Final Feasibility Report
National Waterway-41,
Region VI - Ghataprabha River
Chicksangam to Malali (111.76km)

SURVEY PERIOD: 10 FEB 2016 – 25 MAR 2016

Volume - I

Prepared for:

Inland Waterways Authority of India
(Ministry of Shipping, Govt. of India)
A-13, Sector – 1, NOIDA
Distt. Gautam Budh Nagar,
Uttar Pradesh – 201 301

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ACKNOWLEDGEMENT

IIC Technologies Ltd. expresses its sincere gratitude to IWAI for awarding the work of carrying out detailed hydrographic surveys in the New National Waterways in NW-41 in Region VI – Ghataprabha River from Confluence of Krishna River at Chicksangam to Malali.

We would like to use this opportunity to pen down our profound gratitude and appreciations to **Shri Pravir Pandey, IA&AS, Chairman IWAI** for spending their valuable time and guidance for completing this Project. IIC Technologies Ltd. would also like to thank, **Shri Alok Ranjan, ICAS, Member (Finance), Shri Shashi Bhushan Shukla, Member (Traffic), Shri S.K. Gangwar, Member (Technical)** for their valuable support during the execution of project.

IIC Technologies Ltd, wishes to express their gratitude to **Capt. Ashish Arya, Hydrographic Chief IWAI, Cdr. P.K. Srivastava ex-Hydrographic Chief and Shri SVK Reddy, Chief Engineer-I** for their guidance and inspiration for this project. IIC Technologies Ltd, would also like to thank **Sh. Rajiv Singhal, A.H.S., IWAI** for his invaluable support and suggestions provided throughout the survey period. IIC Technologies Ltd, is pleased to place on records its sincere thanks to other staff and officers of IWAI for their excellent support and cooperation throughout the survey period.

CONTENTS

List of Abbreviations

CD	Chart Datum
SD	Sounding Datum
DGPS	Differential Global Positioning Systems
GTP	Ghataprabha
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 Center
LIS	Lift Irrigation Scheme
CWC	Central Water Commission
KJBNL	Krishna Jal Bhagya Nigam Limited
MI	Minor Irrigation
NH	National Highway
SH	State Highway
KPTCL	Karnataka Power Transmission Corporation Limited

SALIENT FEATURES AT A GLANCE

<table>
<tr><th>#</th><th>Particulars</th><th>Details</th></tr>
<tr><td>1.</td><td>Name of Consultant</td><td>IIC Technologies Limited, Hyderabad</td></tr>
<tr><td>2.</td><td>Region number & State(s)</td><td>Region – VI & Karnataka</td></tr>
<tr><td>3.</td><td>Waterway stretch, NW #
(from…. to; total length)</td><td>National Waterway No – 41
Confluence of Krishna at Chicksangam to Malali Village (111.76km)</td></tr>
<tr><td>4.</td><td>Navigability status</td><td>At present non navigable</td></tr>
<tr><td>a)</td><td>Tidal & non tidal portions
(from… to, length, average tidal variation)</td><td>The survey Stretch of Ghataprabha River is non-tidal.</td></tr>
<tr><td>b)</td><td>Least Spot Height status (w.r.t. CD)
i) Survey period (10th Feb to 25th Mar 2016)
ii) < 1.2 m (km)
iii) 1.2 m to 1.4 m (km)
iv) 1.5 m to 1.7 m (km)
v) 1.8 m to 2.0 m (km)
vi) > 2.0 m (km)</td><td>Ghataprabha River is dry and the survey was conducted by topographic method.
<table>
<tr><th></th><th>0-30 (km)</th><th>30-60 (km)</th><th>60-90 (km)</th><th>90-111.76 (km)</th><th>Total</th></tr>
<tr><td>< 1.2 m (km)</td><td>30</td><td>30</td><td>30</td><td>21.76</td><td>111.76</td></tr>
<tr><td>1.2 to 1.4 m (km)</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1.5 to 1.7 m (km)</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1.8 to 2.0 m (km)</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>> 2.0 m (km)</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Total</td><td>30</td><td>30</td><td>30</td><td>21.76</td><td>111.76</td></tr>
</table></td></tr>
<tr><td>c)</td><td>Cross structures
i) Dams, weirs, barrages etc
(total number; with navigation Locks or not)
ii) Bridges, Power cables etc
[total number; range of horizontal and vertical clearances]</td><td>Cross Structures
i) Barrages - 14 Nos.
ii) Bridges – 3 Nos.
Horizontal Clearance – 10.81 to 40.25m
Vertical Clearance – 1.597 to 7.204 m w.r.t. HFL
iii) Power cables – Nil
iv) High Tension Lines – 7 Nos
Vertical Clearance – 16.285 to 24.355m w.r.t HFL</td></tr>
<tr><td>d)</td><td>Avg. discharge & no. of days</td><td>As the river stretch is dry Avg. Discharge cannot be calculated.</td></tr>
</table>

