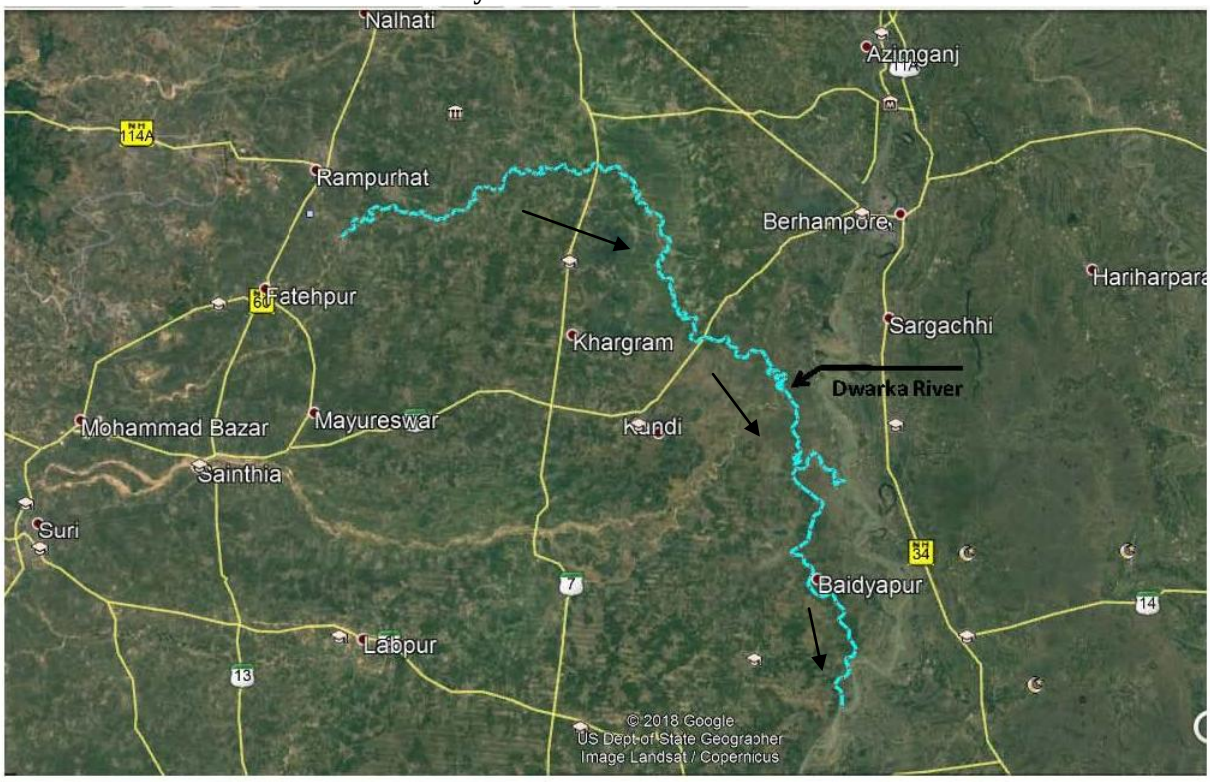
INLAND WATERWAYS AUTHORITY OF INDIA, A-13, SECTOR-1, NOIDA
DIST-GAUTAM BUDHA NAGAR, UTTAR PRADESH, PIN- 201 301(UP)

"FINAL FEASIBILITY REPORT ON HYDROGRAPHIC SURVEY

DWARKA RIVER (NW-36) (119.165 km)

"FROM THE CONFLUENCE WITH BHAGIRATHI RIVER NEAR MAUGRAM VILLAGE TO BRIDGE AT TARAPITH"

Survey Period from 22.08.15 to 04.09.15



FINAL REPORT ON HYDROGRAPHICAL SURVEY OF DWARKA RIVER, WEST BENGAL

REPORT SUBMISSION DATE- 29.03.2019

SUBMITTED BY:

B.S.Geotech PVT.Ltd.
32/B, Pearabagan Bye Lane, Konnagar, Hooghly,712235
Ph: 9331419395, Email:bsgpl@yahoo.com, Web:bsgpl.in

Acknowledgement

B.S.Geotech Pvt. Ltd. Konnagar, Hooghly express its sincere gratitude to **IWAI** for awarding the work and guidance for completing this Project of detailed Hydrographic Survey and the Feasibility Report in **Region-VIII (Dwarka River) from confluence with Bhagirathi River near Maugram village to Bridge at Tarapith (119.165 km).**

We would like to use this opportunity to pen down our profound gratitude and appreciations to **Shri Jalaj Srivastava, IAS, Chairman, IWAI** for spending their valuable time and guidance for compleing this project of " Detailed Hydrography and Topography survey in Dwarka River." B.S.Geotech 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).**

B.S.Geotech Pvt. Ltd. wishes to express their gratitude to **Capt. Ashish Arya, Hydrographic Chief, IWAI, Cdr. P.K. Srivastava, Ex. Hydrographic Chief, Shri S.V.K Reddy, Chief Engineer-I, IWAI** for his guidance and inspiration for this project. B.S.Geotech Pvt. Ltd. would also like to thank **Shri Rajiv Singhal, S.H.S., IWAI** for invaluable support and suggestions provided throughout the survey period. B.S.Geotech Pvt. Ltd. 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.

List of Abbreviations

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

Table 1- List of Abbreviations

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Salient Features of Dwarka River

Sl.	Particulars	Details
1.	Name of Consultant	B.S.Geotech Pvt. Ltd.
2.	Region number & State(s)	Region -VIII, West Bengal
3.	a) Waterway name b) NW # c) Total Stretch and length of declared NW (from…. To….; total length) d) Survey Period (… to …)	a) Dwarka River b) NW-36 c) From Confluence with Bhagirathi River near Maugram village to Bridge at Tarapith (119.165 km) d) 22nd August, 2015 to 04th September, 2015
4.	Tidal & non tidal portions (from… to, length, average tidal variation)	There are no Tidal influence or portions found in this zone of River.
5.	LAD status (Least Available Depth) i) < 1.2 m (km) ii) 1.2 m to 1.4 m (km) iii) 1.5 m to 1.7 m (km) iv) 1.8 m to 2.0 m (km) v) > 2.0 m (km)	**Observed Depth**

Sub Stretch-1 (0.00-10.00 km)	Sub Stretch-2 (10.00-20.00 km)	Sub Stretch-3 (20.00 – 30.00 km)	Sub Stretch-4 (30.00-40.00 km)
0	0.5	0.8	6.4
1.4	1.2	5.6	1.4
1.6	1.7	1.5	0
1.8	0	0	0
5.2	6.6	2.1	2.2
Total-10.00	Total- 10.00	Total- 10.00	Total- 10.00

Sub Stretch-5 (40.00-50.00 km)	Sub Stretch-6 (50.00-60.00 km)	Sub Stretch-7 (60.00-70.00 km)	Sub Stretch-8 (70.00-80.00km)
7.9	6.1	6.2	10.00
0	0	0	0
0	1.7	1.7	0
0	0	0	0
2.1	2.2	2.1	0
Total- 10.00	Total- 10.00	Total- 10.00	Total- 10.00

Sl.	Particulars	Details

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

Sub Stretch-9 (80.00-90.00 km)	Sub Stretch-10 (90.00-100.00 km)	Sub Stretch-11 (100.00-110.00 km)	Sub Stretch-12 (110.00-119.165km)
10	10	6.9	9.165
0	0	1.2	0
0	0	0	0
0	0	1.9	0
0	0	0	0
Total- 10.00	Total- 10.00	Totai-10.00	Total- 9.165

Total (km)
73.965
10.8
8.2
3.7
22.5
Total=119.165 km

LAD status (Least Available Depth)

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

Reduced Depth

Sub Stretch-1 (0.00-10.00 km)	Sub Stretch-2 (10.00-20.00 km)	Sub Stretch-3 (20.00 – 30.00 km)	Sub Stretch-4 (30.00-40.00 km)
5.1	6.8	7.2	8.7
1.3	0	1.3	1.3
1.5	0	1.5	0
0	0	0	0
2.1	3.2	0	0
Total-10.00	Total-10.00	Total- 10.00	Total- 10.00

Sub Stretch-5 (40.00-50.00 km)	Sub Stretch-6 (50.00-60.00 km)	Sub Stretch-7 (60.00-70.00 km)	Sub Stretch-8 (70.00-80.00 km)
8.0	6.4	8.5	10.00
0	0	0	0
0	1.6	1.5	0
0	0	0	0
2.0	2.0	0	0
Total- 10.00	Total- 10.00	Total-10.00	Total-10.00

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

Sl.	Particulars	Details

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

Sub Stretch-9 (80.00-90.00 km)	Sub Stretch-10 (90.00-100.00 km)	Sub Stretch-11 (100.00-110.00 km)	Sub Stretch-12 (110.00-119.165 km)
10	10	8.9	9.165
0	0	1.1	0
0	0	0	0
0	0	0	0
0	0	0	0
Total- 10.00	Total- 10.00	Total-10.00	Total-9.165

Total
98.765
5.0
6.1
0.0
9.3
Total=119.165 km

LAD status (Least Available Depth)

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

Observed Depth at Link of Dwarka River (Secondary Channel)

Sub Stretch-1 (0.00-7.261km)
3.0
0
0
0
4.261
Total-7.261

Reduced Depth at Link of Dwarka River (Secondary Channel)

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

Sub Stretch-1 (0.00-7.261km)
4.0
0
0
0
3.261
Total-7.261

Sl.	Particulars	Details
6.	Cross structures i) Dams, weirs, barrages etc (total number; with navigation locks or not) ii) Bridges, Power cables etc [total number; range of horizontal and vertical clearances	i) Check Dam-1(one)

Chainage (km)	Location	Latitude (N)	Longitude (E)
119.165	Tarapith	24° 6'57.47"	87°47'51.69"

ii) RCC Bridge- 5 (Five), Iron Bridge- 1(one), RCC Rail Bridge – 1 (one) in primary Channel

Clearance w.r.t H.F.L	Min (m)	Max (m)
Horizontal Clearance (m)	5.94	37.77
Vertical Clearance w.r.t. H.F.L (m)	1.8	8.217

iii) RCC Bridge-2 (Two) at link of Dwarka River (Secondary Channel)

Clearance w.r.t H.F.L	Min (m)	Max (m)
Horizontal Clearance (m)	11.45	17.45
Vertical Clearance w.r.t.H.F.L (m)	1.59	3.308

iv) Electric Lines-37 (Thirty seven) in primary channel

Clearance w.r.t H.F.L	Min (m)	Max (m)
Horizontal Clearance (m)	30.24	202.66
Vertical Clearance w.r.t. H.F.L (m)	4.0	10.20

v) High Tension Lines- 09 (Nine) in primary channel

Clearance w.r.t H.F.L	Min (m)	Max (m)
Horizontal Clearance (m)	83.56	276.15
Vertical Clearance w.r.t. H.F.L (m)	4.3	11.32

vi) Electric line at Link of Dwarka River (Secondary Channel)-2 (Two)

Clearance w.r.t H.F.L	Min (m)	Max (m)
Horizontal Clearance (m)	88.89	111.60
Vertical Clearance w.r.t. H.F.L (m)	9.8	9.8

<table>
<tr><th>Sl.</th><th>Particulars</th><th>Details</th></tr>
<tr><td>7.</td><td>Slope (m/ km, cm/km)</td><td>
<table>
<tr><th colspan="2">Reach</th><th>River 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</td><td>11.265</td><td>0.861</td><td>11.265</td><td>0.076</td><td>7.643</td></tr>
<tr><td>11.266</td><td>24.321</td><td>0.977</td><td>13.055</td><td>0.075</td><td>7.484</td></tr>
<tr><td>24.322</td><td>34.100</td><td>0.767</td><td>9.778</td><td>0.078</td><td>7.844</td></tr>
<tr><td>34.101</td><td>49.821</td><td>1.201</td><td>15.841</td><td>0.076</td><td>7.582</td></tr>
<tr><td>49.822</td><td>62.455</td><td>0.965</td><td>12.633</td><td>0.076</td><td>7.639</td></tr>
<tr><td>62.456</td><td>72.5</td><td>0.322</td><td>10.044</td><td>0.032</td><td>3.206</td></tr>
<tr><td>72.6</td><td>82.5</td><td>0.411</td><td>9.9</td><td>0.042</td><td>4.152</td></tr>
<tr><td>82.6</td><td>92.5</td><td>2.4</td><td>9.9</td><td>0.242</td><td>24.242</td></tr>
<tr><td>92.6</td><td>102.5</td><td>2.43</td><td>9.9</td><td>0.245</td><td>24.545</td></tr>
<tr><td>102.6</td><td>112.5</td><td>2.79</td><td>9.9</td><td>0.282</td><td>28.182</td></tr>
<tr><td>112.6</td><td>119.165</td><td>1.8</td><td>6.565</td><td>0.274</td><td>27.418</td></tr>
<tr><td colspan="4">Avg. slope</td><td>0.136 cm/km</td><td>13.630 m/km</td></tr>
</table>
Slope of Link at Dwarka River (Secondary table) is tabulated below-
<table>
<tr><th colspan="2">Reach</th><th>River 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</td><td>7.261</td><td>0.120</td><td>7.261</td><td>0.0165 cm/km</td><td>1.65 m/km</td></tr>
</table>
</td></tr>
<tr><td>8.</td><td>i) Present IWT operations

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

ii) As much as three passenger ferry services named Tenya Ferry ghat (13.641km), Bali ghat (14.549km), Boratay ghat (11.272 km) is available in this Zone of river. The Cargo movement is available near Tenya ferry ghat in Tenya village. Rice, vehicle like cycle and motor cycle, vegetables etc. are available in Teya ferry ghat. Tarapith (deity Tara) is one of the famous tourist and religious place located in this zone of river. Besides, Hazarduari palace museum is located approximately 31.00 km far from Sankar ghat bus Stop.</td></tr>
<tr><td>9.</td><td>Approx Distance of Rail & Road from Industry</td><td>i) Salar Railway Station (7.84 km approx from the waterway)
ii) Ramporehat Railway station (6.14 km approx from the waterway)
iii) Tarapith Road Railway Station (0.17 km approx from NH-60)
iv) Name of National highway close to the River- NH- 34 (8.02 km from waterway), NH-60 (4.44 km from the waterway)
v) Name of SH- SH-6 (17.11 km approx from the waterway), SH-7 (22.76 km approx from the waterway), SH-11(over the waterway or Ronogram Bridge)
vi) Bakreswar Thermal power plant is located approximately 72 km from the waterway.</td></tr>
<tr><td>10.</td><td>Any other information/ comment</td><td>Recommend for the detailed project Report of Dwarka River for the waterway development. Besides, Dredging is also required after the Chainage of 60 km for IWT operations. The water level is not enough for the Bathymetry survey after 65 km. Three major ferry services mainly Tenya ferry ghat is transported cargo including bamboo and paddy. Besides passengers, vehicle like cycle and motor cycle, vegetables are transported through ferry services.</td></tr>
</table>

Section-1: Introductory Considerations

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

Rising from near Santhal Parganas of the Jharkhand of but larger part of this river is situated in West Bengal. Dwarka River flows west to east through the eastern part of India. Dwarka is one of the smallest rivers in West Bengal. But it flows to a considerable length through the State of Jharkhand & West Bengal. The river is fairly deep and navigable. It receives on its bank tributaries such as the Tarapith, Daucha, Rampurhat and Mayureswar and so many small villages. Two shaktipith are situated in the bank of this river the Tarapith and Dwarbasini.

Dwarka is a typical river system consisting through the Indian state of Jharkhand and out falls in the Bhagirathi River in West Bengal. The other named of Dwarka is Babla in Bhirbhum. Through the district of Birbhum and Murshidabad, the river ultimately out falls near Maugram village in Birbhum.

The river receives heavy amount of water during the monsoon rains, the stream receives good amount of water from the various tributaries. The average rainfall in the region is about 1450 mm. and 80% of the Annual rain occurs during 4 to 5 months. The catchment area of this river stretched over Jharkhand and West Bengal. As the stream run very close to each other in plains with Bhagirathi which combine into single river during Peak monsoon months and inundate a huge land area in West Bengal. During the monsoon the river reserved a large amount of water along with alluvium and it makes the land of both side of the river bank is cultivation friendly environment. So, a huge number of agriculture grows in the both side of the river bank and the main profession of this place is cultivation. But the stream is suffering lack of water in the season of summer for this reason the small islands are appeared in river.

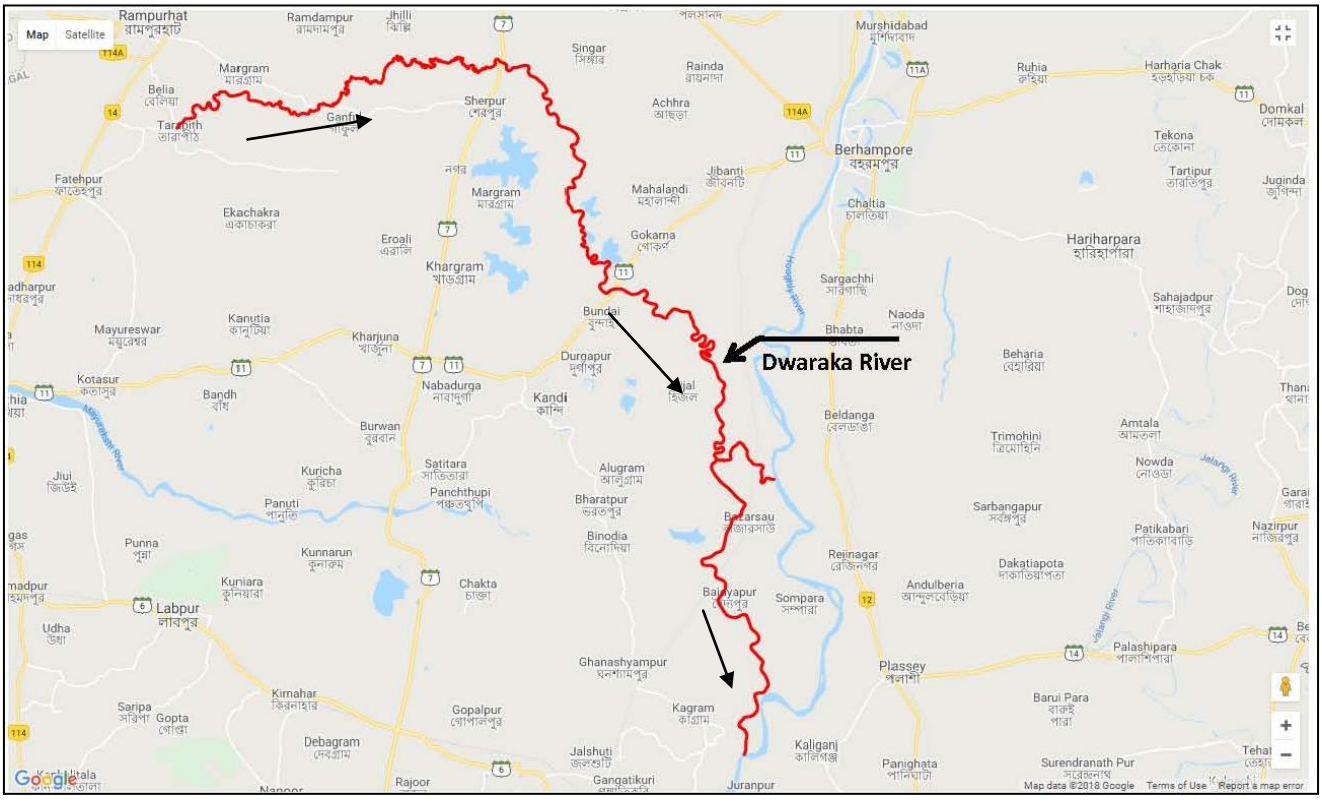


Figure 1-Site Map of Dwarka River

1.2 - Tributaries / Network of River/ Basin:-

Dwarka River (also called Babla) is a tributary of Bhagirathi River. The right tributary of Dwarka River is Brahmani.

1.3 - State / District through which river passes:-

The River Dwarka passes through the district of Birbhum and Murshidabad in the state of west Bengal.

1.4 – Project Site Location Map:-

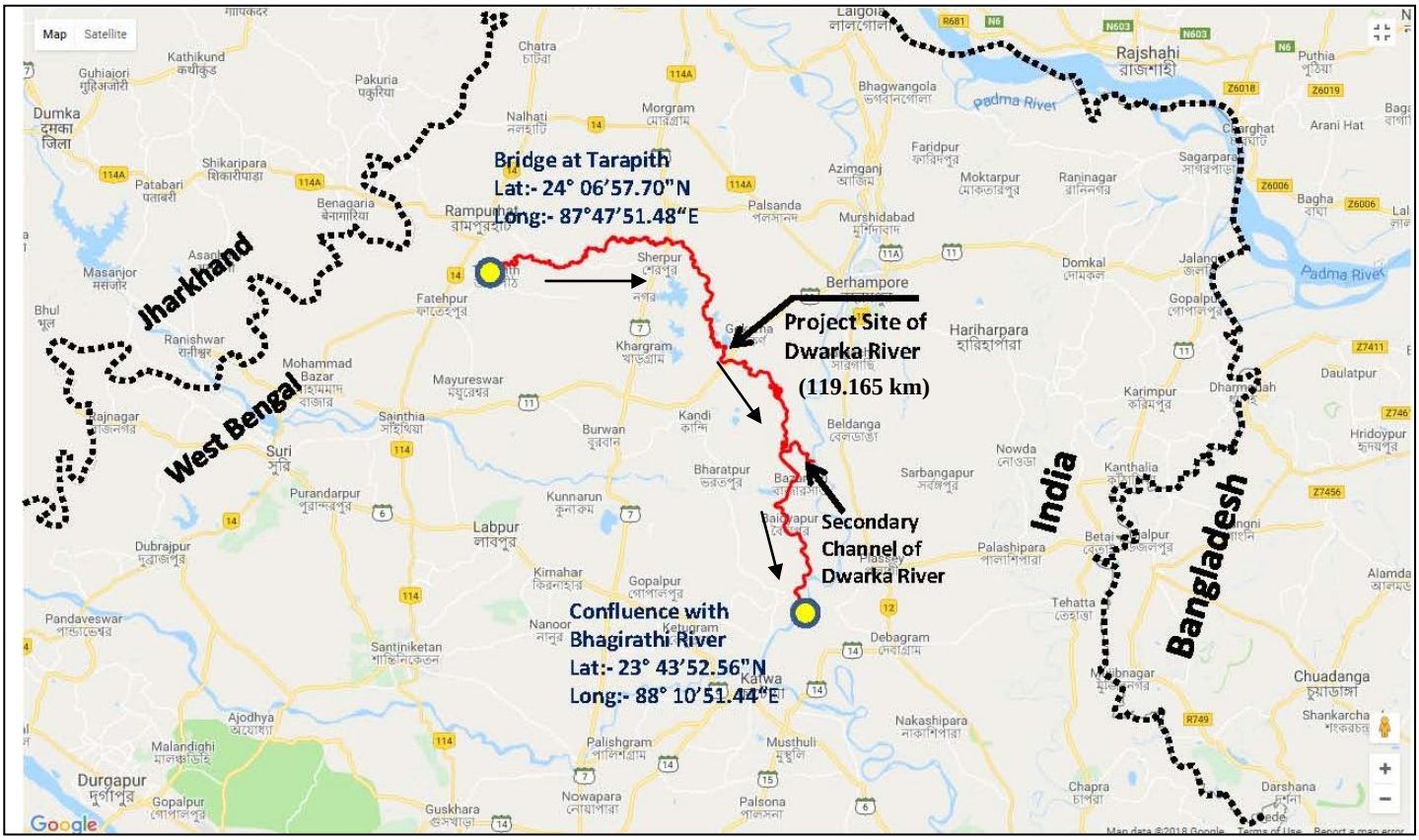


Figure 2 - Project Site Location Map of Dwarka River

1.5 - Scope of work:-

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

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

- Detailed Hydrographic Survey to assess the navigability of the waterway.
- To collect Water and bottom samples, current meter observation and discharge from the deepest route at every 10 km interval.
- To identify cross structures which are obstructing navigation.
- To identify the length of bank protection required.
- The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.
- The pillar extends 60.cms above ground level. Inscription "IWAI", "B.S.Geotech Pvt. Ltd." and BM No. can be seen on the face of the pillar.

Section-2: Methodology Adopted to undertake Study

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

Equipments:-

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

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

Table 2 - Equipments

- **Conduct of survey work**

- **Topographic Survey:-**

The Topography survey of Dwarka river has been carried out from "Confluence with Bhagirathi River near Maugram village (Lat: - 23°43'52.56"N, Long: - 88°10'51.44"E) to Tarapith Bridge (Lat: - 24°06'57.70"N, Long: - 87°47'51.48"E).

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

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

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

- **Establishment of Horizontal Control:-**

The Horizontal control for Topography survey: - High precision RTK DGPS in fix mode is using UHF Radio Modem with IHO accuracy standards, with minimum 24 hours observations at some permanent platform/base with the Topographic survey Equipments: South (S86T) GNSS RTK, Total Station was used for conducting the topographic survey on UTM Projection at Zone 45 N as directed in the contract specifications.
The Horizontal control for Bathymetry survey: - DGPS is receiving corrections from Beacons from the Base stations.

- **Establishment of Vertical Control:-**

Vertical control from N.B.M C-27N (G.T.S Pillar) bench mark is used for the entire survey work. Its value is 14.971 meter w.r.t. M.S.L has been considered for calculating the vertical levels. Total 13 no. Bench Mark was established along the 119.165 km stretches of Dwarka River with the reference of N.B.M C-27N (G.T.S pillar) which is situated near Kalayanpur ghat area.

Figure 3- N.B.M C-27N (G.T.S pillar) near Kalayanpur ghat area.

Topography Survey:-

The survey was commenced on 22nd August, 2015 and completed on 4th September, 2015. Then the days were autumn season. The climate become normal which reached about 29◦ C. Mostly day weather was sunny and was very favorable for the conduct of survey and the weather condition remains same for the entire duration of the survey.

The survey was undertaken as per the line plan provided and the spot level points in the cross line were spaced at 40 m interval. The plotting of the chart was done on UTM Projection at Zone 45 N as directed in the contract specifications. The spot levels along the river were obtained by using Trimble DGPS. The data was post processed using Trimble Business Center to get the precise position and MSL height values of the rover locations. Topographic survey Equipments: South (S86T) GNSS RTK, Total Station was used for conducting the topographic survey.

Figure 4-During the Topography Survey

Bathymetry Survey:-

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

The sound velocity was set to 1500 m/s on single beam echo sounder during acquisition by the Bar check procedure method. 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 Dwarka 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 Dwarka River. The DGPS position along with water depths was recorded simultaneously and the tidal reduction was applied to the obtained depths.

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

Figure 5-Batymery Survey

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

For Topographic survey, the Horizontal control has been carried out from the G.T.S Bench Mark no – NBM-C-27N, right bank at Kalaynpur ghat situated beside Bhagirathi River. The level of the G.T.S Bench mark is:-

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

Figure 6- G.T.S Bench mark location of Dwarka River near Kalayanpur ghat

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

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

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

IWAI had provided Sounding Datum at Confluence link of Dwarka River (Confluence-389.000), Confluence with Bhagirathi River (356.750) and Bazarsaw (Seasonal). The same was used to arrive the Sounding Datum values at BM Pillars and at tide gauges.

Sl. No	Place	Sounding Datum w.r.t MSL (Provided by IWAI)
1	Confluence (389.000) link of Dwarka River	10.405 m
2	Confluence with Bhagirathi River (356.750)	8.386 m
3	Bazarsaw (Seasonal)	10.143 m

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

The Chart Datum value of Dwarka River is-

i) Link of Dwarka River (Confluence-389.000)- 10.405 m
ii) Confluence with Bhagirathi River (356.750)- 8.386 m
iii) Bazarsaw (Seasonal) – 10.143 m.

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

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

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

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

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

There is no Dam, Barrage, weirs, Anicut, Locks, Aqueducts found in this zone of river.

2.9- Description of erected Bench mark Pillars:-

Sl. No	BM No	Location	Chainage (km)	Latitude (N)	Longitude (E)	Easting (m)	Northing (m)	BM Height above MSL (m)	BM Height above SD (m)
1	BM 1	Kalyanpur Ghat	0.101	23°43'54.722"	88°10'43.527"	620145.573	2625038.458	12.903	4.507
2	BM 2	Chak Gupura	11.272	23°48'33.987"	88°10'59.689"	620531.684	2633631.736	14.600	5.385
3	BM 3	Ghoshkura	24.281	23°53'11.489"	88°10'35.079"	619764.381	2642161.236	18.097	7.873
4	BM 4	Hijal	34.183	23°56'55.692"	88°9'54.198"	618551.3548	2649047.6841	19.367	8.386
5	BM 5	Uttar Hijal	44.530	23°59'11.489"	88°8'34.794"	616639.784	2653926.001	16.47	4.682
6	BM 6	Indrahata	49.926	23°53'11.489"	88°10'35.079"	613311.876	2655591.635	16.89	4.698
7	BM 7	Bibinagar	62.389	24°3'22.872"	88°4'12.832"	608811.161	2660879.951	19.435	6.283
8	BM 8	Surkhali	67.541	24°5'16.928"	88°4'8.203"	608653.708	2664387.056	25.53	12.105
9	BM 9	Khansama Danga	80.524	24°9'2.188"	88°1'24.454"	603345.979	2671961.332	27.65	10.981
10	BM 10	Siata	92.161	24°9'19.504"	87°57'18.566"	597036.042	2671764.626	19.865	3.776
11	BM 11	Kalidaha	102.703	24°7'11.489"	87°54'10.619"	591750.151	2668898.082	27.049	8.288
12	BM 12	Ranapur	114.733	24°7'20.897"	87°49'38.017"	583573.92	2668557.667	29.038	7.129
13	BM 13	Nabagram	118.673	24°7'7.995"	87°48'3.213"	581386.405	2667621.588	26.528	3.218

Table 3 - Bench Mark Details

2.10- Description of erected Tide Gauges:-

Tide Gauge Name	Chainage (km)	Easting (m)	Northing (m)	Latitude (N)	Longitude (E)	W.L w.r.t MSL (m)	Period of observation
GS (TP)-10	65.000	607875.18	2662584.98	24°04'18.534"	88°03'40.151"	13.560	24 hrs
GS (TP)-4	62.455	608682.55	2660912.69	24°03'23.968"	88°04'08.288"	13.285	24 hrs
GS (TP)-3	49.889	613376.26	2655653.17	24°00'31.796"	88°06'52.985"	12.165	24 hrs
GS (TP)-6	49.821	613408.35	2655639.28	24°00'31.336"	88°06'54.117"	12.158	24 hrs
GS (TP)-5	34.100	618637.57	2648991.75	23°56'53.851"	88°09'57.232"	11.835	24 hrs
GS (TP)-9	33.970	618548.42	2648883.95	23°56'50.37"	88°09'54.047"	11.820	24 hrs
GS (TP)-8	24.321	619818.01	2642280.61	23°53'15.355"	88°10'37.01"	11.243	24 hrs
GS (TP)-2	11.318	620639.18	2633701.65	23°48'36.231"	88°11'03.508"	10.625	24 hrs
GS (TP)-7	11.265	620712.03	2633507.58	23°48'29.902"	88°11'06.025"	10.620	24 hrs
GS (TP)-1	0.132	620298.72	2625088.97	23°43'56.323"	88°10'48.95"	9.50	24 hrs

Table 4- Tide Gauge Details (Primary Channel)

Tide Gauge No	Chainage (km)	Easting (m)	Northing (m)	Latitude (N)	Longitude (E)	W.L w.r.t MSL (m)	Period of observation
GS (TP)-11	2.8	620834.92	2644664.13	23°54'32.56"	88°11'13.64"	11.100	24 hrs

Table 5- Tide Gauge Details at Link of Dwarka River (Secondary Channel)

2.11- Chart Datum / Sounding Datum and Reductions details in Primary Channel:-

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	E	F = (E- WL data in MSL)	G = (E- Topo levels in MSL)
1	GS-10/ZZB	118.500	118-119.165		23.310	-0.300	Dwarka Reduced Topo.xyz
2	GS-10/ZZA	117.500	117-118		22.800	-0.300	
3	GS-10/ZZ	116.500	116-117		22.670	-0.300	
4	GS-10/ZY	115.500	115-116		21.940	-0.300	
5	GS-10/ZX	114.500	114-115		21.900	-0.300	
6	GS-10/ZW	113.500	113-114		21.870	-0.300	
7	GS-10/ZV	112.500	112-113		21.510	-0.300	
8	GS-10/ZU	111.500	111-112		20.600	-0.300	
9	GS-10/ZT	110.500	110-111		20.240	-0.300	
10	GS-10/ZS	109.500	109-110		20.120	-0.300	
11	GS-10/ZR	108.500	108-109		19.810	-0.300	
12	GS-10/ZQ	107.500	107-108		19.720	-0.300	
13	GS-10/ZP	106.500	106-107		19.400	-0.300	
14	GS-10/ZO	105.500	105-106		19.150	-0.300	
15	GS-10/ZN	104.500	104-105		19.000	-0.300	
16	GS-10/ZM	103.500	103-104		18.920	-0.300	
17	GS-10/ZL	102.500	102-103		18.720	-0.300	
18	GS-10/ZK	101.500	101-102		18.230	-0.300	Submitted in Soft Copy
19	GS-10/ZJ	100.500	100-101		17.980	-0.300	
20	GS-10/ZI	99.500	99-100		17.750	-0.300	
21	GS-10/ZH	98.500	98-99		17.670	-0.300	
22	GS-10/ZG	97.500	97-98		17.500	-0.300	
23	GS-10/ZF	96.500	96-97		17.120	-0.300	
24	GS-10/ZE	95.500	95-96		16.910	-0.300	
25	GS-10/ZD	94.500	94-95		16.610	-0.300	
26	GS-10/ZC	93.500	93-94		16.460	-0.300	
27	GS-10/ZB	92.500	92-93		16.290	-0.300	
28	GS-10/ZA	91.500	91-92		16.130	-0.300	
29	GS-10/Z	90.500	90-91		16.010	-0.300	
30	GS-10/Y	89.500	89-90		15.800	-0.300	
31	GS-10/X	88.500	88-89		15.500	-0.300	

Sl No	CWC gauge / Dam / Barrage / Weir / Anicut / Bench Mark / tide gauges	Chainage (km)	Stretch for corrected soundings and topo levels (km)	Established Sounding Datum w.r.t. MSL (m) at col. A.	Sounding Datum of Tide Gauge w.r.t. MSL (m)	Correction in WL data for Bathymetric survey (m)	Topo level data to be converted as depth for volume calculation w.r.t. SD (m)
	A	B	C (50% stretch is to be selected on both side of tide gauge)	D	E	F = (E- WL data in MSL)	G = (E- Topo levels in MSL)
32	GS-10/W	87.500	87-88		15.320	-0.300	Dwarka Reduced Topo.xyz
33	GS-10/V	86.500	86-87		15.280	-0.300	Submitted in Soft Copy
34	GS-10/U	85.500	85-86		14.920	-0.300	
35	GS-10/T	84.500	84-85		14.840	-0.300	
36	GS-10/S	83.500	83-84		14.750	-0.300	
37	GS-10/R	82.500	82-83		13.890	-0.300	
38	GS-10/Q	81.500	81-82		13.850	-0.300	
39	GS-10/P	80.500	80-81		13.802	-0.300	
40	GS-10/O	79.500	79-80		13.776	-0.300	
41	GS-10/N	78.500	78-79		13.745	-0.300	
42	GS-10/M	77.500	77-78		13.720	-0.300	
43	GS-10/L	76.500	76-77		13.660	-0.300	
44	GS-10/K	75.500	75-76		13.587	-0.300	
45	GS-10/J	74.500	74-75		13.540	-0.300	
46	GS-10/I	73.500	73-74		13.490	-0.300	
47	GS-10/H	72.500	72-73		13.479	-0.300	
48	GS-10/G	71.500	71-72		13.468	-0.300	
49	GS-10/F	70.500	70-71		13.459	-0.300	
50	GS-10/E	69.500	69-70		13.442	-0.300	
51	GS-10/D	68.500	68-69		13.433	-0.300	
52	GS-10/C	67.500	67-68		13.425	-0.300	
53	GS-10/B	66.500	66-67		13.413	-0.300	
54	GS-10/A	65.500	65-66		13.410	-0.300	
55	GS-10	65.000	56.2-65.00		13.351	-0.209	
56	GS-4	62.455	49.9-56.2		13.157	-0.128	
57	GS-3	49.889	42.0-49.9		12.197	0.032	
58	GS-6	49.821	34.0-42.0		12.192	0.034	
59	GS-5	34.100	29.1-34.0		10.991	-0.844	
60	GS-9	33.970	17.8-29.1		10.981	-0.839	
61	GS-8	24.321	11.3-17.8		10.224	-1.019	
62	Bazarsaw (Seasonal)	23.000		10.143		-1.042	
63	GS-2	11.318	5.7-11.3		9.215	-1.410	
64	GS-7	11.265	0.1-5.7		9.247	-1.373	
65	GS-1	0.132	0-0.1		8.396	-1.104	

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	E	F = (E- WL data in MSL)	G = (E- Topo levels in MSL)
66	Confluence (356.750)	0.000		8.386		-1.110	

Table 6 - Chart Datum / Sounding Datum & Reduction Details (Primary Channel)

2.11.1- Chart Datum / Sounding Datum and Reductions details at link of Dwarka River (Secondary Channel):-

Sl. No	link of Dwarka River	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	E	F = (E- WL data in MSL)	G = ((E- topo levels in MSL)
1		Confluence of Dwarka	7.261	0.00-7.261		10.525	-0.975	Dwarka Reduced Topo.xyz
2		GS-11	2.800			10.451	-0.649	
3		Confluence (389.000)	0		10.405		-0.495	

Table 7- Chart Datum / Sounding Datum & Reduction Details of link of Dwarka River (Secondary Channel)

2.12 -Average Slope:-

Reach		River depth Level Change (m)	Distance (km)	Slope (m/km)	Slope (cm/km)
From	To				
0	11.265	0.861	11.265	0.076	7.643
11.266	24.321	0.977	13.055	0.075	7.484
24.322	34.100	0.767	9.778	0.078	7.844
34.101	49.821	1.201	15.841	0.076	7.582
49.822	62.455	0.965	12.633	0.076	7.639
62.456	72.5	0.322	10.044	0.032	3.206
72.6	82.5	0.411	9.9	0.042	4.152
82.6	92.5	2.4	9.9	0.242	24.242
92.6	102.5	2.43	9.9	0.245	24.545
102.6	112.5	2.79	9.9	0.282	28.182
112.6	119.165	1.8	6.565	0.274	27.418
Avg. Slope				0.136 m/km	13.630 cm/km

Table 8 – Average slope-(Primary Channel)

2.12.1 - Average Slope at link of Dwarka River (Secondary Channel):-

Reach		River Depth Level Change (m)	Distance (km)	Slope (cm/km)	Slope (m/km)
From	To				
0	7.261	0.120	7.261	0.0165 cm/km	1.65 m/km

Table 9-Average slope of Link of Dwarka River-(Secondary Channel)

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

A check dam is found near the Chainage of 119.165 km in this zone of river.

Sl No	Structure Name	Chainage (km)	Location	Latitude (N)	Longitude (E)	Northing (m)	Easting (m)	Length (m)	Width (m)	Height w.r.t. above M.S.L (m)	Present Condition
1	Check Dam	119.165	Tarapith	24° 6'57.47"	87°47'51.69"	2667296.5810	581063.6112	50.17	8.15	7.677	Complete

Table 10 Details of Check Dam

2.14 - Details of Locks:-

There are no locks found in this zone of river.

