
32600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
32800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
33000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
33200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
33400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
33600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
33800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
34000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
34200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
34400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
34600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
34800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
35000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
35200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
35400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
35600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
35800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
36000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
36200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
36400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
36600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
36800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
37000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
37200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
37400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
37600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
37800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
38000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
38200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
38400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
38600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
38800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
39000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
39200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
39400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
39600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
39800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
40000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
40200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
40400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
40600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
40800	-0.3	0	-0.3	0	-0.3	0	-0.3	0

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Reduced		Reduced		Reduced		Reduced	
	Min	Max	Min	Max	Min	Max	Min	Max
41000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
41200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
41400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
41600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
41800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
42000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
42200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
42400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
42600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
42800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
43000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
43200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
43400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
43600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
43800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
44000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
44200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
44400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
44600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
44800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
45000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
45200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
45400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
45600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
45800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
46000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
46200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
46400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
46600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
46800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
47000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
47200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
47400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
47600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
47800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
48000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
48200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
48400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
48600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
48800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
49000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
49200	-0.3	0	-0.3	0	-0.3	0	-0.3	0

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Reduced		Reduced		Reduced		Reduced	
	Min	Max	Min	Max	Min	Max	Min	Max
49400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
49600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
49800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
50000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
50200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
50400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
50600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
50800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
51000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
51200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
51400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
51600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
51800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
52000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
52200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
52400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
52600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
52800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
53000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
53200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
53400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
53600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
53800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
54000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
54200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
54400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
54600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
54800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
55000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
55200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
55400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
55600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
55800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
56000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
56200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
56400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
56600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
56800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
57000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
57200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
57400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
57600	-0.3	0	-0.3	0	-0.3	0	-0.3	0

Chainage (in meter)	Class-I		Class-II		Class-III		Class-IV	
	Reduced		Reduced		Reduced		Reduced	
	Min	Max	Min	Max	Min	Max	Min	Max
57800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
58000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
58200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
58400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
58600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
58800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
59000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
59200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
59400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
59600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
59800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
60000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
60200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
60400	-0.3	0	-0.3	0	-0.3	0	-0.3	0
60600	-0.3	0	-0.3	0	-0.3	0	-0.3	0
60800	-0.3	0	-0.3	0	-0.3	0	-0.3	0
61000	-0.3	0	-0.3	0	-0.3	0	-0.3	0
61200	-0.3	0	-0.3	0	-0.3	0	-0.3	0
61400	-0.3	0	-0.3	0	-0.3	0	-0.3	0

Figure 18- 200 mtr interval depth (Reduced)

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

Date	Tide Pole name	Chainage (km)	Time	T. Reading (m)	Zero of TP w.r.t. MSL (m)	W.L w.r.t. MSL (m)	SD value w.r.t. MSL (m)	Corrected Tide (m)
				A	B	C = A+B	D	E = D-C
04.01.16	GS- (TP)-9	59.000	24 hrs	0.26	94.935	95.195	94.709	-0.486
04.01.16	GS- (TP)-8	54.000	24 hrs	0.35	94.264	94.614	94.076	-0.538
05.01.16	GS- (TP)-7	49.000	24 hrs	0.39	93.833	94.223	93.443	-0.790
06.01.16	GS- (TP)-6	44.000	24 hrs	0.45	93.137	93.587	92.810	-0.777
06.01.16	GS- (TP)-5	39.000	24 hrs	0.55	92.491	93.041	92.177	-0.864
08.01.16	GS- (TP)-4	34.000	24 hrs	0.58	92.231	92.811	91.544	-1.267
08.01.16	GS- (TP)-3	29.000	24 hrs	0.62	91.877	92.497	90.911	-1.586
09.01.16	GS- (TP)-2	23.542	24 hrs	0.65	90.683	91.333	90.220	-1.113
09.01.16	GS- (TP)-1	1.038	24 hrs	0.69	87.707	88.397	87.371	-1.026

Table 19- Details of Collected water level of Different gauge stations

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

Date of Survey	Type of survey	Chainage	
		From (km)	To (km)
10.12.15	Bathymetry Survey	0.00	12.3
12.12.15	Bathymetry Survey	12.3	23.380

Table 20- Details of Bathymetry survey

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

The River had a tendency to break its boundary. So for this reason some short and as well as long embankments and Bolder pitching are needed in the both banks of the river. From chainage 1.00 km to 18.500 km (Bengenakhowa village- Dayang Bagicha village), The Bituminus Road are protected the left bank side. Besides both side embankments, plants are also protect the river side from flood and erosion. RCC Bridge and Rail Bridge area are highly protected by Boulder pitching. Though in the Rainy season the water level becomes very high and the both side river bank are flooded in some places.

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

The bank of the river includes villages, Ferry ghat, Irrigation canals and outlets, Rail Bridges, RCC Bridges, pump house, wooden Bridges, Bamboo Bridges and Forest etc. The both side river bank are highly protected by embankment and bolder pitching due to flood, erosion etc. The villagers are also situated near the bank side of the river. Recently different kinds of industries are also located near the bank side of the river. Both side paddy land are also noticed during the survey period.

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

- **Establishment of Horizontal Control:-**

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

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

Establishment of Vertical Control:-

Vertical control from CP- D-24, situated near the Hanhchora Village is used for the entire Survey work. Its value is 93.176 km w.r.t. MSL has been considered for calculating the vertical levels. Total 7 no. of BM have been established along the 61.368 kms stretch of the Doyans River with the reference of G.T.S Level, which was fixed near at CP-D-24.