<table>
<tr><th>#</th><th>Particulars</th><th>Details</th></tr>
<tr><td>e)</td><td>Slope (1 in ….)</td><td>
<table>
<tr><th colspan="2">Chainage (km)</th><th rowspan="2">Slope (A/B)</th></tr>
<tr><th>From</th><th>To</th></tr>
<tr><td>0</td><td>30</td><td>1 : 0.015</td></tr>
<tr><td>30</td><td>60</td><td>1 : 0.119</td></tr>
<tr><td>60</td><td>90</td><td>1 : 0.252</td></tr>
<tr><td>90</td><td>111.76</td><td>1 : 0.193</td></tr>
</table>
Average Slope of Ghataprabha River is 1: 0.141
</td></tr>
<tr><td>5.</td><td>Traffic potential</td><td>No navigational traffic is present in the survey stretch of Ghataprabha River.</td></tr>
<tr><td>a)</td><td>Present IWT operations, ferry services, tourism, cargo, if any</td><td>No IWT operations had been found. There are no local Ferry Service by small boats and operation of tourism boats.</td></tr>
<tr><td>b)</td><td>Important industries within 50 km</td><td>• 1st Boiler Structure, NTPC, STPP Kudgi, Kudgi, Bijapur, Karnataka is 19.34km away from Ghataprabha River.
• Bagalkot Cement Factory Karnataka is 3.06km away from Ghataprabha River.
• Jamkhandi Sugars Limited, Bagalkot is 33.66km away from Ghataprabha River.</td></tr>
<tr><td>c)</td><td>Distance of Rail & Road from Industry</td><td>• 1st Boiler Structure, NTPC, STPP Kudgi, Kudgi, Bijapur, Karnataka is 1.77km away from SH124 and 2.36km away from Kudgi Railway Station.
• Bagalkot Cement Factory Karnataka is 2.07km away from Bagalkot Railway Station.
• Jamkhandi Sugars Limited, Bagalkot is 4.65km away from SH34.</td></tr>
<tr><td>6.</td><td>Consultant’s recommendation for going ahead with TEF / DPR preparation</td><td>No scope of TEF/DPR can be provided for the Ghataprabha River since the river is dry. This river stretch is not-viable for navigable channel.</td></tr>
<tr><td>7.</td><td>Any other information/ comment</td><td>-Nil-</td></tr>
</table>

(Signature)

Date: Name of Consultant

1 Introduction

1.1 Background

Ghataprabha River originates in the Western Ghats near the Chaukul village, tehsil Sawantwadi in the Sindhudurg district of Maharashtra. It arises about 12km away from the well-known hill-station of Amboli forming on the east-face of the same hills. From here on the river flows eastward into the Kolhapur district of Maharashtra. This river takes a north-easterly course towards the town of Mudhol and thereafter turns south-easterly until it reaches Bagalkot. At Bagalkot, it widens out to merge with the backwaters of the Almatti Dam built on River Krishna, though prior to the dam its confluence with the River Krishna was situated further down along its course at Almatti.

The stretch of about 111.76km, of Ghataprabha River, from confluence with River Krishna at Chicksangam to Barrage near Malali village was identified for Inland Water Transport facility as per a study carried out earlier. To assess the feasibility of water transportation over this stretch of river a bathymetric survey and topographic survey was carried out by IIC Technologies Ltd. on behalf of IWAI.