2.15 - Details of Aqueducts:-

There are no aqueducts found in this zone of River.

2.16- Details of existing Bridges and Crossings over waterway in Primary Channel:-

Sl. No	Chainage (km)	Location	Cross-Structure details	Latitude (N)	Longitude (E)	Northing (m)	Easting (m)	Length (m)	Width (m)	No of Piers	Horizontal Clearance (m)	Vertical Clearance w.r.t H.F.L (m)
1	16.700	Haranandapur	Babla RCC Rail Bridge	23°50'22.59"	88° 9'41.72"	2636954.83	618298.57	100.11	4.33	4	18.39	3.196
2	53.200	Ronogram	Ronogram Iron Bridge	24° 1'0.57"	88° 5'35.75"	2656521.6887	611187.9668	98.07	6.2	4	6.87	4.661
3	67.500	Surkhali	Surkhali RCC Bridge	24° 5'15.41"	88° 4'11.60"	2664341.7323	608750.3221	246.42	11.36	7	37.77	8.007
4	80.500	Shakoghat	Sankorghat RCC Bridge	24° 9'23.37"	88° 1'1.68"	2671928.6393	603332.3626	67.04	10.19	2	34.11	8.217
5	102.500	Bishnupur	Bishnupur RCC Bridge	24° 7'48.27"	87°54'9.34"	2668923.1522	591714.6099	51.88	9.33	7	5.95	1.80
6	105.000	Lalita Kundu	Lalita Kundu RCC Bridge	24° 7'30.19"	87°53'8.85"	2668356.4280	590010.9454	107.35	10.02	7	13.67	3.80
7	119.165	Tarapith	Tarapith RCC Bridge	24° 6'57.47"	87°47'51.69"	2667296.5810	581063.6112	50.17	8.15	6	5.940	4.477

Table 11 - Bridge Details in primary channel

2.16.1- Details of existing Bridges and Crossings over waterway in Secondary channel (link of Dwarka River):-

Sl No	Chainage (km)	Location	Cross-Structure details	Latitude (N)	Longitude (E)	Northing (m)	Easting (m)	Length (m)	Width (m)	No of Piers	Horizontal Clearance (m)	Vertical Clearance w.r.t H.F.L (m)
1	2.700	Ronogram	Ronogram RCC Bridge	23°54'31.98"	88°11'22.12"	2644648.0118	621074.6270	84.1	9.59	5	17.45	3.308
2	2.800	Kazipara	Uttarasan Rail Bridge (230)	23°54'32.33"	88°11'18.59"	2644658.6105	620971.1597	54.3	4.76	3	11.45	1.59

Table 12- Bridge Details of Link of Dwarka River (secondary channel)

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

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

2.18 - Electric lines / Tele-communication lines in Primary Channel:-

Sl. no	Line	Chainage (km)	Location	Latitude (N)	Longitude (E)	Easting (m)	Northing (m)	No of piers	Horizontal clearance (m)	Vertical clearance w.r.t H.F.L (m)	Remarks
1	Electric line	13.802	Tenya	23°49'7.179"	88°9'56.869"	618745.59	2634637.91	4	139.83	9.8	Complete
2	Electric line	14.995	Baidyapur	23°49'42.637"	88°9'51.061"	618572.29	2635727.17	4	109.69	4.6	Complete
3	Electric line	52.834	Indrahata	24°1'2.733"	88°5'47.895"	611529.73	2656590.29	4	156.97	9.115	Complete
4	Electric line	52.908	Indrahata	24°0'57.987"	88°5'44.663"	611439.56	2656443.6	4	137.65	9.201	Complete
5	Electric line	53.106	Indrahata	24°1'2.563"	88°5'37.617"	611239.4	2656582.79	4	131.21	9.810	Complete
6	Electric line	53.333	Indrahata	24°1'1.16"	88°5'30.373"	611035.06	2656538.04	4	83.65	9.880	Complete
7	Electric line	54.102	Indrahata	24°0'59.368"	88°5'10.583"	610476.37	2656478.61	4	104	10.2	Complete
8	Electric line	54.468	Indrahata	24°1'1.979"	88°4'56.626"	610081.44	2656555.89	4	78.6	9.0	Complete
9	Electric line	62.424	Ratanpur	24°3'23.774"	88°4'10.898"	608756.31	2660907.28	4	103.5	9.35	Complete
10	Electric line	62.522	Ratanpur	24°3'25.613"	88°4'9.604"	608719.35	2660963.57	4	81.91	10.050	Complete
11	Electric line	64.95	Ratanpur	24°6'17.311"	88°3'41.21"	607905.36	2662547.6	4	89.73	9.220	Complete
12	Electric line	65.17	Ratanpur	24°6'23.94"	88°3'39.507"	607855.74	2662751.12	4	61.73	9.220	Complete
13	Electric line	67.563	Ratanpur	24°5'56.357"	88°4'15.8"	608868.7	2664329.51	4	202.66	8.320	Complete
14	Electric line	69.224	Ratanpur	24°5'56.357"	88°3'54.284"	608251.47	2665596.81	4	103.41	8.350	Complete
15	Electric line	70.488	Bhatkanda	24°6'27.065"	88°4'0.767"	608427.33	2666542.74	4	67.7	4.2	Complete
16	Electric line	71.802	Bhatkanda	24°6'59.51"	88°3'40.377"	607844.13	2667536.28	4	135.06	8.12	Complete
17	Electric line	75.359	Rahimnagar	24°8'7.932"	88°2'44.069"	606238.81	2669628.87	4	109.98	4.28	Complete
18	Electric line	80.524	Rahimnagar	24°9'21.874"	88°1'1.203"	603318.75	2671881.78	4	85.36	8.05	Complete
19	Electric line	82.173	Shako ghat	24°9'14.143"	88°0'22.461"	602227.07	2671636.09	4	96.84	7.69	Complete
20	Electric line	82.333	Shako ghat	24°9'9.234"	88°0'19.418"	602142.28	2671484.47	4	59.17	7.9	Complete
21	Electric line	87.595	Shako ghat	24°9'25.405"	87°58'34.545"	599179.05	2671960.91	4	44.63	7.55	Complete
22	Electric line	95.265	Basantapur	24°9'13.088"	87°56'18.924"	595354.18	2671555.9	4	43.56	7.42	Complete
23	Electric line	95.705	Basantapur	24°9'0.197"	87°56'14.615"	595235.23	2671158.6	4	63.88	7.45	Complete
24	Electric line	95.937	Basantapur	24°8'54.314"	87°56'12.973"	595190.09	2670977.34	4	70.98	6.20	Complete
25	Electric line	96.433	Basantapur	24°8'39.555"	87°56'8.492"	595066.66	2670522.55	4	59.45	6.15	Complete
26	Electric line	96.736	Basantapur	24°8'38.26"	87°5'558.479"	594784.33	2670480.85	4	58.46	6.08	Complete

Sl. no	Line	Chainage (km)	Location	Latitude (N)	Longitude (E)	Easting (m)	Northing (m)	No of piers	Horizontal clearance (m)	Vertical clearance w.r.t H.F.L (m)	Remarks
27	Electric line	97.756	Basantapur	24°8'41.321"	87°55'32.398"	594047.58	2670570.1	4	48.65	4.12	Complete
28	Electric line	99.116	Basantapur	24°8'49.446"	87°54'56.754"	593039.94	2670813.39	4	30.24	4.0	Complete
29	Electric line	99.29	Basantapur	24°8'49.191"	87°54'53.477"	592947.51	2670804.93	4	35.24	4.3	Complete
30	Electric line	103.851	Joypur	24°7'47.733"	87°53'34.946"	590743.14	2668900.36	4	49.98	6.9	Complete
31	Electric line	104.113	Joypur	24°7'39.238"	87°53'34.651"	590736.48	2668639.06	4	50.03	7.2	Complete
32	Electric line	105.115	Joypur	24°7'28.295"	87°53'7.005"	589958.24	2668297.51	4	64.14	5.3	Complete
33	Electric line	110.989	Margram	24°8'16.063"	87°50'38.056"	585744.86	2669740.76	4	83.10	8.42	Complete
34	Electric line	111.944	Margram	24°8'7.513"	87°50'6.443"	584854.14	2669472.46	4	75.86	5.9	Complete
35	Electric line	117.072	Nabagram	24°7'37.653"	87°48'28.782"	582102.92	2668537.91	4	73.67	5.62	Complete
36	Electric line	117.461	Nabagram	24°7'9.871"	87°48'34.495"	582266.23	2668185.63	4	48.96	8.05	Complete
37	Electric line	117.711	Tarapith	24°7'9.871"	87°48'8.438"	582199.15	2667954.26	4	71.84	8.36	Complete

Table 13- Details of Electric lines in primary channel

2.18.1 - Electric lines / Tele-communication lines in Primary Channel:-

Sl. no	Line	Chainage (km)	Location	Latitude (N)	Longitude (E)	Easting (m)	Northing (m)	No of piers	Horizontal clearance (m)	Vertical clearance w.r.t H.F.L (m)	Remarks
1	High Tension line	22.674	Bazarsau	23°52'33.634"	88°10'30.96"	619657.58	2640996	8	217.57	9.65	Complete
2	High Tension line	22.781	Bazarsau	23°52'34.933"	88°10'34.769"	619764.98	2641036.8	8	211.75	9.7	Complete
3	High Tension line	24.791	Bazarsau	23°53'27.478"	88°10'27.655"	619550.33	2642651.3	8	193.99	4.8	Complete
4	High Tension line	25.079	Bazarsau	23°53'34.453"	88°10'20.782"	619354.19	2642864.2	8	171.27	4.3	Complete
5	High Tension line	52.275	Indrahata	24°0'50.396"	88°6'1.545"	611918.37	2656213.8	8	276.15	9.732	Complete
6	High Tension Line	54.3	Indrahata	24°0'56.899"	88°4'59.76"	610171.18	2656400.3	8	153.35	11.32	Complete
7	High Tension Line	107.445	Joypur	24°7'46.3"	87°48'4.196"	588181.83	2668840.2	8	249.13	5.1	Complete
8	High Tension Line	107.706	Kalidaha	24°7'51.295"	87°52'3.459"	588160.09	2668993.7	8	83.56	5.25	Complete
9	High Tension Line	118.547	Tarapith	24°7'9.871"	87°48'8.438"	581533.56	2667680.1	8	134.55	9.1	Complete

Table 14- Details of High Tension lines in primary channel

2.18.2 Electric lines at Link of Dwarka River (Secondary Channel):-

Sl. no	Line	Chainage (km)	Location	Latitude (N)	Longitude (E)	Easting (m)	Northing (m)	No of piers	Horizontal clearance (m)	Vertical clearance w.r.t H.F.L (m)	Remarks
1	Electric line	2.732	Ronogram	23°54'34.086"	88°11'21.575"	621058.015	2644712.769	4	111.6	9.8	Complete
2	Electric line	2.780	Ronogram	24°3'21.024"	88°10'26.094"	620997.101	2660907.280	4	88.89	9.8	Complete

Table 15-Electric/H.T Lines Details of Link of Dwarka (secondary channel)

2.19 - Current Meter and Discharge details:-

Stretch No.	Chainage (km)	Position				Observed Depth (m) (D)	Velocity (m/sec.)	Average Velocity (m/sec.)	X-Sectional area (sq. m.)	Discharge (m3/sec)
		Latitude (N)	Longitude (E)	Easting (m)	Northing (m)		0.5 D			
1	0.00	23°43'52.81"	88°10'49.455"	620313.890	2624981.050	2.0	1.10	1.10	165.74	182.314
2	10.00	23°48'35.401"	88°11'03.13"	620628.690	2633676.040	2.2	1.20	1.20	121.92	146.304
3	20.00	23°53'12.247"	88°10'40.594"	619920.160	2642185.870	1.9	1.00	1.00	152.7	152.700
4	30.00	23°56'55.261"	88°09'58.138"	618662.830	2649035.330	2.2	1.20	1.20	139.34	167.208
5	40.00	23°59'35.198"	88°08'48.943"	616666.810	2653938.650	3.0	1.04	1.04	113.42	117.957
6	50.00	24°00'30.989"	88°06'53.314"	613385.750	2655628.410	1.9	1.01	1.01	84.24	85.082
7	60.00	24°03'21.647"	88°04'09.884"	608728.170	2660841.630	1.0	0.831	0.831	78.9	65.566
8	70.00	24°05'16.466"	88°04'11.463"	608745.870	2664373.560	0.5	0.521	0.521	65.22	33.980
9	80.00	24°09'23.374"	88°01'01.541"	603327.940	2671927.990	0.3	0.213	0.213	75.19	16.015
10	90.00	24°09'19.095"	87°57'18.963"	597047.330	2671752.110	0.4	0.354	0.354	62.02	21.955
11	100.00	24°07'48.271"	87°54'09.895"	591729.550	2668923.230	0.5	0.521	0.521	57.86	30.145
12	110.00	24°07'38.659"	87°49'20.872"	583573.110	2668577.390	0.3	0.213	0.213	74.99	15.973
13	119.00	24°07'08.669"	87°48'02.794"	581374.450	2667642.240	0.4	0.354	0.354	57.62	20.397

Table 16 - Current Meter Details

2.20 - (a) Soil Sample Locations:-

Sample No.	Chainage (km)	Latitude (N)	Longitude (E)	Easting (m)	Northing (m)	Depth (m)
1	0.00	23°43'50.817"	88°10'48.844"	620297.12	2624919.60	2.0
2	20.00	23°51'20.597"	88°09'52.511"	618588.54	2638740.52	1.9
3	40.00	23°58'50.179"	88°09'34.28"	617959.36	2652564.43	3.0
4	50.00	24°00'33.62"	88°06'50.196"	613296.99	2655708.64	1.9
5	60.00	24°02'31.312"	88°04'27.433"	609235.67	2659297.23	1.0
6	70.00	24°06'19.085"	88°03'48.678"	608087.89	2666294.69	0.5
7	80.00	24°09'12.034"	88°01'12.254"	603632.84	2671581.39	0.3
8	110.00	24°07'58.352"	87°50'56.907"	586280.22	2669199.26	0.3
9	119.00	24°07'02.023"	87°47'54.788"	581149.61	2667436.55	0.4

Table 17 - Soil Sample Locations

Note:- The Report of soil samples has been shown in Annexure no-11, page no-152

(b) Water Sample Locations:-

Sample No.	Chainage (km)	Latitude (N)	Longitude (E)	Easting (m)	Northing (m)	Total Depth (d) (m)	Mid-Depth (0.5d) (m)
1	0.00	23°43'50.817"	88°10'48.844"	620297.12	2624919.60	2.0	1
2	10.00	23°48'01.625"	88°11'23.493"	621213.64	2632641.99	2.2	1.1
3	20.00	23°51'20.597"	88°09'52.511"	618588.54	2638740.52	1.9	0.95
4	30.00	23°55'12.212"	88°09'37.136"	618095.19	2645860.88	2.2	1.1
5	40.00	23°58'50.179"	88°09'34.28"	617959.36	2652564.43	3.0	1.5
6	50.00	24°00'33.62"	88°06'50.196"	613296.99	2655708.64	1.9	0.95
7	60.00	24°02'31.312"	88°04'27.433"	609235.67	2659297.23	1.0	0.5
8	70.00	24°06'19.085"	88°03'48.678"	608087.89	2666294.69	0.5	0.25
9	80.00	24°09'12.034"	88°01'12.254"	603632.84	2671581.39	0.3	0.15
10	90.00	24°09'14.122"	87°57'56.828"	598117.02	2671606.50	0.4	0.2
11	100.00	24°08'34.526"	87°54'43.836"	592678.33	2670352.11	0.5	0.25
12	110.00	24°07'58.352"	87°50'56.907"	586280.22	2669199.26	0.3	0.15
13	119.00	24°07'02.023"	87°47'54.788"	581149.61	2667436.55	0.4	0.2

Table 18 - Water Sample Locations

Note: - The Report of Water samples has been shown in Annexure no-12, page no-163

Section-3: Description of waterway

3.1- From Chainage 0.00 Km to Chainage 10.00 Km. (Maugram village to Chak Gupura village):-

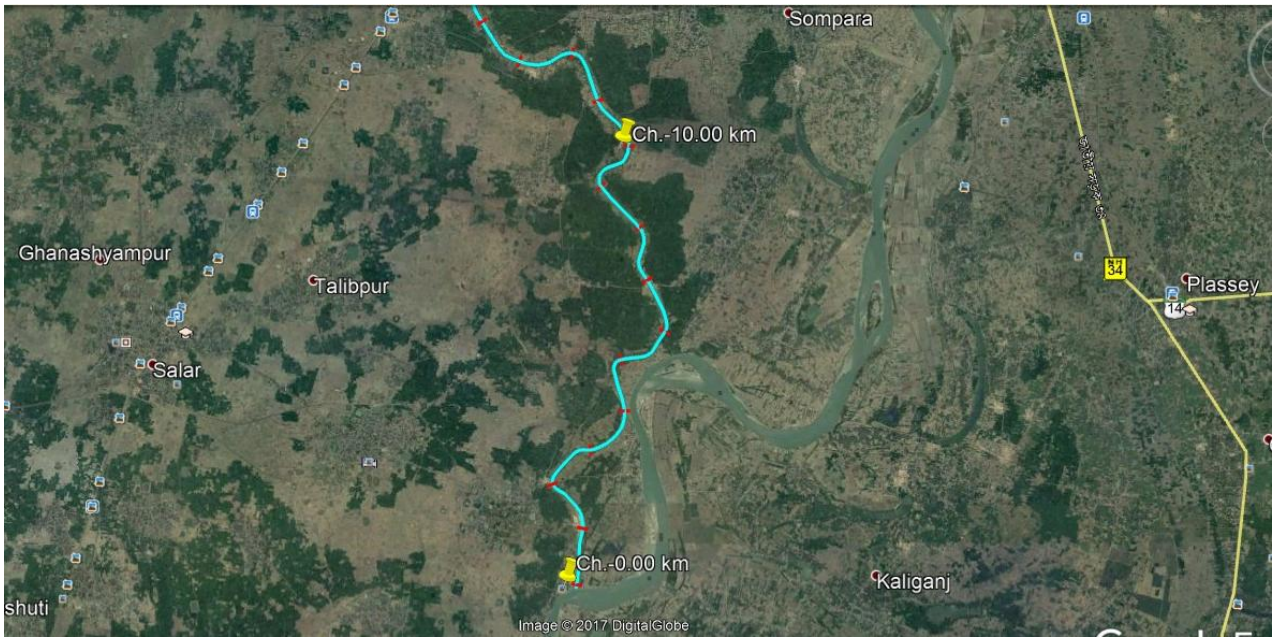


Figure 7- Chainage 0.00 km to Chainage 10.00 km

The width of Dwarka River from Chainage 0.00 Km. to Chainage 10.00 Km is approximately 129.01m. to 80.15 m. The average width portion of the river is approximately104.58 m.

BM-1 is situated near Chainage of 0.101 km left bank side of the river. The River starts from confluence with the Bhagirathi River which is called Dwarka River. Char Narayanpur, Nutangram, Char Gobalpur, Sujapur, Dakshin Bachhara etc. villages are located right bank side of the river and Kalyanpur, Maugram, Kagram, Dhandanga, Ramnabarakhari, Sarmastapur etc. villages are located left bank side of the river. No cross structures are found in this zone of river. Maugram to Dhandanga bituminous road are found near Chainage of 2.5 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	1.4	10.7	0.00	0	0.2	9.5	4200	10940.92
II	0.00	10.00	1.1	10.8	55.00	0.15	0.18	9.6	5700	30107.84
III	0.00	10.00	1.1	10.8	3000	3640.56	0.16	9.7	9000	98084.13
IV	0.00	10.00	1.0	11.0	5710	9642.94	0.1	9.8	9000	168421.63

- **Bathymetry Survey:-**

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

The Bathymetry survey of the Dwarka River has been carried out from the Chainage of 0.000 km to Chainage 10.00 km from Confluence with Bhagirathi River near Maugram village to Chak Gupura village.

- **Topographic Survey:-**

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

The Topographic survey has been carried out from the Chainage of 0.00 km to Chainage 10.00 km from Confluence with Bhagirathi River near Maugram village to Chak Gupura village.

a) Prominent Dams / Barrage:-

There is no dam found in this stretches of river.

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

The Bank of the river starts with the confluence of Bhagirathi River. The width of the confluence point is 0.14 km. Kalayanpur ghat is located left bank side of the confluence point. The Agricultural land is found both sides of the river bank in this stretches of river. Embankment is also found both sides of the river bank.

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

No obstructions like Rocks, steep gradient, forest, wild life sanctuary are noticed in this zone of river.

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

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

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

NH-34 is located 8.25 km far from the waterway in the right side of the river. There is no NH, SH crossing over the waterway in this stretches.

f) Railway Line and Stations in the vicinity:-

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

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

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

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

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

i) Availability of Bulk / Construction Material:-

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

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

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

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

There are no jetty services available in this stretches of river.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Sarmastapur, Bachhara, Salar etc. major places are located in this stretches of river. There is no tourist place located in this stretches of river.

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

Maugram, Kagram, Dhandanga, Ramnabarakhari etc. villages are located left bank side of the river and Charnarayanpur, Nutangram, Chargopalpur, Sujapur, Dakshin Bachhara etc. villages are located right bank side of the river.

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

There is no passenger ferry services found in this stretches of river.

p) Available and probable Water Sport Recreational Facilities:-

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

q) Fishing activities:-

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

r) Sand mining:-

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

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and Outlets:-

There are two irrigation canal and outlets found in this stretches of river near the Chainage of 5.245 km and 7.686 km in the left bank side of the river.

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

There is no Nala found in this zone of river.

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

The water of the river is essential for cultivation which is the main occupation for the villagers of this region.

3.2 - From Chainage 10.00 Km to Chainage 20.00 Km (Chak Gupura village to Kataikona village):-

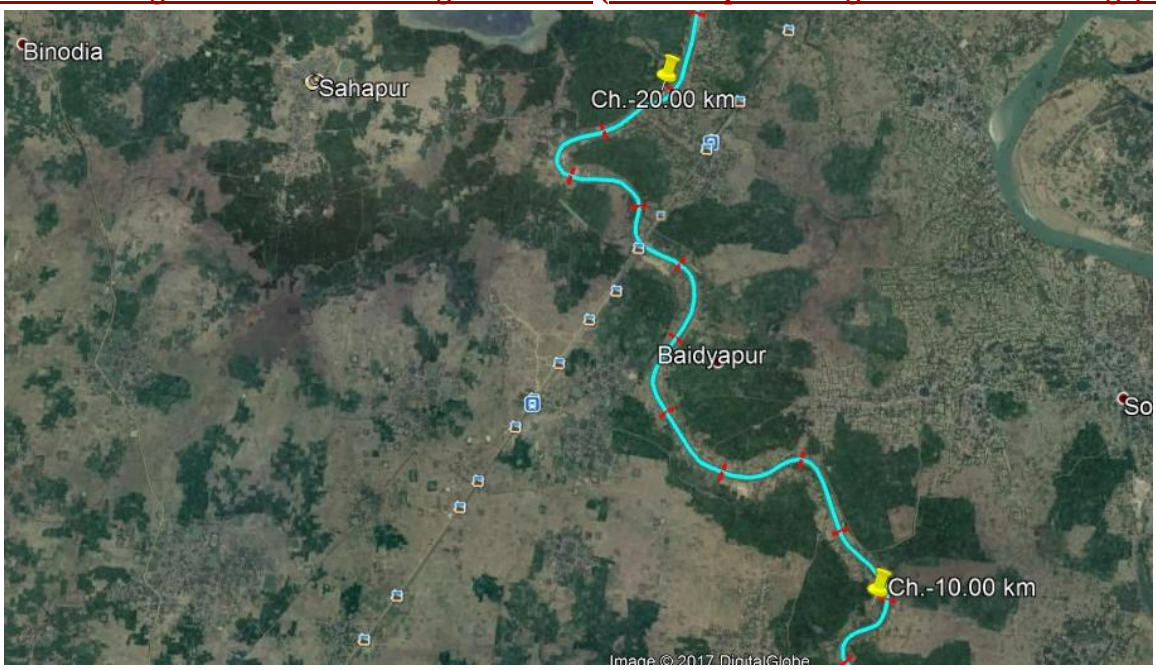


Figure 8 – Chainage 10.00 km to Chainage 20.00 km

The width of Dwarka River from Chainage 10.00 Km. to Chainage 20.00 Km is approximately 80.15 m to 108.52 m. The average width portion of the river is approximately 94.335 m.

BM-2 is situated near Chainage of 11.272 km left bank side of the river. Babla Rail Bridge is crossed over the river near Chainage of 16.700 km in this stretches of river. The Position of the Babla Rail Bridge is- (Lat: - 23°50'22.59"N, Long: - 88° 9'41.72"E). The Rail Bridge is communicated through Tenya, Milangram Railway station. Chak Rangapara, Gholla, Baidyapur, Jaykrishnapur, Mian etc. villages are located right bank side of the river and sarmastapur, Chak Gupura, Barahatti, Tenya, Bara Baidyapur, Nawapara, Haranandapur, pollesri etc. villages are located left bank side of the river. Two electric lines are located near Chainage of 13.802 km and 14.995 km. The Ferry Service is available near the Chainage of 13.641 km (Tenya Ghat). The position of this Ferry ghat is (23°49'3.057"N, Long: - 88°10'0.522"E). Boratay Ferry ghat is also situated in this zone of river near the Chainage of 11.272 km. The position of this Ferry ghat is (Lat: - 23°48'35.314"N, Long: - 88°11'2.047"E). Bali ferry ghat is also available in this zone of river near the Chainage of 14.554 km. The position of this ferry ghat is (23°49'31.187"N, 88° 9'44.599"E).

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	10.00	20.00	0.5	6.8	550	785.63	0.3	5.3	7050	12434.05
II	10.00	20.00	0.3	6.9	2820	3070.96	0.1	5.4	8450	37402.92
III	10.00	20.00	0.3	6.9	9100	18165.22	0.1	5.6	10000	129614.24
IV	10.00	20.00	0.1	7.1	10000	36201.45	0.1	5.6	10000	220438.31

Figure 9-Boratay Ferry ghat (Chainage-11.272 km)

Figure 10-Ferry Boat near Tenya village with goods (Chainage-13.641 km)

Figure 11-Ferry Boat near Tenya village (Chainage-13.641 km)

Figure 12-Tractor for carrying goods near Tenya village (Chainage-13.641 km)

Figure 13-Bali Ferry Ghat (Chainage-14.554 km)

Figure 14- Babla Rail Bridge (Chainage-16.700 km)

- **Bathymetry Survey:-**

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

The Bathymetry survey of the Dwarka River has been carried out from the Chainage of 10.000 km to Chainage 20.000 km from Chak Gupura village to Miangram village.

- **Topographic Survey:-**

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

The Topographic survey has been carried out from the Chainage of 10.000 km to 20.00 km from Chak Gupura village to Miangram village.

a) Prominent Dams / Barrage:-

There is no dam found in this stretches of river.

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

The bank of the river includes with villages, Road, Ferry Ghats, Jetties and Rail Bridge etc. Rail Bridge areas are highly protected by concrete pitching. Most of the river stretches are protected by long embankments and Boulder pitching.

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

There are no obstructions like wildlife sanctuaries, rapid waterfalls, rocks etc. found in this stretches of river.

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

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

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

NH-34 is located 8.85 km far from the waterway. But there is no NH, SH found over the waterway in this stretches of river.

f) Railway Line and Stations in the vicinity:-

Babla Rail Bridge is situated near the Chainage of 16.700 km. The Rail Bridge is communicated through Tenya and Miangram Railway Station.

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

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

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

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

i) Availability of Bulk / Construction Material:-

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

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

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

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

The Ferry Service is available near the Chainage of 13.641 km (Tenya Ghat). The position of the Ferry ghat is (23°49'2.689"N, Long: - 88° 9'59.831"E). Boratay Ferry ghat service is also available in this stretches of river near the Chainage of 11.272 km. The position of this Ferry ghat is (Lat:- 23°48'33.987"N, Long: - 88°10'59.689"E). Bali ferry ghat is also available in this zone of river near the Chainage of 14.554 km. The position of this ferry ghat is (23°49'30.49"N, 88° 9'43.84"E).

l) Existing Cargo Movement:-

The Cargo movement is generally processed through waterways system. The cargo movement is available in this stretches of river near Tenya ferry ghat (Chainage-13.641 km). The vehicle like cycle and motor cycle, paddy, Rice, vegetables etc are carried through the Tenya ferry ghat.

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

Tenya, Bara Baidyapur, Nawapara, Sahapur, Haranandapur, Pollesri, Malihati etc. villages are located left bank side of the river and Mian, Baidyapur, Chak Rangapara, Gholla, Manikahar, Mahata and saktipur etc. villages are located right bank side of the river.

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

Tenya, Bara Baidyapur, Nawapara, Sahapur, Haranandapur, Pollesri, Malihati etc. villages are located left bank side of the river and Mian, Baidyapur, Chak Rangapara, Gholla, Manikahar, Mahata and saktipur etc. villages are located right bank side of the river.

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

As much as three passenger ferry services are available in this zone of river. Besides, Bamboo, paddy, vegetables etc. are transported through ferry services in this zone of river.

Sl No	Chainage (km)	Latitude (N)	Longitude (E)	Name of the Ferry Ghat
1	13.641	23°49'3.057"	88°10'0.522"	Tenya ferry Ghat
2	11.272	23°48'35.314"	88°11'2.047"	Boratay Ferry ghat
3	14.554	23°49'31.187"	88° 9'44.599"	Bali ferry ghat

p) Available and probable Water Sport Recreational Facilities:-

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

q) Fishing activities:-

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

r) Sand mining:-

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

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and Outlets:-

The only irrigation canal and outlet is located near the Chainage of 18.5 km in the left portion of the river

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

There is no Nala found in this stretches of river.

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

The water is essential for cultivation which is the main occupation for the villagers of this region. Ferry services are also navigable in this stretches of river. The water is used as irrigation purposes. With the help of the irrigation system, the cultivation can easily accessible.

3.3- From Chainage 20.00 Km to Chainage 30.00 Km (Kataikona village to Gobindopur village):-

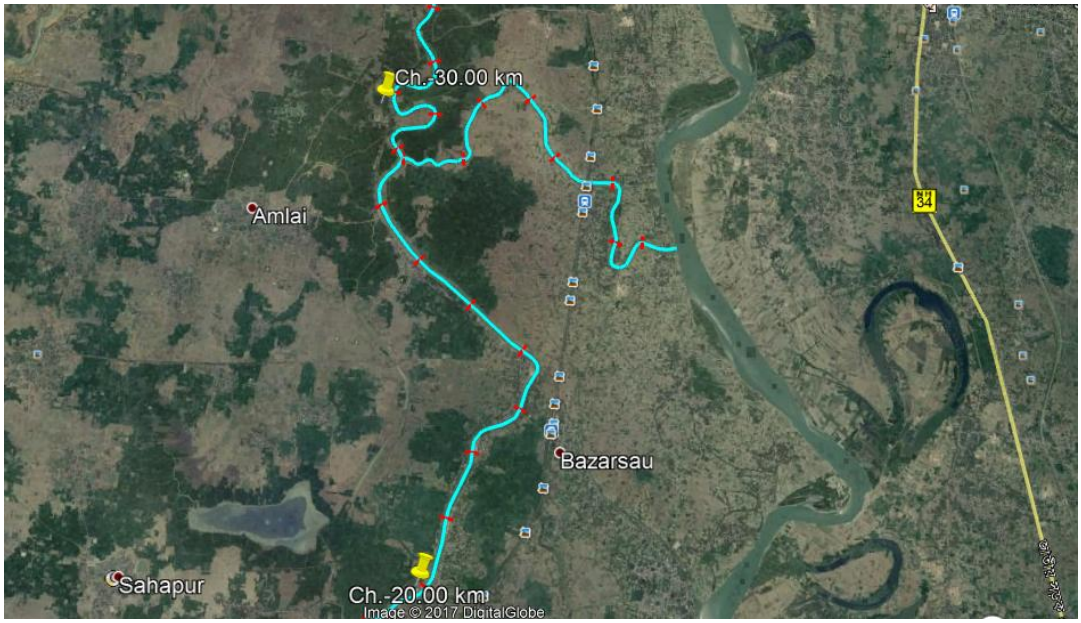


Figure 15 - Chainage 20.00 to Chainage 30.00 km

The width of Dwarka River from Chainage 20.00 Km. to Chainage 30.00 Km is approximately 108.52 m to 68.88 m. The average width portion of the river is approximately 88.7 m.

In this stretches of river, a link of Dwarka River is stretched near Chainage of 28.00 km which is connected with Bhagirathi River. Kataikona, Ghoshkura, Lohadaha, Jorgachhi etc. villages are located left bank side of the river and Ismailpur etc. village is located right bank side of the river. BM-3 is situated near Chainage of 24.281 km. Both side paddy lands are also located near the bank side of the river. Bazarsau Railway station is situated right bank side of the river. Four highTension lines are located near Chainage of 22.674 km, 22.781 km, 24.791 km and 25.079 km. in this stretches of river.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	20.00	30.00	0.6	8.7	200	80.38	-0.3	7.2	4800	26101.33
II	20.00	30.00	0.5	8.73	2150	2293.45	-0.32	7.23	8350	64503.71
III	20.00	30.00	0.5	8.73	8100	20779.02	-0.3	7.29	9250	158616.14
IV	20.00	30.00	0.3	8.79	9100	54246.01	-0.3	7.29	10000	252106.42

- **Bathymetry Survey:-**

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

The Bathymetry survey of the Dwarka River has been carried out from the Chainage of 20.000 km to Chainage 28.500 km from Miangram village to Gobindapur.

- **Topographic Survey:-**

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

The Topographic survey has been carried out from the Chainage of 20.00 km to Chainage 30.00 km from Miangram village to Gobindapur village.

a) Prominent Dams / Barrage:-

There are no Dams found in this zone of river.

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

The both sides of the river bank are covered with agricultural lands. The both sides bank are protected by long embankment. The link of Dwarka (secondary channel) is found in this stretches of river near the Chainage of 28.00 km in the right side of the river bank. Paddy land is found mainly in this stretches of river. During the Rainy season, the bank of the river sometimes is flooded.

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

No obstructions like Rocks, steep gradient, forest, wild life sanctuary are noticed in this zone of river.

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

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

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

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

f) Railway Line and Stations in the vicinity:-

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

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

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

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

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

i) Availability of Bulk / Construction Material:-

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

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

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

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

There is no existing jetty found in this stretches of river.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Kataikona, Ghoshkura, Khaira, Lohadaha, Ghoshkura, Jorgachhi, Narayanpur, Amlai, Bhaluipara, Uttar sahapur, Gobindapur etc. villages are located left bank side of the river and Bazarsau, Ismailpur, Kamnagar etc. villages are located right bank side of the river.

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

Kataikona, Ghoshkura, Khaira, Lohadaha, Ghoshkura, Jorgachhi, Narayanpur, Amlai, Bhaluipara, Uttar sahapur, Gobindapur etc. villages are located left bank side of the river and Bazarsau, Ismailpur, Kamnagar etc. villages are located right bank side of the river.

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

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

p) Available and probable Water Sport Recreational Facilities:-

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

q) Fishing activities:-

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

r) Sand mining:-

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

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and Outlets:-

The only irrigation canal and outlet is located near the Chainage of 27.1 km in the left portion of the river. River.

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

There is no Nala found in this stretches of river.

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

The water is essential for cultivation which is the main occupation for the villagers of this region. The water is also used in the industrial hubs. Ferry services are also navigable in this region of river. The water is used as irrigation purposes. With the help of the irrigation system, the cultivation can easily accessible.

3.4- From Chainage 30.00 Km to Chainage 40.00 Km (Gobindopur village to Dakshin Hijal village):-

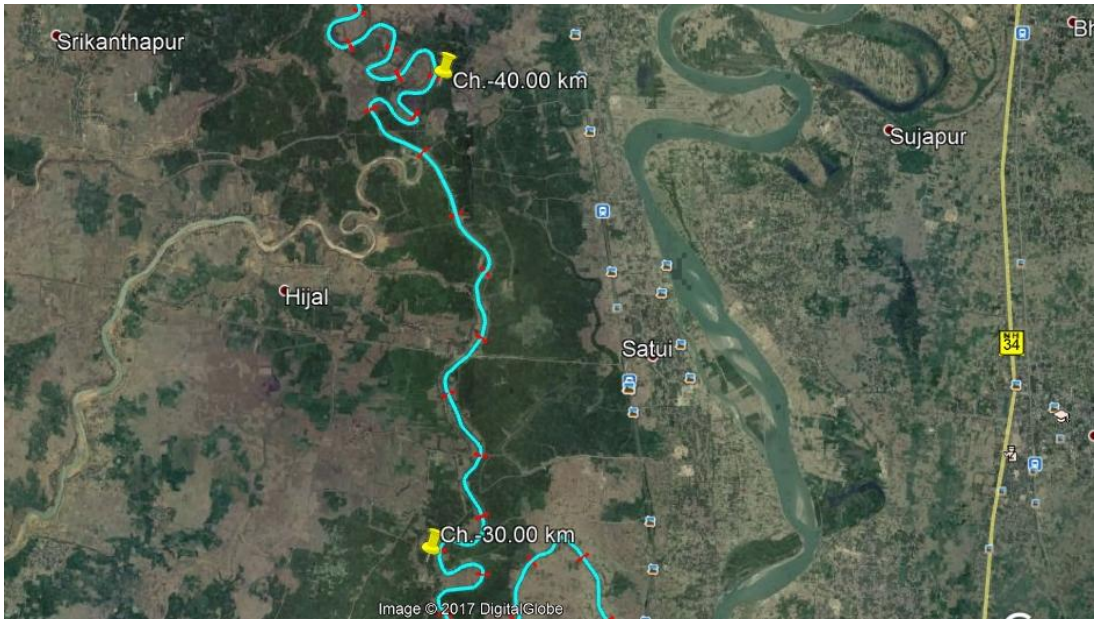


Figure 16 - Chainage 30.00 km to Chainage 40.00 km

The width of Dwarka River from Chainage 30.00 Km. to Chainage 40.00 Km is approximately 68.88 m to 31.15 m. The average width portion of the river is approximately 50.015 m.

BM-4 is situated near Chainage of 34.183 km left bank side of the river. Satui, Bhagabanbati, Basabari, Dakshin Hijal etc. villages are located right bank side of the river and Madanpur, Ranipur, Jayrampur, Gobindapur, Hijal etc. villages are located left bank side of the river.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	30.00	40.00	0.5	9.2	3250	12793.46	0.2	8.3	5500	20780
II	30.00	40.00	0.3	9.23	6900	31128.65	0.17	8.33	8050	50762.58
III	30.00	40.00	0.3	9.23	10000	83772.85	-0.3	8.39	10000	125975.18
IV	30.00	40.00	0.1	9.29	10000	127305.14	-0.3	8.41	10000	181158.17

- **Bathymetry Survey:-**

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

The Bathymetry survey of the Dwarka River has been carried out from the Chainage of 30.000 km to Chainage 40.00 km from Gobindopur village to Dakshin Hijal village.

- **Topographic Survey:-**

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

The Topographic survey has been carried out from the Chainage of 30.00 km to Chainage 40.00 km from Gobindopur village to Dakshin Hijal village.

a) Prominent Dams / Barrage:-

There is no dam found in this stretches of river.

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

The both sides bank of the river protected with long embankments in this stretches of river. The Agricultural lands are found both sides bank of the river. Bakreswar Mayurakshi River, a major tributary located in this stretches of river near the Chainage of 37.445 km.