Topography Survey:-

The survey was commenced on 1st December 2015 and completed on 22nd December 2015. Then the days winter season and the climate become pleasant which reached about 14◦ C. Mostly day weather was sunny and was very favorable for the conduct of survey and the weather condition remains same for the entire duration of the survey.

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

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

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

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

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

Figure 19-Topography Survey Instrument

○ Bathymetry Survey:-

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

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

Figure 20- Bathymetry Survey Instrument

Annexure-10:- Photographs of Equipment:-

Following equipment was employed for the Bathymetric and Topographic survey:-

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

Survey Vessel:-

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

Figure 21 Survey Boat

- **Positioning System:-**

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

Figure 22 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 23 Echo Sounder Instrument

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

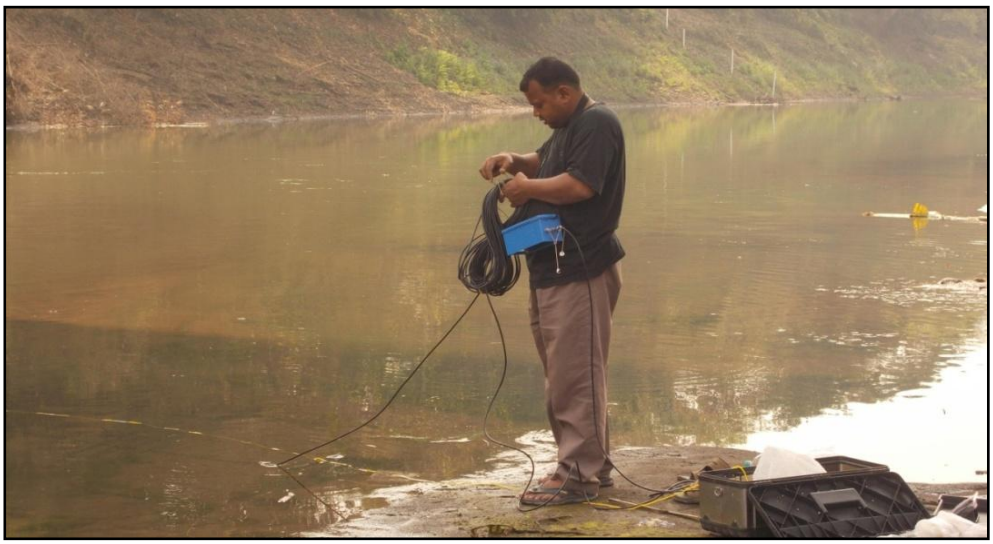


Figure 24 Current Meter

- **Calibration**

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

Annexure-11:- Bench Mark Forms:-

BM Name	Northing (m)	Easting (m)	RL (m)	Latitude (N)	Longitude (E)
BM 1	2925557.044	596073.791	93.225	26°26'49.50"	93°57'49.08"

Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal;
Date of Establishment – 05.12.2015

Station Description :-

Benchmark is located near Hanhchora village.

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

The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No can be seen on the face of the pillar.
The measurements of the bench mark pillar from notable locations / edges as follows:
West from Road -0.67 km.

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

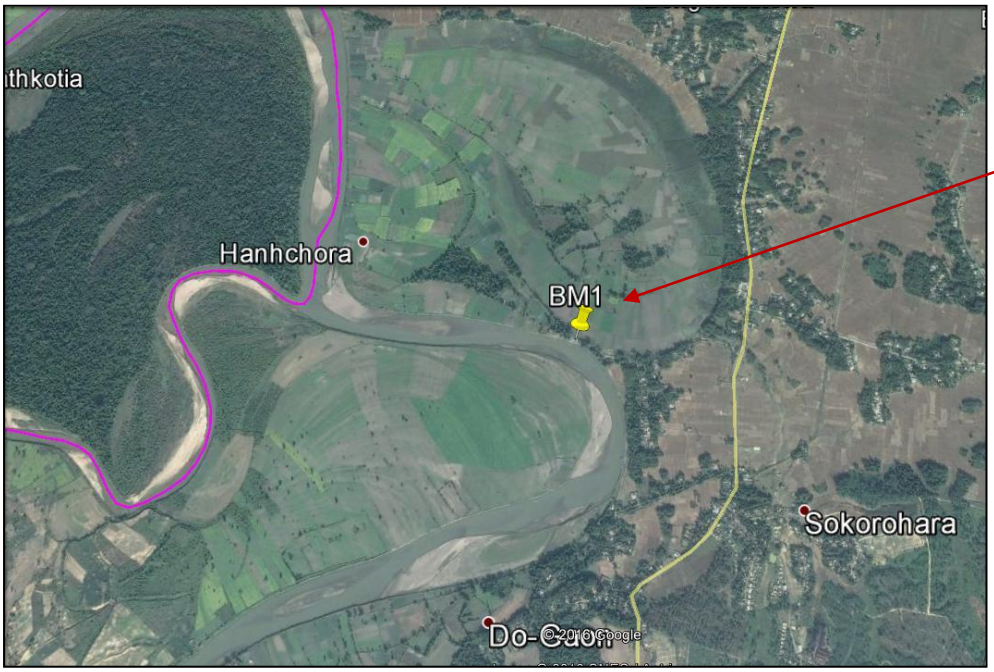


Figure 25- BM Form & Google image of BM-1

BM Name	Northing (m)	Easting (m)	RL (m)	Latitude (N)	Longitude (E)
BM 2	2917628.172	594709.002	104.52	26°22'32.13"	93°56'57.72"

Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal;
Date of Establishment – 08.12.2015

Station Description :-

Benchmark is located near Gualtup village close to the 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:

West from Road -0.12km.