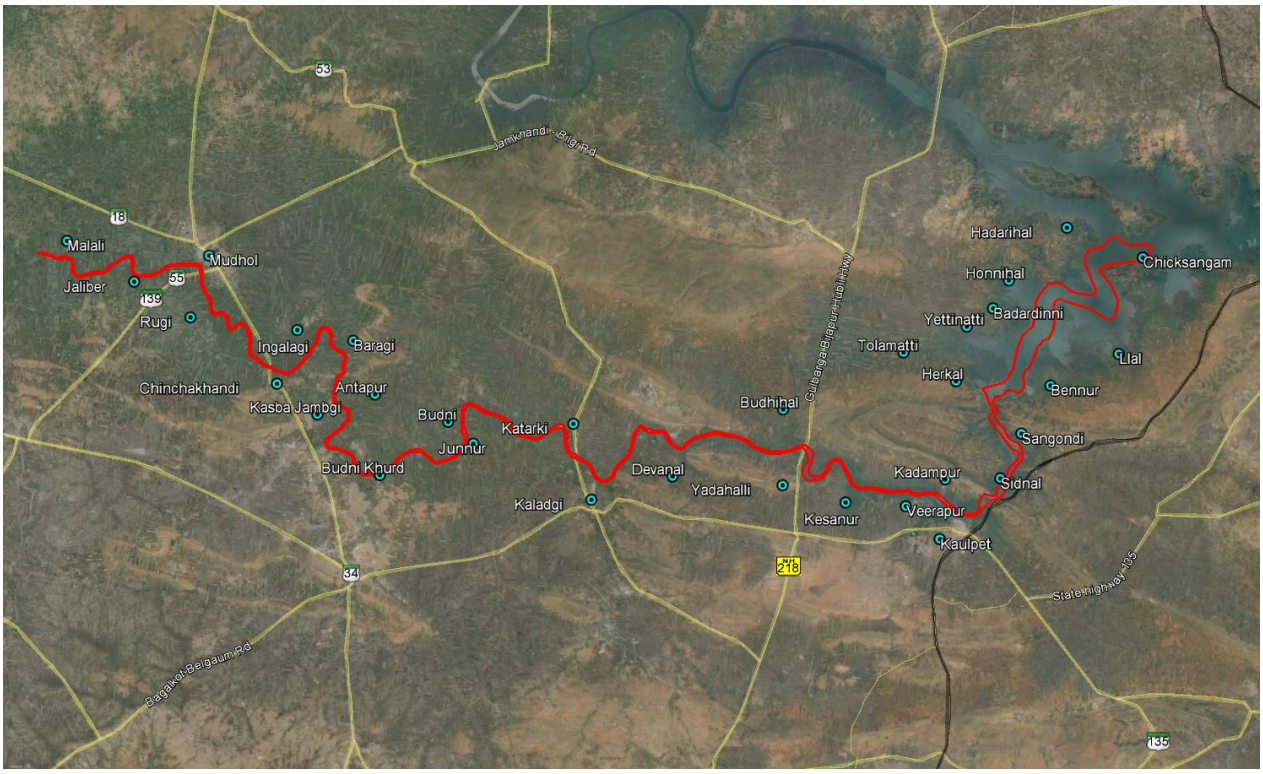


Figure 1 - Locations around Ghataprabha River

1.2 Tributaries of Ghataprabha River

Near Amboli, Maharashtra, Ghataprabha River forming at the east-face of the same hills which give birth to the Hiranyakeshi River, one of its important tributaries. From here on, the river flows eastward into the Kolhapur district of Maharashtra forming the Phatakwadi Lake, an artificial water body created by damming the river. The river ends its short course within Maharashtra near the town Daddi, Belgaum district of Karnataka which is also the site where the river Tamiraparani drains into it.

This river is then joined by the Hiranyakeshi River, its most important left-bank tributary. It then runs through sandstone hills near Gokak before running over a cliff to form the Gokak Falls. Less than a kilometer from the falls, the Markandeya River, a right-bank tributary joins. So Hiranyakeshi and Markandeya are two tributaries of Ghataprabha River.