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

No obstructions like Rocks, steep gradient, forest, wild life sanctuary are noticed in this zone of river.

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

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

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

There is no NH, SH found in this stretches of river. NH-34 is located approximately 8 km from the waterway.

f) Railway Line and Stations in the vicinity:-

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

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

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

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

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

i) Availability of Bulk / Construction Material:-

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

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

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

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

There is no existing ferry ghat located in this stretches of river.

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Gobindapur, Jayrampur, Ranipur, Hijal etc. villages are located left bank side of the river and Bhagabanbati, Bara satui, Satui, Basabari, Dakshin Hijal etc. villages are located right bank side of the river.

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

Gobindapur, Jayrampur, Ranipur, Hijal etc. villages are located left bank side of the river and Bhagabanbati, Bara satui, Satui, Basabari, Dakshin Hijal etc. villages are located right bank side of the river.

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

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

p) Available and probable Water Sport Recreational Facilities:-

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

q) Fishing activities:-

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

r) Sand mining:-

There is no existing sand mine found in this stretches of river.

s) Tributaries:-

There is a major tributary named Bakreswar Mayurakshi River found in this stretches of river near the Chainage of 37.445 km.

t) Details of Irrigation Canals and Outlets:-

The only irrigation canal and outlet is located near the Chainage of 32.3 km in the left portion of the river.

u) Details of Nalas. Polluted water discharge in to the rivers and treatment plants (if any):-
There is no Nala found in this stretches of river.

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

The water is essential for cultivation which is the main occupation for the villagers of this region. With the help of the irrigation system, the cultivation can easily accessible in this stretches of river.

3.5- From Chainage 40.00 Km to Chainage 50.00 Km. (Dakshin Hijal village to Indrahata village):-

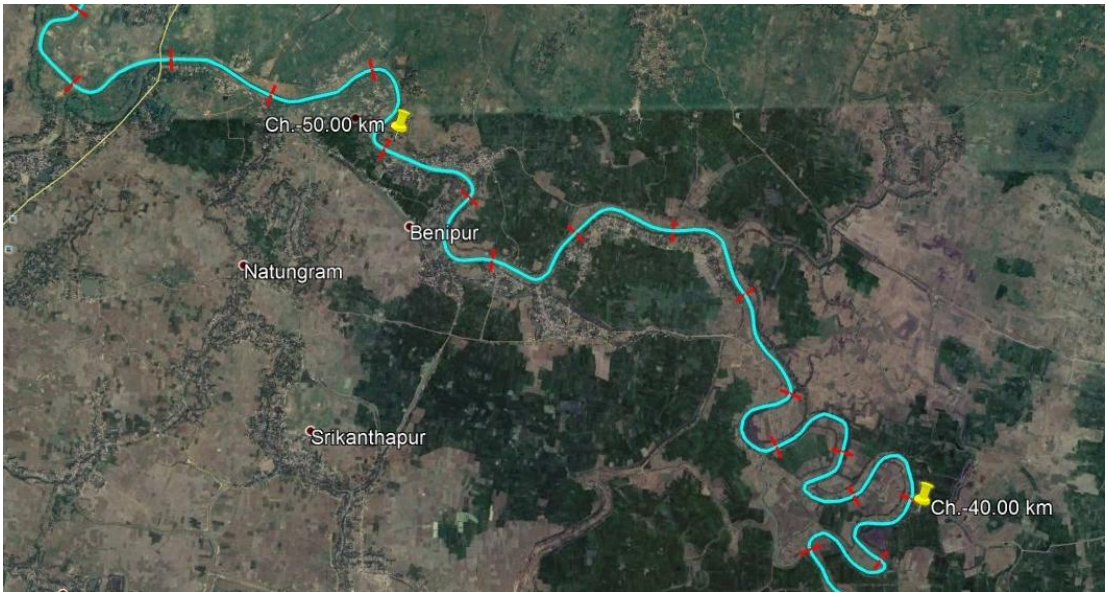


Figure 17- Chainage 40.00 km to Chainage 50.00 km

The width of Dwarka River from Chainage 40.00 Km. to Chainage 50.00 Km is approximately 31.15 m to 46.53 m. The average width portion of the river is approximately 38.84 m.

BM-5 and BM-6 are situated near the Chainage of 44.530 km and 49.926 km left bank side of the river. Uttar Hijal, Gosaidob etc. villages are situated right bank side of the river and Srikantapur, Natungram, Benipur etc. villages are located left bank side of the river.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	40.00	50.00	0.5	5.2	9100	61893.28	0.3	4.8	9160	81606.49
II	40.00	50.00	0.3	5.4	10000	147334.08	0.2	5.0	10000	182523.49
III	40.00	50.00	0.3	5.4	10000	332145.04	-0.3	5.4	10000	391991.22
IV	40.00	50.00	0.1	5.8	10000	463907.61	-0.3	5.6	10000	530357.07

- **Bathymetry Survey:-**

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

The Bathymetry survey of the Dwarka River has been carried out from the Chainage of 40.000 km to 50.00 km from Dakshin Hijal village to Indrahata village.

- **Topographic Survey:-**

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

The Topography survey of the Dwarka River has been carried out from the Chainage of 40.000 km to 50.00 km from Dakshin Hijal village to Indrahata village.

a) Prominent Dams / Barrage:-

There is no dam found in this stretches of river.

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

The Agricultural lands are found both sides of the river banks. The long embankment is found both sides of the river banks. Bent curve is noticed in this stretches of river.

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

No obstructions like Rocks, steep gradient, forest, wild life sanctuary are noticed in this zone of river.

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

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

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

There is no NH, SH found over the waterway in this stretches of river. SH-11 is found approximately 2.18 km far from the Chainage 50.00 km.

f) Railway Line and Stations in the vicinity:-

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

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

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

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

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

i) Availability of Bulk / Construction Material:-

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

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

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

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

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

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Uttar Hijal, Arazi Chhiruti, Arazi Chandpara, Gosaidob, Natungram, Gobarhati etc. places are located right bank side of the river and Sikanthapur, Benipur, Harinagar, Chatur etc.places are located left bank side of the river.

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

Uttar Hijal, Arazi Chhiruti, Arazi Chandpara, Gosaidob, Natungram, Gobarhati etc. places are located right bank side of the river and Sikanthapur, Benipur, Harinagar, Chatur etc.places are located left bank side of the river.

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

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

p) Available and probable Water Sport Recreational Facilities:-

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

q) Fishing activities:-

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

r) Sand mining:-

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

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and Outlets:-

The only irrigation canal and outlet is located near the Chainage of 45.7 km in the right bank side of the river.

u) 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.

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

The water is essential for cultivation which is the main occupation for the villagers of this region. The water is also used in the industrial hubs. Ferry services are also navigable in this region of river. The water is used as irrigation purposes. With the help of the irrigation system, the cultivation can easily accessible.

3.6- From Chainage 50.00 Km to Chainage 60.00 Km (Indrahata village to Ratanpur Arazi village):-

Figure 18- Chainage 50.00 km to Chainage 60.00 km

The width of Dwarka River from Chainage 50.00 Km. to Chainage 60.00 Km is approximately 46.53 m to 31.27 m. The average width portion of the river is approximately 38.9 m.

Ronogram iron Bridge is situated near Chainage of 53.200 km. The position of the Bridge is (Lat: - 24° 1'0.57"N, Long: - 88° 5'35.75"E). The Bridge is communicated between Gokorno to Kandi. Two High tension lines are located near Chainage of 52.275 km and 54.300 km and six electric lines are also located in this stretches of river near Chainage of 52.834 km, 52.908 km, 53.106 km, 53.333 km, 54.102 km, 54.468 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	50.00	60.00	0.5	4.5	9250	86317.24	0.3	4.3	10000	119222.88
II	50.00	60.00	0.3	4.52	10000	183842.44	0.1	4.32	10000	242947.26
III	50.00	60.00	0.3	4.52	10000	397390.26	-0.3	4.36	10000	491298.59
IV	50.00	60.00	0.1	4.56	10000	557119.15	-0.3	4.36	10000	662012.9

Figure 19- Ronogram Iron Bridge (Chainage-53.200 km)

- **Bathymetry Survey:-**

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

The Bathymetry survey of the Dwarka River has been carried out from the Chainage of 50.000 km to 60.00 km from Indrahata village to Ratanpur Arazi village.

- **Topographic Survey:-**

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

The Topography survey of the Dwarka River has been carried out from the Chainage of 50.000 km to 60.00 km from Indrahata village to Ratanpur Arazi village.

a) Prominent Dams / Barrage:-

There is no dam found in this stretches of river.

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

The Agricultural lands are found both sides of the river banks. The long embankment is found both sides of the river banks. Bent curve is noticed in this stretches of river. Ronogram iron Bridge is located in this stretches of river near the Chainage of 53.200 km which is known as SH-11. Both sides agricultural land are found in this stretches of river.

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

No obstructions like Rocks, steep gradient, forest, wild life sanctuary are noticed in this zone of river.

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

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

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

SH-11 is located in this stretches of river which is crossed over the waterway near 53.200 km at Ranogram village.

f) Railway Line and Stations in the vicinity:-

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

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

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

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

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

i) Availability of Bulk / Construction Material:-

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

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

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

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

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

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Majharer dhar, Kutirpar, Ranagram, Bilamalbandha, Arazi Gokarna, etc. places are located right bank side of the river and Indrahata, Chator, Baje Gopalnagar, Chekhali, Chandrapradpur, Dakhin Lakhinarayanpur, Borai, sujapur etc.places are located left bank side of the river.

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

Majharer dhar, Kutirpar, Ranagram, Bilamalbandha, Arazi Gokarna, etc. places are located right bank side of the river and Indrahata, Chator, Baje Gopalnagar, Chekhali, Chandrapradpur, Dakhin Lakhinarayanpur, Borai, sujapur etc.places are located left bank side of the river.

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

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

p) Available and probable Water Sport Recreational Facilities:-

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

q) Fishing activities:-

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

r) Sand mining:-

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

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and Outlets:-

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

u) 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.

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

The water is essential for cultivation which is the main occupation for the villagers of this region. The water is mainly used in the agricultural purposes.

3.7- From Chainage 60.00 Km to Chainage 70.00 Km (Ratanpur Arazi village to Churigram village):-

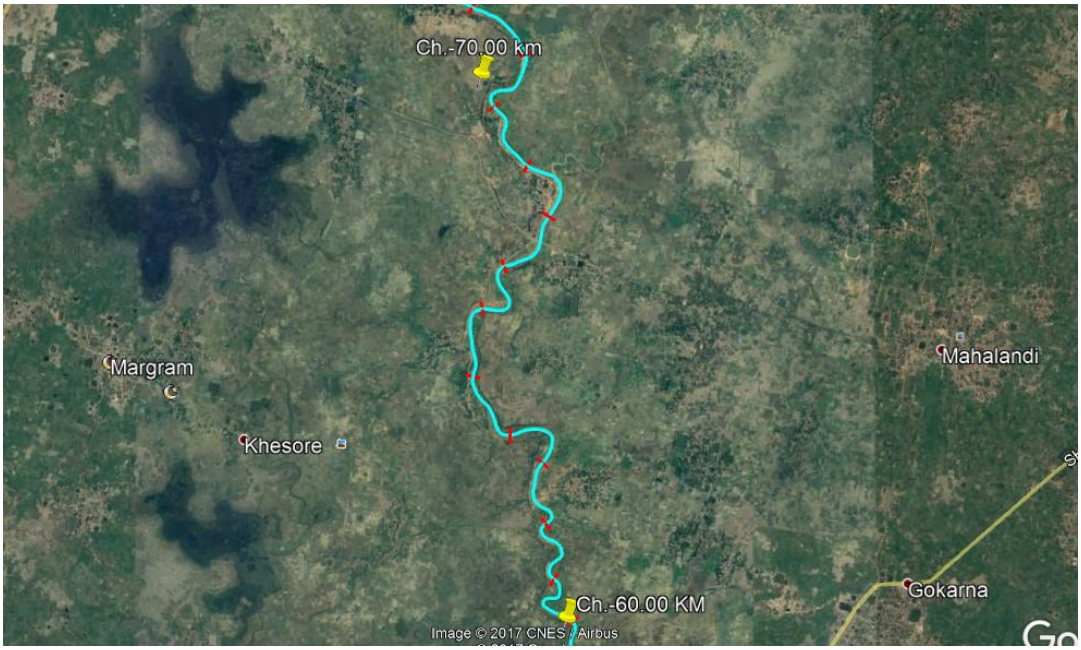


Figure 20- Chainage 60.00 km to Chainage 70.00 km

The width of Dwarka River from Chainage 60.00 Km. to Chainage 70.00 Km is approximately 31.27 m to 45.62 m. The average width portion of the river is approximately 38.445 m.

BM-7 and BM-8 are situated near Chainage of 62.389 km and 67.541 km. Surkhali RCC Bridge is situated near Chainage of 67.500 km in this stretches of river. The position of the Bridge is (Lat. - 24° 5'15.41"N, Long.- 88° 4'11.60"E). The Bridge is communicated through Gentla Ghat which linked with NH-7. Gokorna, Kumarsanda, Solepara, Gantla, Dangapara, Mahalandi, Bahadurpur, Hosenabad, Khordda Narayanpur etc. villages are situated right bank side of the river and Naldipi, Bibinagar, Khesore, Gurulia, Nowda, Sundarpur, Surkhali etc. villages are situated left bank side of the river. Six electric lines are located in this stretches of river near Chainage of 62.424 km, 62.522 km, 64.950 km, 65.170 km, 67.563 km and 69.224 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	60.00	70.00	0.1	2.9	10000	224035.12	-0.3	2.7	10000	307286.85
II	60.00	70.00	0.1	2.93	10000	383621.57	-0.3	2.73	10000	502109.5
III	60.00	70.00	0.1	2.93	10000	653117.95	-0.3	2.79	10000	808484.1
IV	60.00	70.00	0.1	3.2	10000	836575.6	-0.3	3.0	10000	1002144.2

Figure 21- Surkhali RCC Bridge (Chainage- 67.500 km)

- **Bathymetry Survey:-**

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

The Bathymetry survey of the Dwarka River has been carried out from the Chainage of 60.000 km to Chainage 64.822 km from Ratanpur Arazi village to Nowda village.

- **Topographic Survey:-**

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

The Topography survey of the Dwarka River has been carried out from the Chainage of 60.000 km to Chainage 70.00 km from Ratanpur Arazi village to Nowda village.

a) Prominent Dams / Barrage:-

There is no dam found in this stretches of river.

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

The Agricultural lands are found both sides bank of the river. The long embankment is found both sides of the river bank. Bent curve is noticed in this stretches of river. Surkhali RCC Bridge is located in this stretches of river near the Chainage of 67.500 km. Boulder pitching is found near the bridge sites from Chainage 67.129 km to 67.177 km.

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

No obstructions like Rocks, steep gradient, forest, wild life sanctuary are noticed in this zone of river.

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

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

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

There is no NH/SH found over the waterway in this stretches of river. But SH-11 is located approximately 6.56 km far from the Chainage 60.00 km.

f) Railway Line and Stations in the vicinity:-

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

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

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

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

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

i) Availability of Bulk / Construction Material:-

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

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

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

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

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

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Bijaynagar, Madarhati, Nowapara, Rameswarpur, Kumarsanda, Belun, Solepara, Gantla, Bahadarpur, Bhatkhanda etc. places are located right bank side of the river and Ratanpur Arazi, Dakhin Gangarampur, Ratanpur, Bibinagar, Khesore, Nowda, Sundarpur, Margram Arazi, Surkhali, Sankarpur, Churigram, Jahangirpur etc. places are located left bank side of the river.

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

Majharer dhar, Kutirpar, Ranagram, Bilamalbandha, Arazi Gokarna, etc. places are located right bank side of the river and Indrahata, Chator, Baje Gopalnagar, Chekhali, Chandrapradpur, Dakhin Lakhinarayanpur, Borai, sujapur etc.places are located left bank side of the river.

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

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

p) Available and probable Water Sport Recreational Facilities:-

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

q) Fishing activities:-

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

r) Sand mining:-

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

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and Outlets:-

There are three nos of irrigation canal and outlets found in this stretches of river near the Chainage 63.96 km 68.419 km in the right bank side of the river and the Chainage 66.716 km in the left bank side of the river.

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

There is no Nala found in this zone of river.

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

The water is essential for cultivation which is the main occupation for the villagers of this region. Through the irrigation canal, the water is easily accessible in the paddy fields, vegetables fields etc.

3.8- From Chainage 70.00 Km to Chainage 80.00 Km (Churigram village to Khansama Danga village):-

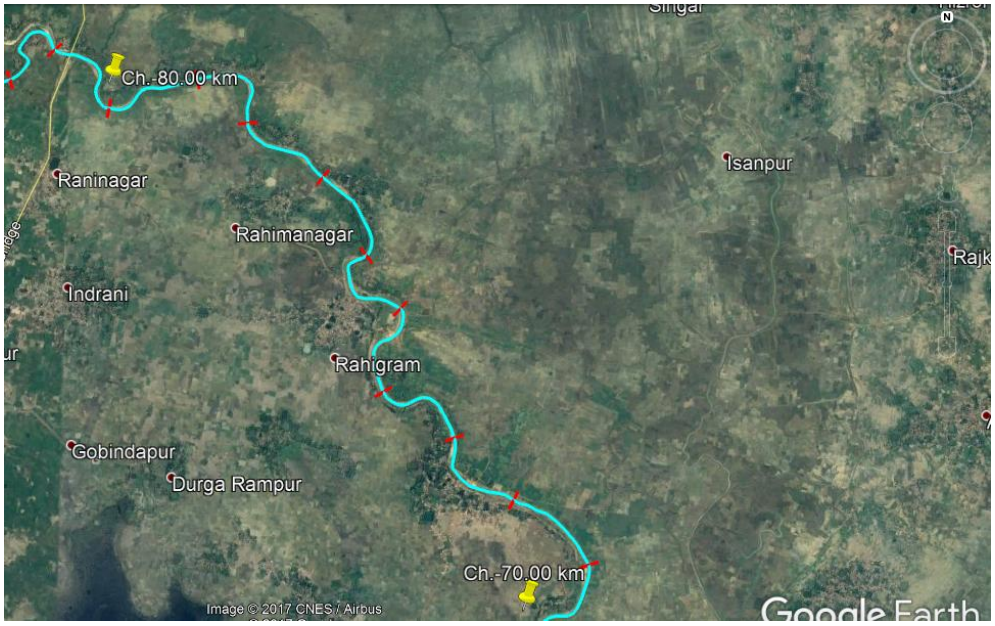


Figure 22- Chainage 70.00 km to Chainage 80.00 km

The width of Dwarka River from Chainage70.00 Km. to Chainage 80.00 Km is approximately 45.62 m to 53.24 m. The average width portion of the river is approximately 49.43 m.

Three electric lines are located near Chainage of 69.224 km, 70.488 km and 71.802 km in this stretches of river. Pirtala Ghat, Mirpara Ghat , Rahigram Ghat are located near Chainage of 72.00 km, 72.115 km and 75.283 km respectively. Uttar Gangarampur, Jurankandi, Radhanagar, Radhanagar, Jhulanpur etc. villages are located right bank side of the river and raghunathpur, Sadal, Amjua, Rahigram, Rahimnagar, Sarmastapur, Raninagar, Ramchandrapur etc. villages are located left bank side of the river.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	70.00	80.00	0.1	0.6	10000	389183.44	-0.3	0	10000	511491.58
II	70.00	80.00	0.07	0.8	10000	602813.3	-0.3	0	10000	760232
III	70.00	80.00	0.07	0.8	10000	924787.4	-0.3	0.2	10000	1120287.3
IV	70.00	80.00	0.01	1.2	10000	1123810.3	-0.3	0.2	10000	1328108

- **Bathymetry Survey:-**

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

The Bathymetry survey was not possible in this stretches of river due to insufficient of water. The layer of water was very low for carrying out the Bathymetry survey.

- **Topographic Survey:-**

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

The Topography survey of the Dwarka River has been carried out from the Chainage of 70.000 km to Chainage 80.00 km from Churigram village to Khansama Danga village.

a) Prominent Dams / Barrage:-

There is no dam found in this stretches of river.

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

The long embankment is found both sides bank of the river. The Bent curve is noticed in this river stretches.

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

There is no obstruction like rock, waterfall, wildlife sanctuary found in this stretches of river.

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

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

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

There is no NH/SH found over the waterway in this stretches of river. But SH-7 is located approximately 0.60 km far from the Chainage 80.00 km.

f) Railway Line and Stations in the vicinity:-

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

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

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

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

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

i) Availability of Bulk / Construction Material:-

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

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

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

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

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

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Hosenabad, Uttar Gangarampur, Jurankandi, Radhanagar, Jhulanpur etc. places are located right bank side of the river and Sadal, Raghunathpur, Amjua, Rahigram, Rahimanagar, Sarmastapur, Raninagar etc. places are located left bank side of the river.

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

Hosenabad, Uttar Gangarampur, Jurankandi, Radhanagar, Jhulanpur etc. places are located right bank side of the river and Sadal, Raghunathpur, Amjua, Rahigram, Rahimanagar, Sarmastapur, Raninagar etc. places are located left bank side of the river.

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

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

p) Available and probable Water Sport Recreational Facilities:-

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

q) Fishing activities:-

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

r) Sand mining:-

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

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and Outlets:-

The only irrigation canal and outlet is found near the Chainage 77.453 km in the left bank side of the river.

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

There is no Nala found in this stretches of river.

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

The water is essential for cultivation which is the main occupation for the villagers of this region. Through the irrigation canal, the water is easily accessible in the paddy fields, vegetables fields etc.

3.9- From Chainage 80.00 Km to Chainage 90.00 Km (Khansama Danga village to Siata village):-

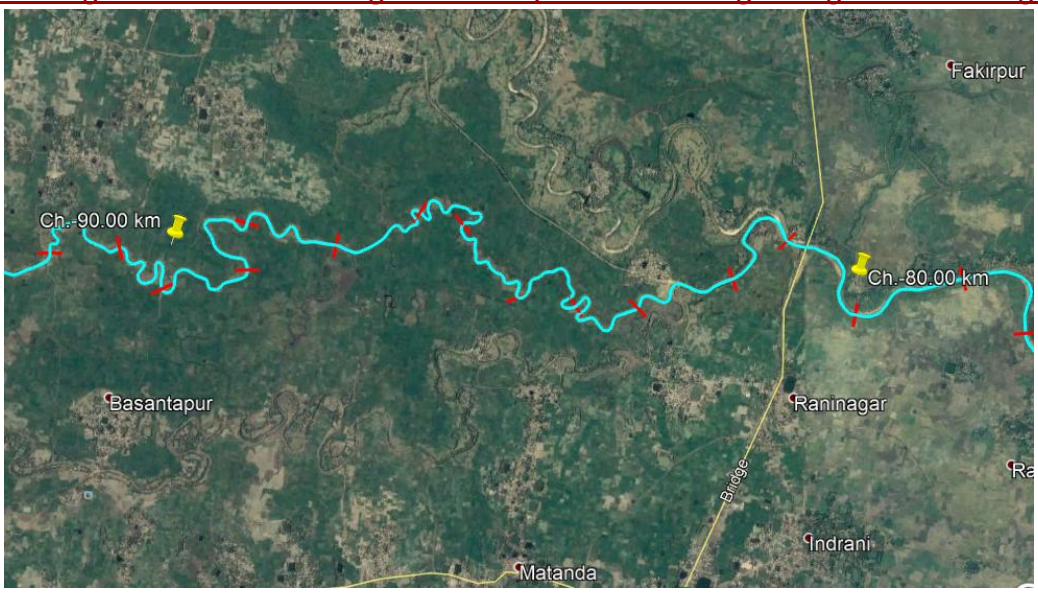


Figure 23- Chainage 80.00 km to Chainage 90.00 km

The width of Dwarka River from Chainage 80.00 Km. to Chainage 90.00 Km is approximately 53.24 m to 54.24m. The average width portion of the river is approximately 53.74m.

BM-9 is situated near Chainage of 80.524 km left bank side of the river. Shankor Ghat RCC Bridge is situated near Chainage of 80.500 km in this stretches of river. The Position of the RCC Bridge is (Lat. - 24° 9'23.37"N, Long. - 88° 1'1.68"E). The Bridge is communicated through kuli and Berhampore. Four electric lines are located in this stretches of river near Chainage of 80.524 km, 82.173 km, 82.333 km and 87.595 km. Agricultutal land are found left bank side of the river. Hazipur, Rasulpur, Kelai, Sanigram etc. villages are located right bank side of the river and Ramchandrapur, Bazitpur, Diara etc. villages are located left bank side of the river.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	80.00	90.00	0.1	0.7	10000	341114.25	-0.3	0.0	10000	443214.5
II	80.00	90.00	0.07	0.8	10000	521859.3	-0.3	0.0	10000	653114.2
III	80.00	90.00	0.07	0.8	10000	791519.5	-0.3	0.2	10000	953967.4
IV	80.00	90.00	0.01	1.2	10000	957271.3	-0.3	0.2	10000	1126875.2

- **Bathymetry Survey:-**

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

The Bathymetry survey was not possible in this stretches of river due to insufficient of water. The layer of water was very low for carrying out the Bathymetry survey.

- **Topographic Survey:-**

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

The Topography survey of the Dwarka River has been carried out from the Chainage of 80.000 km to Chainage 90.00 km from Khansama Danga village to Siata village.

a) Prominent Dams / Barrage:-

There is no dam, barrage found in this stretches of river

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

The agricultural land is found both sides of the river bank. Bent curve is noticed in this river channel. Sankar ghat RCC bridge is located in this stretches of river near the Chainage of 80.500 km. Bent curve is noticed in this stretches of river. The Bridge area is well protected by concrete pitching. Besides, long embankment is found both sides bank of the river.

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

There is no obstruction like rock, waterfall, wildlife sanctuary found in this stretches of river.

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

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

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

SH-7 is located in this stretches of river.

f) Railway Line and Stations in the vicinity:-

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

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

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

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

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

i) Availability of Bulk / Construction Material:-

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

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

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

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

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

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Hazipur, Kelai, Sanigram, Kamarpur etc. places are located right bank side of the river and Sadal, Raghunathpur, Amjua, Rahigram, Rahimanagar, Sarmastapur, Raninagar etc. places are located left bank side of the river.

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

Hazipur, Kelai, Sanigram, Kamarpur etc. places are located right bank side of the river and Sadal, Raghunathpur, Amjua, Rahigram, Rahimanagar, Sarmastapur, Raninagar etc. places are located left bank side of the river.

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

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

p) Available and probable Water Sport Recreational Facilities:-

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

q) Fishing activities:-

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

r) Sand mining:-

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

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and Outlets:-

Two irrigational canals are located in this stretches of river near the Chainage 80.890 km in the right bank side of the river and the Chainage 82.280 km in the left bank side of the river.

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

There is no Nala found in this stretches of river.

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

The water is essential for cultivation which is the main occupation for the villagers of this region. Through the irrigation canal, the water is easily accessible in the paddy fields, vegetables fields etc.

3.10- From Chainage 90.00 Km to Chainage 100.00 Km (Siata village to Sarbamangalapur village):-

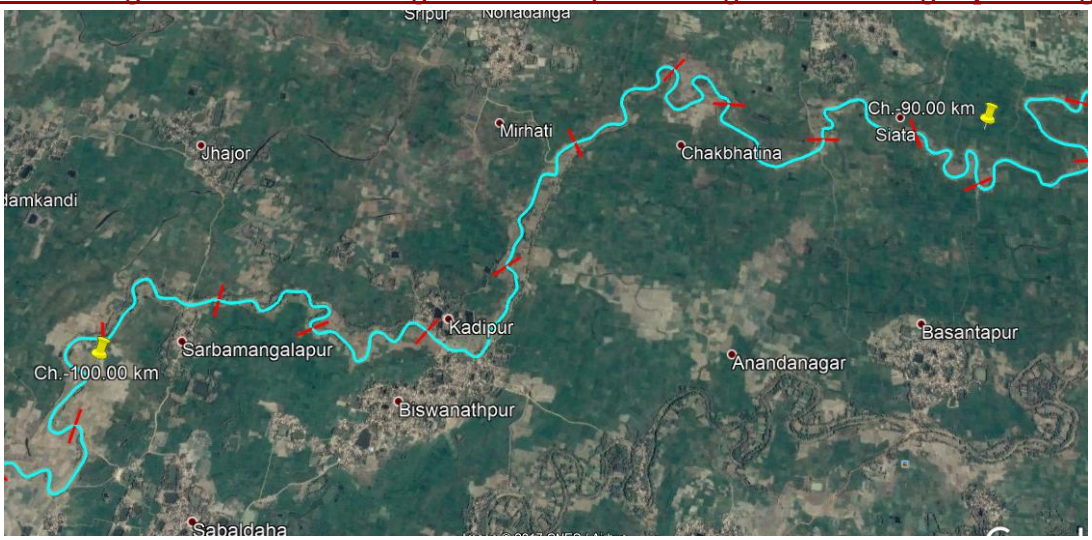


Figure 24-Chainage 90.00 km to Chainage 100.00 km

The width of Dwarka River from Chainage 90.00 Km. to Chainage 100.00 Km is approximately 54.24 m to 73.60 m. The average width portion of the river is approximately 63.92m.

BM-10 is situated near Chainage of 92.161 km in this stretches of river. Eight electric lines are located in this stretches of river near Chainage of 95.265 km, 95.705 km, 95.937 km, 96.433 km, 96.736 km, 97.756 km, 99.116 km and 99.290 km. Siata, Mirhati, Sripur, Nonadanga, Kadipur, Jhajor, Jhajhra etc. villages are located right bank side of the river and Basantapur, Ananvdanagar, Chakbhatina, Sarbamangalapur etc. villages are located left bank side of the river.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	90.00	100.00	0.1	0.6	10000	355367.5	-0.3	0.00	10000	459874.3
II	90.00	100.00	0.1	0.7	10000	542049.6	-0.3	0.00	10000	676121.2
III	90.00	100.00	0.1	0.7	10000	818659.3	-0.3	0.2	10000	984442.3
IV	90.00	100.00	0.1	1.1	10000	988025.4	-0.3	0.2	10000	11610612

- **Bathymetry Survey:-**

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

The Bathymetry survey was not possible in this stretches of river due to insufficient of water. The layer of water was very low for carrying out the Bathymetry survey.

- **Topographic Survey:-**

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

The Topography survey of the Dwarka River has been carried out from the Chainage of 90.000 km to Chainage 100.00 km from Siata village to Sarbamangalapur village.

a) Prominent Dams / Barrage:-

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

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

The long embankment is found both sides bank of the river. The Agricultural land is found both sides bank of the river.

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

There is no obstruction like rock, waterfall, wildlife sanctuary found in this stretches of river.

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

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

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

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

f) Railway Line and Stations in the vicinity:-

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

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

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

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

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

i) Availability of Bulk / Construction Material:-

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

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

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

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

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

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Siata, Mirhati, Sriour, Nonadanga, Kadipur, Jhajor, Jhajhra etc. places are located right bank side of the river and Basantapur, Anandanagar, Chakbhatina, Biswanathpur, Mangaldanga, Sarbamangalapur etc. places are located left bank side of the river.

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

Siata, Mirhati, Sriour, Nonadanga, Kadipur, Jhajor, Jhajhra etc. places are located right bank side of the river and Basantapur, Anandanagar, Chakbhatina, Biswanathpur, Mangaldanga, Sarbamangalapur etc. places are located left bank side of the river.

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

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

p) Available and probable Water Sport Recreational Facilities:-

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

q) Fishing activities:-

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

r) Sand mining:-

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

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and Outlets:-

Two irrigational canal and outlets are located in this stretches of river near the Chainage 95.119 km in the right bank side of the river and the Chainage 90.102 km in the left bank side of the river.

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

There is no Nala found in this stretches of river.

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

The water is essential for cultivation which is the main occupation for the villagers of this region. Through the irrigation canal, the water is easily accessible in the paddy fields, vegetables fields etc.

3.11- From Chainage 100.00 Km to Chainage 110.00 Km (Sarbamangalapur village to Margram village):-

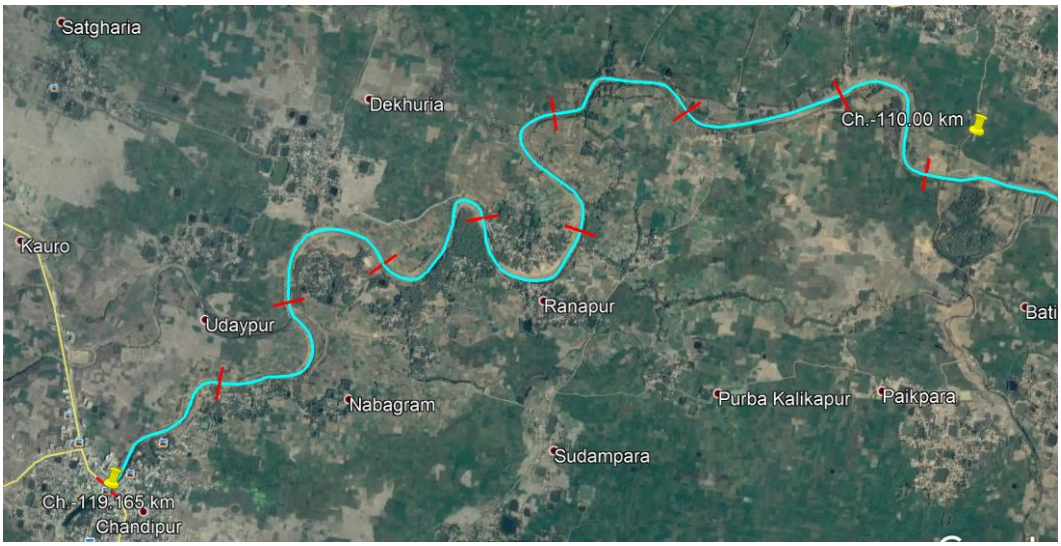


Figure 25-Chainage 100 km to Chainage 110.00 km

The width of Dwarka River from Chainage100.00 Km. to Chainage 110.00 Km is approximately 73.60 m to 33.84m. The average width portion of the river is approximately 53.72.m.

Bishnupur RCC Bridge and Lalita kundu RCC Bridge are situated near Chainage of 102.500 km and 105.00 km respectively in this stretches of river. The position of the RCC Bridges are (Lat: - 24° 7'48.27"N, Long: - 87°54'9.34"E), (Lat: - 24° 7'30.19"N, Long: - 87°53'8.85"E) respectively. Bishnupur RCC Bridge is communicated with Bishnupur Road which is linked with NH-7. Lalita Kundu RCC Bridge is communicated through Rambhadrapur and Bishnupur Road. BM-11 is situated near Chainage of 102.703 km. Three electric lines and two high tension lines are located near Chainage of 103.851 km, 104.113 km, 105.115 km, 107.445 km and 107.706 km respectively. Kalidaha, Bishnupur, Basua etc. villages are located right bank side of the river and Sabaldaha, Purapara, Desalpur, Ganful, Lalita kundu, Diara, Dhalla, Batina, Paikpara etc. villages are located left bank side of the river.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	100.00	110.00	0.1	3.2	10000	368764.7	-0.3	0.00	10000	476899.9
II	100.00	110.00	0.1	3.3	10000	568417.7	-0.3	0.00	10000	708389
III	100.00	110.00	0.1	3.3	10000	866768.8	-0.3	0.20	10000	1041395.6
IV	100.00	110.00	0.1	3.5	10000	1049196.9	-0.3	0.20	10000	1231849

Figure 26- Bishnupur RCC Bridge (Chainage-102.500 km)

Figure 27- Lalita kundu RCC Bridge (Chainage-105.00 km)

- **Bathymetry Survey:-**

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

The Bathymetry survey has been carried out from the Chainage 102.810 km to 105.000 km from Bishnupur village to Lalita kundu village. The water level was not sufficient for the remaining stretches of the river.

- **Topographic Survey:-**

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

The Topography survey of the Dwarka River has been carried out from the Chainage of 100.000 km to Chainage 110.00 km from Sarbamangalapur village to Margram village.

a) Prominent Dams / Barrage:-

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

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

The long embankment is found both sides bank of the river. The Agricultural land is found both sides bank of the river. Bishnupur RCC Bridge and Lalita kundu RCC Bridge is located in this stretches of river near the Chainage of 102.500 km and 105.00 km. Bent curve is noticed in this river channel.

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

There is no obstruction like rock, waterfall, wildlife sanctuary found in this stretches of river.

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

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

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

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

f) Railway Line and Stations in the vicinity:-

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

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

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

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

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

i) Availability of Bulk / Construction Material:-

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

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

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

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

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

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Tetulia, Kalidaha, Bishnupur, Basoa etc. places are located right bank side of the river and Sabaldaha, Desalpur, Lalita kundu, Diara, Dhalla, Dakshin Narayanpur, Beladanga, Batina etc. places are located left bank side of the river.

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

Tetulia, Kalidaha, Bishnupur, Basoa etc. places are located right bank side of the river and Sabaldaha, Desalpur, Lalita kundu, Diara, Dhalla, Dakshin Narayanpur, Beladanga, Batina etc. places are located left bank side of the river.

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

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

p) Available and probable Water Sport Recreational Facilities:-

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

q) Fishing activities:-

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

r) Sand mining:-

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

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and Outlets:-

The only irrigational canal and outlet is located in this stretches of river near the Chainage 107 km in the left bank side of the river.

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

There is no Nala found in this stretches of river.

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

The water is essential for cultivation which is the main occupation for the villagers of this region. Through the irrigation canal, the water is easily accessible in the paddy fields, vegetables fields etc.

3.12- From Chainage 110.00 Km to Chainage 119.165 Km (Margram village to Tarapith Bridge):-

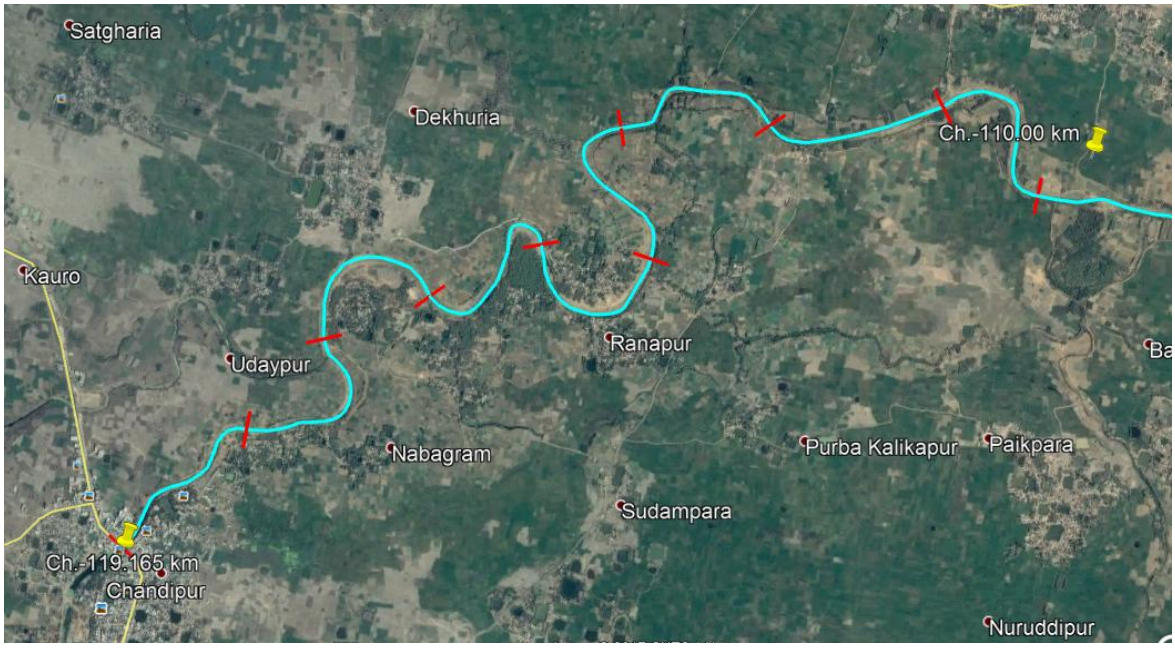


Figure 28- Chainage 110.00 km to Chainage 119.165 km

The width of Dwarka River from Chainage110.00 Km. to Chainage 119.165 Km is approximately 33.84m to 45.75 m. The average width portion of the river is approximately 40 m.