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

Figure 26- BM Form & Google image of BM-2

BM Name	Northing (m)	Easting (m)	RL (m)	Latitude (N)	Longitude (E)
BM 3	2913600.368	597112.17	101.66	26°20'20.64"	93°58'23.33"

Pillar Established by : - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal;
Date of Establishment – 9.12.2015

Station Description :-

Benchmark is located near Naharjan Grant village.
The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.
The pillar extends 60.cms above ground level. Inscription "IWAI", "PSC" and BM No. can be seen on the face of the pillar.
The measurements of the bench mark pillar from notable locations / edges as follows:
West from Road -0.91km.

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

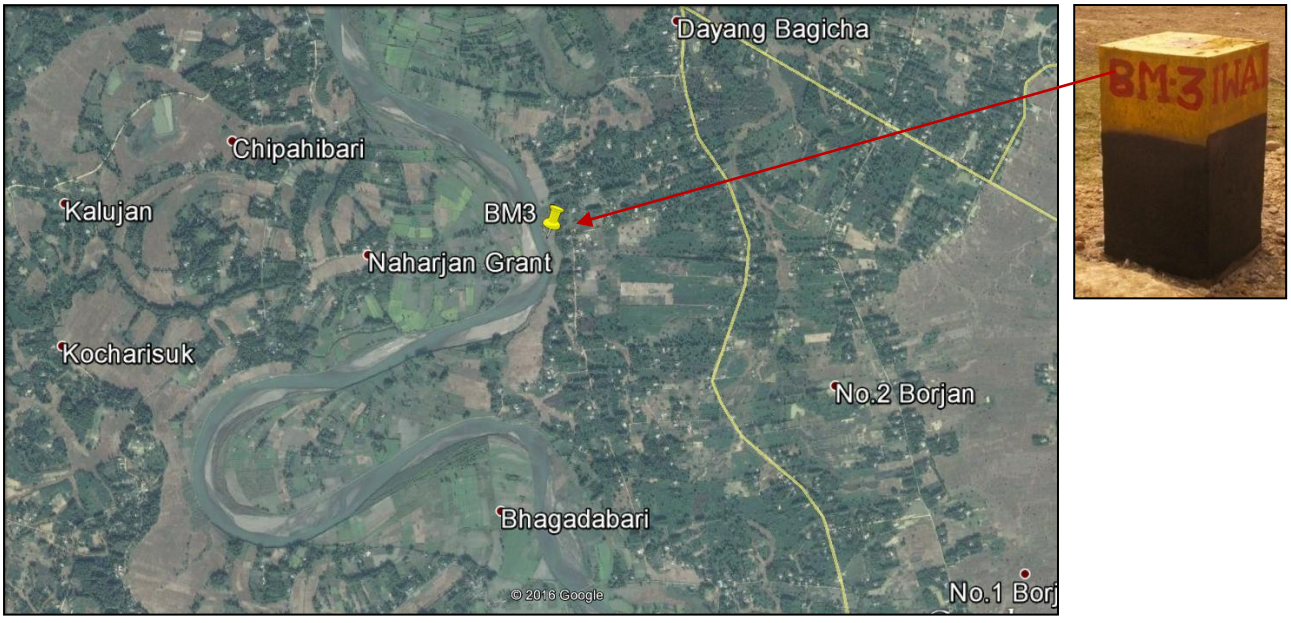


Figure 27- BM Form & Google image of BM-3

BM Name	Northing (m)	Easting (m)	RL (m)	Latitude (N)	Longitude (E)
BM 4	2907941.727	597797.662	101.67	26°17'16.54"	`93°58'46.50"

Pillar Established by : - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal;
Date of Establishment:-11.12.2015

Station Description :-

Benchmark is located near jitpur Boraimori Village.