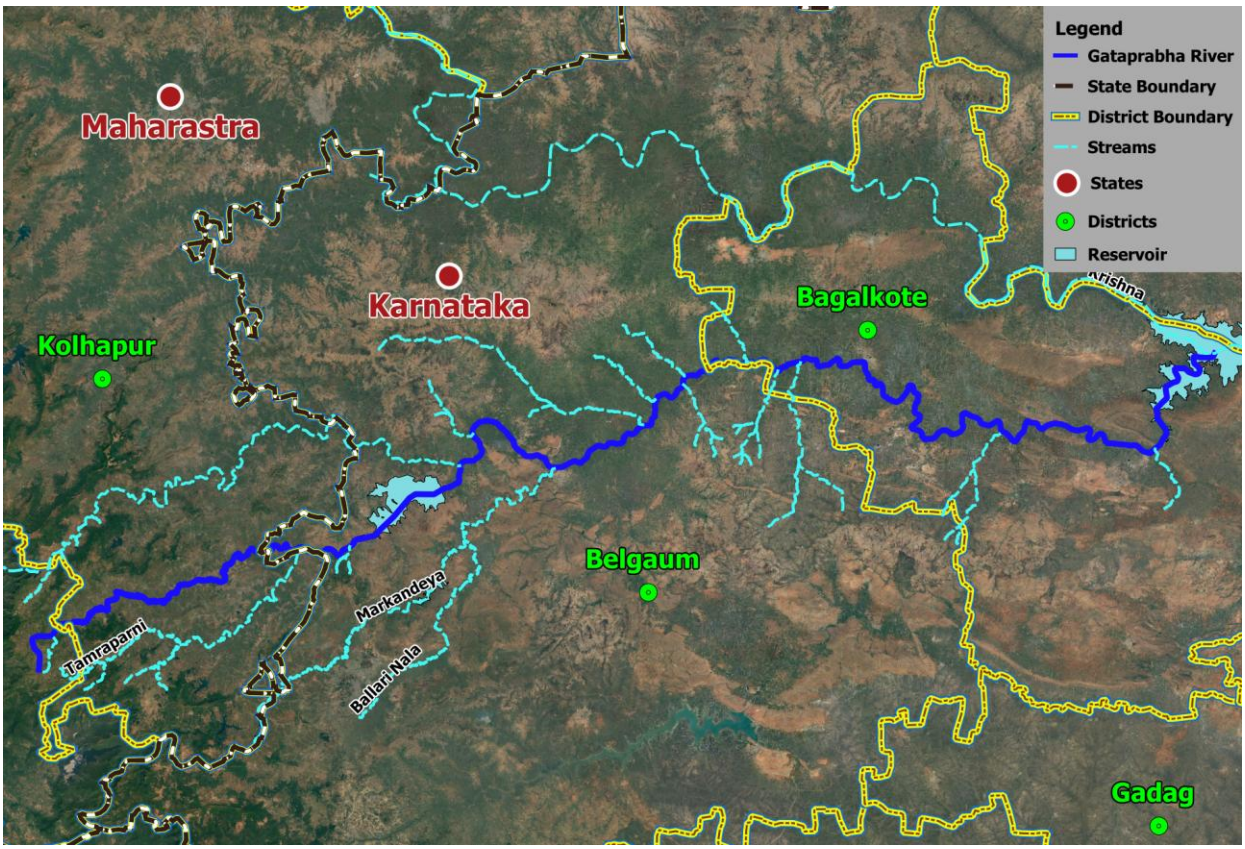


Figure 2 - Tributaries of total Ghataprabha River

1.3 State/ District through which river passes

The Ghataprabha River is a major river in South India and flows through Karnataka state.

State	Chainage (km)		Length (km)
	From	To	
Karnataka	0	111.76	111.76

Table 1 - State wise waterway

1.4 Maps

1.4.1 Full course of the waterway

The map displaying the state boundary with road and rail network for the course of water way is represented as below:-