BM-12 and BM-13 are situated in this stretches of river near Chainage of 114.733 km and 118.673 km. Tarapith RCC Bridge over Check Dam is situated in this stretches of river near Chainage of 119.165 km. The position of the RCC Bridge is (Lat: - 24° 6'57.47"N, Long: - 87°47'51.69"E). The RCC Bridge is communicated through Budhigram and also linked with NH-60.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	110.00	119.165	0.1	0.5	9000	412528.9	-0.3	0.0	9000	539812.92
II	110.00	119.165	0.1	0.7	9000	637154.03	-0.3	0.0	9000	795500.73
III	110.00	119.165	0.1	0.7	9000	965556.52	-0.3	0.2	9000	1161805.79
IV	110.00	119.165	0.1	1.1	9000	1166137.08	-0.3	0.2	9000	1371089.05

Figure 29- Tarapith RCC Bridge over Check Dam (Chainage-119.165 km)

Figure 30-Downstream of check dam at Tarapith (Chainage-119.165 km)

Figure 31-Upstream of check dam at Tarapith (Chainage-119.165 km)

- **Bathymetry Survey:-**

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

The Bathymetry survey was not possible in this stretches of river due to insufficient of water. The layer of water was very low for carrying out the Bathymetry survey.

- **Topographic Survey:-**

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

The Topography survey of the Dwarka River has been carried out from the Chainage of 110.000 km to Chainage 119.165.00 km from Margram village to Tarapith Bridge area.

a) Prominent Dams / Barrage:-

Tarapith Check Dam is located in this stretches of river near the Chainage of 119.165 km.

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

The long embankment is found both sides bank of the river. The Agricultural land is found both sides bank of the river. Agricultural lands are found both sides bank of the river. Long embankment is also found both sides bank of the river.

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

There is no obstruction like rock, waterfall, wildlife sanctuary found in this stretches of river.

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

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

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

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

f) Railway Line and Stations in the vicinity:-

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

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

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

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

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

i) Availability of Bulk / Construction Material:-

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

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

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

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

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

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Tetulia, Kalidaha, Bishnupur, Basoa etc. places are located right bank side of the river and Sabaldaha, Desalpur, Lalita kundu, Diara, Dhalla, Dakshin Narayanpur, Beladanga, Batina etc. places are located left bank side of the river.

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

Margram, Kamikhya, Dekhuria, Udaypur, Satgharia etc. places are located right bank side of the river and Nabagram, Ranapur, Sudampara, Purba Kalikapur, Paikpara etc. places are located left bank side of the river.

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

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

p) Available and probable Water Sport Recreational Facilities:-

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

q) Fishing activities:-

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

r) Sand mining:-

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

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and Outlets:-

The only irrigational canal and outlet is located in this stretches of river near the Chainage 107 km in the left bank side of the river.

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

There is no Nala found in this stretches of river.

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

The water is essential for cultivation which is the main occupation for the villagers of this region. Through the irrigation canal, the water is easily accessible in the paddy fields, vegetables fields etc.

3.13 River Stretches at Link of Dwarka River (Secondary Channel) from 0.00 km to 7.261km (Saharbati village to Amlai village):-

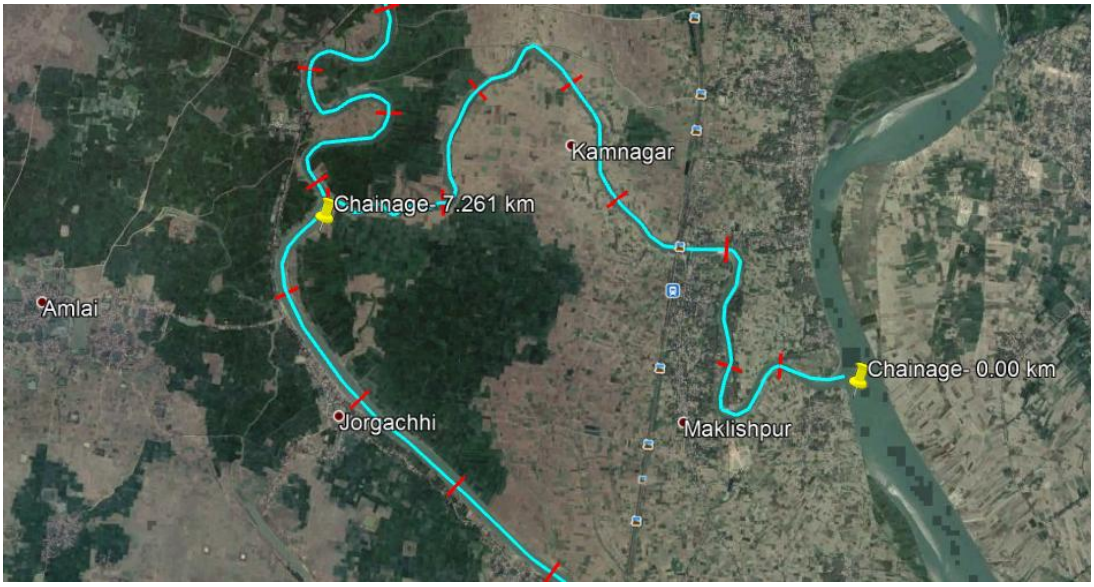


Figure 32- Chainage 0.00 km to 7.261 km

The width at link of Dwarka River (Secondary Channel) near the Chainage of 0.00 km to Chainage 7.261 km is approximately 142.47 m to 71.04 m. The average width portion of the river is 106.755m.

Ronogram RCC Bridge and Uttarasan Rail Bridge no-230 are situated near Chainage of 2.700 km and 2.800 km. The position of the RCC Bridge and Rail Bridge is (Lat: - 23°54'31.98"N, Long: - 88°11'22.12"E), (Lat: - 23°54'32.33"N, Long: - 88°11'18.59"E) respectively. Two electric lines are located in this stretches of river near Chainage of 2.732 km and 2.780 km. Saharbati, Ronogram are located right bank side of the river and Saharbatidiar, Maklishpur, Kazipara, kamnagar etc. villages are located left bank side of the river.

Class	Chainage (km)		Observed				Reduced w.r.t. Sounding Datum			
	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)
I	0.00	7.261	0.5	13.70	4860	21472.61	0.2	11.90	6100	39983.62
II	0.00	7.261	0.4	13.72	7000	44041.91	0.18	11.92	7000	82227.76
III	0.00	7.261	0.3	13.74	7000	104560.85	0.1	11.94	7000	187469.99
IV	0.00	7.261	0.2	13.76	7000	152735.62	-0.3	11.96	7000	267612.62

- **Bathymetry Survey:-**

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

The Bathymetry survey of the link of Dwarka River (Secondary channel) has been carried out from the Chainage of 0.000 km to 7.261 km from Saharbati village to Amlai village.

w) Topographic Survey:-

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

The Topography survey of the link of Dwarka River (Secondary channel) has been carried out from the Chainage of 0.000 km to 7.261 km from Saharbati village to Amlai village.

a) Prominent Dams / Barrage:-

There are no Dams found in this zone of river.

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

Both side agricultural lands, Rail Bridge, RCC Bridge are found in this stretches of river. Long embankment is found both sides bank of the river. The Bridges area is protected by concrete pitching. Bent curve is also noticed in this channel of the river. Ronogram RCC Bridge and Uttarasan Rail Bridge is located in this stretches of river near the Chainage of 2.700 km and 2.800 km respectively.

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

No obstructions like Rocks, steep gradient, forest, wild life sanctuary are noticed in this zone of river.

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

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

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

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

f) Railway Line and Stations in the vicinity:-

Uttarasan Rail Bridge is located in this stretches of river near the Chainage of 2.800 km. Kazipara Railway station is located near the bank side of the river (0.30 km).

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

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

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

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

i) Availability of Bulk / Construction Material:-

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

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

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

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

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

l) Existing Cargo Movement:-

There is no cargo available in this stretches of river.

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

Saharbati, Nagar etc. villages are located right bank side of the river and Saharbatidiar, Maklishpur, Kazipara, Kamnagar etc. villages are located left bank side of the river.

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

Saharbati, Nagar etc. villages are located right bank side of the river and Saharbatidiar, Maklishpur, Kazipara, Kamnagar etc. villages are located left bank side of the river.

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

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

p) Available and probable Water Sport Recreational Facilities:-

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

q) Fishing activities:-

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

r) Sand mining:-

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

s) Tributaries:-

There is no tributary found in this stretches of river.

t) Details of Irrigation Canals and Outlets:-

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

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

There are no Nalas found in this zone of river.

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

In Recent time's man avoid drinking the water of the river but the water is essential for cultivation which is the main occupation for the villagers of this region. The water is also used in the industrial hubs. Ferry services are also navigable in this region of river. The water is used as irrigation purposes. With the help of the irrigation system, the cultivation can easily accessible.

Section 4: Terminals

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

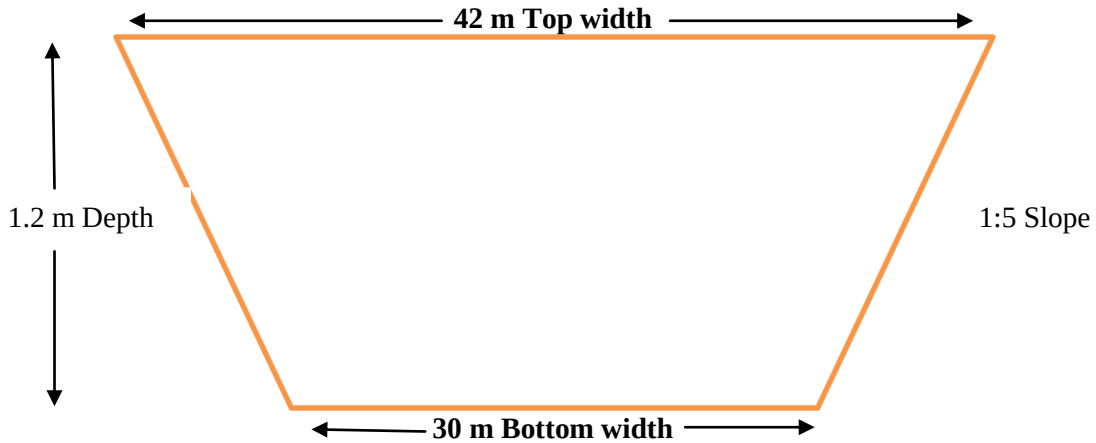
4.1 Details of Land use, owner etc.:-

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

Section 5: Fairway development in Primary Channel:-

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

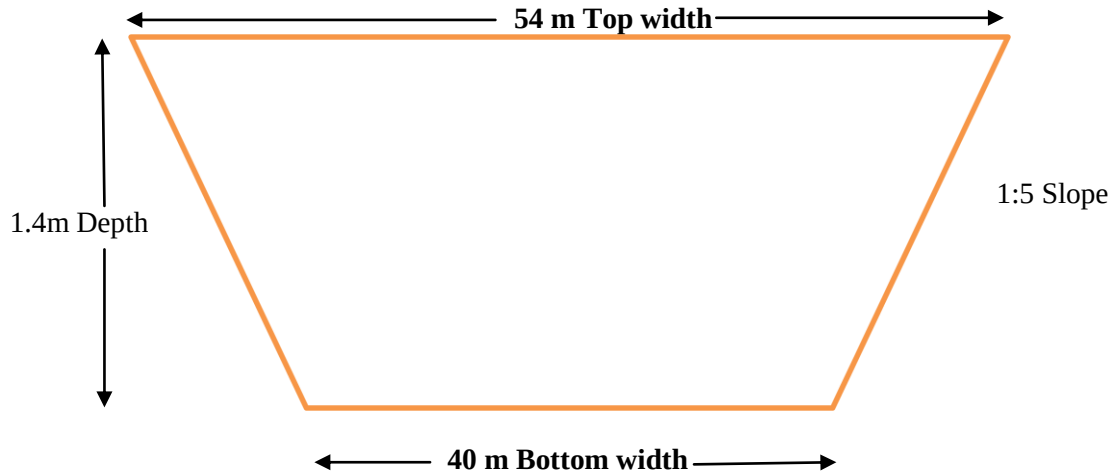
Class-I:-



Class-I													
Location		Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	From	To	Min. depth (m)	Maxd epth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)`	Min. Depth (m)	Max Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)`
Mangram	Chak Gupura	0	10	1.4	10.7	0	0.00	0.00	0.2	9.5	4140	10940.920	10940.920
Chak Gupura	Kataikona	10	20	0.5	6.8	550	785.63	785.63	0.3	5.3	6780	12434.050	23374.970
Gobindapur	Gobindapur	20	30	0.6	8.7	200	80.38	866.01	-0.3	7.2	4800	26101.330	49476.300
Dakshin Hijal	Dakshin Hijal	30	40	0.5	9.2	3250	12793.46	13659.47	0.2	8.3	5450	20780.000	70256.300
Indrahata	Indrahata	40	50	0.5	5.2	9100	61893.28	75552.75	0.3	4.8	9160	81606.490	151862.790
Ratanpur Arazi	Ratanpur Arazi	50	60	0.5	4.5	9250	86317.24	161869.99	0.3	4.3	10000	119222.880	271085.670
Churigram	Churigram	60	70	0.1	2.9	10000	224035.12	385905.11	-0.3	2.7	10000	307286.850	578372.520
Khansama Danga	Khansama Danga	70	80	0.1	0.6	10000	389183.44	775088.55	-0.3	0	10000	511491.580	1089864.100
Siata	Siata	80	90	0.1	0.7	10000	341114.25	1116202.80	-0.3	0	10000	443214.500	1533078.600
Sarbamangalapur	Sarbamangalapur	90	100	0.1	0.6	10000	355367.50	1471570.30	-0.3	0	10000	459874.300	1992952.900
Margram	Margram	100	110	0.1	3.2	10000	368764.70	1840335.00	-0.3	0	10000	476899.900	2469852.800
Tarapith	Tarapith	110	119.165	0.1	0.5	9000	412528.90	2252863.90	-0.3	0	9000	539812.920	3009665.720
Total						81350	2252863.90		Total		99330	3009665.720	

Table 19- Dredging quantity in class-I (Primary Channel)

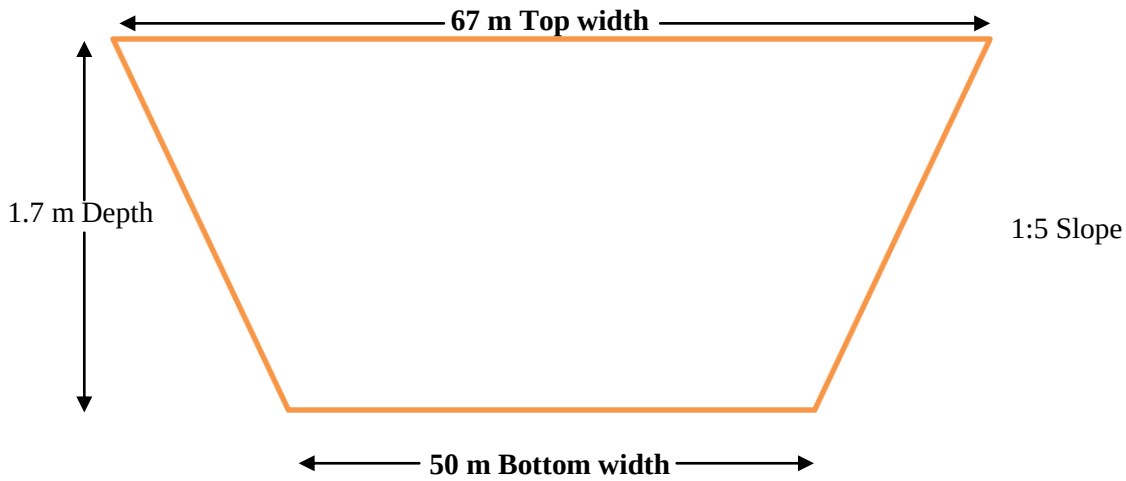
Class-II:-



Class-II													
Location		Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	From	To	Min depth (m)	Max depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)`	Min. Depth (m)	Max Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)`
Mangram	Chak Gupura	0	10	1.3	10.8	55.0	0.15	0.15	0.18	9.6	5700	30107.84	30107.84
Chak Gupura	Kataikona	10	20	0.3	6.9	2820	3070.96	3071.11	0.1	5.4	8450	37402.92	67510.76
Gobindapur	Gobindapur	20	30	0.5	8.73	2150	2293.45	5364.56	-0.32	7.23	8350	64503.71	132014.47
Dakshin Hijal	Dakshin Hijal	30	40	0.3	9.23	6900	31128.65	36493.21	0.17	8.33	8050	50762.58	182777.05
Indrahata	Indrahata	40	50	0.3	5.4	10000	147334.08	183827.29	0.2	5.0	10000	182523.49	365300.54
Ratanpur Arazi	Ratanpur Arazi	50	60	0.3	4.52	10000	183842.44	367669.73	0.1	4.32	10000	242947.26	608247.8
Churigram	Churigram	60	70	0.1	2.93	10000	383621.57	751291.30	-0.3	2.73	10000	502109.5	1110357.3
Khansama Danga	Khansama Danga	70	80	0.07	0.8	10000	602813.30	1354104.60	-0.3	0	10000	760232	1870589.3
Siata	Siata	80	90	0.07	0.8	10000	521859.30	1875963.90	-0.3	0	10000	653114.2	2523703.5
Sarbamangalapur	Sarbamangalapur	90	100	0.1	0.7	10000	542049.60	2418013.50	-0.3	0	10000	676121.2	3199824.7
Margram	Margram	100	110	0.1	3.3	10000	568417.70	2986431.20	-0.3	0	10000	708389	3908213.7
Tarapith	Tarapith	110	119.165	0.1	0.7	9000	637154.03	3623585.23	-0.3	0	9000	795500.73	4703714.4
Total						90925	3623585.23		Total		109550	4703714.4	

Table 20- Dredging quantity in class-II (Primary Channel)

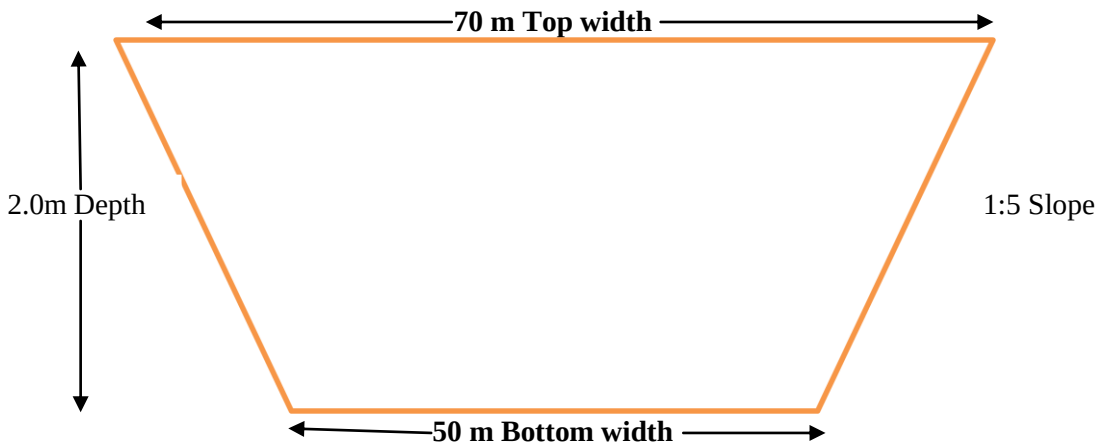
Class-III:-



Class-III													
Location		Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	From	To	Min depth (m)	Max depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)`	Min. Depth (m)	Max Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)`
Mangram	Chak Gupura	0	10	1.3	10.8	55	3640.56	3640.56	0.1	9.8	5700	98084.13	98084.13
Chak Gupura	Katakona	10	20	0.3	6.9	2820	18165.22	21805.78	0.1	5.6	8450	129614.24	227698.37
Gobindapur	Gobindapur	20	30	0.5	8.73	2150	20779.02	42584.8	-0.3	7.29	8350	158616.14	386314.51
Dakshin Hijal	Dakshin Hijal	30	40	0.3	9.23	6900	83772.85	126357.65	-0.3	8.39	8020	125975.18	512289.69
Indrahata	Indrahata	40	50	0.3	5.4	10000	332145.04	458502.69	-0.3	5.4	10000	391991.22	904280.91
Ratanpur Arazi	Ratanpur Arazi	50	60	0.3	4.52	10000	397390.26	855892.95	-0.3	4.36	10000	491298.59	1395579.5
Churigram	Churigram	60	70	0.1	2.93	10000	653117.95	1509010.9	-0.3	2.79	10000	808484.1	2204063.6
Khansama Danga	Khansama Danga	70	80	0.07	0.8	10000	924787.4	2433798.3	-0.3	0.2	10000	1120287.3	3324350.9
Siata	Siata	80	90	0.07	0.8	10000	791519.5	3225317.8	-0.3	0.2	10000	953967.4	4278318.3
Sarbamangalapur	Sarbamangalapur	90	100	0.1	0.7	10000	818659.3	4043977.1	-0.3	0.2	10000	984442.3	5262760.6
Margram	Margram	100	110	0.1	3.3	10000	866768.8	4910745.9	-0.3	2.9	10000	1041395.6	6304156.2
Tarapith	Tarapith	110	119.165	0.1	0.7	9000	965556.52	5876302.42	-0.3	0.2	9000	1161805.79	7465961.99
Total						90925	5876302.42				109520	7465961.99	

Table 21- Dredging quantity in class-III (Primary Channel)

Class-IV:-



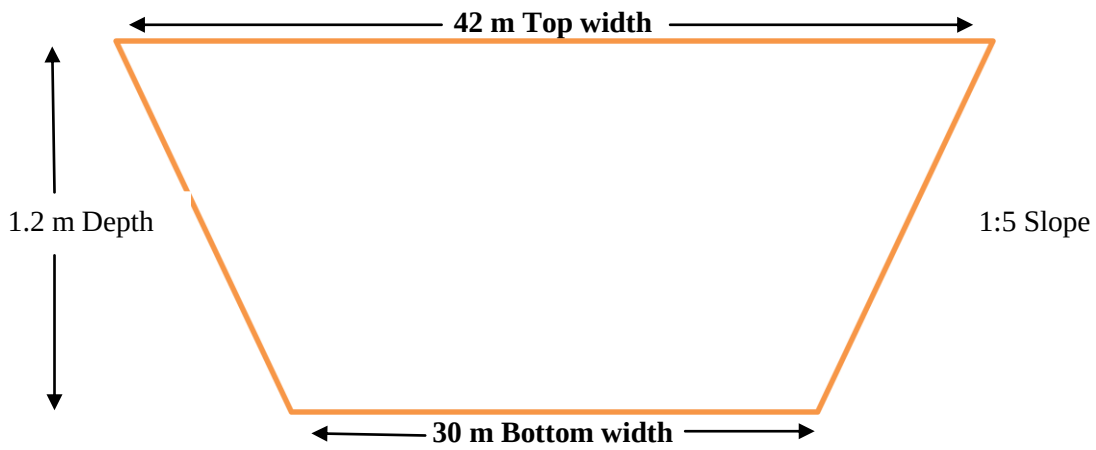
Class-IV													
Location			Chainage (km)	Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	From	To	Min. depth (m)	Max depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)`	Min Depth (m)	Max Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)`
Mangram	Chak Gupura	0	10	1.0	11.0	5710	9642.94	9642.94	0.1	9.8	9000	168421.63	168421.63
Chak Gupura	Kataikona	10	20	0.1	7.1	10000	36201.45	45844.39	0.1	5.6	10000	220438.31	388859.94
Gobindapur	Gobindapur	20	30	0.3	8.79	9100	54246.01	100090.4	-0.3	7.29	10000	252106.42	640966.36
Dakshin Hijal	Dakshin Hijal	30	40	0.1	9.29	10000	127305.14	227395.54	-0.3	8.41	10000	181158.17	822124.53
Indrahata	Indrahata	40	50	0.1	5.8	10000	463907.61	691303.15	-0.3	5.6	10000	530357.07	1352481.6
Ratanpur Arazi	Ratanpur Arazi	50	60	0.1	4.56	10000	557119.15	1248422.3	-0.3	4.36	10000	662012.9	2014494.5
Churigram	Churigram	60	70	0.1	3.2	10000	836575.6	2084997.9	-0.3	3.0	10000	1002144.2	3016638.7
Khansama Danga	Khansama Danga	70	80	0.01	1.2	10000	1123810.3	3208808.2	-0.3	0.2	10000	1328108	4344746.7
Siata	Siata	80	90	0.01	1.2	10000	957271.3	4166079.5	-0.3	0.2	10000	1126875.2	5471621.9
Sarbamangalapur	Sarbamangalapur	90	100	0.1	1.1	10000	988025.4	5154104.9	-0.3	0.2	10000	1161062	6632683.9
Margram	Margram	100	110	0.1	3.5	10000	1049196.9	6203301.8	-0.3	0.2	10000	1231849	7864532.9
Tarapith	Tarapith	110	119.165	0.1	1.1	9000	1166137.08	7369438.88	-0.3	0.2	9000	1371089.05	9235621.95
Total						113810	7369438.88		Total		118000	9235621.95	

Table 22- Dredging quantity in class- IV (Primary Channel)

5.1- Fairway Development in Link of Dwarka River- (Secondary Channel)

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

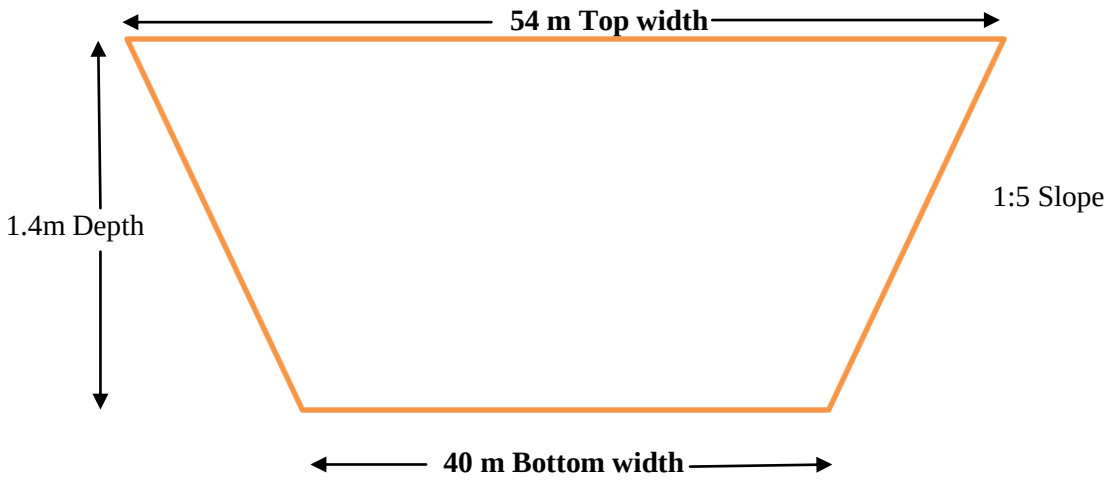
Class-I:-



Location		Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)`	Min Depth (m)	Max Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)`
Saharbati	Amlai	0	7.261	0.5	13.7	4860	21472.61	21472.61	0.2	11.9	6100	39983.62	39983.62
Total						4860	21472.61		Total		6100	39983.62	

Table 23-Dredging Summery at link of Dwarka River (Secondary Channel) (Class-I)

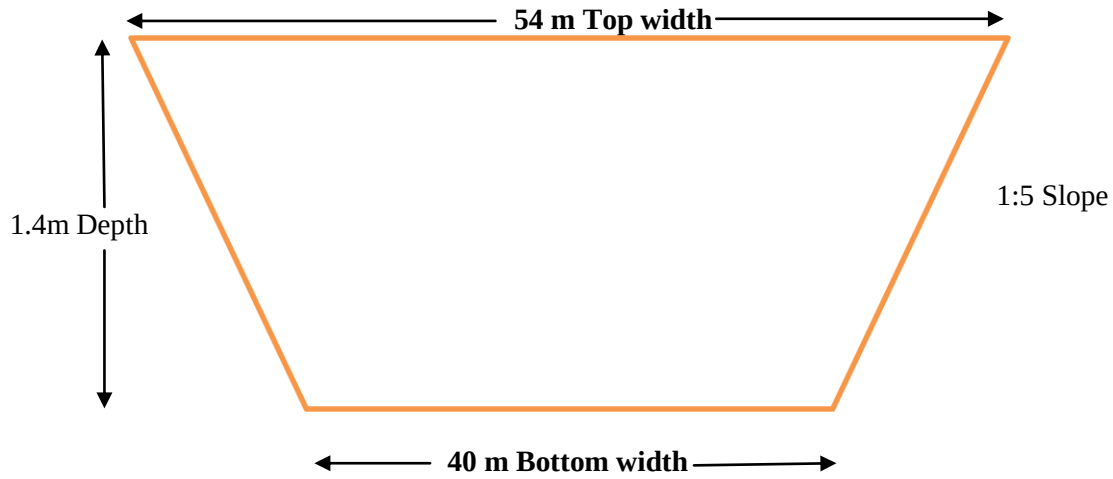
Class-II:-



Location		Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)`	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)`
Saharbati	Amlai	0	7.261	0.4	13.72	7000	44041.91	44041.91	0.18	11.92	7000	82227.76	82227.76
Total						7000	44041.91	44041.91	Total		7000	82227.76	82227.76

Table 24-Dredging Summery at link of Dwarka River (Secondary Channel) (Class-II)

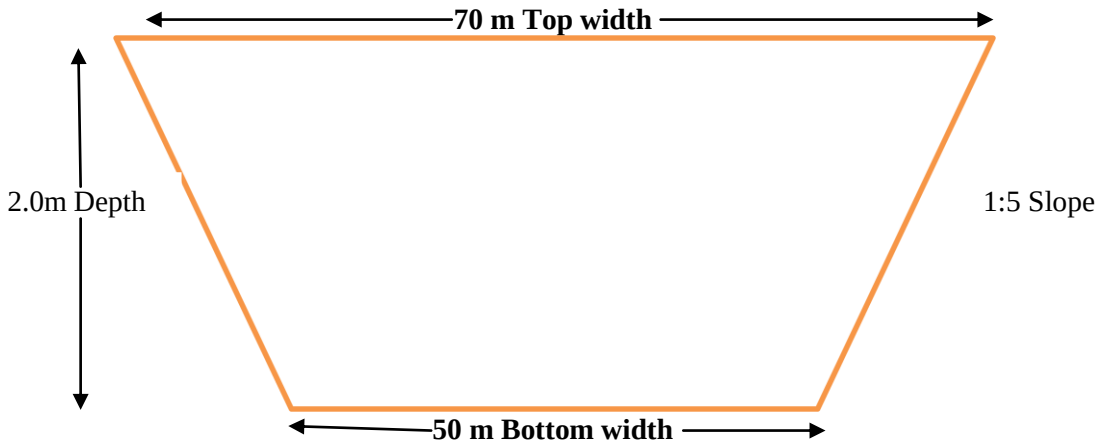
Class-III:-



Location		Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	From	To	Min depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)`	Min. Depth (m)	Max Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)`
Saharbati	Amlai	0	7.261	0.3	13.74	7000	104560.85	104560.85	0.1	11.94	7000	187469.99	187469.99
Total						7000	104560.85	104560.85	Total		7000	187469.99	187469.99

Table 25-Dredging Summery at link of Dwarka River (Secondary Channel) (Class-III)

Class-IV:-



Location		Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)`	Min. Depth (m)	Max Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty. (cu.m.)`
Saharbati	Amlai	0	7.261	0.2	13.76	7000	152735.62	152735.62	-0.3	11.96	7000	267612.62	267612.62
Total						7000	152735.62	152735.62	Total		7000	267612.62	267612.62

Table 26-Dredging Summery at link of Dwarka River (Secondary Channel) (Class-IV)

Section 6: Conclusion

The Survey stretch of Dwarka River is 119.165 km. As much as three numbers of Ferry Ghats including Tenya Ghat, Bali ghat, Boratay kheya ghat, Boratay ghat etc are available in this zone of river. The waterway of the Dwarka River includes many villages, Rail and Road, Ferry Ghat, Jetty etc. There is a Railway Bridge (Babla Rail Bridge) crossing over the river which is very communicative for the native villagers and the foreigners. The Railway line is connected with Tarapith Road, Salar, Chougahia etc Railway station. Five numbers of RCC bridges and an iron bridge are situated in this zone of river which is very communicative to the daily passengers and also for the tourist. During the period of the survey we found the water level of the river is not appropriate for the entire survey stretches. Tourists can have beautiful view of the river and its natural surroundings from the bridges situated on NH no- 34. Discharging a huge amount of water every year, the river turns dangerous during monsoon season. NH-34, NH-60, NH-2B are the major communicative way in this zone and other state-Highways like SH-11, SH-13, SH-14 are situated for a better communication system and good transportation.

6.1 Class wise Avg. Reduced Depths/Percentage in the Primary Channel:-

Sl. No	From Chainage	To Chainage	Minimum Avg. Reduced Depth/ Percentage				Maximum Avg. Reduced Depth/ percentage			
	(km)	(km)	Class-I	Class-II	Class-III	Class-IV	Class-I	Class-II	Class-III	Class-IV
1	0	10	0.98/ 0.0098	0.88/0.0088	0.68/0.0068	0.65/0.0065	5.01/0.0501	5.12/0.0512	5.32/0.0532	5.39/0.0539
2	10	20	0.76/0.0076	0.65/0.0065	0.45/0.0045	0.45/0.0045	3.67/0.0367	3.77/0.0367	3.98/0.0398	4.06/0.0406
3	20	30	0.69/0.0069	0.58/0.0058	0.40/0.0040	0.36/0.0036	3.65/0.0365	3.76/0.0376	3.97/0.0386	4.05/0.0405
4	30	40	0.78/0.0078	0.67/0.0067	0.4/0.004	0.41/0.0041	5.34/0.0534	5.45/0.0545	5.65/0.0565	5.8/0.058
5	40	50	0.54/0.0054	0.41/0.0041	0.21/0.0021	0.20/0.0020	3.85/0.0385	3.97/0.0397	4.22/0.0422	4.31/0.0431
6	50	60	0.44/0.0044	0.33/0.0033	0.21/0.0021	0.21/0.0021	2.46/0.0246	2.57/0.0257	2.78/0.0278	2.79/0.0279
7	60	70	-1.11/-0.011	-0.06/-0.0006	-0.06/-0.0006	-0.24/0.0024	0.98/0.0098	1.04/0.0104	1.22/0.0122	1.94/0.0194
8	70	80	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	0/0	0/0	0/0	0/0
9	80	90	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	0/0	0/0	0/0	0/0
10	90	100	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	0/0	0/0	0/0	0/0
11	100	110	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	0/0	0/0	0.49/0.0049	0.49/0.0049
12	110	119.165	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	-0.3/-0.003	0/0	0/0	0/0	0/0

6.1.1 Class wise Avg. Reduced Depths/Percentage in the link of Dwarka River (Secondary Channel)

Sl. No	From Chainage	To Chainage	Minimum Avg. Reduced Depth/ Percentage				Maximum Avg. Reduced Depth/ percentage			
	(km)	(km)	Class-I	Class-II	Class-III	Class-IV	Class-I	Class-II	Class-III	Class-IV
1	0	7.261	0.34/0.0034	0.29/0.0029	0.23/0.0023	0.14/0.0014	5.07/0.0507	5.12/0.0512	5.17/0.0517	5.23/0.0523

6.2 Range of Depths in the Primary Channel:-

Sl No	From Chainage (km)	To Chainage (km)	Reduced Depth				
			<1.2 m	1.2 m to 1.4 m	1.5 m to 1.7 m	1.8 m to 2.0 m	>2.0 m
			(km)	(km)	(km)	(km)	(km)
1	0	10	5.10	1.30	1.50	0.00	2.10
2	10	20	6.80	0.00	0.00	0.00	0.00
3	20	30	7.20	1.30	1.50	0.00	0.00
4	30	40	8.70	1.30	0.00	0.00	0.00
5	40	50	8.00	0.00	0.00	0.00	0.00
6	50	60	6.40	0.00	1.60	0.00	2.00
7	60	70	8.50	0.00	1.50	0.00	0.00
8	70	80	10.00	0.00	0.00	0.00	0.00
9	80	90	10.00	0.00	0.00	0.00	0.00
10	90	100	10.00	0.00	0.00	0.00	0.00
11	100	110	8.90	1.10	0.00	0.00	0.00
12	110	119.165	9.17	0.00	0.00	0.00	0.00

6.2.1 Range of Depths in the Primary Channel (Secondary Channel)

Sl No	From Chainage	To	Reduced Depth				
	(km)	Chainage	<1.2 m	1.2 m to 1.4 m	1.5 m to 1.7 m	1.8 m to 2.0 m	>2.0 m
		(km)	(km)	(km)	(km)	(km)	(km)
1	0	7.261	4	0	0	0	3.261

6.3 Min/Max and Avg. Width of Waterway in the Primary Channel:-

Sl. No	From Chainage (km)	To Chainage (km)	Min. Width (m)	Max. Width (m)	Avg. width of waterway (m)
1	0	10	129.01	80.15	169.085
2	10	20	80.15	108.52	134.41
3	20	30	108.52	68.88	142.96
4	30	40	68.88	31.15	84.455
5	40	50	31.15	46.53	54.415
6	50	60	46.53	31.27	62.165
7	60	70	31.27	45.62	54.08
8	70	80	45.62	53.24	72.24
9	80	90	53.24	54.24	80.36
10	90	100	54.24	73.6	91.04
11	100	110	73.60	33.84	90.52
12	110	119.165	33.84	45.75	56.715

6.3.1 Min/Max and Avg. Width of Waterway in the Link of Dwarka River (Secondary Channel)

Sl. No	From Chainage (km)	To Chainage (km)	Min. Width (m)	Max. Width (m)	Avg. width of waterway (m)
1	0	7.261	142.47	71.04	177.99

6.4 Stretch wise Slopes in Primary Channel:

Stretch (km)	Slope (m/km)
0.00-10.00	7.643
10.00-20.00	7.484
20.00-30.00	7.844
30.00-40.00	7.582
40.00-50.00	7.639
50.00-60.00	3.206
60.00-70.00	4.152
70.00-80.00	24.242
80.00-90.00	24.545
90.00-100.00	28.182
100.00-119.165	27.418

6.4.1 Slopes at Link of Dwarka River (Secondary Channel):

Stretch (km)	Slope (m/km)
0.00-7.261	1.65

6.5 Dredging Summery in Primary Channel:-

Class	Sounding Observed w.r.t Sounding Datum (Cu.m)	Sounding Reduced w.r.t Sounding Datum (Cu.m)
Class-I	2252863.88	3009665.72
Class-II	3623585.23	4703714.43
Class-III	5876302.42	7465961.99
Class-IV	7369438.88	9235621.95

6.5.1 Dredging Summery at Link of Dwarka River (Secondary Channel):-

Class	Sounding Observed w.r.t Sounding Datum (Cu.m)	Sounding Reduced w.r.t Sounding Datum (Cu.m)
Class-I	21472.61	39983.62
Class-II	44041.91	82227.76
Class-III	104560.85	187469.99
Class-IV	152735.62	267612.62

The Detailed project report may progress for the waterway development and also required for dredging for the river's low depth after the Chainage of 60.00 km. The water level at confluence point is sufficient for carried out the Bathymetry survey in this zone of river. Tenya ferry ghat includes cargo belonging paddy, Bamboo, vegetables etc. transported in this zone of river. Tarapith, Rampurhat etc. religious places are located in this zone of river. If the dredging is possible after the Chainage of 60.00 km to remaining stretches of river, the IWT operations may develop in this zone of river. Tarapith, a religious place is famous for Tata deity where a thousand of pilgrims come every year to worship Tara deity. Many hotels, tourist spot are built up near the temple area. If the ferry service may develop in temple surroundings area, many tourists will come here easily with cheap rate.