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

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

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

Westside from Road - 0.93km

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

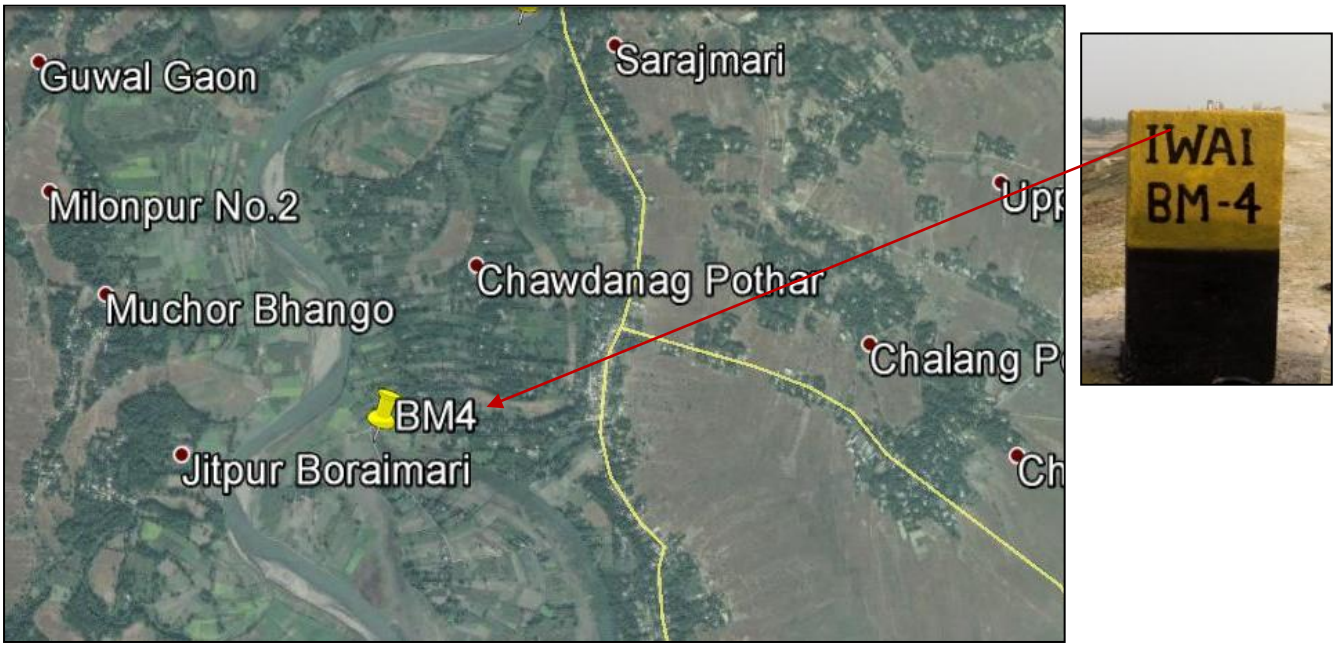


Figure 28- BM form & Google image view of BM-4

BM Name	Northing (m)	Easting (m)	RL (m)	Latitude (N)	Longitude (E)
BM 5	2902813.916	597511.115	111.605	26°14'29.94"	93°58'34.79"
Pillar Established by : - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal; Date of Establishment – 12.12.2015					
Station Description :-					
Benchmark is located near Janata Pothar village close to the 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: West from riverside –0.06km					
Life of Station : 15Yrs	Datum: - WGS 84		ZONE :46 R		

Figure 29- BM form & Google image view of BM- 5

BM Name	Northing (m)	Easting (m)	RL (m)	Latitude (N)	Longitude (E)
BM 6	2898317.169	597268.87	106.92	26°12'3.88"	93°58'24.82"
Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal; Date of Establishment – 13.12.2015					
Station Description :-					
Benchmark is located near Kalyanpur No-2 village close to the wooden 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: West from road –1.53km					
Life of Station : 15Yrs	Datum: - WGS 84	ZONE :46 R			

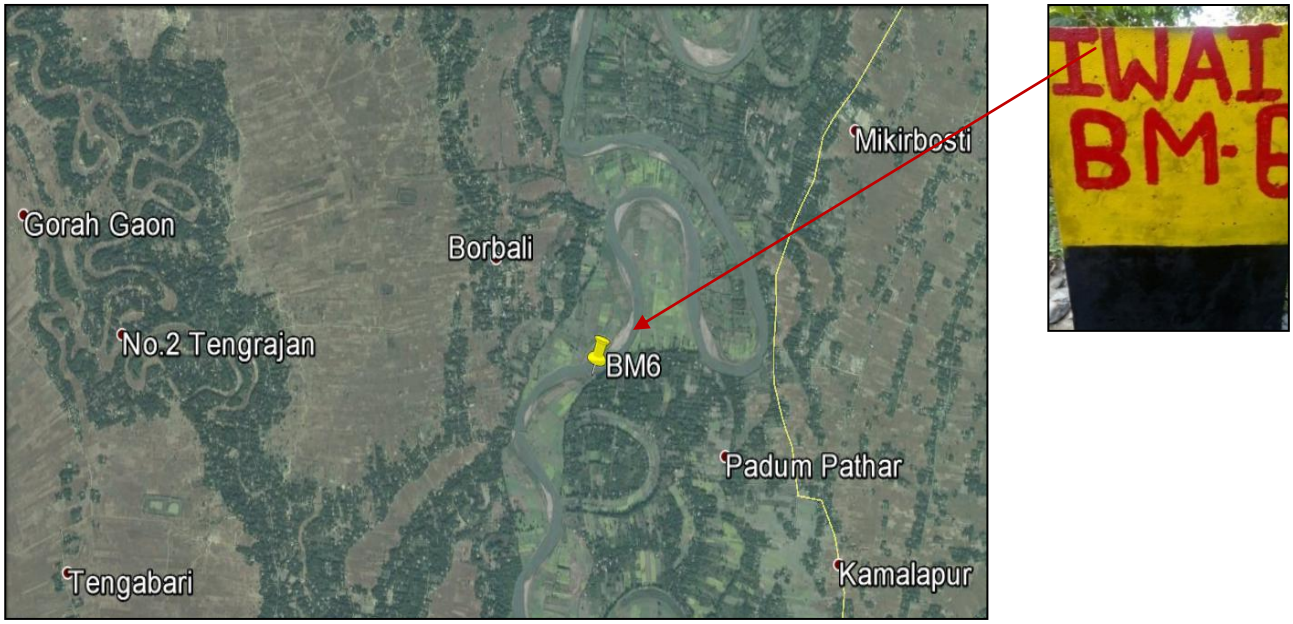


Figure 30- BM Form & Google image view of BM-6

BM Name	Northing (m)	Easting (m)	RL (m)	Latitude (N)	Longitude (E)
BM 7	2896013.567	598500.983	112.53	26°10'48.69"	3°59'8.57"

Pillar Established by: - Precision Survey Consultancy. Surveyor – Mr. Debasis Mondal;
Date of Establishment – 15.12.2015

Station Description :-

Benchmark is located near Gobinpur village close to the wooden 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:
West From Road –1.08 km

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

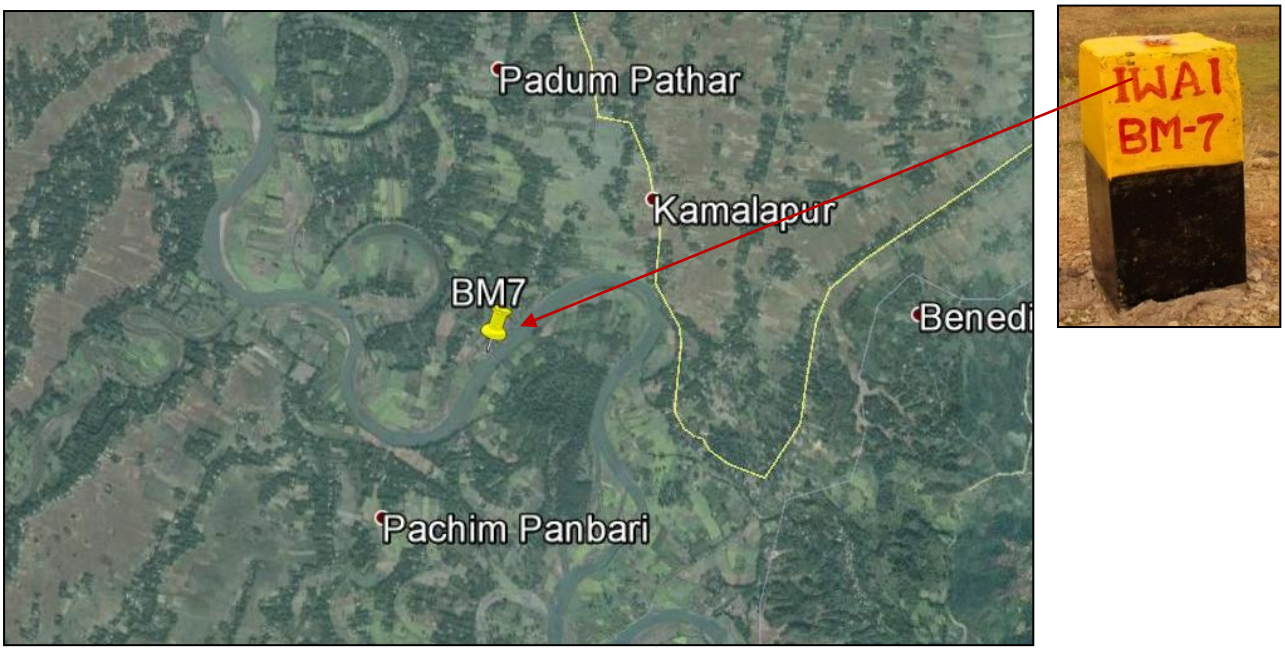


Figure 31- BM Form & Google image view of BM-7

Annexure-12:- Levelling Calculation:

Leveling from BM-1 to GS-1

BS	IS	FS	RISE(+)	FALL(-)	RL (m)	REMARKS
0.685					93.225	BM-1
0.552		2.145		1.460	91.765	
0.654		2.346		1.794	89.971	
		2.228		1.574	88.397	Gauge Station-1

Leveling from BM-3 to GS-2

BS	IS	FS	RISE(+)	FALL(-)	RL (m)	REMARKS
0.426					101.660	BM-3
0.535		2.851		2.425	99.235	
0.485		2.587		2.052	97.183	
0.842		1.899		1.414	95.769	
0.658		2.455		1.613	94.156	
0.385		1.684		1.026	93.130	
		2.182		1.797	91.333	Gauge Station-2

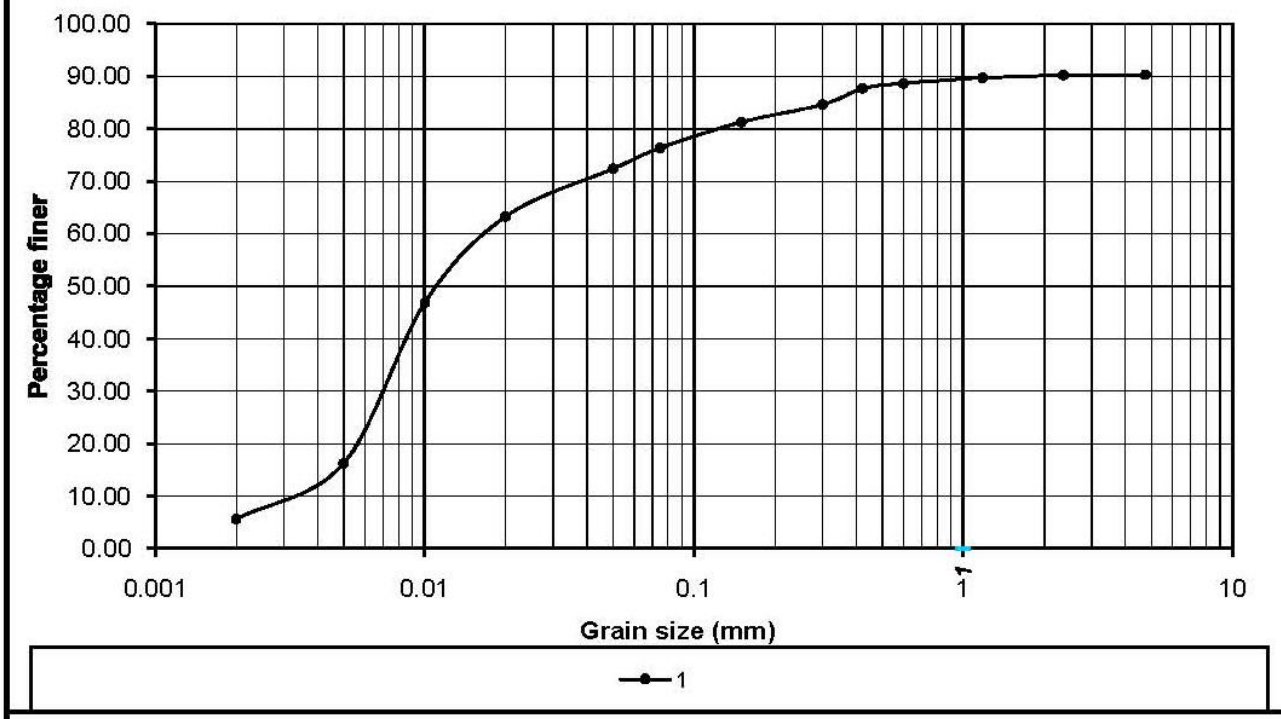
Table 21- Leveling Calculation of Doyans River