Annexure:-

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

The Chart Datum value of Confluence with Dwarka River, Confluence with Bhagirathi River and Bazarsaw (Seasonal) has been provided by IWAI office.

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

Class-I:-

Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
0	1	2.3	10.7	0	0	0	2.1	9.5	0	0	0
1	2	1.5	6.2	0	0	0	0.2	3.1	1000	1298.54	1298.54
2	3	1.6	7.2	0	0	0	0.8	5.8	1000	4147.87	5446.41
3	4	1.6	7.5	0	0	0	1	4.5	100	43.42	5489.83
4	5	1.5	8.6	0	0	0	1.1	7.2	40	10.57	5500.4
5	6	1.4	9.4	0	0	0	0.2	6.9	1000	3864.42	9364.82
6	7	1.4	8.2	0	0	0	1.2	2.7	0	0	9364.82
7	8	1.8	5.8	0	0	0	0.7	3.5	1000	1576.1	10940.92
8	9	2.3	4.9	0	0	0	1.3	2.8	0	0	10940.92
9	10	2.2	6.1	0	0	0	1.2	4.1	0	0	10940.92
10	11	1.7	5.2	0	0	0	1.3	3.1	0	0	10940.92
11	12	1.2	4.4	0	0	0	0.7	3.2	200	358.01	11298.93
12	13	1.1	5	150	223.77	223.77	0.7	3.9	550	799.82	12098.75
13	14	1.2	3.8	0	0	223.77	0.8	2.8	30	11.93	12110.68
14	15	1.3	4.7	0	0	223.77	0.9	3.2	1000	3265.37	15376.05
15	16	1.2	4.5	100	209.98	433.75	0.7	3.5	1000	1299.73	16675.78
16	17	1.2	6.8	0	0	433.75	0.8	5.3	1000	1460.75	18136.53
17	18	0.5	5.3	100	180.14	613.89	0.3	4.2	1000	1477.07	19613.6
18	19	1.1	5	200	171.74	785.63	0.8	4.3	1000	2507.18	22120.78
19	20	1.2	4.2	0	0	785.63	0.6	3.2	1000	1254.19	23374.97
20	21	1.3	4.1	0	0	785.63	0.5	3.6	500	608.89	23983.86
21	22	1.2	5.1	0	0	785.63	0.8	4.3	1000	3516.85	27500.71
22	23	2.1	5.8	0	0	785.63	1.5	4.7	0	0	27500.71
23	24	2.1	8.7	0	0	785.63	1.3	7.2	0	0	27500.71
24	25	1.2	4.1	0	0	785.63	0.5	3.2	100	133.7	27634.41
25	26	1.5	2.6	0	0	785.63	1.1	2.3	100	165.72	27800.13
26	27	1.3	2.2	0	0	785.63	0.7	1.8	1000	4986.05	32786.18
27	28	1.2	3.4	0	0	785.63	0.3	3.2	1000	13710.92	46497.1

Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
28	29	0.6	7.3	100	73.54	859.17	0.5	6.2	1000	2884.56	49381.66
29	30	0.8	6.5	100	6.84	866.01	-0.3	1.2	100	94.64	49476.3
30	31	1.1	9.2	200	376.93	1242.94	0.2	8.3	1000	1264.38	50740.68
31	32	1.1	8.7	1000	2240.57	3483.51	0.3	7.9	1000	5638.26	56378.94
32	33	1.1	5.7	100	41.42	3524.93	1.1	4.8	500	484.81	56863.75
33	34	0.6	5.4	500	671.99	4196.92	0.6	4.3	1000	1068.43	57932.18
34	35	2.2	5.6	0	0	4196.92	1.2	5.6	0	0	57932.18
35	36	0.5	5.4	100	7.18	4204.1	0.6	5.5	50	32.39	57964.57
36	37	0.9	3.7	100	109.32	4313.42	0.8	3.7	200	272.01	58236.58
37	38	1.4	4.6	0	0	4313.42	1.3	4.7	0	0	58236.58
38	39	0.9	6.8	250	348.54	4661.96	0.9	5	700	739.16	58975.74
39	40	0.8	6.8	1000	8997.51	13659.47	0.8	3.6	1000	11280.56	70256.3
40	41	0.5	4.6	1000	11355.46	25014.93	0.4	4.3	1000	15049.75	85306.05
41	42	0.6	3.2	1000	10828.79	35843.72	0.5	3	1000	12073.5	97379.55
42	43	1	5.2	1000	11205.6	47049.32	0.8	4.8	1000	14878.64	112258.19
43	44	0.5	4.7	1000	13649.19	60698.51	0.5	3.7	1000	17244.57	129502.76
44	45	0.7	4.4	1000	3453.1	64151.61	0.5	3.8	1000	6368.12	135870.88
45	46	1.1	4.3	100	140.91	64292.52	0.8	4.1	160	192.7	136063.58
46	47	0.5	4.3	1000	2424.19	66716.71	0.3	4	1000	2845.34	138908.92
47	48	0.9	4.6	1000	2723.72	69440.43	0.6	4.2	1000	4718.1	143627.02
48	49	0.8	3.6	1000	4339.75	73780.18	0.5	3.4	1000	5586.51	149213.53
49	50	0.7	3.3	1000	1772.57	75552.75	0.5	3.2	1000	2649.26	151862.79
50	51	0.9	3.7	1000	2143.68	77696.43	0.8	3.6	1000	2960.43	154823.22
51	52	1.1	4.1	1000	2436.4	80132.83	0.7	3.6	1000	4015.89	158839.11
52	53	0.8	4.5	250	375.74	80508.57	0.5	4.3	1000	882.65	159721.76
53	54	0.5	3.1	1000	3484.16	83992.73	0.3	3	1000	3021.35	162743.11
54	55	0.5	2.2	1000	7603.66	91596.39	0.4	2	1000	12501.75	175244.86
55	56	0.5	1.5	1000	11866.74	103463.13	0.3	1.2	1000	16182.64	191427.5
56	57	0.5	2.7	1000	13934.36	117397.49	0.3	2.5	1000	17494.56	208922.06
57	58	0.9	2.1	1000	13019.55	130417.04	0.5	1.9	1000	19387.64	228309.7
58	59	0.5	1.6	1000	12104.69	142521.73	0.3	1.4	1000	19342.66	247652.36
59	60	0.5	1.7	1000	19348.26	161869.99	0.3	1.1	1000	23433.31	271085.67
60	61	0.5	2.9	1000	10887.86	172757.85	0.3	2.7	1000	18703.6	289789.27
61	62	0.8	2.6	1000	13163.16	185921.01	0.3	2.2	1000	19335.95	309125.22
62	63	0.5	2.1	1000	9449.54	195370.55	0.3	1.3	1000	16101.25	325226.47
63	64	0.5	2.6	1000	8062.33	203432.88	0.3	2.4	1000	13141.88	338368.35
64	65	0.5	1.7	1000	9096.9	212529.78	0.3	1.2	1000	15008.2	353376.55
65	66	0.2	0.5	1000	14975.85	227505.63	-0.3	0	1000	19237.73	372614.28
66	67	0.2	0.5	1000	39079.41	266585.04	-0.3	0	1000	50212.4	422826.68

Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
67	68	0.1	0.4	1000	37348.34	303933.38	-0.3	0	1000	48742.79	471569.47
68	69	0.2	0.5	1000	40842.47	344775.85	-0.3	0	1000	53520.1	525089.57
69	70	0.4	0.6	1000	41129.26	385905.11	-0.3	0	1000	53282.95	578372.52
70	71	0.3	0.5	1000	39110.14	425015.25	-0.3	0	1000	51902.93	630275.45
71	72	0.2	0.6	1000	39637.62	464652.87	-0.3	0	1000	51401.23	681676.68
72	73	0.1	0.4	1000	41609.16	506262.03	-0.3	0	1000	54180.85	735857.53
73	74	0.2	0.3	1000	39800.34	546062.37	-0.3	0	1000	52032.88	787890.41
74	75	0.1	0.3	1000	39866.02	585928.39	-0.3	0	1000	51988.8	839879.21
75	76	0.2	0.5	1000	38672.28	624600.67	-0.3	0	1000	50946.02	890825.23
76	77	0.3	0.5	1000	36642.98	661243.65	-0.3	0	1000	48547.38	939372.61
77	78	0.2	0.6	1000	37464.77	698708.42	-0.3	0	1000	49658.69	989031.3
78	79	0.1	0.3	1000	39421.45	738129.87	-0.3	0	1000	52564.69	1041596
79	80	0.2	0.6	1000	36958.68	775088.55	-0.3	0	1000	48268.06	1089864.1
80	81	0.2	0.5	1000	32830.83	807919.38	-0.3	0	1000	43725.83	1133589.9
81	82	0.1	0.3	1000	38896.78	846816.16	-0.3	0	1000	51550.13	1185140
82	83	0.1	0.3	1000	38257.18	885073.34	-0.3	0	1000	49296.85	1234436.9
83	84	0.2	0.6	1000	34723.38	919796.72	-0.3	0	1000	45431.82	1279868.7
84	85	0.3	0.5	1000	28499.26	948295.98	-0.3	0	1000	37808.65	1317677.3
85	86	0.3	0.6	1000	35430.55	983726.53	-0.3	0	1000	44788.49	1362465.8
86	87	0.2	0.5	1000	30352.94	1014079.5	-0.3	0	1000	40884.34	1403350.2
87	88	0.2	0.5	1000	27014.29	1041093.8	-0.3	0	1000	32708.7	1436058.9
88	89	0.5	0.7	1000	42107.72	1083201.5	-0.3	0	1000	54884.82	1490943.7
89	90	0.2	0.4	1000	33001.34	1116202.8	-0.3	0	1000	42134.93	1533078.6
90	91	0.2	0.4	1000	35978.95	1152181.8	-0.3	0	1000	46583.91	1579662.5
91	92	0.1	0.3	1000	30246.99	1182428.8	-0.3	0	1000	42297.9	1621960.4
92	93	0.2	0.4	1000	31753.7	1214182.5	-0.3	0	1000	39664.75	1661625.2
93	94	0.2	0.5	1000	37646.7	1251829.2	-0.3	0	1000	48842.13	1710467.3
94	95	0.2	0.4	1000	32135.16	1283964.3	-0.3	0	1000	43821.13	1754288.4
95	96	0.3	0.6	1000	39406.36	1323370.7	-0.3	0	1000	47293.44	1801581.9
96	97	0.2	0.5	1000	37753.69	1361124.4	-0.3	0	1000	48663.72	1850245.6
97	98	0.3	0.5	1000	40159.69	1401284.1	-0.3	0	1000	52699.62	1902945.2
98	99	0.2	0.4	1000	30513.96	1431798	-0.3	0	1000	38601.25	1941546.5
99	100	0.1	0.2	1000	39772.27	1471570.3	-0.3	0	1000	51406.39	1992952.9
100	101	0.1	0.3	1000	36030.88	1507601.2	-0.3	0	1000	48958.41	2041911.3
101	102	0.2	0.4	1000	35958.04	1543559.2	-0.3	0	1000	46567.9	2088479.2
102	103	0.3	0.8	1000	39374.33	1582933.5	0.2	0.7	1000	48313.05	2136792.2
103	104	0.5	3.2	1000	34502.84	1617436.4	0.2	2.9	1000	45205.82	2181998
104	105	0.5	1.9	1000	30711.43	1648147.8	0.2	1.3	1000	42354.56	2224352.6
105	106	0.3	0.6	1000	36184.69	1684332.5	-0.3	0	1000	45904.92	2270257.5

Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
106	107	0.1	0.3	1000	41693.71	1726026.2	-0.3	0	1000	51731.13	2321988.6
107	108	0.2	0.2	1000	36493.33	1762519.5	-0.3	0	1000	47343.13	2369331.8
108	109	0.1	0.3	1000	37618.13	1800137.7	-0.3	0	1000	48952.57	2418284.3
109	110	0.2	0.4	1000	40197.29	1840335	-0.3	0	1000	51568.47	2469852.8
110	111	0.3	0.5	1000	83275.64	1923610.6	-0.3	0	1000	108092.14	2577945
111	112	0.2	0.5	1000	42719.34	1966329.9	-0.3	0	1000	55082.31	2633027.3
112	113	0.1	0.3	1000	38679.15	2005009.1	-0.3	0	1000	51484.37	2684511.6
113	114	0.1	0.3	1000	40797.03	2045806.1	-0.3	0	1000	52204.02	2736715.7
114	115	0.2	0.5	1000	42220.18	2088026.3	-0.3	0	1000	54123.66	2790839.3
115	116	0.2	0.3	1000	40120.92	2128147.2	-0.3	0	1000	52344.69	2843184
116	117	0.2	0.3	1000	41229.01	2169376.2	-0.3	0	1000	53303.72	2896487.7
117	118	0.1	0.3	1000	41785.35	2211161.6	-0.3	0	1000	53751.88	2950239.6
118	119.165	0.1	0.4	1000	41702.3	2252863.9	-0.3	0	1000	59426.12	3009665.7
Total				81350	2252863.9		Total		99330	3009665.7	

Table 27- Minimum & Maximum depth per km wise (Class-I)

Class-II:-

Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
0	1	2.2	10.8	0	0	0	2	9.6	0	0	0
1	2	1.49	6.21	0	0	0	0.19	3.11	1000	3282.95	3282.95
2	3	1.4	7.4	0	0	0	0.6	6	1000	9206.43	12489.38
3	4	1.5	7.6	0	0	0	0.9	4.6	500	588.84	13078.22
4	5	1.4	8.8	0	0	0	0.9	7.4	700	630.65	13708.87
5	6	1.38	9.42	25	0.07	0.07	0.18	6.92	1000	9573.93	23282.8
6	7	1.3	8.3	30	0.08	0.15	1.1	2.8	150	196.06	23478.86
7	8	1.6	6	0	0	0.15	0.5	3.7	1000	6308.33	29787.19
8	9	2.2	5	0	0	0.15	1.2	2.9	250	260.33	30047.52
9	10	2.18	6.12	0	0	0.15	1.18	4.12	100	60.32	30107.84
10	11	1.67	5.23	0	0	0.15	1.27	3.13	150	196.36	30304.2
11	12	1.1	4.5	100	30.28	30.43	0.6	3.3	1000	2972.54	33276.74
12	13	0.9	5.2	500	784.34	814.77	0.5	4.1	1000	2586.64	35863.38
13	14	1.1	3.9	100	17.39	832.16	0.7	2.9	300	615.39	36478.77
14	15	1.29	4.71	100	43.76	875.92	0.89	3.21	1000	8528.31	45007.08
15	16	1	4.7	700	639.93	1515.85	0.5	3.7	1000	2991.48	47998.56
16	17	1.1	6.9	20	3.65	1519.5	0.7	5.4	1000	4215.92	52214.48
17	18	0.3	5.5	50	10.36	1529.86	0.1	4.4	1000	4399.47	56613.95
18	19	1.18	5.02	1000	1259.97	2789.83	0.78	4.32	1000	6259.44	62873.39
19	20	1.1	4.3	250	281.28	3071.11	0.5	3.3	1000	4637.37	67510.76
20	21	1.1	4.3	100	22.58	3093.69	0.3	3.8	1000	1274.44	68785.2
21	22	1.1	5.2	100	19.51	3113.2	0.7	4.4	1000	9432.49	78217.69
22	23	2.08	5.82	0	0	3113.2	1.48	4.72	0	0	78217.69
23	24	2.07	8.73	0	0	3113.2	1.27	7.23	350	401.53	78619.22
24	25	1.1	4.2	100	187.22	3300.42	0.4	3.3	1000	1360.04	79979.26
25	26	1.4	2.8	0	0	3300.42	0.9	2.5	1000	1417.13	81396.39
26	27	1.2	2.3	150	241.04	3541.46	0.6	1.9	1000	14639.25	96035.64
27	28	1	3.6	200	275.81	3817.27	0.1	3.4	1000	27125.07	123160.71
28	29	0.5	7.4	700	839.27	4656.54	0.4	6.3	1000	7623.1	130783.81
29	30	0.78	6.52	800	708.02	5364.56	-0.32	0.02	1000	1230.66	132014.47
30	31	1.07	9.23	1000	1335.96	6700.52	0.17	8.33	1000	4281.28	136295.75
31	32	1	8.8	1000	4657.43	11357.95	0.2	8	1000	11385.66	147681.41
32	33	1	5.9	550	710.01	12067.96	0.9	5	1000	1811.77	149493.18
33	34	0.5	5.5	1000	1593.44	13661.4	0.5	4.4	1000	2761.78	152254.96
34	35	2.19	5.61	0	0	13661.4	1.19	5.61	700	657.14	152912.1
35	36	0.3	5.6	250	272.27	13933.67	0.2	5.7	250	392.93	153305.03
36	37	0.8	3.8	1000	1359.77	15293.44	0.7	3.8	1000	1776.61	155081.64

Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
37	38	1.2	4.8	100	51.45	15344.89	1.1	4.9	70	40.46	155122.1
38	39	0.88	6.82	1000	4204.6	19549.49	0.88	5.02	1000	5883.17	161005.27
39	40	0.7	6.9	1000	16943.72	36493.21	0.7	3.7	1000	21771.78	182777.05
40	41	0.3	4.8	1000	25489.64	61982.85	0.2	4.5	1000	32132.15	214909.2
41	42	0.5	3.3	1000	24619.66	86602.51	0.4	3.1	1000	28529.86	243439.06
42	43	0.8	5.4	1000	24978.16	111580.67	0.6	5	1000	29792.61	273231.67
43	44	0.4	4.8	1000	27564.47	139145.14	0.4	3.8	1000	34437.56	307669.23
44	45	0.69	4.41	1000	11440.25	150585.39	0.49	3.81	1000	14302.08	321971.31
45	46	0.9	4.5	1000	2983.17	153568.56	0.6	4.3	1000	4012.68	325983.99
46	47	0.4	4.4	1000	7255.04	160823.6	0.2	4.1	1000	9685.86	335669.85
47	48	0.7	4.8	1000	8261.04	169084.64	0.4	4.4	1000	11019.04	346688.89
48	49	0.78	3.62	1000	9293.74	178378.38	0.48	3.42	1000	11493.48	358182.37
49	50	0.6	3.4	1000	5448.91	183827.29	0.4	3.3	1000	7118.17	365300.54
50	51	0.7	3.9	1000	6783.61	190610.9	0.6	3.8	1000	8751.22	374051.76
51	52	1	4.2	1000	8936.93	199547.83	0.6	3.7	1000	12425.3	386477.06
52	53	0.78	4.52	1000	3242.76	202790.59	0.48	4.32	1000	5171.03	391648.09
53	54	0.47	3.13	1000	7077.66	209868.25	0.27	3.03	1000	10757.98	402406.07
54	55	0.4	2.3	1000	20266.44	230134.69	0.3	2.1	1000	26433.67	428839.74
55	56	0.3	1.7	1000	23639.16	253773.85	0.1	1.4	1000	31696.51	460536.25
56	57	0.4	2.8	1000	27670.85	281444.7	0.2	2.6	1000	34269.43	494805.68
57	58	0.7	2.3	1000	27525.6	308970.3	0.3	2.1	1000	35609.09	530414.77
58	59	0.4	1.7	1000	26655.25	335625.55	0.2	1.5	1000	36930.75	567345.52
59	60	0.48	1.72	1000	32044.18	367669.73	0.28	1.12	1000	40902.28	608247.8
60	61	0.47	2.93	1000	23345.5	391015.23	0.27	2.73	1000	32867.56	641115.36
61	62	0.7	2.7	1000	26794.91	417810.14	0.2	2.3	1000	35632.58	676747.94
62	63	0.3	2.3	1000	22417.23	440227.37	0.1	1.5	1000	31682.6	708430.54
63	64	0.3	2.8	1000	19667.33	459894.7	0.1	2.6	1000	29387.76	737818.3
64	65	0.4	1.8	1000	20078.91	479973.61	0.2	1.3	1000	28170.44	765988.74
65	66	0.19	0.51	1000	28619.78	508593.39	-0.3	0	1000	38477.6	804466.34
66	67	0.2	0.7	1000	59609.08	568202.47	-0.3	0	1000	75626.95	880093.29
67	68	0.1	0.5	1000	57063.45	625265.92	-0.3	0	1000	72320.32	952413.61
68	69	0.2	0.7	1000	63169.84	688435.76	-0.3	0	1000	79232.74	1031646.4
69	70	0.38	0.62	1000	62855.54	751291.3	-0.3	0	1000	78710.9	1110357.3
70	71	0.2	0.6	1000	61187.17	812478.47	-0.3	0	1000	76772.21	1187129.5
71	72	0.1	0.8	1000	61021.54	873500.01	-0.3	0	1000	76727.94	1263857.4
72	73	0.1	0.5	1000	63973.05	937473.06	-0.3	0	1000	80124.94	1343982.3
73	74	0.18	0.32	1000	61293.36	998766.42	-0.3	0	1000	77163.66	1421146
74	75	0.07	0.33	1000	61104.72	1059871.1	-0.3	0	1000	76714.15	1497860.2
75	76	0.1	0.6	1000	59941.67	1119812.8	-0.3	0	1000	75434.52	1573294.7
76	77	0.1	0.7	1000	56955.94	1176768.8	-0.3	0	1000	72171.5	1645466.2

Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
77	78	0.1	0.7	1000	58395.49	1235164.2	-0.3	0	1000	74439.62	1719905.8
78	79	0.1	0.5	1000	62016.8	1297181	-0.3	0	1000	78000.31	1797906.1
79	80	0.1	0.7	1000	56923.55	1354104.6	-0.3	0	1000	72683.2	1870589.3
80	81	0.18	0.52	1000	51367.94	1405472.5	-0.3	0	1000	65251.03	1935840.3
81	82	0.07	0.33	1000	60786.68	1466259.2	-0.3	0	1000	76398.05	2012238.4
82	83	0.1	0.4	1000	58363.21	1524622.4	-0.3	0	1000	73499.97	2085738.4
83	84	0.2	0.8	1000	53573.8	1578196.2	-0.3	0	1000	66781.88	2152520.2
84	85	0.1	0.7	1000	44611.88	1622808.1	-0.3	0	1000	55630.12	2208150.4
85	86	0.2	0.7	1000	52878.96	1675687.1	-0.3	0	1000	65985.84	2274136.2
86	87	0.19	0.51	1000	48116.91	1723804	-0.3	0	1000	60061.92	2334198.1
87	88	0.2	0.7	1000	38198.04	1762002	-0.3	0	1000	47561.36	2381759.5
88	89	0.4	0.8	1000	64275.81	1826277.8	-0.3	0	1000	80019.09	2461778.6
89	90	0.1	0.6	1000	49686.08	1875963.9	-0.3	0	1000	61924.95	2523703.5
90	91	0.18	0.42	1000	54762.43	1930726.3	-0.3	0	1000	68356.9	2592060.4
91	92	0.1	0.4	1000	49907.91	1980634.2	-0.3	0	1000	62528.82	2654589.2
92	93	0.2	0.6	1000	46658.13	2027292.4	-0.3	0	1000	58204.51	2712793.7
93	94	0.1	0.6	1000	57601.46	2084893.8	-0.3	0	1000	71796.31	2784590.1
94	95	0.18	0.42	1000	51674.5	2136568.3	-0.3	0	1000	64397.27	2848987.3
95	96	0.27	0.63	1000	55751.02	2192319.4	-0.3	0	1000	69557.19	2918544.5
96	97	0.1	0.6	1000	57387.29	2249706.6	-0.3	0	1000	71517.82	2990062.3
97	98	0.1	0.7	1000	62145.27	2311851.9	-0.3	0	1000	77445.21	3067507.5
98	99	0.1	0.5	1000	45525.48	2357377.4	-0.3	0	1000	56734.59	3124242.1
99	100	0.1	0.4	1000	60636.14	2418013.5	-0.3	0	1000	75582.53	3199824.7
100	101	0.1	0.4	1000	57742.31	2475755.8	-0.3	0	1000	71969.58	3271794.2
101	102	0.18	0.42	1000	54975.29	2530731.1	-0.3	0	1000	68597.27	3340391.5
102	103	0.27	0.83	1000	56962.92	2587694.1	-0.3	0.7	1000	71001.57	3411393.1
103	104	0.4	3.3	1000	53597.87	2641291.9	-0.3	2.9	1000	67149.34	3478542.4
104	105	0.3	2.1	1000	51143.39	2692435.3	-0.3	1.3	1000	65693.42	3544235.8
105	106	0.1	0.8	1000	57015.02	2749450.3	-0.3	0	1000	69614.81	3613850.7
106	107	0.1	0.4	1000	62614.5	2812064.8	-0.3	0	1000	76773.88	3690624.5
107	108	0.19	0.21	1000	55866.51	2867931.3	-0.3	0	1000	69724.25	3760348.8
108	109	0.1	0.5	1000	57757.81	2925689.2	-0.3	0	1000	72063.42	3832412.2
109	110	0.1	0.5	1000	60742.07	2986431.2	-0.3	0	1000	75801.51	3908213.7
110	111	0.1	0.7	1000	127438.61	3113869.8	-0.3	0	1000	159049.1	4067262.8
111	112	0.18	0.52	1000	64955.03	3178824.9	-0.3	0	1000	80986.39	4148249.2
112	113	0.1	0.4	1000	61004.78	3239829.6	-0.3	0	1000	76667.12	4224916.3
113	114	0.1	0.5	1000	61718.33	3301548	-0.3	0	1000	77162.94	4302079.3
114	115	0.1	0.6	1000	63824.45	3365372.4	-0.3	0	1000	79537.43	4381616.7
115	116	0.18	0.32	1000	61723.05	3427095.5	-0.3	0	1000	76921.54	4458538.2
116	117	0.17	0.33	1000	62988.87	3490084.3	-0.3	0	1000	78707.26	4537245.5

Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
117	118	0.1	0.4	1000	63422.72	3553507.1	-0.3	0	1000	79130.93	4616376.4
118	119.165	0.1	0.6	1000	70078.17	3623585.2	-0.3	0	1000	87337.98	4703714.4
Total				90925	3623585.2		Total		109520	4703714.4	

Table 28 - Minimum & Maximum depth per km wise (Class II)

Class-III:-

Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty
0	1	2.2	10.8	0	0	0	2	9.8	0	0	0
1	2	1.49	6.21	0	0	0	0.17	3.13	1000	3282.95	3282.95
2	3	1.4	7.4	0	0	0	0.2	6.4	1000	9206.43	12489.38
3	4	1.5	7.6	0	0	0	0.7	4.8	500	588.84	13078.22
4	5	1.4	8.8	0	0	0	0.5	7.8	700	630.65	13708.87
5	6	1.38	9.42	25	0.07	0.07	0.14	6.96	1000	9573.93	23282.8
6	7	1.3	8.3	30	0.08	0.15	0.9	3	150	196.06	23478.86
7	8	1.6	6	0	0	0.15	0.1	4.1	1000	6308.33	29787.19
8	9	2.2	5	0	0	0.15	1	3.1	250	260.33	30047.52
9	10	2.18	6.12	0	0	0.15	1.14	4.16	100	60.32	30107.84
10	11	1.67	5.23	0	0	0.15	1.21	3.19	150	196.36	30304.2
11	12	1.1	4.5	100	30.28	30.43	0.4	3.5	1000	2972.54	33276.74
12	13	0.9	5.2	500	784.34	814.77	0.2	4.5	1000	2586.64	35863.38
13	14	1.1	3.9	100	17.39	832.16	0.4	3.1	300	615.39	36478.77
14	15	1.29	4.71	100	43.76	875.92	0.84	3.23	1000	8528.31	45007.08
15	16	1	4.7	700	639.93	1515.85	0.3	4.1	1000	2991.48	47998.56
16	17	1.1	6.9	20	3.65	1519.5	0.3	5.6	1000	4215.92	52214.48
17	18	0.3	5.5	50	10.36	1529.86	0.1	4.8	1000	4399.47	56613.95
18	19	1.18	5.02	1000	1259.97	2789.83	0.74	4.36	1000	6259.44	62873.39
19	20	1.1	4.3	250	281.28	3071.11	0.3	3.5	1000	4637.37	67510.76
20	21	1.1	4.3	100	22.58	3093.69	0.2	4.2	1000	1274.44	68785.2
21	22	1.1	5.2	100	19.51	3113.2	0.5	4.6	1000	9432.49	78217.69
22	23	2.08	5.82	0	0	3113.2	1.44	4.76	0	0	78217.69
23	24	2.07	8.73	0	0	3113.2	1.21	7.29	350	401.53	78619.22
24	25	1.1	4.2	100	187.22	3300.42	0.2	3.5	1000	1360.04	79979.26
25	26	1.4	2.8	0	0	3300.42	0.5	2.9	1000	1417.13	81396.39
26	27	1.2	2.3	150	241.04	3541.46	0.4	2.1	1000	14639.25	96035.64
27	28	1	3.6	200	275.81	3817.27	-0.3	3.8	1000	27125.07	123160.71
28	29	0.5	7.4	700	839.27	4656.54	0.2	6.5	1000	7623.1	130783.81
29	30	0.78	6.52	800	708.02	5364.56	-0.3	0.06	1000	1230.66	132014.47
30	31	1.07	9.23	1000	1335.96	6700.52	0.11	8.39	1000	4281.28	136295.75
31	32	1	8.8	1000	4657.43	11357.95	-0.3	8.2	1000	11385.66	147681.41
32	33	1	5.9	550	710.01	12067.96	0.5	5.4	1000	1811.77	149493.18
33	34	0.5	5.5	1000	1593.44	13661.4	0.3	4.6	1000	2761.78	152254.96
34	35	2.19	5.61	0	0	13661.4	1.15	5.63	700	657.14	152912.1
35	36	0.3	5.6	250	272.27	13933.67	-0.3	6.1	250	392.93	153305.03
36	37	0.8	3.8	1000	1359.77	15293.44	0.5	4	1000	1776.61	155081.64
37	38	1.2	4.8	100	51.45	15344.89	0.7	5.3	70	40.46	155122.1

Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty
38	39	0.88	6.82	1000	4204.6	19549.49	0.84	5.06	1000	5883.17	161005.27
39	40	0.7	6.9	1000	16943.72	36493.21	0.5	3.9	1000	21771.78	182777.05
40	41	0.3	4.8	1000	25489.64	61982.85	-0.3	4.9	1000	32132.15	214909.2
41	42	0.5	3.3	1000	24619.66	86602.51	0.2	3.3	1000	28529.86	243439.06
42	43	0.8	5.4	1000	24978.16	111580.67	0.2	5.4	1000	29792.61	273231.67
43	44	0.4	4.8	1000	27564.47	139145.14	0.2	4	1000	34437.56	307669.23
44	45	0.69	4.41	1000	11440.25	150585.39	0.43	3.83	1000	14302.08	321971.31
45	46	0.9	4.5	1000	2983.17	153568.56	0.3	4.7	1000	4012.68	325983.99
46	47	0.4	4.4	1000	7255.04	160823.6	0.2	4.3	1000	9685.86	335669.85
47	48	0.7	4.8	1000	8261.04	169084.64	0.3	4.8	1000	11019.04	346688.89
48	49	0.78	3.62	1000	9293.74	178378.38	0.44	3.46	1000	11493.48	358182.37
49	50	0.6	3.4	1000	5448.91	183827.29	0.2	3.5	1000	7118.17	365300.54
50	51	0.7	3.9	1000	6783.61	190610.9	0.3	4.2	1000	8751.22	374051.76
51	52	1	4.2	1000	8936.93	199547.83	0.4	3.9	1000	12425.3	386477.06
52	53	0.78	4.52	1000	3242.76	202790.59	0.44	4.36	1000	5171.03	391648.09
53	54	0.47	3.13	1000	7077.66	209868.25	0.24	3.09	1000	10757.98	402406.07
54	55	0.4	2.3	1000	20266.44	230134.69	0.25	2.3	1000	26433.67	428839.74
55	56	0.3	1.7	1000	23639.16	253773.85	0.1	1.8	1000	31696.51	460536.25
56	57	0.4	2.8	1000	27670.85	281444.7	0.2	2.8	1000	34269.43	494805.68
57	58	0.7	2.3	1000	27525.6	308970.3	0.3	2.5	1000	35609.09	530414.77
58	59	0.4	1.7	1000	26655.25	335625.55	-0.3	1.7	1000	36930.75	567345.52
59	60	0.48	1.72	1000	32044.18	367669.73	0.24	1.16	1000	40902.28	608247.8
60	61	0.47	2.93	1000	23345.5	391015.23	0.21	2.79	1000	32867.56	641115.36
61	62	0.7	2.7	1000	26794.91	417810.14	0.2	2.3	1000	35632.58	676747.94
62	63	0.3	2.3	1000	22417.23	440227.37	0.1	1.5	1000	31682.6	708430.54
63	64	0.3	2.8	1000	19667.33	459894.7	0.1	2.6	1000	29387.76	737818.3
64	65	0.4	1.8	1000	20078.91	479973.61	0.2	1.3	1000	28170.44	765988.74
65	66	0.19	0.51	1000	28619.78	508593.39	-0.3	0	1000	38477.6	804466.34
66	67	0.2	0.7	1000	59609.08	568202.47	-0.3	0	1000	75626.95	880093.29
67	68	0.1	0.5	1000	57063.45	625265.92	-0.3	0	1000	72320.32	952413.61
68	69	0.2	0.7	1000	63169.84	688435.76	-0.3	0	1000	79232.74	1031646.4
69	70	0.38	0.62	1000	62855.54	751291.3	-0.3	0	1000	78710.9	1110357.3
70	71	0.2	0.6	1000	61187.17	812478.47	-0.3	0	1000	76772.21	1187129.5
71	72	0.1	0.8	1000	61021.54	873500.01	-0.3	0	1000	76727.94	1263857.4
72	73	0.1	0.5	1000	63973.05	937473.06	-0.3	0	1000	80124.94	1343982.3
73	74	0.18	0.32	1000	61293.36	998766.42	-0.3	0	1000	77163.66	1421146
74	75	0.07	0.33	1000	61104.72	1059871.1	-0.3	0	1000	76714.15	1497860.2
75	76	0.1	0.6	1000	59941.67	1119812.8	-0.3	0	1000	75434.52	1573294.7
76	77	0.1	0.7	1000	56955.94	1176768.8	-0.3	0	1000	72171.5	1645466.2
77	78	0.1	0.7	1000	58395.49	1235164.2	-0.3	0	1000	74439.62	1719905.8

Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty
78	79	0.1	0.5	1000	62016.8	1297181	-0.3	0	1000	78000.31	1797906.1
79	80	0.1	0.7	1000	56923.55	1354104.6	-0.3	0	1000	72683.2	1870589.3
80	81	0.18	0.52	1000	51367.94	1405472.5	-0.3	0	1000	65251.03	1935840.3
81	82	0.07	0.33	1000	60786.68	1466259.2	-0.3	0	1000	76398.05	2012238.4
82	83	0.1	0.4	1000	58363.21	1524622.4	-0.3	0	1000	73499.97	2085738.4
83	84	0.2	0.8	1000	53573.8	1578196.2	-0.3	0	1000	66781.88	2152520.2
84	85	0.1	0.7	1000	44611.88	1622808.1	-0.3	0	1000	55630.12	2208150.4
85	86	0.2	0.7	1000	52878.96	1675687.1	-0.3	0	1000	65985.84	2274136.2
86	87	0.19	0.51	1000	48116.91	1723804	-0.3	0	1000	60061.92	2334198.1
87	88	0.2	0.7	1000	38198.04	1762002	-0.3	0	1000	47561.36	2381759.5
88	89	0.4	0.8	1000	64275.81	1826277.8	-0.3	0	1000	80019.09	2461778.6
89	90	0.1	0.6	1000	49686.08	1875963.9	-0.3	0	1000	61924.95	2523703.5
90	91	0.18	0.42	1000	54762.43	1930726.3	-0.3	0	1000	68356.9	2592060.4
91	92	0.1	0.4	1000	49907.91	1980634.2	-0.3	0	1000	62528.82	2654589.2
92	93	0.2	0.6	1000	46658.13	2027292.4	-0.3	0	1000	58204.51	2712793.7
93	94	0.1	0.6	1000	57601.46	2084893.8	-0.3	0	1000	71796.31	2784590.1
94	95	0.18	0.42	1000	51674.5	2136568.3	-0.3	0	1000	64397.27	2848987.3
95	96	0.27	0.63	1000	55751.02	2192319.4	-0.3	0	1000	69557.19	2918544.5
96	97	0.1	0.6	1000	57387.29	2249706.6	-0.3	0	1000	71517.82	2990062.3
97	98	0.1	0.7	1000	62145.27	2311851.9	-0.3	0	1000	77445.21	3067507.5
98	99	0.1	0.5	1000	45525.48	2357377.4	-0.3	0	1000	56734.59	3124242.1
99	100	0.1	0.4	1000	60636.14	2418013.5	-0.3	0	1000	75582.53	3199824.7
100	101	0.1	0.4	1000	57742.31	2475755.8	-0.3	0	1000	71969.58	3271794.2
101	102	0.18	0.42	1000	54975.29	2530731.1	-0.3	0	1000	68597.27	3340391.5
102	103	0.27	0.83	1000	56962.92	2587694.1	-0.3	0.7	1000	71001.57	3411393.1
103	104	0.4	3.3	1000	53597.87	2641291.9	-0.3	2.9	1000	67149.34	3478542.4
104	105	0.3	2.1	1000	51143.39	2692435.3	-0.3	1.3	1000	65693.42	3544235.8
105	106	0.1	0.8	1000	57015.02	2749450.3	-0.3	0	1000	69614.81	3613850.7
106	107	0.1	0.4	1000	62614.5	2812064.8	-0.3	0	1000	76773.88	3690624.5
107	108	0.19	0.21	1000	55866.51	2867931.3	-0.3	0	1000	69724.25	3760348.8
108	109	0.1	0.5	1000	57757.81	2925689.2	-0.3	0	1000	72063.42	3832412.2
109	110	0.1	0.5	1000	60742.07	2986431.2	-0.3	0	1000	75801.51	3908213.7
110	111	0.1	0.7	1000	127438.61	3113869.8	-0.3	0	1000	159049.1	4067262.8
111	112	0.18	0.52	1000	64955.03	3178824.9	-0.3	0	1000	80986.39	4148249.2
112	113	0.1	0.4	1000	61004.78	3239829.6	-0.3	0	1000	76667.12	4224916.3
113	114	0.1	0.5	1000	61718.33	3301548	-0.3	0	1000	77162.94	4302079.3
114	115	0.1	0.6	1000	63824.45	3365372.4	-0.3	0	1000	79537.43	4381616.7
115	116	0.18	0.32	1000	61723.05	3427095.5	-0.3	0	1000	76921.54	4458538.2
116	117	0.17	0.33	1000	62988.87	3490084.3	-0.3	0	1000	78707.26	4537245.5
117	118	0.1	0.4	1000	63422.72	3553507.1	-0.3	0	1000	79130.93	4616376.4

Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty
118	119.17	0.1	0.6	1000	70078.17	3623585.2	-0.3	0	1000	87337.98	4703714.4
Total				90925	3623585.2		Total		109520	4703714.4	

Table 29 - Minimum & Maximum depth per km wise (Class III)

Class - IV:-

Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
0	1	2	11	0	0	0	2	9.8	0	0	0
1	2	1.47	6.23	1000	1785.56	1785.56	0.15	3.14	1000	17546.44	17546.44
2	3	1	7.8	1000	3062.1	4847.66	0.2	6.5	1000	29084.36	46630.8
3	4	1.3	7.8	400	594.88	5442.54	0.6	4.9	1000	12105.26	58736.06
4	5	1	9.2	260	437.92	5880.46	0.5	7.9	1000	9715.96	68452.02
5	6	1.34	9.46	1000	1167.49	7047.95	0.13	6.98	1000	37025.91	105477.93
6	7	1.1	8.5	1000	1357.65	8405.6	0.7	3.2	1000	5785.56	111263.49
7	8	1.2	6.4	500	645.38	9050.98	0.1	4.2	1000	33862.75	145126.24
8	9	2	5.2	550	591.96	9642.94	1	3.2	1000	10546.86	155673.1
9	10	2.14	6.16	0	0	9642.94	1.12	4.12	1000	12748.53	168421.63
10	11	1.61	5.29	1000	2456.19	12099.13	1.19	3.2	1000	13221.3	181642.93
11	12	0.9	4.7	1000	2708.28	14807.41	0.4	3.6	1000	25944.77	207587.7
12	13	0.5	5.6	1000	3920.87	18728.28	0.2	4.6	1000	16942.11	224529.81
13	14	0.9	4.1	1000	1330.87	20059.15	0.3	3.2	1000	16241.32	240771.13
14	15	1.27	4.73	1000	4780.9	24840.05	0.82	3.25	1000	37512.88	278284.01
15	16	0.6	5.1	1000	2821.91	27661.96	0.2	4.2	1000	14250.36	292534.37
16	17	0.9	7.1	1000	2670.94	30332.9	0.3	5.6	1000	21294.33	313828.7
17	18	0.1	5.9	1000	1956.71	32289.61	0.1	4.9	1000	23991.63	337820.33
18	19	1.14	5.06	1000	6674.85	38964.46	0.72	4.38	1000	29857.11	367677.44
19	20	0.9	4.5	1000	6879.93	45844.39	0.3	3.7	1000	21182.5	388859.94
20	21	0.7	4.7	1000	1591.03	47435.42	0.2	4.3	1000	9004.02	397863.96
21	22	0.9	5.4	1000	5733.91	53169.33	0.4	4.8	1000	38345.15	436209.11
22	23	2.04	5.86	100	5.6	53174.93	1.39	4.76	1000	2510.43	438719.54
23	24	2.01	8.79	1000	2068.68	55243.61	1.19	7.29	1000	9116.01	447835.55
24	25	0.9	4.4	1000	3537.51	58781.12	0.2	3.6	1000	8911.74	456747.29
25	26	1	3.2	1000	763.58	59544.7	0.3	3.2	1000	24925.76	481673.05
26	27	1	2.5	1000	8657.25	68201.95	0.4	2.2	1000	52953.46	534626.51
27	28	0.6	4	1000	21073.68	89275.63	-0.3	3.8	1000	69456.46	604082.97
28	29	0.3	7.6	1000	7373.35	96648.98	0.2	6.5	1000	28344.17	632427.14
29	30	0.74	6.56	1000	3441.42	100090.4	-0.3	0.06	1000	8539.22	640966.36
30	31	1.01	9.29	1000	7980.71	108071.11	0.9	8.41	1000	19005.18	659971.54
31	32	0.8	9	1000	15951.99	124023.1	-0.3	8.4	1000	33378.75	693350.29
32	33	0.6	6.3	1000	4384.01	128407.11	0.4	5.6	1000	8738.38	702088.67

Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
33	34	0.3	5.7	1000	6685.58	135092.69	0.3	4.8	1000	9438.24	711526.91
34	35	2.17	5.63	1000	3200.06	138292.75	1.12	5.61	1000	8945.31	720472.22
35	36	0.1	6	1000	2072.92	140365.67	-0.3	6.2	1000	1957.07	722429.29
36	37	0.6	4	1000	10717.9	151083.57	0.4	4.2	1000	11784.44	734213.73
37	38	0.8	5.2	1000	6325.6	157409.17	0.5	5.5	1000	5465.04	739678.77
38	39	0.84	6.86	1000	22208.06	179617.23	0.81	5.08	1000	25981.75	765660.52
39	40	0.5	7.1	1000	47778.31	227395.54	0.3	4.2	1000	56464.01	822124.53
40	41	0.1	5.2	1000	67451.01	294846.55	-0.3	4.9	1000	77725.2	899849.73
41	42	0.3	3.5	1000	69439.46	364286.01	0.2	3.3	1000	76597.25	976446.98
42	43	0.4	5.8	1000	69891.04	434177.05	0.1	5.6	1000	78581.37	1055028.4
43	44	0.2	5	1000	74178.83	508355.88	0.2	4.2	1000	85306.59	1140334.9
44	45	0.67	4.43	1000	43148.34	551504.22	0.41	3.85	1000	49567.39	1189902.3
45	46	0.5	4.9	1000	23879.71	575383.93	0.3	4.7	1000	27341.83	1217244.2
46	47	0.2	4.6	1000	28747.71	604131.64	0.2	4.5	1000	33629.7	1250873.9
47	48	0.3	5.2	1000	30846.7	634978.34	0.3	4.9	1000	36029.03	1286902.9
48	49	0.74	3.66	1000	31035.87	666014.21	0.42	3.48	1000	35702.22	1322605.1
49	50	0.4	3.6	1000	25288.94	691303.15	0.2	3.7	1000	29876.5	1352481.6
50	51	0.3	4.3	1000	32691.96	723995.11	0.3	4.3	1000	37878.58	1390360.2
51	52	0.8	4.4	1000	35335.34	759330.45	0.4	3.9	1000	44285.35	1434645.5
52	53	0.74	4.56	1000	26897.05	786227.5	0.44	4.36	1000	34042.65	1468688.2
53	54	0.41	3.19	1000	44799.6	831027.1	0.24	3.09	1000	54958.22	1523646.4
54	55	0.2	2.5	1000	60311.74	891338.84	0.25	2.3	1000	70556.79	1594203.2
55	56	0.1	2.1	1000	67822.04	959160.88	0.1	1.8	1000	80537.38	1674740.6
56	57	0.2	3	1000	73797.13	1032958	0.2	2.8	1000	83848.7	1758589.3
57	58	0.3	2.7	1000	70267.94	1103226	0.3	2.5	1000	82464.65	1841053.9
58	59	0.2	1.9	1000	70796.74	1174022.7	-0.3	1.7	1000	86122.51	1927176.4
59	60	0.44	1.76	1000	74399.6	1248422.3	0.24	1.16	1000	87318.1	2014494.5
60	61	0.41	2.99	1000	62338.84	1310761.1	0.21	2.79	1000	76605.67	2091100.2
61	62	0.5	2.9	1000	64963.05	1375724.2	-0.3	2.5	1000	77741.39	2168841.6
62	63	0.1	2.7	1000	61417.9	1437142.1	-0.3	1.9	1000	75333.85	2244175.5
63	64	0.1	3.2	1000	62348.21	1499490.3	-0.3	3	1000	77168.7	2321344.2
64	65	0.2	2	1000	57281.38	1556771.7	-0.3	1.5	1000	71370.1	2392714.3
65	66	0.17	0.53	1000	76679.26	1633450.9	-0.3	0.01	1000	90431.69	2483145.9
66	67	0.1	1.1	1000	111769.17	1745220.1	-0.3	0.2	1000	132451.68	2615597.6
67	68	0.1	0.7	1000	107372.3	1852592.4	-0.3	0.1	1000	127238.42	2742836
68	69	0.1	1.1	1000	116621.19	1969213.6	-0.3	0.2	1000	137445.79	2880281.8

Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
69	70	0.34	0.66	1000	115784.29	2084997.9	-0.3	0.02	1000	136356.83	3016638.7
70	71	0.1	0.8	1000	113098.08	2198096	-0.3	0.1	1000	133331.46	3149970.1
71	72	0.1	1.2	1000	113518.08	2311614	-0.3	0.2	1000	133878.3	3283848.4
72	73	0.1	0.7	1000	117836.57	2429450.6	-0.3	0.1	1000	138780.4	3422628.8
73	74	0.14	0.36	1000	113968.58	2543419.2	-0.3	0.02	1000	134551.25	3557180.1
74	75	0.01	0.39	1000	112796.1	2656215.3	-0.3	0.03	1000	133054.28	3690234.4
75	76	0.1	0.8	1000	111106.1	2767321.4	-0.3	0.1	1000	131189.46	3821423.8
76	77	0.1	1.1	1000	106670.09	2873991.5	-0.3	0.2	1000	126423.74	3947847.6
77	78	0.1	0.9	1000	110912.81	2984904.3	-0.3	0.1	1000	131775.44	4079623
78	79	0.1	0.9	1000	115095.25	3099999.5	-0.3	0.2	1000	135827.59	4215450.6
79	80	0.1	0.9	1000	108808.7	3208808.2	-0.3	0.1	1000	129296.15	4344746.7
80	81	0.14	0.56	1000	96889.21	3305697.5	-0.3	0.02	1000	114927.33	4459674.1
81	82	0.01	0.39	1000	112567.1	3418264.6	-0.3	0.03	1000	132822.81	4592496.9
82	83	0.1	0.6	1000	108773.24	3527037.8	-0.3	0.1	1000	128403.08	4720900
83	84	0.1	1.2	1000	97752.29	3624790.1	-0.3	0.2	1000	114873.66	4835773.6
84	85	0.1	1.1	1000	81486.83	3706276.9	-0.3	0.2	1000	95769.82	4931543.4
85	86	0.1	0.9	1000	96458.29	3802735.2	-0.3	0.1	1000	113370.43	5044913.9
86	87	0.17	0.53	1000	87938.59	3890673.8	-0.3	0.01	1000	103376.59	5148290.5
87	88	0.1	1.1	1000	68960.49	3959634.3	-0.3	0.2	1000	80966.38	5229256.8
88	89	0.2	1	1000	116198.84	4075833.1	-0.3	0.1	1000	136437.22	5365694.1
89	90	0.1	1	1000	90246.34	4166079.5	-0.3	0.2	1000	105927.87	5471621.9
90	91	0.14	0.46	1000	100381.28	4266460.7	-0.3	0.02	1000	118085.06	5589707
91	92	0.1	0.6	1000	91180.4	4357641.1	-0.3	0.1	1000	107234.28	5696941.3
92	93	0.1	1	1000	83830.53	4441471.7	-0.3	0.2	1000	98423.32	5795364.6
93	94	0.1	0.8	1000	105093.61	4546565.3	-0.3	0.1	1000	123494.62	5918859.2
94	95	0.14	0.46	1000	94222.06	4640787.3	-0.3	0.02	1000	110714.7	6029573.9
95	96	0.21	0.69	1000	101923.46	4742710.8	-0.3	0.03	1000	119820.59	6149394.5
96	97	0.1	0.8	1000	104666.27	4847377.1	-0.3	0.1	1000	122983.92	6272378.4
97	98	0.1	1.1	1000	113185.68	4960562.8	-0.3	0.2	1000	132935.45	6405313.9
98	99	0.1	0.7	1000	82902.21	5043465	-0.3	0.1	1000	97354.18	6502668
99	100	0.1	0.8	1000	110639.93	5154104.9	-0.3	0.2	1000	130015.84	6632683.9
100	101	0.1	0.6	1000	105328.33	5259433.2	-0.3	0.1	1000	123771.63	6756455.5
101	102	0.14	0.46	1000	100548.01	5359981.2	-0.3	0.02	1000	118206.04	6874661.6
102	103	0.21	0.89	1000	103929.74	5463911	0.2	0.03	1000	122128.46	6996790
103	104	0.2	3.5	1000	99074.01	5562985	0.2	0.1	1000	116632.93	7113422.9
104	105	0.1	2.5	1000	100026.15	5663011.1	0.1	0.2	1000	119126.06	7232549

Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
105	106	0.1	1.2	1000	106648.47	5769659.6	-0.3	0.2	1000	123545.33	7356094.3
106	107	0.1	0.6	1000	114788.14	5884447.7	-0.3	0.1	1000	133543.49	7489637.8
107	108	0.17	0.23	1000	102230.52	5986678.3	-0.3	0.01	1000	120193.58	7609831.4
108	109	0.1	0.9	1000	105589.93	6092268.2	-0.3	0.2	1000	124135.12	7733966.5
109	110	0.1	0.7	1000	111033.64	6203301.8	-0.3	0.1	1000	130566.39	7864532.9
110	111	0.1	1.1	1000	233141.82	6436443.7	-0.3	0.2	1000	274118.64	8138651.6
111	112	0.14	0.56	1000	118556.83	6555000.5	-0.3	0.02	1000	139338.29	8277989.8
112	113	0.1	0.6	1000	112934.65	6667935.1	-0.3	0.1	1000	133039.67	8411029.5
113	114	0.1	0.9	1000	113390.41	6781325.5	-0.3	0.2	1000	133410.82	8544440.3
114	115	0.1	0.8	1000	116398.91	6897724.5	-0.3	0.1	1000	136768.34	8681208.7
115	116	0.14	0.36	1000	112587.6	7010312.1	-0.3	0.02	1000	132289.76	8813498.4
116	117	0.11	0.39	1000	115329.15	7125641.2	-0.3	0.03	1000	135588.52	8949087
117	118	0.1	0.6	1000	115971.24	7241612.4	-0.3	0.1	1000	136334.68	9085421.6
118	119.17	0.1	1	1000	127826.44	7369438.9	-0.3	0.2	1000	150200.32	9235622
Total				113810	7369438.9		Total		118000	9235622	

Table 30- Minimum & Maximum depth per km wise (Class IV)

Annexure-2.1: Min. / max. Depth, length of shoal per km-wise for different classification in the designed dredged channel (Link of Dwarka River-Secondary Channel):-

Class-I:

Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
0	1	0.6	4	1000	6222.26	6222.26	0.2	4.8	1000	13423.4	13423.4
1	2	0.7	5.6	1000	3969.3	10191.56	0.6	4.9	1000	6273.52	19696.92
2	3	0.8	13.7	1000	7330.49	17522.05	0.3	11.9	1000	9647.02	29343.94
3	4	0.5	4.5	360	363.29	17885.34	0.3	2.6	350	563.13	29907.07
4	5	0.6	5.2	350	499.03	18384.37	0.2	4.2	1000	2100.15	32007.22
5	6	0.7	5	150	110.65	18495.02	0.5	3.6	750	869.7	32876.92
6	7.26	0.5	5.3	1000	2977.59	21472.61	0.3	3.5	1000	7106.7	39983.62
Total				4860	21472.61		Total		6100	39983.62	

Table 31 - Dredging Quantity per km at link of Dwarka River -Class-I

Class-II:

Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
0	1	0.59	4.01	1000	11070.82	11070.82	0.19	4.81	1000	23234.35	23234.35
1	2	0.6	5.7	1000	6532.32	17603.14	0.5	5	1000	10875.98	34110.33
2	3	0.78	13.72	1000	11431.77	29034.91	0.28	11.92	1000	14856.04	48966.37
3	4	0.4	4.6	1000	2287.34	31322.25	0.2	2.7	1000	4526.24	53492.61
4	5	0.58	5.22	1000	2857.52	34179.77	0.18	4.22	1000	7257.82	60750.43
5	6	0.6	5.1	1000	1739.17	35918.94	0.4	3.7	1000	5259.3	66009.73
6	7.26	0.48	5.32	1000	8122.97	44041.91	0.28	3.52	1000	16218.03	82227.76
Total				7000	44041.91		Total		7000	82227.76	

Table 32- Dredging Quantity per km at link of Dwarka River -Class-II

Class-III:

Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
0	1	0.58	4.02	1000	22488.17	22488.17	0.18	4.82	1000	42048.5	42048.5
1	2	0.5	5.8	1000	12364.82	34852.99	0.4	5.1	1000	22821.5	64870
2	3	0.76	13.74	1000	18641.65	53494.64	0.26	11.94	1000	25436.89	90306.89
3	4	0.3	4.7	1000	10298.66	63793.3	0.1	2.8	1000	18282.53	108589.42
4	5	0.56	5.24	1000	10566.7	74360	0.16	4.24	1000	24163.51	132752.93
5	6	0.5	5.2	1000	9603.51	83963.51	0.3	3.8	1000	19361.68	152114.61
6	7.26	0.46	5.34	1000	20597.34	104560.85	0.26	3.54	1000	35355.38	187469.99
Total				7000	104560.85		Total		7000	187469.99	

Table 33-Dredging Quantity per km at link of Dwarka River -Class-III

Class-IV:

Chainage (km)		Observed Dredging Qty. w.r.t Sounding Datum					Reduced Dredging Qty. w.r.t Sounding Datum				
From	To	Min. depth (m)	Max. depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Cumulative Dredging Qty (cu.m.)
0	1	0.57	4.03	1000	32420.84	32420.84	0.17	4.83	1000	57367.94	57367.94
1	2	0.4	5.9	1000	17893.58	50314.42	0.3	5.2	1000	33712.81	91080.75
2	3	0.74	13.76	1000	23729.95	74044.37	0.24	11.96	1000	34221.82	125302.57
3	4	0.2	4.8	1000	15448.97	89493.34	-0.3	2.9	1000	26937.21	152239.78
4	5	0.54	5.26	1000	17483.74	106977.08	0.14	4.26	1000	36905.85	189145.63
5	6	0.4	5.3	1000	15582.11	122559.19	0.2	3.9	1000	29836.86	218982.49
6	7.26	0.44	5.36	1000	30176.43	152735.62	0.24	3.56	1000	48630.13	267612.62
Total				7000	152735.62		Total		7000	267612.62	

Table 34-Dredging Quantity per km at link of Dwarka River -Class-IV

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

Date	Tide Pole name	Chainage (km)	Time	T. Reading	Zero of TP w.r.t. MSL (m)	W.L w.r.t. MSL (m)	SD value w.r.t M.S.L	Corrected Tide (m)
				A	B	C = A+B	D	E = D-C
	GS-10/ZZB	118.5	24 hrs	0.25	23.360	23.61	23.31	-0.3
	GS-10/ZZA	117.5	24 hrs	0.25	22.850	23.1	22.8	-0.3
	GS-10/ZZ	116.5	24 hrs	0.27	22.700	22.97	22.67	-0.3
	GS-10/ZY	115.5	24 hrs	0.31	21.930	22.24	21.94	-0.3
	GS-10/ZX	114.5	24 hrs	0.33	21.870	22.2	21.9	-0.3
	GS-10/ZW	113.5	24 hrs	0.35	21.820	22.17	21.87	-0.3
	GS-10/ZV	112.5	24 hrs	0.37	21.440	21.81	21.51	-0.3
	GS-10/ZU	111.5	24 hrs	0.39	20.510	20.9	20.6	-0.3
	GS-10/ZT	110.5	24 hrs	0.41	20.130	20.54	20.24	-0.3
	GS-10/ZS	109.5	24 hrs	0.43	19.990	20.42	20.12	-0.3
	GS-10/ZR	108.5	24 hrs	0.45	19.660	20.11	19.81	-0.3
	GS-10/ZQ	107.5	24 hrs	0.47	19.550	20.02	19.72	-0.3
	GS-10/ZP	106.5	24 hrs	0.49	19.210	19.7	19.4	-0.3
	GS-10/ZO	105.5	24 hrs	0.51	18.940	19.45	19.15	-0.3
	GS-10/ZN	104.5	24 hrs	0.53	18.770	19.3	19	-0.3
	GS-10/ZM	103.5	24 hrs	0.55	18.670	19.22	18.92	-0.3
	GS-10/ZL	102.5	24 hrs	0.57	18.450	19.02	18.72	-0.3
	GS-10/ZK	101.5	24 hrs	0.59	17.940	18.53	18.23	-0.3
	GS-10/ZJ	100.5	24 hrs	0.61	17.670	18.28	17.98	-0.3
	GS-10/ZI	99.5	24 hrs	0.63	17.420	18.05	17.75	-0.3
	GS-10/ZH	98.5	24 hrs	0.65	17.320	17.97	17.67	-0.3
	GS-10/ZG	97.5	24 hrs	0.67	17.130	17.8	17.5	-0.3
	GS-10/ZF	96.5	24 hrs	0.69	16.730	17.42	17.12	-0.3
	GS-10/ZE	95.5	24 hrs	0.71	16.500	17.21	16.91	-0.3
	GS-10/ZD	94.5	24 hrs	0.73	16.180	16.91	16.61	-0.3
	GS-10/ZC	93.5	24 hrs	0.75	16.010	16.76	16.46	-0.3
	GS-10/ZB	92.5	24 hrs	0.77	15.820	16.59	16.29	-0.3
	GS-10/ZA	91.5	24 hrs	0.79	15.640	16.43	16.13	-0.3
	GS-10/Z	90.5	24 hrs	0.81	15.500	16.31	16.01	-0.3
	GS-10/Y	89.5	24 hrs	0.83	15.270	16.1	15.8	-0.3
	GS-10/X	88.5	24 hrs	0.85	14.950	15.8	15.5	-0.3
	GS-10/W	87.5	24 hrs	0.87	14.750	15.62	15.32	-0.3
	GS-10/V	86.5	24 hrs	0.89	14.690	15.58	15.28	-0.3
	GS-10/U	85.5	24 hrs	0.91	14.310	15.22	14.92	-0.3
	GS-10/T	84.5	24 hrs	0.93	14.210	15.14	14.84	-0.3

Date	Tide Pole name	Chainage (km)	Time	T. Reading	Zero of TP w.r.t. MSL (m)	W.L w.r.t. MSL (m)	SD value w.r.t M.S.L	Corrected Tide (m)
	GS-10/S	83.5	24 hrs	0.95	14.100	15.05	14.75	-0.3
	GS-10/R	82.5	24 hrs	0.97	13.220	14.19	13.89	-0.3
	GS-10/Q	81.5	24 hrs	0.99	13.160	14.15	13.85	-0.3
	GS-10/P	80.5	24 hrs	1.01	13.092	14.102	13.802	-0.3
	GS-10/O	79.5	24 hrs	1.03	13.046	14.076	13.776	-0.3
	GS-10/N	78.5	24 hrs	1.05	12.995	14.045	13.745	-0.3
	GS-10/M	77.5	24 hrs	1.07	12.950	14.02	13.72	-0.3
	GS-10/L	76.5	24 hrs	1.09	12.870	13.96	13.66	-0.3
	GS-10/K	75.5	24 hrs	1.11	12.777	13.887	13.587	-0.3
	GS-10/J	74.5	24 hrs	1.13	12.710	13.84	13.54	-0.3
	GS-10/I	73.5	24 hrs	1.15	12.640	13.79	13.49	-0.3
	GS-10/H	72.5	24 hrs	1.17	12.609	13.779	13.479	-0.3
	GS-10/G	71.5	24 hrs	1.19	12.578	13.768	13.468	-0.3
	GS-10/F	70.5	24 hrs	1.21	12.549	13.759	13.459	-0.3
	GS-10/E	69.5	24 hrs	1.23	12.512	13.742	13.442	-0.3
	GS-10/D	68.5	24 hrs	1.25	12.483	13.733	13.433	-0.3
	GS-10/C	67.5	24 hrs	1.27	12.455	13.725	13.425	-0.3
	GS-10/B	66.5	24 hrs	1.29	12.423	13.713	13.413	-0.3
	GS-10/A	65.5	24 hrs	1.31	12.400	13.71	13.41	-0.3
	GS-10	65	24 hrs	1.33	12.230	13.56	13.351	-0.209
01.01.16	GS-4	62.455	24 hrs	1.35	11.935	13.285	13.157	-0.128
01.01.16	GS-3	49.889	24 hrs	1.37	10.795	12.165	12.197	0.032
02.01.16	GS-6	49.821	24 hrs	1.39	10.768	12.158	12.192	0.034
02.01.16	GS-5	34.1	24 hrs	1.41	10.425	11.835	10.991	-0.844
03.11.15	GS-9	33.97	24 hrs	1.43	10.390	11.82	10.981	-0.839
04.11.15	GS-8	24.321	24 hrs	1.45	9.793	11.243	10.224	-1.019
03.09.15	GS-2	11.318	24 hrs	1.47	9.155	10.625	9.215	-1.41
04.11.15	GS-7	11.265	24 hrs	1.49	9.130	10.62	9.247	-1.373
03.09.15	GS-1	0.132	24 hrs	1.51	7.990	9.5	8.396	-1.104

Table 35- Details of Collected water level at different gauge stations

Annexure-3.1: 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	Zero of TP w.r.t. MSL (m)	W.L w.r.t. MSL (m)	SD value (m)	Corrected Tide (m)
				A	B	C = A+B	D	E = D-C
03.11.15	GS-11	2.8	24 hrs	0.28	10.82	11.100	10.451	-0.649

Table 36- Details of Collected water level at different gauge stations at link of Dwarka River (Secondary table)

Annexure-4: Details of Bathymetric surveys carried out:-

The Bathymetry survey was not carried out from Chainage 28.600 km to Chainage 30.00 km, Chainage 64.822 km to Chainage 102.809 km, Chainage 105.00 km to Chainage 119.165 km due to insufficient layer of water.

Date of Survey	Type of survey	Chainage	
		From (km)	To (km)
03.09.15	Bathymetry Survey	0.000	13.170
04.11.15	Bathymetry Survey	13.170	28.00
03.11.15	Bathymetry Survey	28.00	28.500
02.01.16	Bathymetry Survey	30.00	49.780
01.01.16	Bathymetry Survey	49.780	64.822
30.10.15	Bathymetry Survey	102.810	105.00

Table 37- Details of Bathymetry survey

Date of Survey	Type of survey	Chainage	
		From (km)	To (km)
03.11.15	Bathymetry Survey	0.000	7.261

Table 38- Details of Bathymetry survey at link of Dwarka River (Secondary table)

Annexure-5: Bank Protection along the Bank:-

The bank of the river includes with villages, Roads, Ferry Ghats, Jetty, electric lines, RCC and Rail Bridges etc. RCC, Rail Bridge are highly protected by concrete pitching. Most of the river stretches are protected by long embankments and Boulder pitching.The Bank of the River Dwarka has been affected by floods, sometimes it become dangerous during the monsoon. As a result, the lower portion or the bank side villages are flooded.

Annexure-6: Details of Features across the Bank:-

The bank of the river Dwarka includes with villages, Ferry ghat, Irrigation canals and outlets, Rail Bridges, RCC Bridges, electric lines etc. The both side river bank are highly protected by embankment and bolder pitching due to flood, erosion etc. The villagers are also situated near the bank side of the river. Recently different kinds of industries are also located near the bank side of the river. Paddy lands, forest side are located in this zone of river. Salar, Chougacha, Tarapith Road etc. Railway station is situated in this zone of river. NH-34, NH-60 are located in this zone of river and SH-6, SH-7, SH-11 etc. helps a well communication system in this zone of river.

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

- **Establishment of Horizontal Control:-**

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

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

- **Establishment of Vertical Control:-**

  Vertical control from NBM-C-27 is used for the entire survey work. Its value is 14.971 meter w.r.t. MSL has been considered for calculating the vertical levels. Total 14 no. BM was established along the 135.165 km Dwarka River with the reference of NBM-C-27 which is situated near Kalayanpur Ghat beside the Bhagirathi River.

Topography Survey:-

The survey was commenced on 22nd August, 2015 and completed on 4th September, 2015. Then the days were summer season and arrival of autumn season. The climate become normal which reached about 30◦ C. Mostly day weather was sunny and was very favorable for the conduct of survey and the weather condition remains same for the entire duration of the survey.

The survey was undertaken as per the line plan provided and the spot level points in the cross line were spaced at 40 m interval. The plotting of the chart was done on UTM Projection at Zone 45 N as directed in the contract specifications. The spot levels along the river were obtained by using Trimble DGPS. The data was post processed using Trimble Business Center to get the precise position and MSL height values of the rover locations. The topographic survey for the entire survey stretch was conducted to collect the following data:-

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

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

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

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

Figure 33- Topography Survey Instruments

- **Bathymetry Survey:-**

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

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

Figure 34- Bathymetry Survey Instruments

Annexure-8: Photographs of Equipment:-

Following equipment was employed for the bathymetric and topographic survey:-

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

- **Survey vessel :-**

Figure 35- Survey Vessel

- **Positioning System:-**

- 1 no Trimble DGPS system (SPS361)

Figure 36- DGPS Survey Instrument

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

- To provide on-line route guidance, log navigation data, provide QC of navigation data, etc. The system comprises the following equipment:
- 1 no. DELL Laptop
- 1 no. Hypack version 2014 Navigation & Data Logging Software
- 1 no. Positioning & sensor interfaces
- Sufficient Paper Rolls

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

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

Figure 37- Echo Sounder Instrument

- **Current Meter:-**

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

Figure 38- Current Meter Reading

- **Calibration:-**

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

Annexure-9: Bench Mark Forms:-

BM Name	Northing (m)	Easting (m)	B.M Height above M.S.L (m)	Latitude (N)	Longitude (E)	B.M Height above S.D (m)
BM-1	2625038.458	620145.573	12.903	23°43'54.722"	88°10'43.527"	4.507

Pillar Established by: - B.S.Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment: 24.08.15

Station Description :-

Benchmark - 1 is located at Kalyanpur Ghat in Maugram village area on the right side of the river and Char Narayanpur village is located in left side of the river. The Nearest road is 14 meter away from the BM-1.

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 grounlevel. Inscription "IWAI", and BM-1 No. can be seen on the face of the pillar.

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

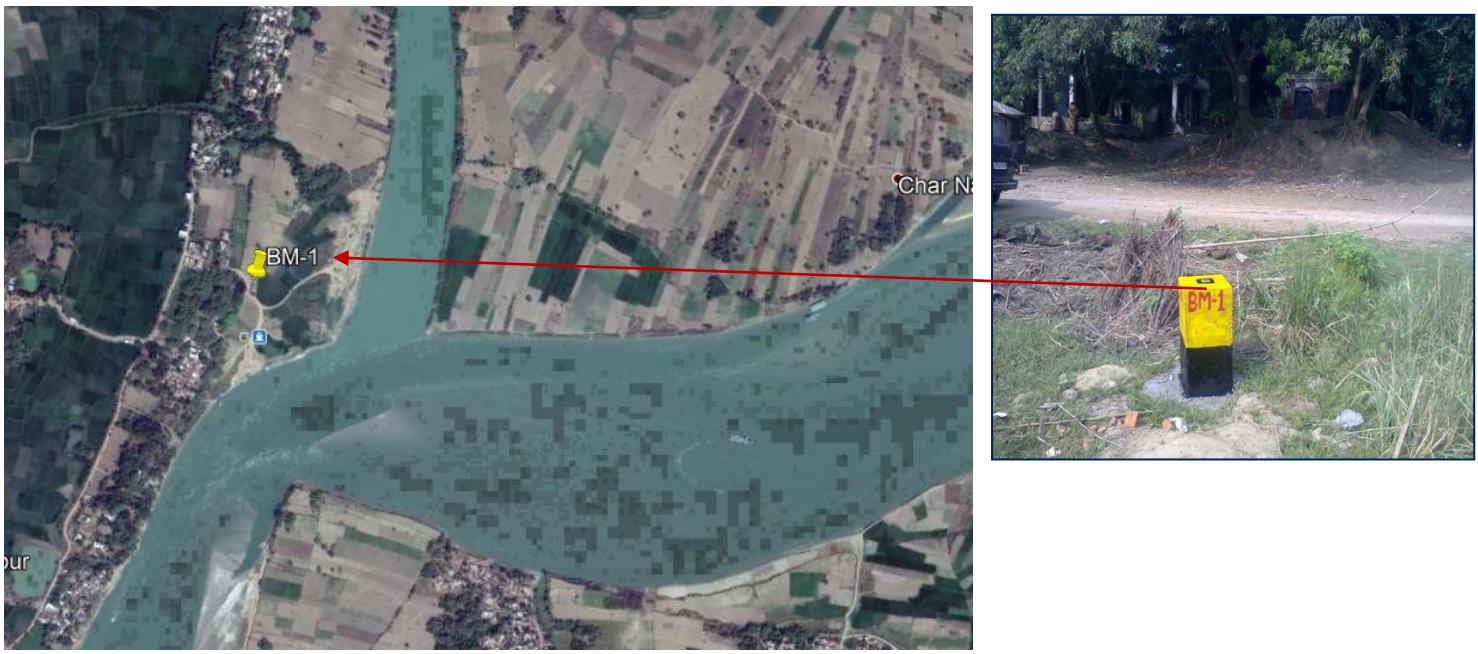


Figure 39- BM Form & Google image view of BM-1

BM Name	Northing (m)	Easting (m)	B.M Height above M.S.L (m)	Latitude (N)	Longitude (E)	B.M Height above S.D (m)
BM-2	2633631.736	620531.684	14.600	23°48'33.987"	88°10'59.689"	5.385

Pillar Established by: - B.S.Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment: 24.08.15

Station Description :-

Benchmark is located near beside Boratay Ghat. The Bench mark is on the west portion of the river. The Nearest village is Sharmastapur 1.3 km., railway station is Tenya 3.77 km. and nearest road is 3.85 km away from BM-2. One Railway bridge is located between BM-2 and BM-3 near Haranandpur towards Azimgunge

The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cm X 30cm X 150cm.The pillar extends 60.cms above ground level. Inscription "IWAI", and BM-2 No. can be seen on the face of the pillar.

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

Figure 40- BM Form & Google image view of BM-2

BM Name	Northing (m)	Easting (m)	B.M Height above M.S.L (m)	Latitude (N)	Longitude (E)	B.M Height above S.D (m)
BM-3	2642161.236	619764.381	18.097	23°53'11.489"	88°10'35.079"	7.873

Pillar Established by: - B.S.Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment: 25.08.15

Station Description :-

Benchmark is located near Ghoshkura Village west side of the river and another village Lohadaga is located 330meter in south-east from the BM-3. The Bench mark is on the west portion of the river.

The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.The pillar extends 60.cms above ground level. Inscription "IWAI", and BM-3 No. can be seen on the face of the pillar.

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

Figure 41- BM Form & Google image view of BM-3

BM Name	Northing (m)	Easting (m)	B.M Height above M.S.L (m)	Latitude (N)	Longitude (E)	B.M Height above S.D (m)
BM-4	2649047.6841	618551.3548	19.367	23°56'55.692"	88°9'54.198"	8.386

Pillar Established by: - B.S.Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment: 25.08.15

Station Description :-

Benchmark is located near Hijal village, beside Mud Road. The Bench mark is on the west portion of the river.

The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.The pillar extends 60.cms above ground level. Inscription "IWAI", and BM-4 No. can be seen on the face of the pillar.

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

Figure 42-BM Form & Google image view of BM-4

BM Name	Northing (m)	Easting (m)	B.M Height above M.S.L (m)	Latitude (N)	Longitude (E)	B.M Height above S.D (m)
BM-5	2653926.001	616639.784	16.470	23°59'11.489"	88°8'34.794"	4.682

Pillar Established by: - B.S.Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment – 27.08.15

Station Description :-

Benchmark is located in paddy land and the surrounding area is agriculture land, it located on west portion of the river. The nearest mud road is 1.2 km. meter away and it located in south side of the BM-5. NH-11 is 6.88 km. far from BM-3.

The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.The pillar extends 60.cms above ground level. Inscription "IWAI", and BM-5 No. can be seen on the face of the pillar.

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

Figure 43-BM Form & Google image view of BM-5

BM Name	Northing (m)	Easting (m)	B.M Height above M.S.L (m)	Latitude (N)	Longitude (E)	B.M Height above S.D (m)
BM-6	2655591.635	613311.876	16.89	23°53'11.489"	88°10'35.079"	4.698

Pillar Established by: - B.S.Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment – 28.08.15

Station Description :-

Benchmark is located near Indrahata village. The Bench mark is situated west portion of the river and nearest location is 60meter away from the BM-6.

The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.The pillar extends 60.cms above ground level. Inscription "IWAI", and BM-6 No. can be seen on the face of the pillar.

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

Figure 44-BM Form & Google image view of BM-6

BM Name	Northing (m)	Easting (m)	B.M Height above M.S.L (m)	Latitude (N)	Longitude (E)	B.M Height above S.D (m)
BM-7	2660879.951	608811.161	19.435	24°3'22.872"	88°4'12.832"	6.283

Pillar Established by: - B.S.Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment – 28.08.15

Station Description :-

Benchmark is located near Rameswar Ghat beside the Rameswar pur Village. The Bench mark is on the East portion of the river.

The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.The pillar extends 60.cms above ground level. Inscription "IWAI", and BM-7 No. can be seen on the face of the pillar.

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

Figure 45-BM Form & Google image view of BM-7

BM Name	Northing (m)	Easting (m)	B.M Height above M.S.L (m)	Latitude (N)	Longitude (E)	B.M Height above S.D (m)
BM-8	2664387.056	608653.708	25.53	24°5'16.928"	88°4'8.203"	12.105

Pillar Established by: - B.S.Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment: 29.08.15

Station Description :-

Benchmark is located near beside the Gentla Ghat Road, Surkhali village, The Bench mark is on the North portion of the river.

The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cm X 30cm X 150 cm. The pillar extends 60.cms above ground level. Inscription "IWAI", and BM-8 No. can be seen on the face of the pillar.

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

Figure 46- BM Form & Google image view of BM-8

BM Name	Northing (m)	Easting (m)	B.M Height above M.S.L (m)	Latitude (N)	Longitude (E)	B.M Height above S.D (m)
BM-9	2671961.332	603345.979	27.650	24°9'2.188"	88°1'24.454"	10.981

Pillar Established by: - B.S.Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment: 29.08.15

Station Description :-

Benchmark is located near Sako Ghat village, beside Sankor Ghat Bus Stop. The Bench mark is on the North portion of the river.

The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.The pillar extends 60.cms above ground level. Inscription "IWAI", and BM-9 No. can be seen on the face of the pillar.

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

Figure 47-BM Form & Google image view of BM-9

BM Name	Northing (m)	Easting (m)	B.M Height above M.S.L (m)	Latitude (N)	Longitude (E)	B.M Height above S.D (m)
BM-10	2671764.626	597036.042	19.865	24°9'19.504"	87°57'18.566"	3.776

Pillar Established by: - B.S.Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment: 30.08.15

Station Description :-

Benchmark is located beside Pipe Culvert Bridge. The Bench mark is on the north of the river.

The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.The pillar extends 60.cms above ground level. Inscription "IWAI", and BM-10 No. can be seen on the face of the pillar.

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

Figure 48-BM Form & Google image view of BM-10

BM Name	Northing (m)	Easting (m)	B.M Height above M.S.L (m)	Latitude (N)	Longitude (E)	B.M Height above S.D (m)
BM-11	2668898.082	591750.151	27.049	24°7'11.489"	87°54'10.619"	8.288

Pillar Established by: - B.S.Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment – 01.09.15

Station Description :-

Benchmark is located near Benchmark is located beside the Bishnupur Road RCC Bridge. The Bench mark is on the south of the river.

The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm. The pillar extends 60.cms above ground level. Inscription "IWAI", and BM-11 No. can be seen on the face of the pillar.