Annexure-13:- Soil Sample:-

RESULT OF TEST OF SOIL SAMPLES

SITE-DOYANS RIVER										
PHYSICAL ANALYSIS OF SOIL										
SL. NO	B.M	GRAVEL (%)	SAND (%)	SILT+CLAY (%)	SPECIFIC GRAVITY	PH VALUE	SILT	CLAY	Cu	Cc
1	1	9.68	31.23	59.09	2.62	7.20	53.50	5.59	5.18	0.89
2	3	16.89	29.68	53.43	2.61	7.10	45.50	7.93	7.5	0.83
3	5	19.70	12.76	67.54	2.62	7.30	59.50	8.04	7.43	1.1
4	7	7.98	23.68	68.34	2.62	7.20	60.20	8.14	4.7	1.23

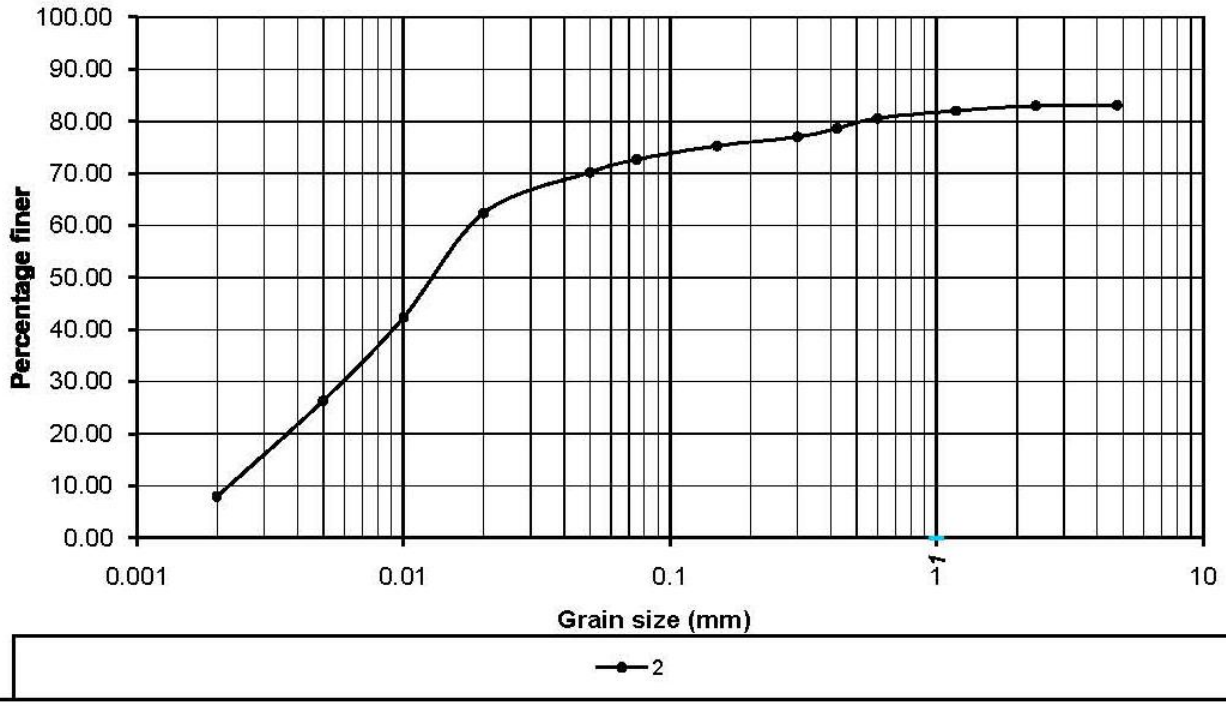
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
1	5.59	53.50	31.23	9.68

*Silt & Clay

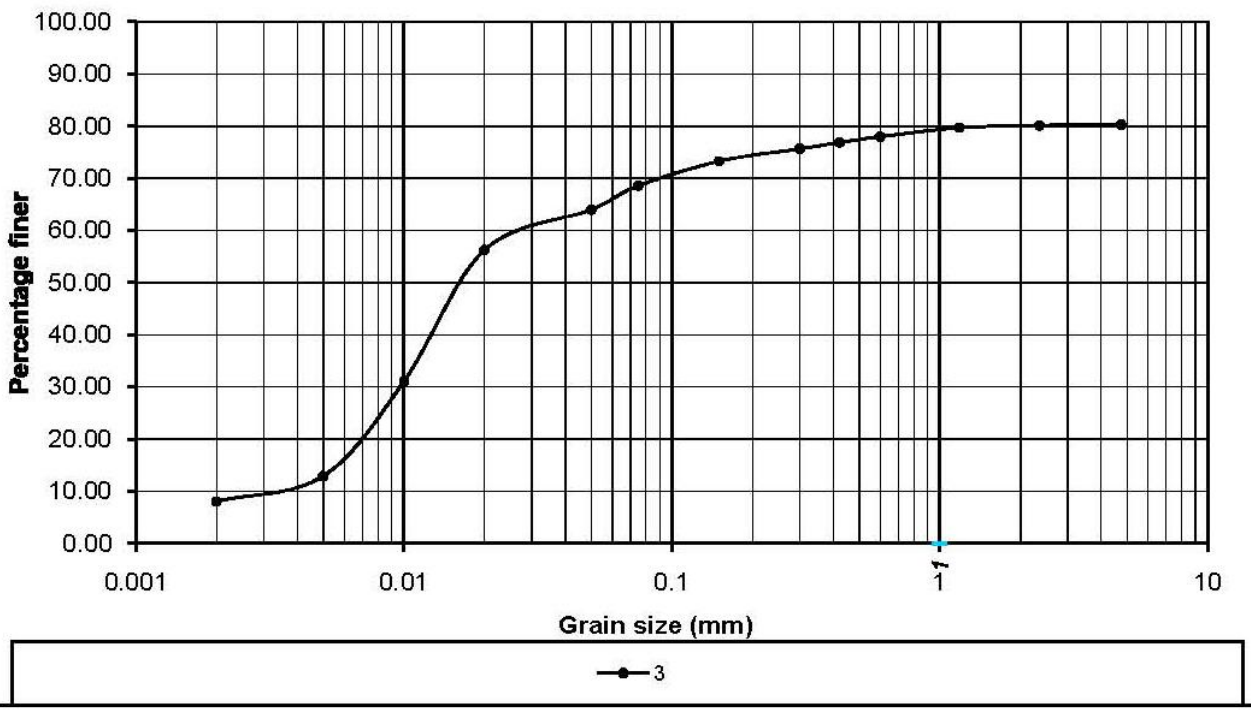
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
2	7.93	45.50	29.68	16.89

*Silt & Clay

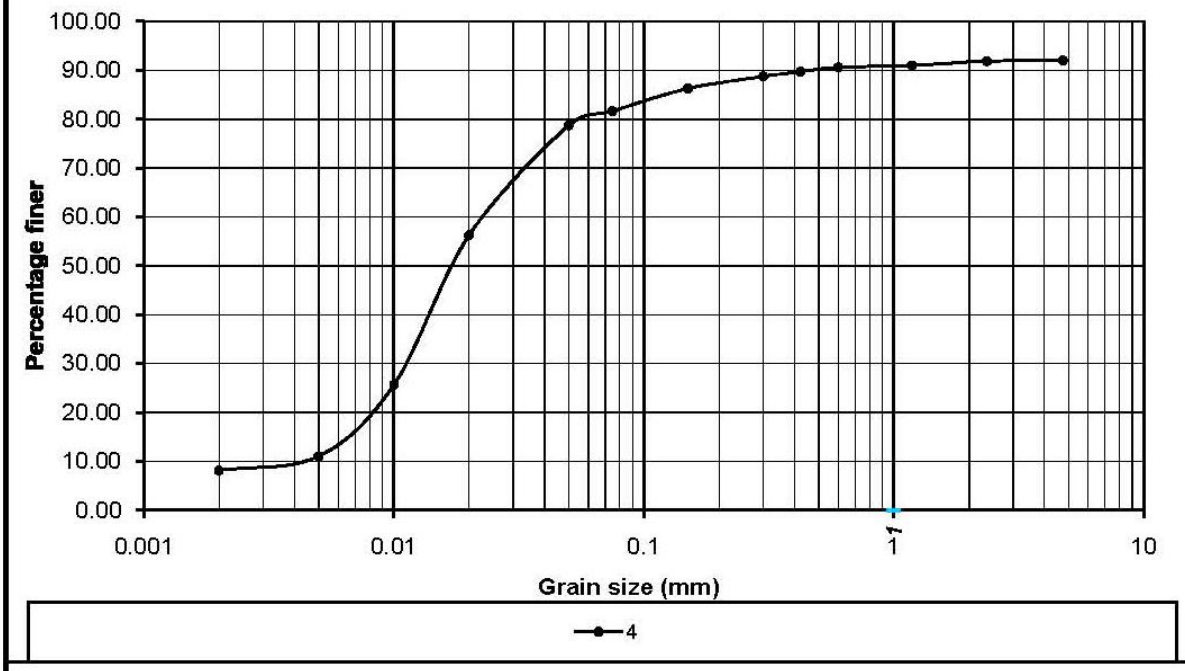
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
3	8.04	59.50	12.76	19.70

*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
4	8.14	60.20	23.68	7.98

*Silt & Clay

Annexure-14:- Water Samples:-

RESULTS OF EXAMINATION OF SAMPLES OF WATER

SITE- RIVER DOYANS

PARAMETER – pH Value at 25° C

SL.NO;	B.M	LOCATION	PARAMETER	WATER SAMPLE RESULTS	PERMISSIBLE LIMIT IS:456-2000
1	1	UPPER	pH Value at 25° C	7.3	6.5 – 8.5
		MIDDLE		7.3	
		BOTTOM		7.2	
2	3	UPPER		7.1	
		MIDDLE		6.9	
		BOTTOM		7.0	
3	5	UPPER		7.1	
		MIDDLE		7.2	
		BOTTOM		7.3	
4	7	UPPER		7.3	
		MIDDLE		7.2	
		BOTTOM		7.1	