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

Figure 49-BM Form & Google image view of BM-11

BM Name	Northing (m)	Easting (m)	B.M Height above M.S.L (m)	Latitude (N)	Longitude (E)	B.M Height above S.D (m)
BM-12	2668557.667	583573.92	29.038	24°7'20.897"	87°49'38.017"	7.129

Pillar Established by: - B.S.Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment – 01.09.15

Station Description :-

Benchmark is located near Ranapur village, beside Mud Road. The Bench mark is on the south of the road.

The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.The pillar extends 60.cms above ground level. Inscription "IWAI", and BM-12 No. can be seen on the face of the pillar.

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

Figure 50-BM Form & Google image view of BM-12

BM Name	Northing (m)	Easting (m)	B.M Height above M.S.L (m)	Latitude (N)	Longitude (E)	B.M Height above S.D (m)
BM-13	2667621.588	581386.405	26.528	24°7'7.995"	87°48'3.213"	3.218

Pillar Established by: - B.S.Geotech Pvt. Ltd. Surveyor – Mr. Bimal Das
Date of Establishment – 02.09.15

Station Description :-

Benchmark is located near Mundamalinitala Temple.

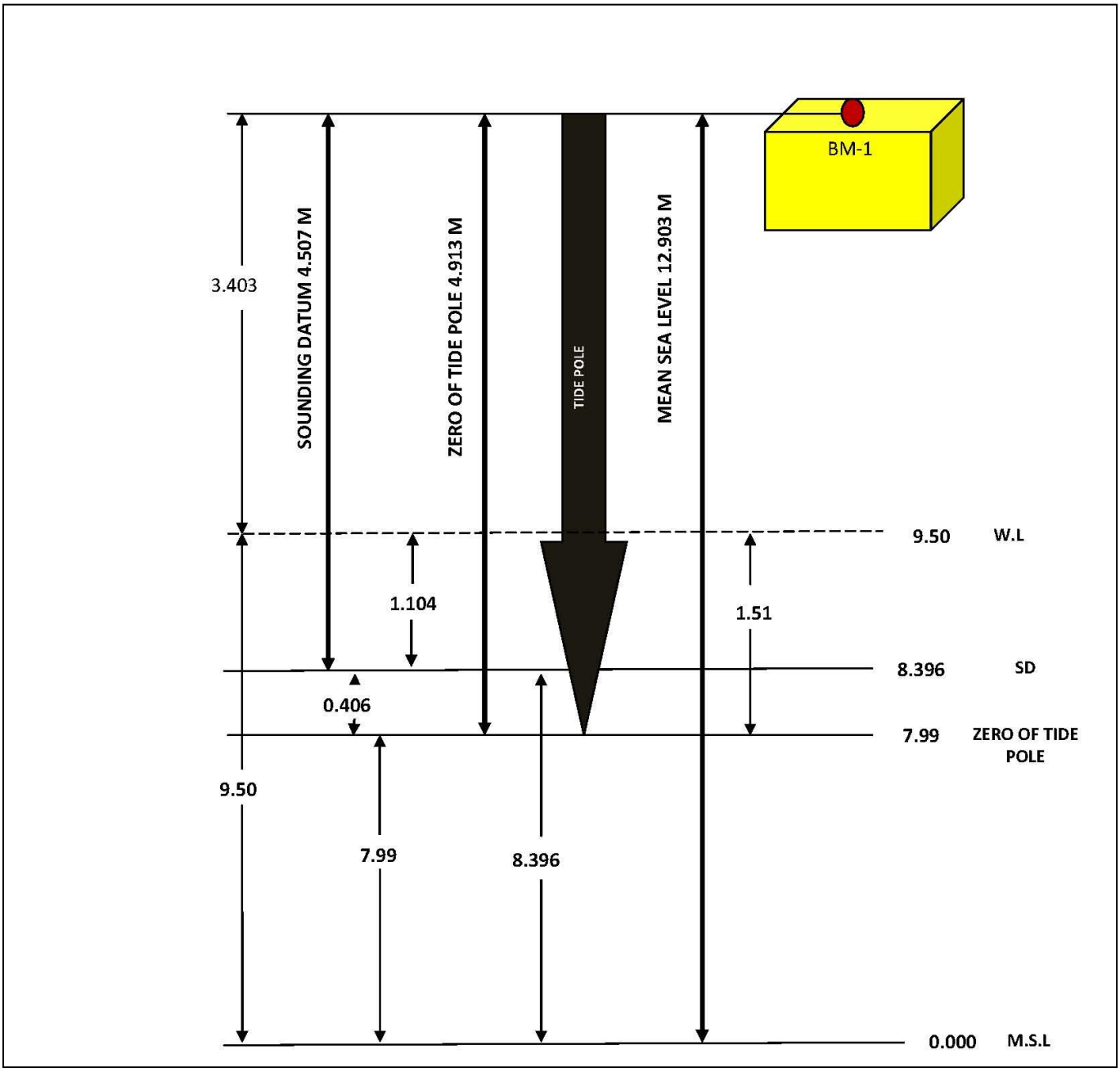
The BM is denoted by a "." mark engraved on a plate. The plate is fixed on a 5cm diameter GI pipe. The GI pipe is cemented with construction pillar of 30cmX30cmX150cm.The pillar extends 60.cms above ground level. Inscription "IWAI", and BM-13 No. can be seen on the face of the pillar.

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

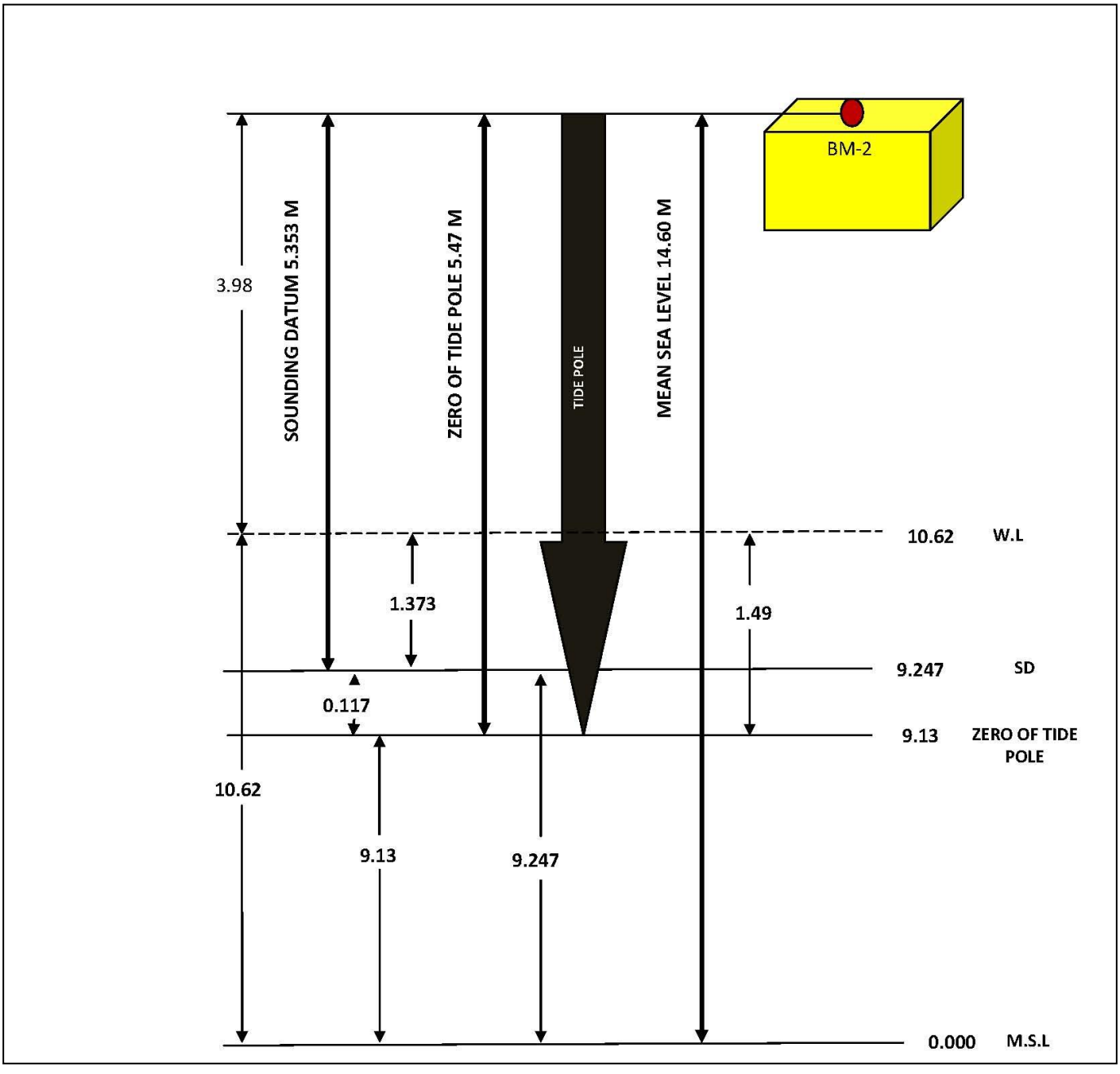
Figure 51-BM Form & Google image view of BM-13

Annexure-10: Levelling Calculation and levelling Diagram:-

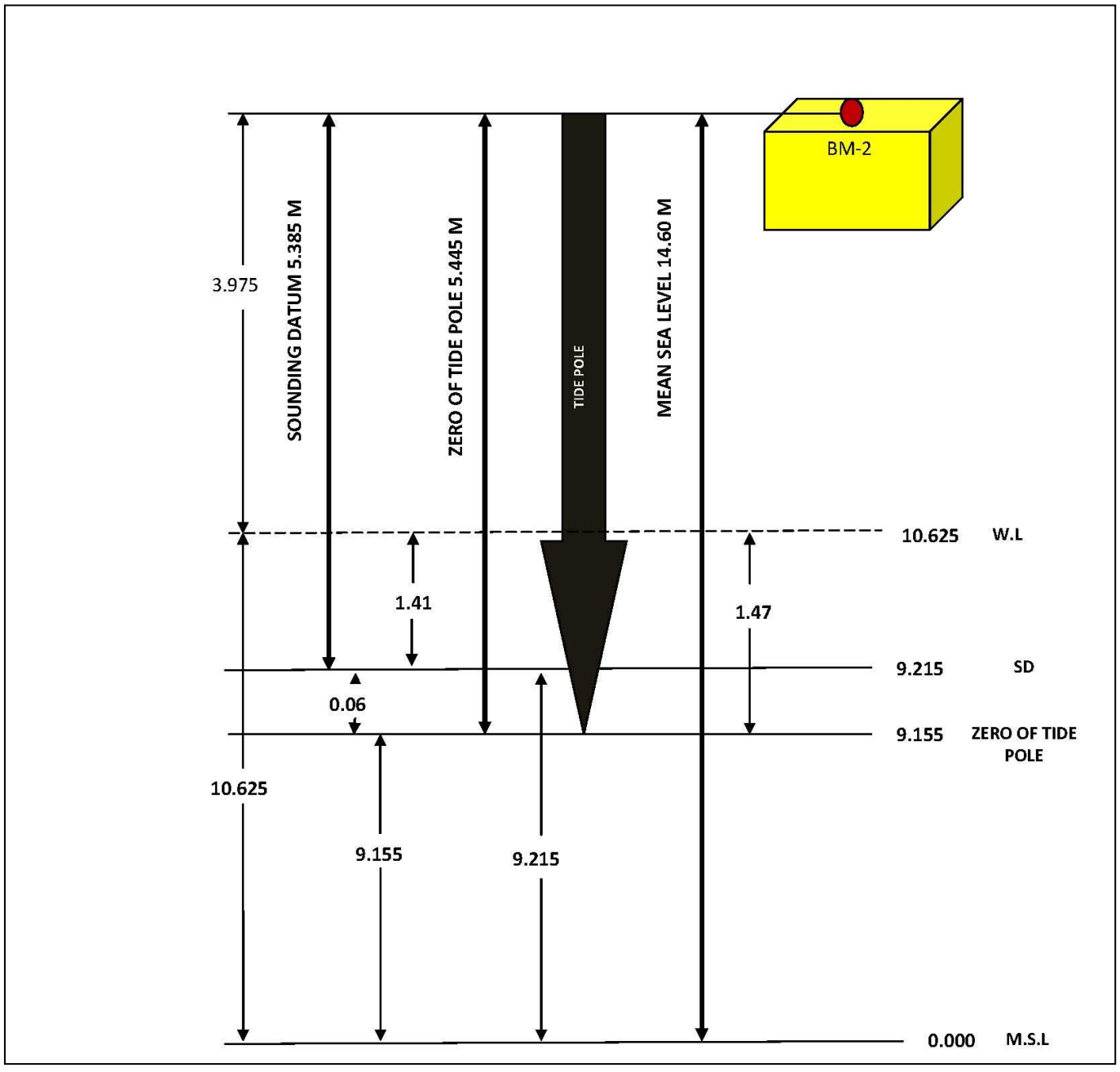
Levelling from BM-1 to GS-1						
BS	**IS**	**FS**	**RISE (+)**	**FALL (-)**	**RL**	**REMARKS**
0.455					12.903	BM-1
0.425		1.991		1.536	10.557	
		1.482		1.057	9.5	GS-1



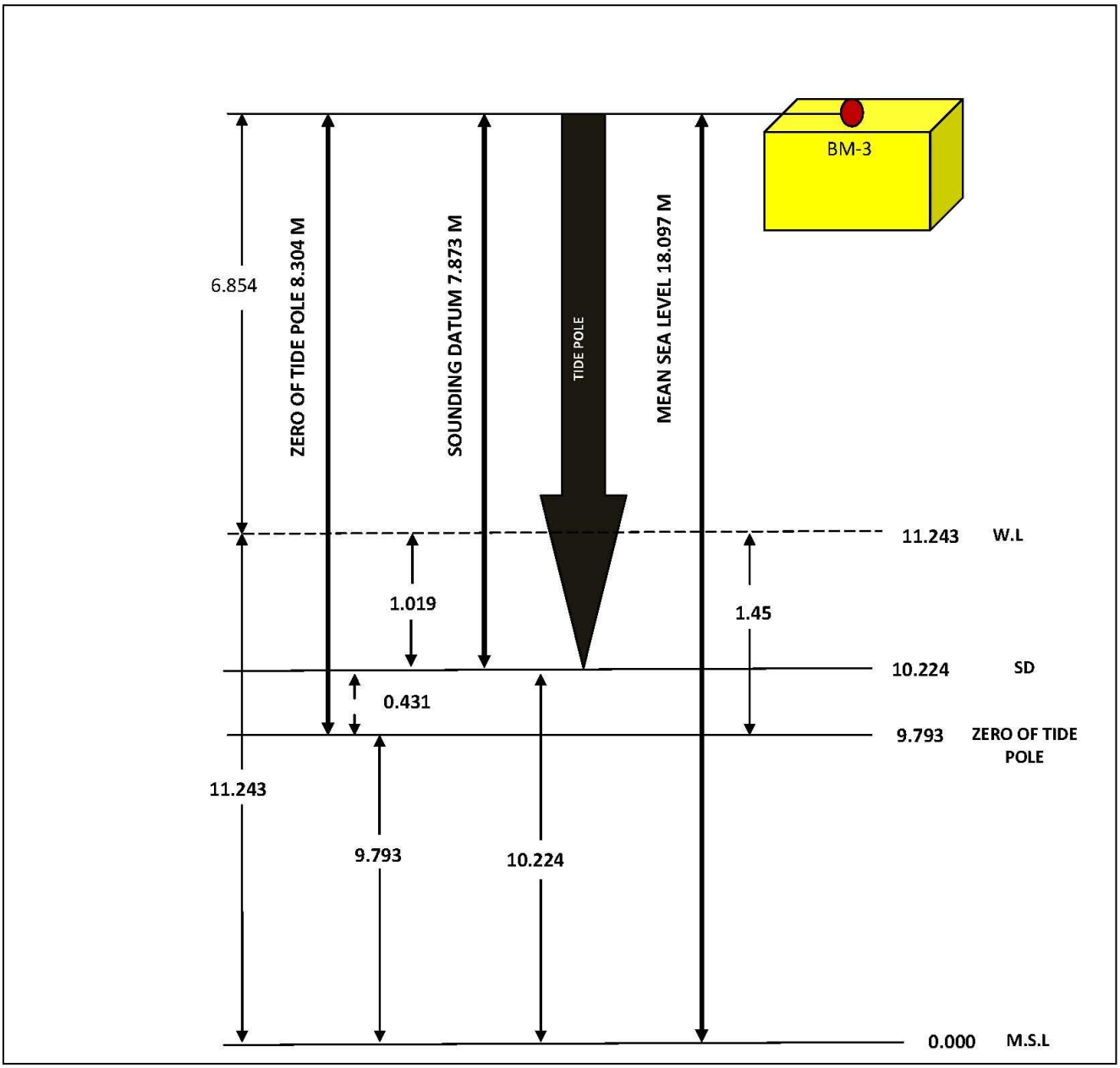
Levelling from BM-2 to GS-7						
BS	**IS**	**FS**	**RISE (+)**	**FALL (-)**	**RL**	**REMARKS**
0.368					14.6	BM-2
0.675		2.253		1.885	12.715	
0.482		2.77		2.095	10.62	GS-7



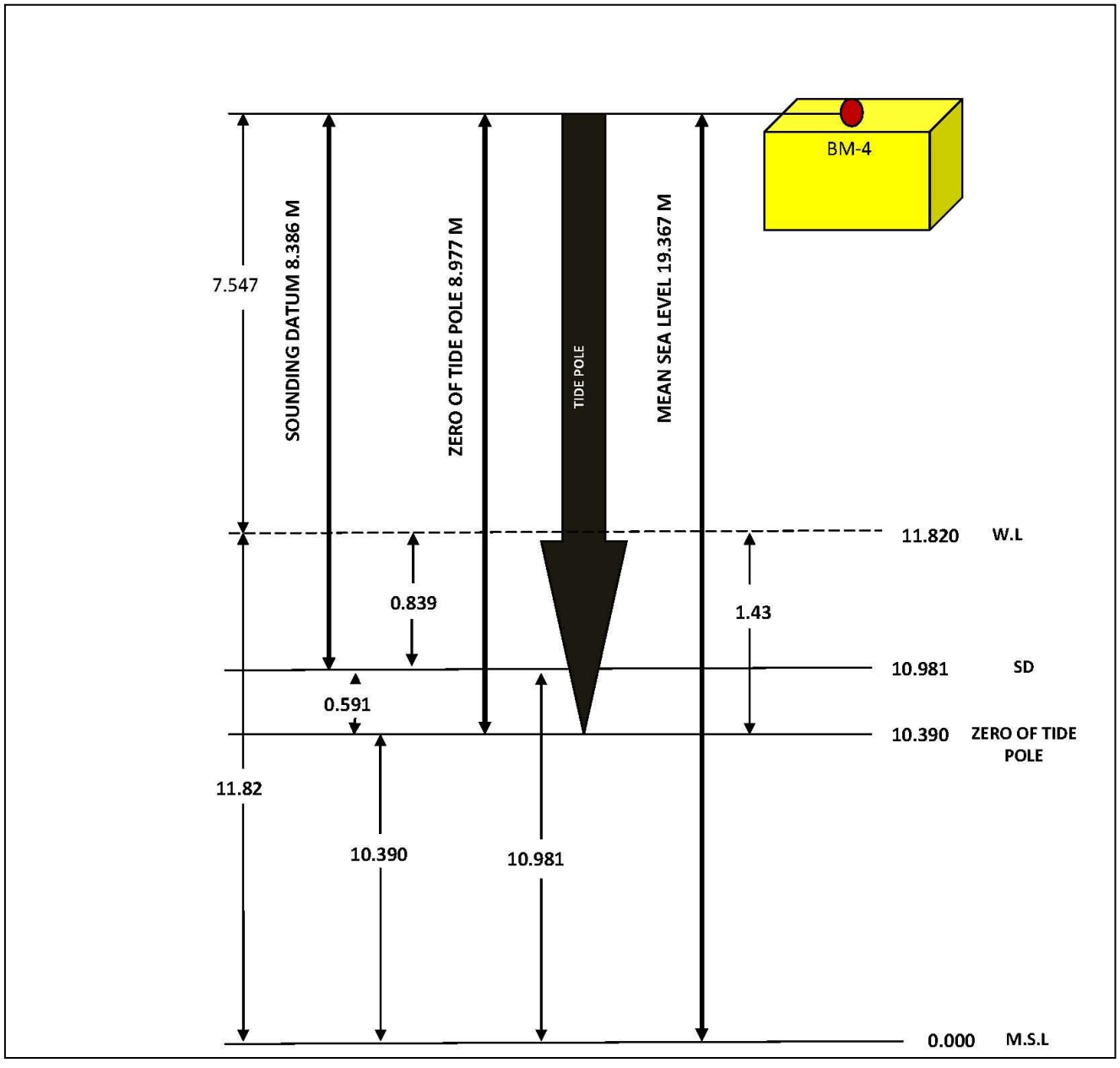
Levelling from BM-2 to GS-2						
BS	**IS**	**FS**	**RISE (+)**	**FALL (-)**	**RL**	**REMARKS**
0.47					14.6	BM-2
0.466		1.98		1.51	13.09	
0.578		1.858		1.392	11.698	
		1.651		1.073	10.625	GS-2



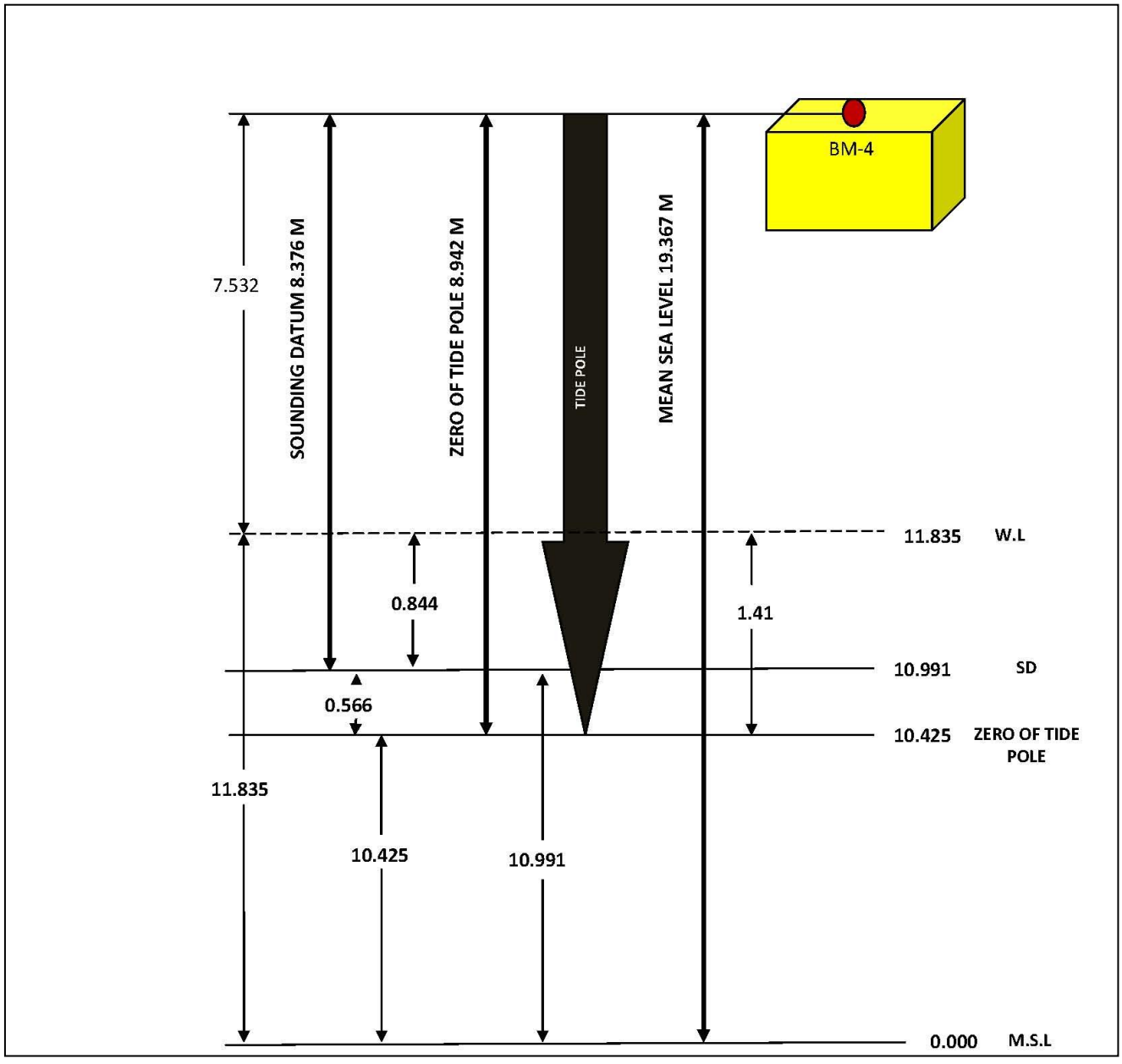
Levelling from BM-3 to GS-8						
BS	**IS**	**FS**	**RISE (+)**	**FALL (-)**	**RL**	**REMARKS**
0.64					18.097	BM-3
0.452		2.135		1.495	16.602	
0.368		1.988		1.536	15.066	
0.675		1.85		1.482	13.584	
0.482		1.73		1.055	12.529	
		1.768		1.286	11.243	GS-8



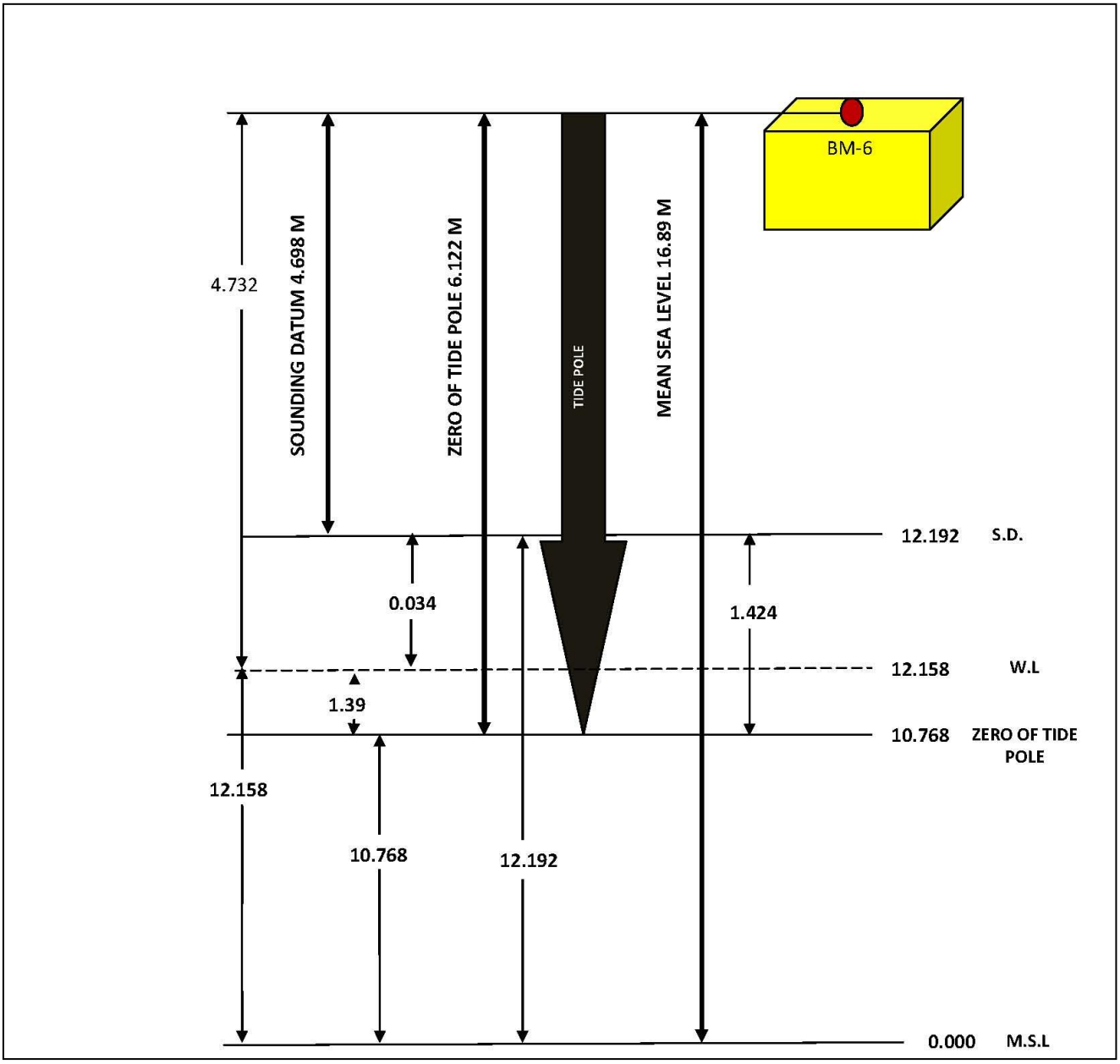
Leveling from BM-4 to GS-9						
BS	**IS**	**FS**	**RISE (+)**	**FALL (-)**	**RL**	**REMARKS**
0.324					19.367	BM-4
0.48		1.85		1.526	17.841	
0.47		1.88		1.4	16.441	
0.466		1.923		1.453	14.988	
0.578		2.085		1.619	13.369	
		2.127		1.549	11.82	GS-9



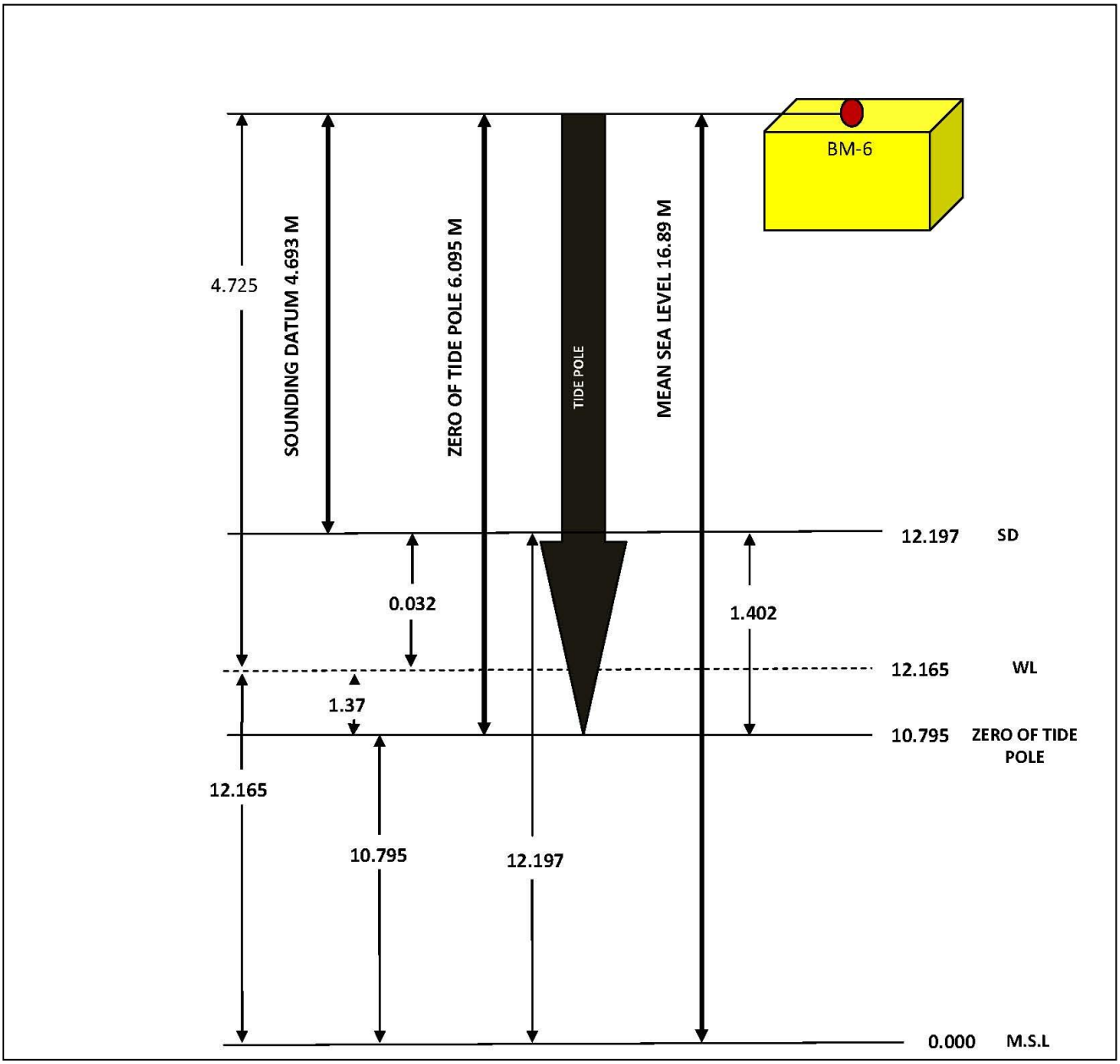
Levelling from BM-4 to GS-5						
BS	**IS**	**FS**	**RISE (+)**	**FALL (-)**	**RL**	**REMARKS**
0.456					19.367	BM-4
0.612		1.982		1.526	17.841	
0.602		2.012		1.4	16.441	
0.598		2.055		1.453	14.988	
0.71		2.217		1.619	13.369	
		2.244		1.534	11.835	GS-5



Levelling from BM-6 to GS-6						
BS	**IS**	**FS**	**RISE (+)**	**FALL (-)**	**RL**	**REMARKS**
0.456					16.89	BM-6
0.412		1.982		1.526	15.364	
0.502		1.28		0.868	14.496	
0.58		1.855		1.353	13.143	
0.571		1.565		0.985	12.158	GS-6



Levelling from BM-6 to GS-3						
BS	**IS**	**FS**	**RISE (+)**	**FALL (-)**	**RL**	**REMARKS**
0.468					16.89	BM-6
0.424		1.97		1.502	15.388	
0.514		1.268		0.844	14.544	
0.52		1.843		1.329	13.215	
		1.57		1.05	12.165	GS-3

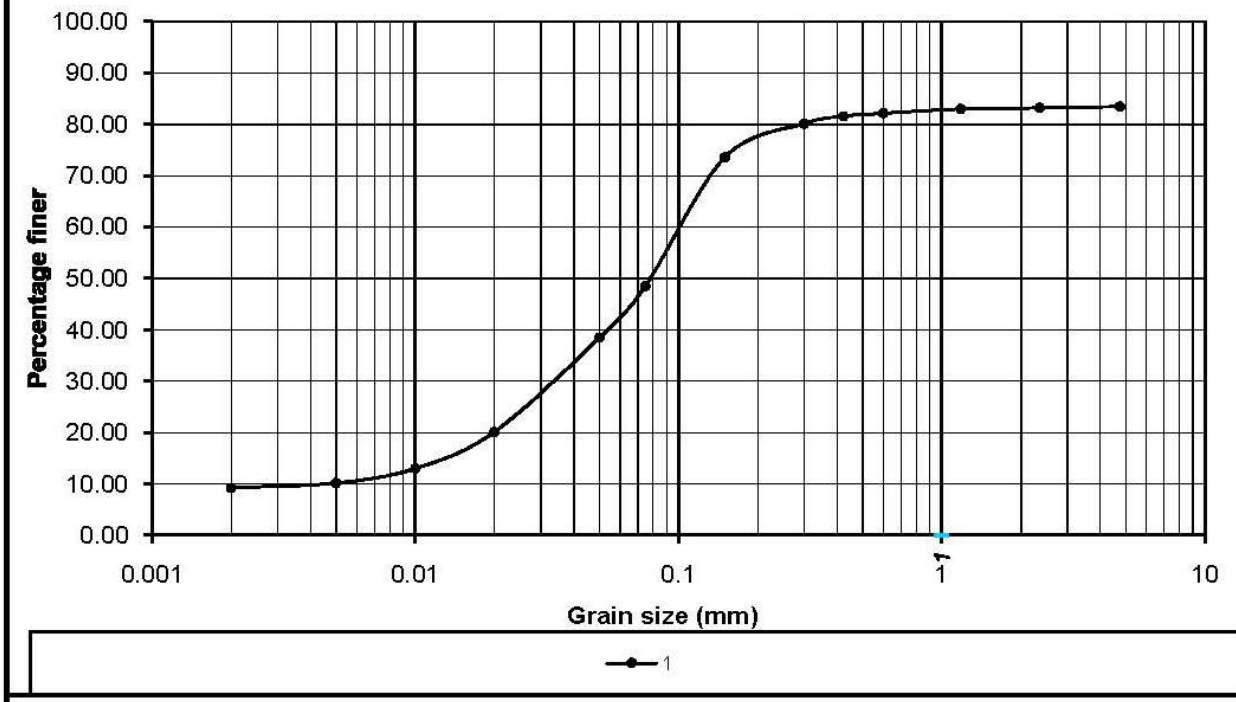


Annexure-11: Soil Sample Report:

RESULTS OF TEST OF SOIL SAMPLES										
SITE – DWARAKA RIVER										
PHYSICAL ANALYSIS OF SOIL										
Sl.No.	**LOCATION**	**GRAVEL (%)**	**SAND (%)**	**SILT+CLAY (%)**	**SPECIFIC GRAVITY**	**pH VALUE**	**SILT (%)**	**CLAY (%)**	**Cu**	**Cc**
1	CH. 0+000	16.57	34.86	48.57	2.61	7.40	39.40	9.17	17.24	1.77
2	CH. 20+000	21.95	31.98	46.07	2.62	7.30	36.10	9.97	18.13	1.24
3	CH. 40+000	26.78	14.90	58.32	2.62	7.40	49.68	8.64	11.71	2.79
4	CH. 50+000	18.04	25.92	56.04	2.62	7.20	46.20	9.84	18.20	1.49
5	CH. 60+000	7.98	67.50	24.52	2.65	7.20	19.60	4.92	10.45	0.02
6	CH. 70+000	8.51	64.60	26.89	2.64	7.10	24.20	2.69	11.00	1.76
7	CH. 80+000	5.87	61.80	32.33	2.62	7.20	28.20	4.13	7.50	1.83
8	CH. 110+000	7.01	63.50	29.49	2.61	7.20	25.70	3.79	8.50	1.82
9	CH. 120+000	6.15	61.75	32.10	2.62	7.20	27.65	4.45	8.00	2.11

Note: - The Positions of the soil samples have been shown in Para no-2.20 (a) at page no-33