PARAMETER –Chloride as Cl (mg/l)
SITE- RIVER DOYANS

SL.NO;	B.M	LOCATION	PARAMETER	WATER SAMPLE RESULTS	PERMISSIBLE LIMIT IS:456-2000
1	1	UPPER	Chloride as Cl (mg/l)	42	2000 mg/l for concrete not containing embedded steel and 500 mg/l for reinforced concrete work.
		MIDDLE		94	
		BOTTOM		79	
2	3	UPPER		43	
		MIDDLE		32	
		BOTTOM		78	
3	5	UPPER		43	
		MIDDLE		31	
		BOTTOM		82	
4	7	UPPER		44	
		MIDDLE		30	
		BOTTOM		80	

PARAMETER –Sulphates as SO4 (mg/l)
SITE- RIVER DOYANS

SL.NO;	B.M	LOCATION	PARAMETER	WATER SAMPLE RESULTS	PERMISSIBLE LIMIT IS:456-2000
1	1	UPPER	Sulphates as SO_4 (mg/l)	267	400 (mg/l)
		MIDDLE		242	
		BOTTOM		263	
2	3	UPPER		266	
		MIDDLE		243	
		BOTTOM		264	
3	5	UPPER		266	
		MIDDLE		242	
		BOTTOM		263	
4	7	UPPER		268	
		MIDDLE		246	
		BOTTOM		264	

PARAMETER –Sediment Concentration (mg/l)
SITE- RIVER DOYANS

SL.NO;	B.M	LOCATION	PARAMETER	WATER SAMPLE RESULTS	PERMISSIBLE LIMIT IS:456-2000
1	1	UPPER	Sediment Concentration (mg/l)	27	2000 (mg/l)
		MIDDLE		30	
		BOTTOM		64	
2	3	UPPER		28	
		MIDDLE		32	
		BOTTOM		66	
3	5	UPPER		30	
		MIDDLE		31	
		BOTTOM		68	
4	7	UPPER		32	
		MIDDLE		30	
		BOTTOM		65	

Annexure-15:- Calibration Certificate:-

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

CALIBRATION CERTIFICATE

CUSTOMER NAME	:	PRECISION SURVEY CONSUTLANCY
ADDRESS	:	Vichitra SP-45, KWIC Bankra, P.S.- Domjur, Dist. –Howrah, Pin: 711 403 (W.B)
INSTRUMENT	:	DGPS EQUIPMENT
SERIES	:	SPS-361
SERIAL NUMBER	:	5308K59587
CALIBRATION DATE	:	05/02/2015
VALIDITY	:	05/02/2016

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

For PAN INDIA CONSULTANTS PVT. LTD.

AUTHORISED SIGNATORY

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

Table 22- Calibration Certificate of DGPS Equipment

PAN INDIA CONSULTANTS PVT. LTD.

SALES DEPARTMENT

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

CALIBRATION CERTIFICATE

CUSTOMER NAME	:	PRECISION SURVEY CONSUTLANCY
ADDRESS	:	P.O. –SALAP, P.S.-Vichitra SP-45,KWIC NH-6, Dist. –Howrah Pin: 711 403 W.B
INSTRUMENT	:	Echo Sounder
SERIES	:	Bathy 500 MF
SERIAL NO.	:	B5MF0560
CALIBRATION DATE	:	05/02/2015
VALIDITY	:	05/02/2016

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

for PAN INDIA CONSULTANTS PVT. LTD.

Pan India Consultants Pvt. Ltd. Gurgaon

AUTHORISED SIGNATORY

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

Table 23- Calibration Certificate of Echo-Sounder

SOUTH

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

Calibration Certificate

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

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

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

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

Authorised Signatory

Table 24- Calibration Certificate of South RTK

Annexure-16:- Field Photograph:-

Figure 32- Field Photograph

Annexure-17:- Survey Charts:-

LIST OF SURVEY CHARTS OF DOYANS RIVER (NW-33)								
Sl. No.	Chart No.	Location	Chainage (Form…….km. To…...km.)	Chart Datum And Water Level w.r.t. MSL			Value of Reduction	Remarks
				Chainage (km)	CD (m)	WL (m)		
1	P_01	Hanhchora to Borpothorua	00.00 km to 7.836 km	1.038	87.371	88.397	-1.026	GS-1
2	P_02	Borpothorua to Aitonia Miri	7.836 km to 13.923 km	1.038	87.371	88.397	-1.026	GS-1
3	P_03	Aitonia Miri to Dayang T.E	13.923 km to 19.786 km	23.542	90.220	91.333	-1.113	GS-2
4	P_04	Dayang T.E to Bhagadabari	19.786 km to 28.432 km	23.542	90.220	91.333	-1.113	GS-2
				29.000	90.911	92.497	-1.586	GS-3
5	P_05	Bhagadabari to Chawdanga pothar	28.432 km to 33.521 km	29.000	90.911	92.497	-1.586	GS-3
6	P_06	Chawdanga pothar to Chaodang Pathor	33.521 km to 40.677 km	34.000	91.544	92.811	-1.267	GS-4
				39.000	92.177	93.041	-0.864	GS-5
7	P_07	Chaodang Pathor to Tanajan miching	40.677 km to 49.363 km	44.000	92.810	93.587	-0.777	GS-6
8	P_08	Tanajan miching to Zengani Pothar	49.363 km to 57.226 km	49.000	93.443	94.233	-0.790	GS-7
				54.000	94.076	94.614	-0.538	GS-8
9	P_09	Zengani Pothar to Sialmari	57.226 km to 61.368 km	59.000	94.709	95.195	-0.486	GS-9

Table 25- Survey Charts

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

Survey period: - 01st December, 2015 to 22nd December, 2015

✧ **G.S:-** Gauge Station