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	9.17	39.40	34.86	16.57

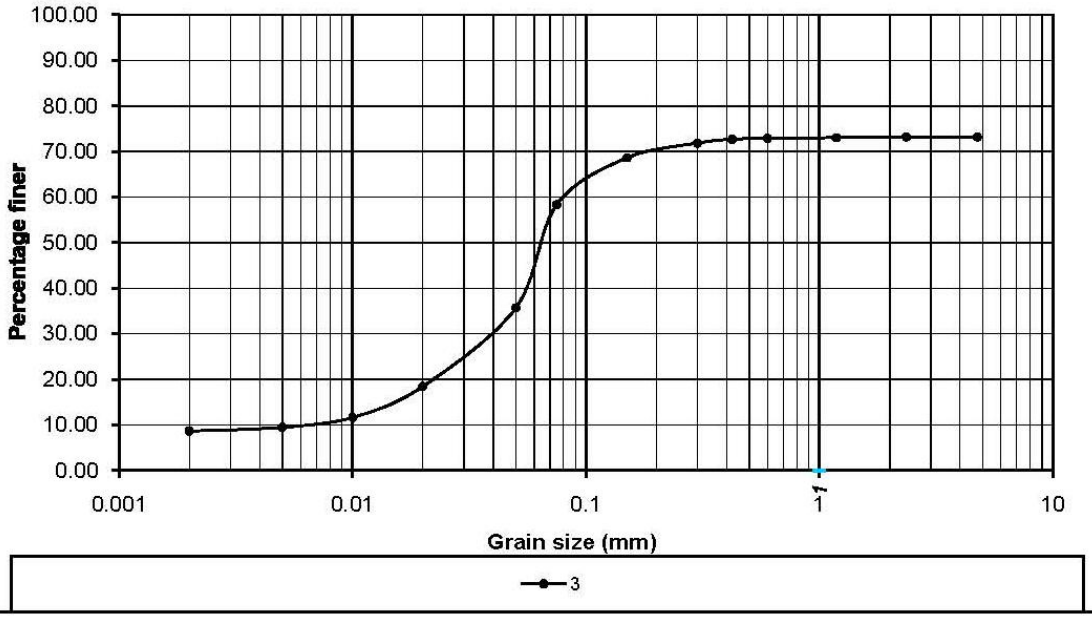
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES

Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
2	9.97	36.10	31.98	21.95

*Silt & Clay

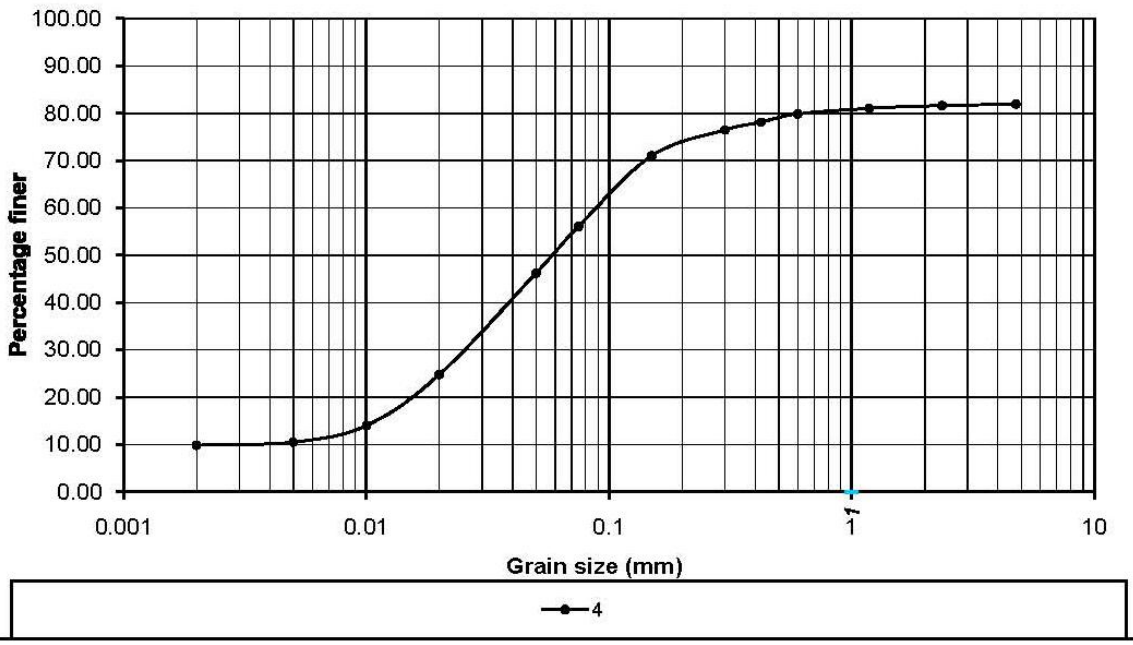
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
3	8.64	49.68	14.90	26.78

*Silt & Clay

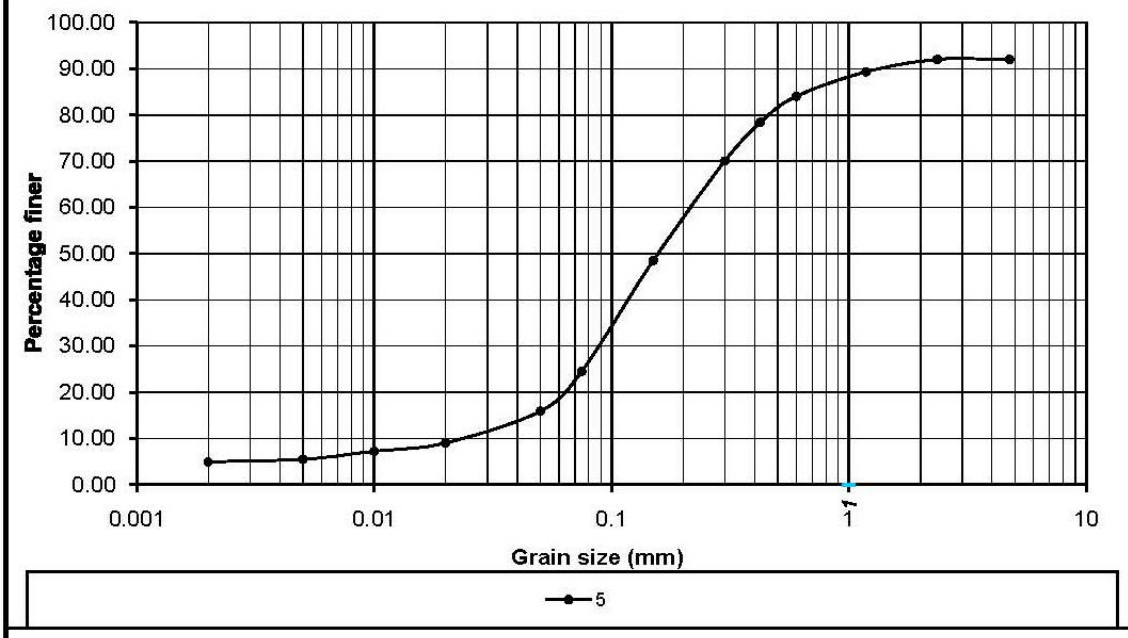
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
4	9.84	46.20	25.92	18.04

*Silt & Clay

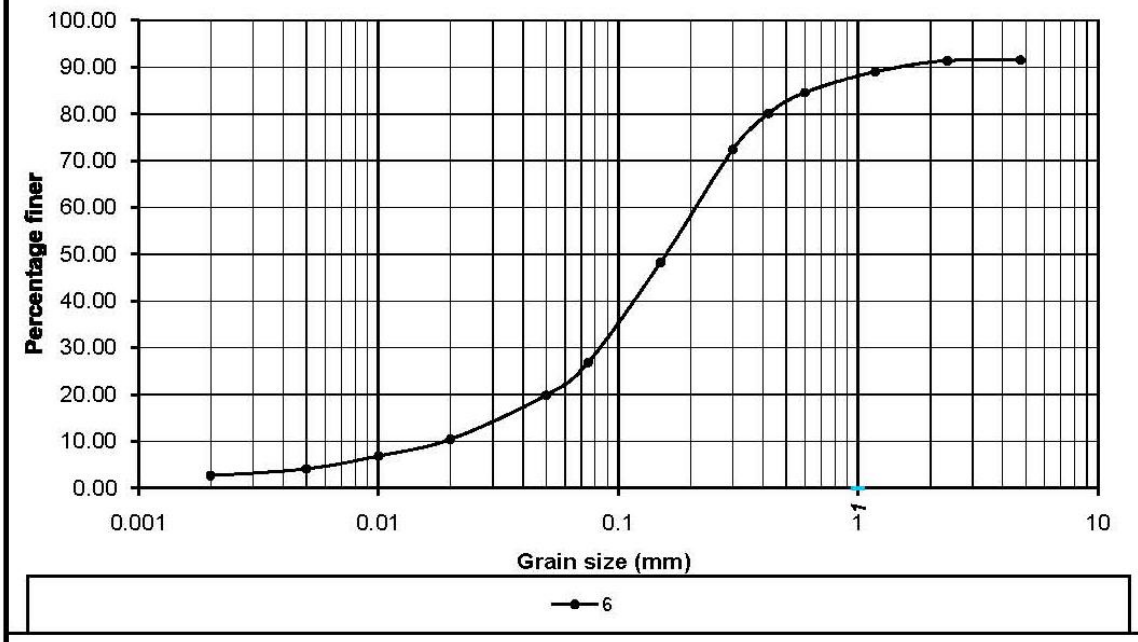
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
5	4.92	19.60	67.50	7.98

*Silt & Clay

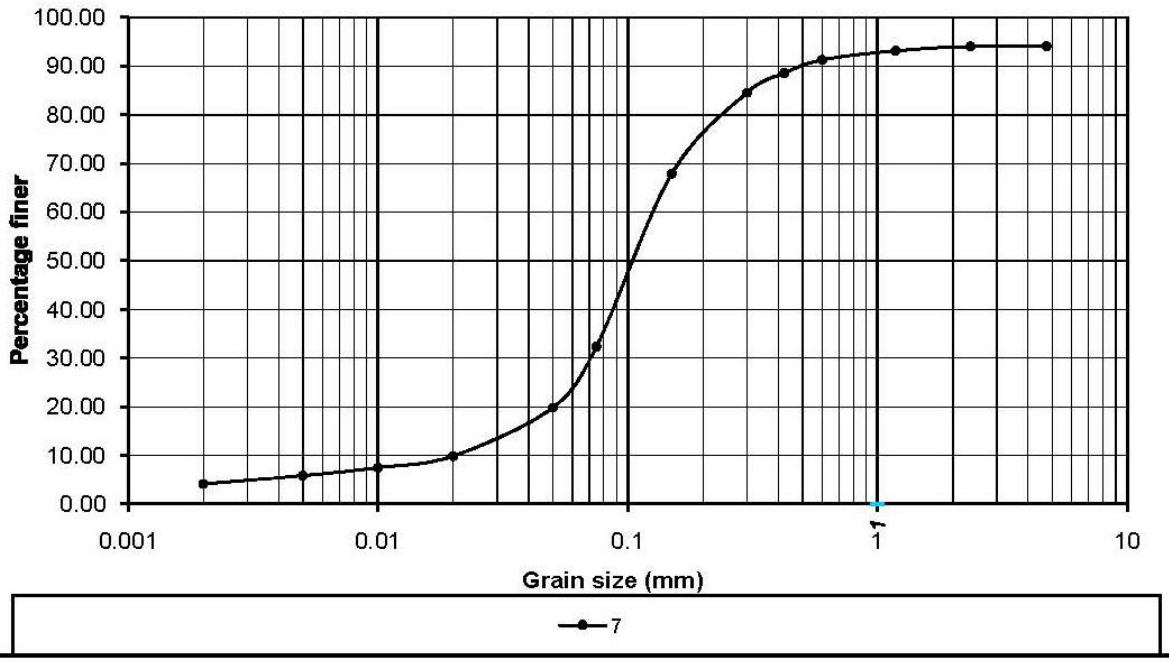
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
6	2.69	24.20	64.60	8.51

*Silt & Clay

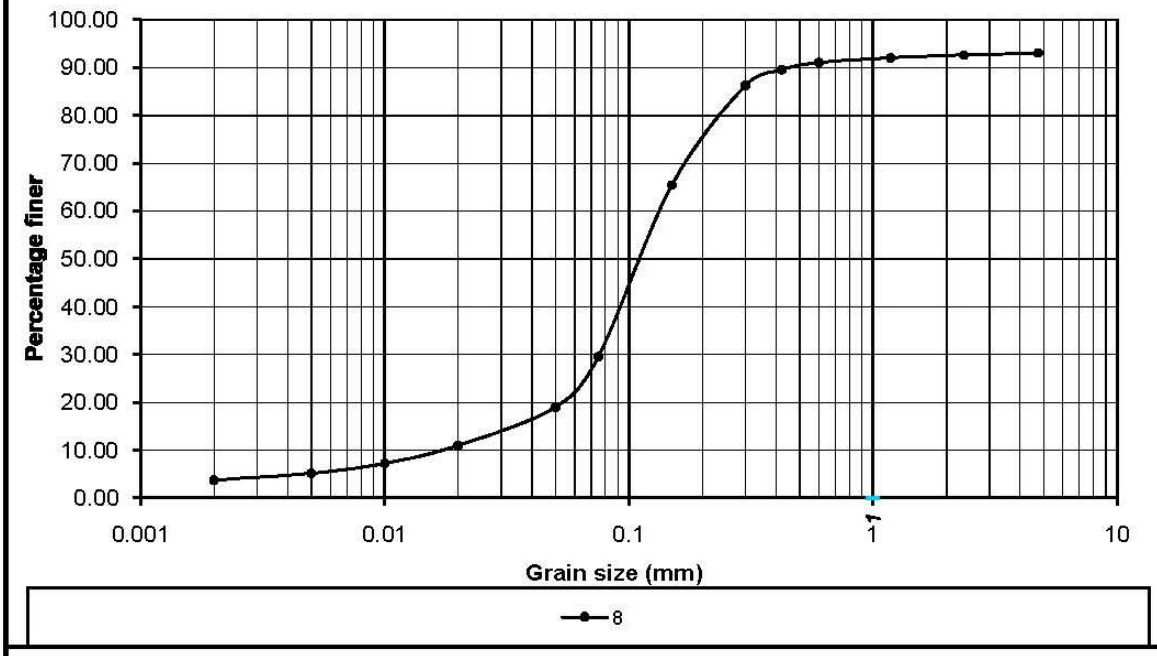
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
7	4.13	28.20	61.80	5.87

*Silt & Clay

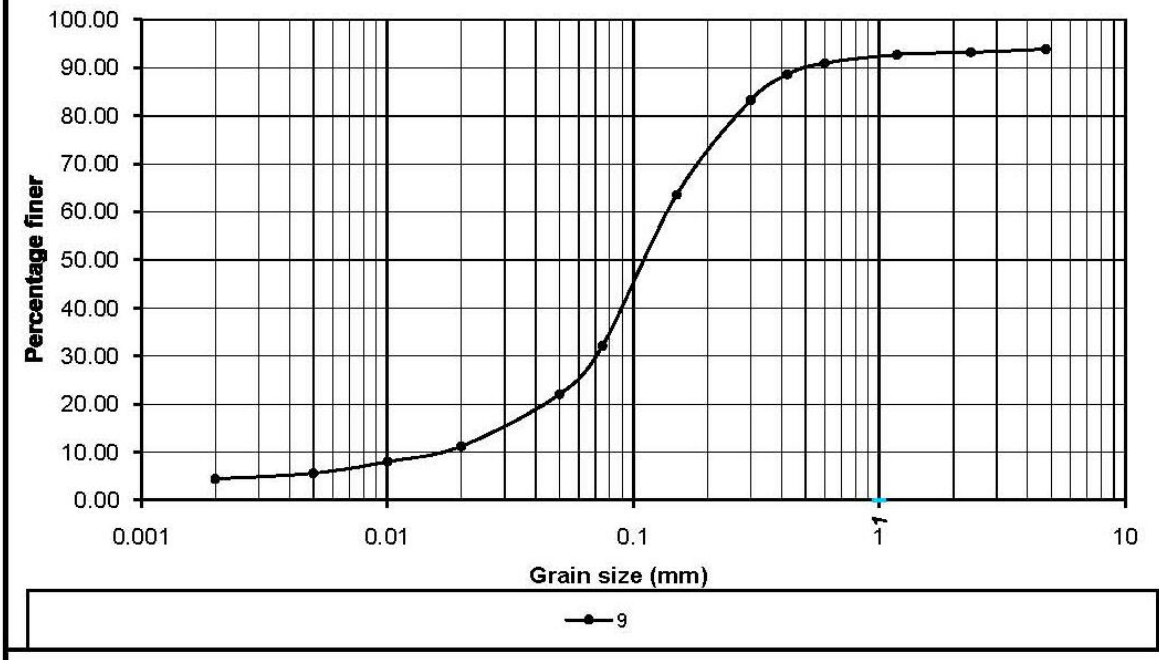
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
8	3.79	25.70	63.50	7.01

*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
9	4.45	27.65	61.75	6.15

*Silt & Clay

Annexure-12: Water Sample Report:

RESULTS OF EXAMINATION OF SAMPLES OF WATER

SITE- RIVER DWARAKA

PARAMETER – Ph Value at 25°C

SL.NO	CH.	B.M	LOCATION	PARAMETER	WATER SAMPLE RESULTS	PERMISSIBLE LIMITS IS:456-2000
1	00	1	UPER-0D		6.8	
			MIDDLE-3D		6.4	
			LOWER-5D		6.5	
2	10	2	UPER-0D		6.8	
			MIDDLE-3D		6.4	
			LOWER-5D		6.5	
3	20	3	UPER-0D		6.8	
			MIDDLE-3D		6.4	
			LOWER-5D		6.5	
4	30	4	UPER-0D		6.8	
			MIDDLE-3D		6.7	
			LOWER-5D		6.6	
5	40	5	UPER-0D		6.8	
			MIDDLE-3D		6.4	
			LOWER-5D		6.5	
6	50	6	UPER-0D		6.8	
			MIDDLE-3D		6.4	
			LOWER-5D		6.5	
7	60	7	UPER-0D		6.8	6.5-8.5
			MIDDLE-3D	pH at 25°C	6.4	
			LOWER-5D		6.5	
8	70	8	UPER-0D		6.5	
			MIDDLE-3D		6.5	
			LOWER-5D		6.6	
9	80	9	UPER-0D		6.8	
			MIDDLE-3D		6.4	
			LOWER-5D		6.5	
10	90	10	UPER-0D		6.9	
			MIDDLE-3D		6.7	
			LOWER-5D		6.4	
11	100	11	UPER-0D		6.8	
			MIDDLE-3D		6.4	
			LOWER-5D		6.3	
12	110	12	UPER-0D		6.8	
			MIDDLE-3D		6.5	
			LOWER-5D		6.3	
13	120	13	UPER-0D		6.7	
			MIDDLE-3D		6.4	
			LOWER-5D		6.4	

Note: - The Positions of the Water samples have been shown in Para no-2.20 (b) at page no-33

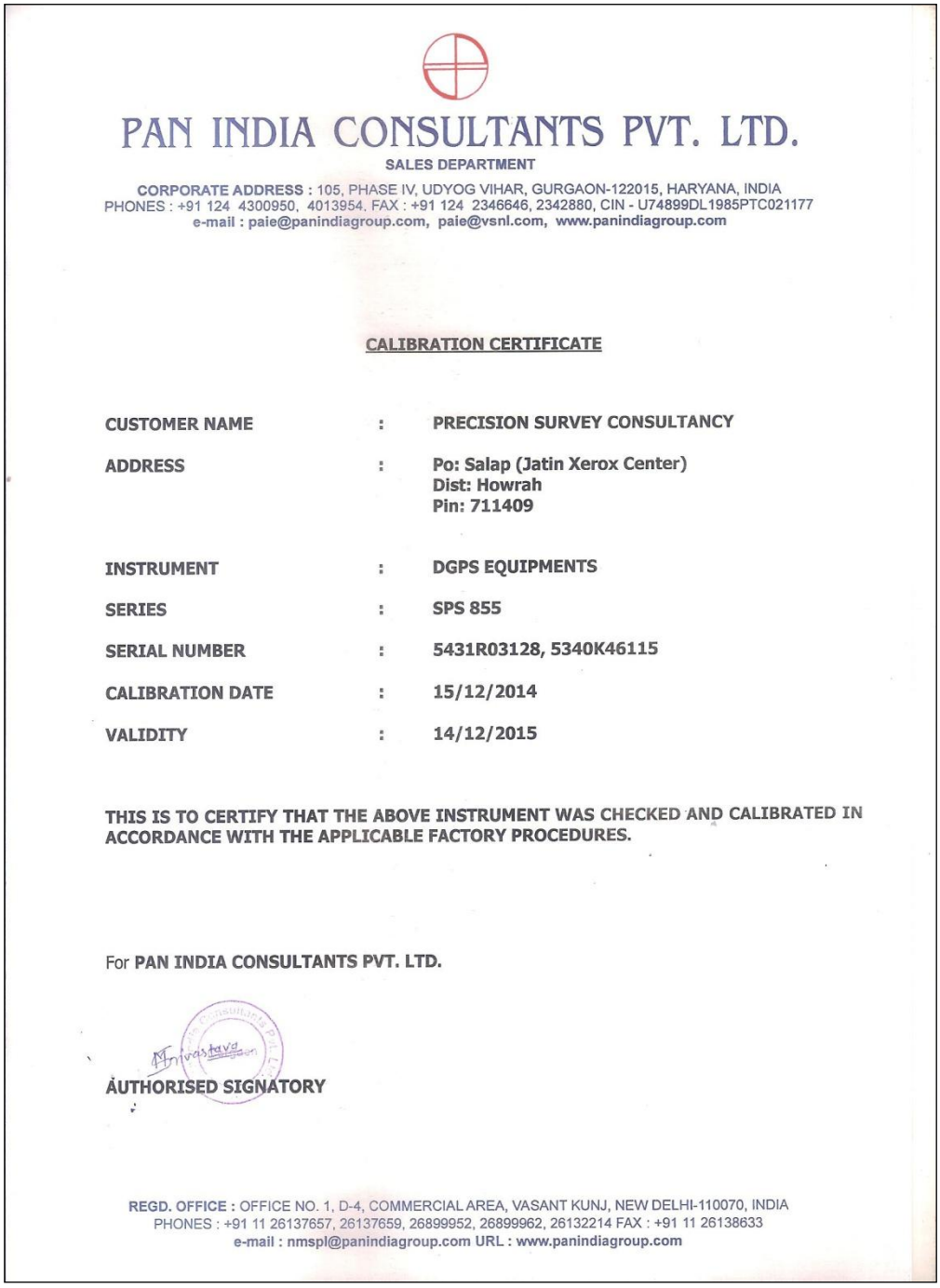
PARAMETER – Chloride as Cl (mg/l)						
SL. NO	CH.	B.M	LOCATION	PARAMETER	WATER SAMPLE RESULTS(mg/l)	PERMISSIBLE LIMITS IS:456-2000
1	00	1	UPER-0D		6	
			MIDDLE-3D		16	
			LOWER-5D		6	
2	10	2	UPER-0D		6	
			MIDDLE-3D		16	
			LOWER-5D		6	
3	20	3	UPER-0D		6	
			MIDDLE-3D		17	
			LOWER-5D		6	
4	30	4	UPER-0D		6	
			MIDDLE-3D		16	
			LOWER-5D		5	
5	40	5	UPER-0D		7	
			MIDDLE-3D		16	
			LOWER-5D		6	
6	50	6	UPER-0D		6	
			MIDDLE-3D		17	
			LOWER-5D		16	
7	60	7	UPER-0D	Chloride as Cl (mg/l)	6	2000 mg/l for concrete not containing embedded steel and 500 mg/l for reinforced concrete work.
			MIDDLE-3D		16	
			LOWER-5D		6	
8	70	8	UPER-0D		7	
			MIDDLE-3D		17	
			LOWER-5D		7	
9	80	9	UPER-0D		6	
			MIDDLE-3D		16	
			LOWER-5D		8	
10	90	10	UPER-0D		6	
			MIDDLE-3D		17	
			LOWER-5D		6	
11	100	11	UPER-0D		6	
			MIDDLE-3D		16	
			LOWER-5D		16	
12	110	12	UPER-0D		6	
			MIDDLE-3D		16	
			LOWER-5D		12	
13	120	13	UPER-0D		7	
			MIDDLE-3D		16	
			LOWER-5D		16	

PARAMETER –Sulphates as SO_4 (mg/l)

SL.NO	CH.	B.M	LOCATION	PARAMETER	WATER SAMPLE RESULTS	PERMISSIBLE LIMITS IS:456-2000
1	00	1	UPER-0D		72	
			MIDDLE-3D		33	
			LOWER-5D		92	
2	10	2	UPER-0D		72	
			MIDDLE-3D		33	
			LOWER-5D		92	
3	20	3	UPER-0D		73	
			MIDDLE-3D		34	
			LOWER-5D		92	
4	30	4	UPER-0D		74	
			MIDDLE-3D		33	
			LOWER-5D		91	
5	40	4	UPER-0D		74	
			MIDDLE-3D	Sulphates as SO_4 (mg/l)	34	400 (mg/l)
			LOWER-5D		83	
6	50	5	UPER-0D		74	
			MIDDLE-3D		33	
			LOWER-5D		82	
7	60	7	UPER-0D		74	
			MIDDLE-3D		33	
			LOWER-5D		82	
8	70	8	UPER-0D		72	
			MIDDLE-3D		33	
			LOWER-5D		83	
9	80	9	UPER-0D		73	
			MIDDLE-3D		34	
			LOWER-5D		40	
10	90	10	UPER-0D		74	
			MIDDLE-3D		34	
			LOWER-5D		40	
11	100	11	UPER-0D		74	
			MIDDLE-3D		34	
			LOWER-5D		40	
12	110	12	UPER-0D		74	
			MIDDLE-3D		34	
			LOWER-5D		40	
13	120	13	UPER-0D		74	
			MIDDLE-3D		34	
			LOWER-5D		40	

PARAMETER – Sediment Concentration(mg/l)						
SL. NO	CH.	B.M	LOCATION	PARAMETER	WATER SAMPLE RESULTS	PERMISSIBLE LIMITS IS:456-2000
1	00	1	UPER-0D		60	
			MIDDLE-3D		110	
			LOWER-5D		310	
2	10	2	UPER-0D		62	
			MIDDLE-3D		120	
			LOWER-5D		310	
3	20	3	UPER-0D		60	
			MIDDLE-3D		110	
			LOWER-5D		320	
4	30	4	UPER-0D		61	
			MIDDLE-3D		110	
			LOWER-5D		460	
5	40	5	UPER-0D		60	
			MIDDLE-3D		120	
			LOWER-5D		460	
6	50	6	UPER-0D		60	
			MIDDLE-3D		110	
			LOWER-5D		450	
7	60	7	UPER-0D	Sediment Concentration (mg/l)	60	2000 (mg/l)
			MIDDLE-3D		110	
			LOWER-5D		440	
8	70	8	UPER-0D		60	
			MIDDLE-3D		110	
			LOWER-5D		440	
9	80	9	UPER-0D		60	
			MIDDLE-3D		110	
			LOWER-5D		430	
10	90	10	UPER-0D		60	
			MIDDLE-3D		110	
			LOWER-5D		430	
11	100	11	UPER-0D		60	
			MIDDLE-3D		110	
			LOWER-5D		430	
12	110	12	UPER-0D		61	
			MIDDLE-3D		110	
			LOWER-5D		420	
13	120	13	UPER-0D		60	
			MIDDLE-3D		110	
			LOWER-5D		430	

Annexure-13: Calibration Certificate:-



PAN INDIA CONSULTANTS PVT. LTD.

SALES DEPARTMENT

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

CALIBRATION CERTIFICATE

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

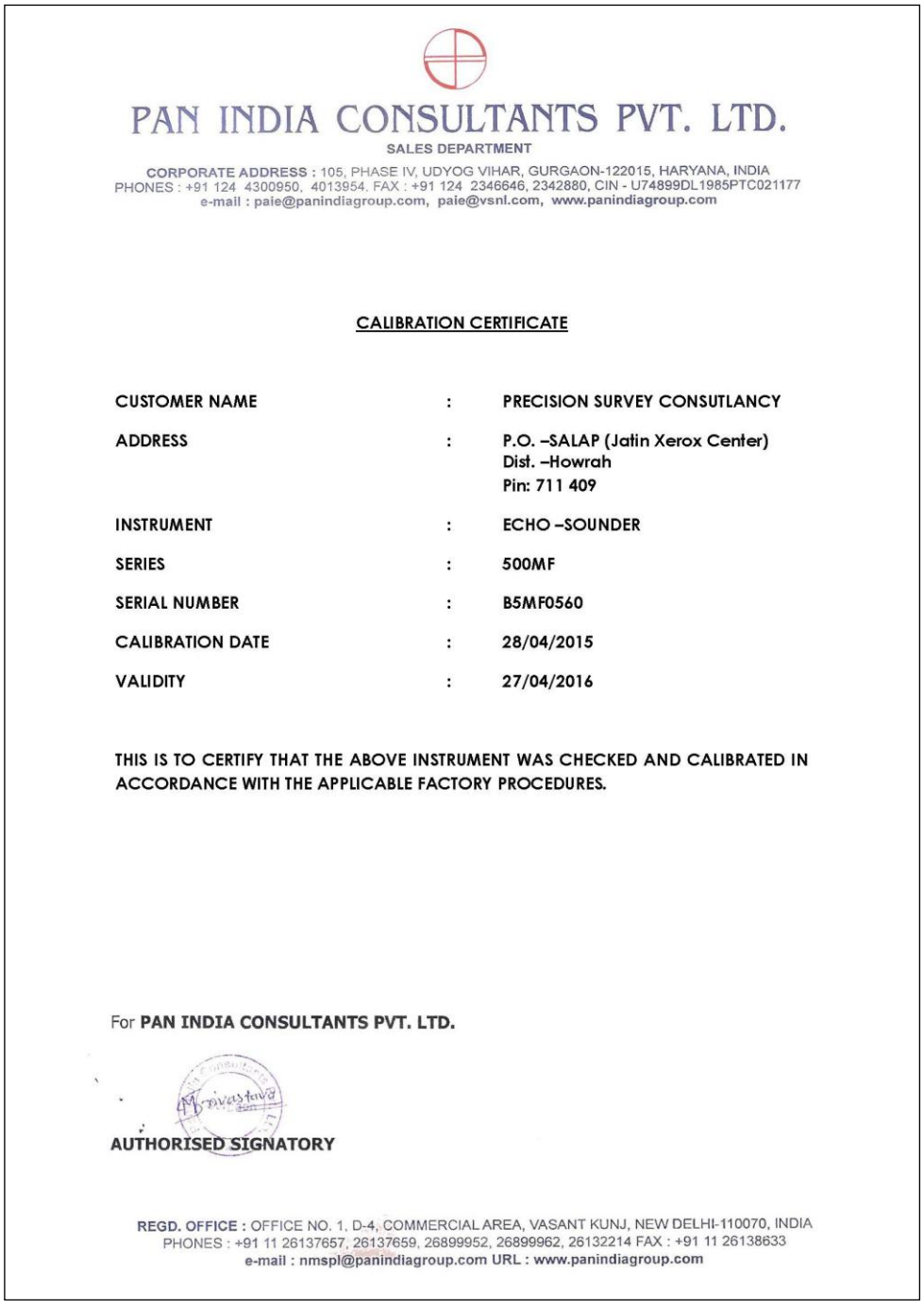
THIS IS TO CERTIFY THAT THE ABOVE INSTRUMENT WAS CHECKED AND CALIBRATED IN ACCORDANCE WITH THE APPLICABLE FACTORY PROCEDURES.

For PAN INDIA CONSULTANTS PVT. LTD.

AUTHORISED SIGNATORY

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

Table 39- Calibration Certificate of DGPS



PAN INDIA CONSULTANTS PVT. LTD.

SALES DEPARTMENT

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

CALIBRATION CERTIFICATE

CUSTOMER NAME	:	PRECISION SURVEY CONSUTLANCY
ADDRESS	:	P.O. –SALAP (Jatin Xerox Center) Dist. –Howrah Pin: 711 409
INSTRUMENT	:	ECHO –SOUNDER
SERIES	:	500MF
SERIAL NUMBER	:	B5MF0560
CALIBRATION DATE	:	28/04/2015
VALIDITY	:	27/04/2016

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

For PAN INDIA CONSULTANTS PVT. LTD.

AUTHORISED SIGNATORY

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

Table 40- Calibration Certificate of Eco Sounder

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

Calibration Certificate

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

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

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

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

Authorised Signatory

Table 41- Calibration Certificate of GPS RTK

Annexure-14: Photographs:-

Figure 52- Bathymetry Survey with IWAI Client

Figure 53- Topography survey Instruments

Figure 54-Topography survey near the bank side

Figure 55 -Electric lines (Chainage- 13.802 km)

Figure 56-Bathymetry Survey work

Figure 57-Bank side image

Annexure-15: Survey Charts in primary Channel:-

Sl. No.	Chart No.	Chainage (from ..... km to .... km)	Location (from .... to .....)	Scale	Size of the Chart
1	1	0.00 km to 0.476 km	Confluence point of Bhagirathi river to Kalayanpur village	1:2000	A-1
2	2	0.476 km to 2.320 km	Kalayanpur village to Nutangram village	1:2000	A-1
3	3	2.320 km to 4.00 km	Nutangram village to Char Gobalpur village	1:2000	A-1
4	4	4.00 km to 6.00 km	Char Gobalpur village to Sujapur village	1:2000	A-1
5	5	6.00 km to 7.601 km	Sujapur village to Dakshin Bachhara village	1:2000	A-1
6	6	7.601 km to 9.602 km	Bachhara village to sarmastapur village	1:2000	A-1
7	7	9.602 km to 11.500 km	Sarmastapur village to Chak Rangapara village	1:2000	A-1
8	8	11.500 km to 13.190 km	Chak Rangapara village to Tenya village	1:2000	A-1
9	9	13.190 km to 14.887 km	Tenya village to Baidyapur village	1:2000	A-1
10	10	14.887 km to 16.878 km	Baidyapur village to Babla village	1:2000	A-1
11	11	16.878 km to 18.662 km	Babla village to Pollesri village	1:2000	A-1
12	12	18.662 km to 20.124 km	Pollesri village to Kataikona village	1:2000	A-1
13	13	20.124 km to 21.441 km	Kataikona village to Ghoshkura village	1:2000	A-1
14	14	21.441 km to 23.00 km	Ghoshkura village to Ismailpur village	1:2000	A-1
15	15	23.00 km to 24.793 km	Ismailpur village to Ghoshkura village	1:2000	A-1
16	16	24.793 km to 26.308 km	Ghoshkura village to Jorgachhi village	1:2000	A-1
17	17	26.308 km to 28.102 km	Jorgachhi village to Kamnagar village	1:2000	A-1
18	22	28.102 km to 31.291 km	Kamnagar village to Bhagabanbati village	1:2000	A-1

Sl. No.	Chart No.	Chainage (from ..... km to .... km)	Location (from .... to .....)	Scale	Size of the Chart
19	23	31.291 km to 33.118 km	Bhagabanbati village to Srikrishnapur village	1:2000	A-1
20	24	33.118 km to 34.825 km	Srikrishnapur village to Bara satui village	1:2000	A-1
21	25	34.825 km to 36.610 km	Bara satui village to Nalghosa village	1:2000	A-1
22	26	36.610 km to 39.220 km	Nalghosa village to Dakshin Hijal village	1:2000	A-1
23	27	39.220 km to 42.198 km	Dakshin Hijal village to Uttar Hijal village	1:2000	A-1
24	28	42.198 km to 44.560 km	Uttar Hijal village to Uttar Hijal village	1:2000	A-1
25	29	44.560 km to 45.950 km	Uttar Hijal village to Amitya village	1:2000	A-1
26	30	45.950 km to 47.748 km	Amitya village to Pairakol village	1:2000	A-1
27	31	47.748 km to 49.830 km	Pairakol village to Gosaidob village	1:2000	A-1
28	32	49.830 km to 51.805 km	Gosaidob village to Majharer dhar village	1:2000	A-1
29	33	51.805 km to 53.443 km	Majharer dhar village to Ranagram village	1:2000	A-1
30	34	53.443 km to 55.720 km	Ranagram village to Sujapur village	1:2000	A-1
31	35	55.720 km to 58.465 km	Sujapur village to Arazi Gokarna village	1:2000	A-1
32	36	58.465 km to 60.370 km	Arazi Gokarna village to Ratanpur Arazi village	1:2000	A-1
33	37	60.370 km to 62.535 km	Ratanpur Arazi village to Rameswarpur village	1:2000	A-1
34	38	62.535 km to 64.446 km	Rameswarpur village to Nowda village	1:2000	A-1

Sl. No.	Chart No.	Chainage (from ..... km to .... km)	Location (from .... to .....)	Scale	Size of the Chart
35	39	64.446 km to 66.457 km	Nowda village to Gantla village	1:2000	A-1
36	40	66.457 km to 68.343 km	Gantla village to Bil Madgarya village	1:2000	A-1
37	41	68.343 km to 70.619 km	Bil Madgarya village to Hosenabad village	1:2000	A-1
38	42	70.619 km to 72.364 km	Hosenabad village to Sadal village	1:2000	A-1
39	43	72.364 km to 74.542 km	Sadal village to Rahigram village	1:2000	A-1
40	44	74.542 km to 76.731 km	Rahigram village to Jurankandi village	1:2000	A-1
41	45	76.731 km to 78.372 km	Jurankandi village to Jhulanpur village	1:2000	A-1
42	46	78.372 km to 80.366 km	Jhulanpur village to Sankor ghat	1:2000	A-1
43	47	80.366 km to 82.420 km	Sankor ghat to Hazipur village	1:2000	A-1
44	48	82.420 km to 85.475 km	Hazipur village to Bajitpur village	1:2000	A-1
45	49	85.475 km to 87.552 km	Bajitpur village to Sanigram village	1:2000	A-1
46	50	87.552 km to 91.77 km	Sanigram village to Siata village	1:2000	A-1
47	51	91.77 km to 93.726 km	Siata village to Chakbhatina village	1:2000	A-1
48	52	93.726 km to 94.00 km	Chakbhatina village to Nonadanga village	1:2000	A-1
49	53	94.00 km to 98.310 km	Nonadanga village to Sarbamangalapur village	1:2000	A-1
50	54	98.310 km to 100.382 km	Sarbamangalapur village to Sabaldaha village	1:2000	A-1

Sl. No.	Chart No.	Chainage (from ..... km to .... km)	Location (from .... to .....)	Scale	Size of the Chart
51	55	100.382 km to 102.129 km	Sabaldaha village to Kalidaha village	1:2000	A-1
52	56	102.129 km to 104.181 km	Kalidaha village to Bishnupur village	1:2000	A-1
53	57	104.181 km to 106.00 km	Bishnupur village to Basoa village	1:2000	A-1
54	58	106.00 km to 108.370 km	Basoa village to Batina village	1:2000	A-1
55	59	108.370 km to 110.160 km	Batina village to Boltala village	1:2000	A-1
56	60	110.160 km to 112.227 km	Boltala village to Madartala village	1:2000	A-1
57	61	112.227 km to 113.615 km	Madartala village to Dekhuria village	1:2000	A-1
58	62	113.615 km to 117.366 km	Dekhuria village to Udaypur village	1:2000	A-1
59	63	117.366 km to 119.165 km	Udaypur village to Tarapith Bridge	1:2000	A-1

Table 42 - Survey Charts in primary Channel

Note: Chart no-17 to 21 is arranged for link of Dwarka River which is details tabulated in the next pages.

Annexure-15.1: Survey Charts in Secondary Channel (Link of Dwarka River):-

Sl. No.	Chart No.	Chainage (from ..... km to .... km)	Location (from .... to .....)	Scale	Size of the Chart
1	17	6.689 km to 7.261 km	Bhaluipara village to Kamnagar village	1:2000	A-1
2	18	4.834 km to 6.689 km	Kamnagar village to Bhaluipara village	1:2000	A-1
3	19	3.124 km to 4.834 km	Kazipara village to Kamnagar village	1:2000	A-1
4	20	0.663 km to 3.124 km	Saharbati village to Kazipara village	1:2000	A-1
5	21	0.00 km to 0.663 km	Alikpur village to Saharbati village	1:2000	A-1

Table 43- Survey Charts at link of Dwarka River (Secondary Channel)