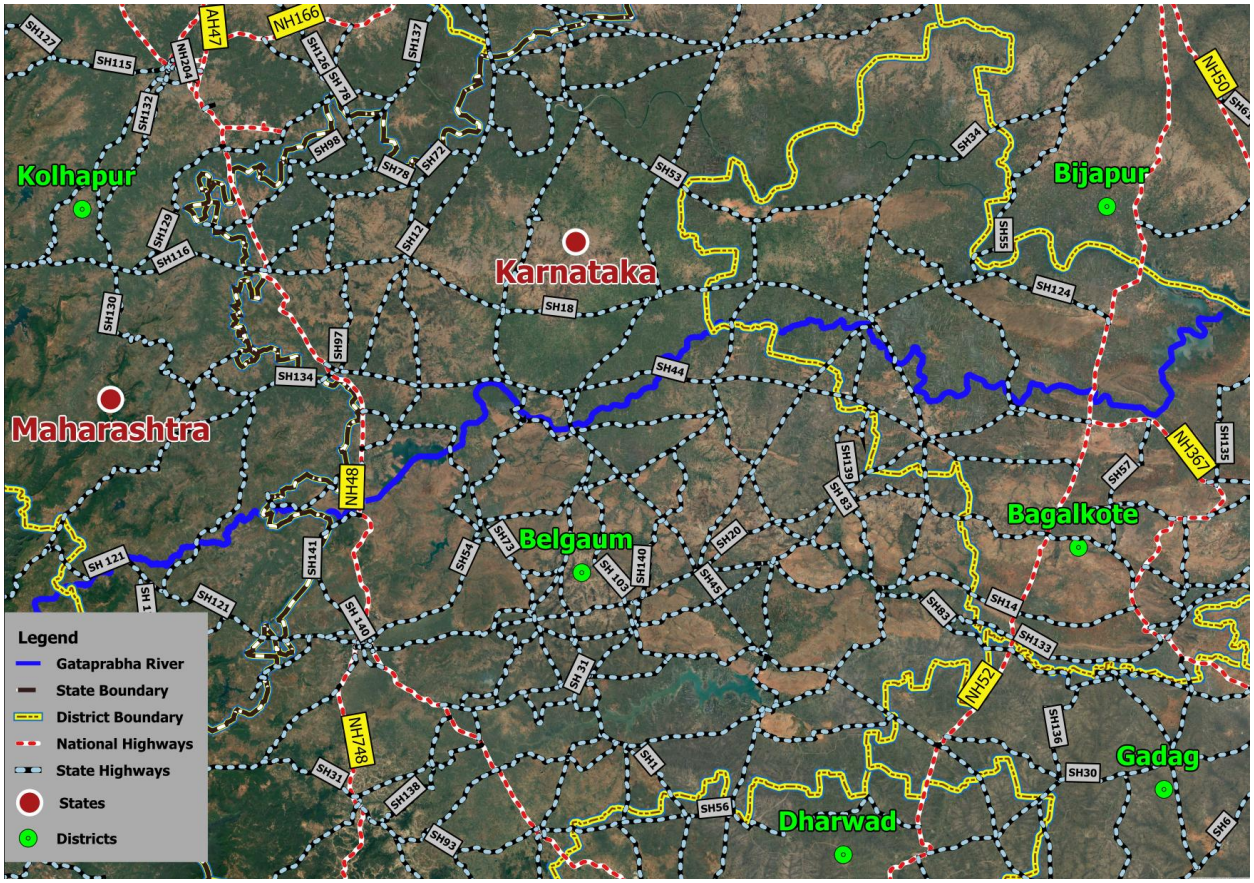


Figure 3 - Full Course of Ghataprabha River

1.4.2 Course of the waterway under study

The map displaying the state boundary with road and rail network for the course of water way is represented as below:

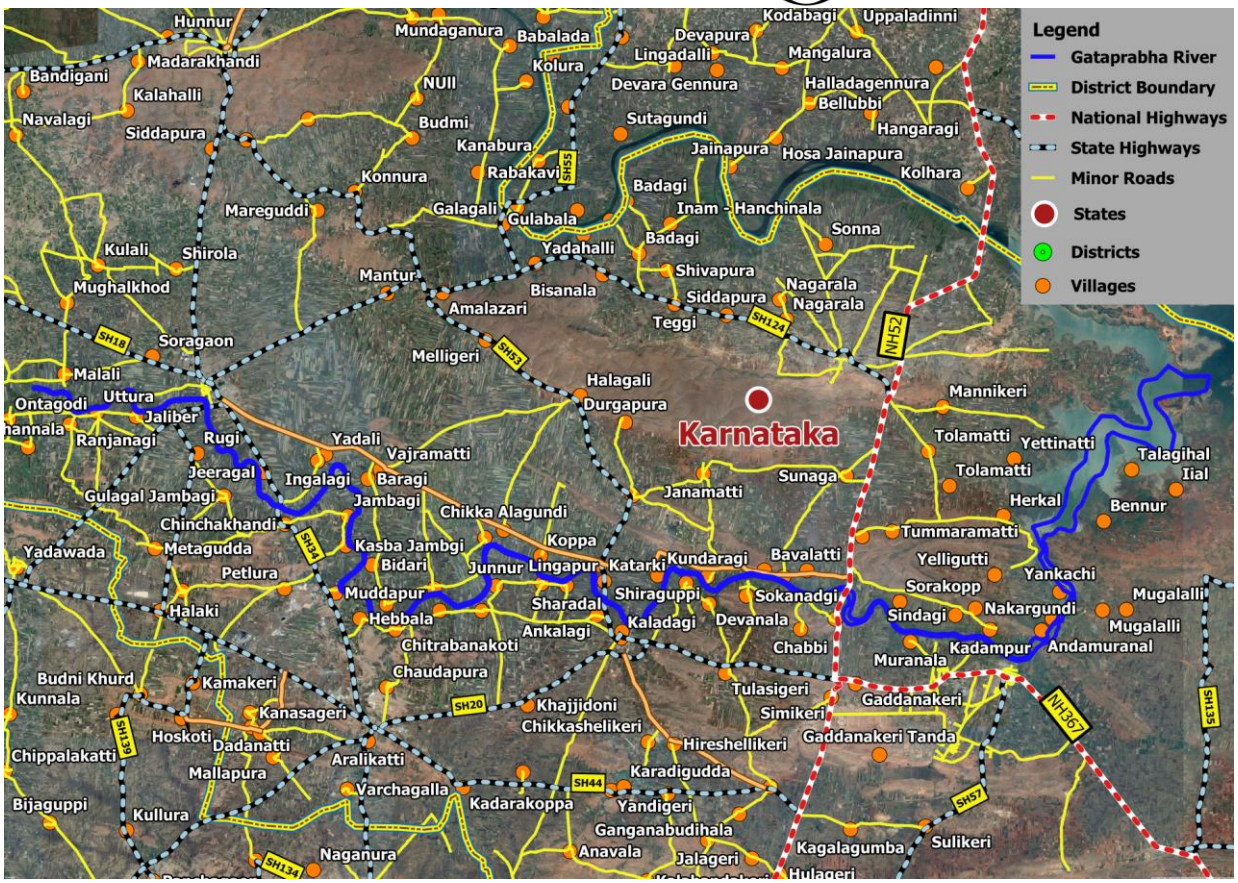


Figure 4 - Course of Ghataprabha River

1.5 Scope of work

The major part of the work is to conduct detailed hydrographic and topographic survey of 111.76km length of the Ghataprabha from confluence of with river Krishna at Chicksangam Lat 16°20'13.37"N, Long 75°47'53.52"E to Barrage (approx. 0.5km from Malali village) at Lat 16°20'01.13"N, Long 75°11'23.14"E.

- Undertake bathymetric and topographic survey of proposed waterway.
- Establishing horizontal and vertical control stations.
- Construction of benchmark pillars and establishing its reduced level w.r.to Mean Sea Level.
- Setting up and deployment of water level gauges.
- Current velocity and discharge measurements.
- Collection and analysis of water and bottom samples.
- A collection of topographic features including existing cross structures.
- Preparation of inventory of industries in the project influence area (PIA)
- Analysis of survey data, including assessment of water availability for navigation.
- Preparation of survey charts and feasibility report.

2 Methodology Adopted to undertake Study

2.1 Recce

Advance recce of the survey area was undertaken in early 05th Feb 2016 by a detach survey party. The detach survey party recovered the GTS Benchmark at Kaladgi, GTS Benchmark upon Chinchakhandi Bridge established by PWD. And gauge at Ranjanagi Village, Mudhol, and gauge at Bagalkot which is located 3km towards the northeast of Bagalkot which is being established by CWC. The recce was started from a Malali village, Bagalkot Dist. in Karnataka till the Sangam of Ghataprabha and Krishna River at a village near Chicksangam. Stretch was examined at four places (Barrage near Malali village, Mudhol, Bagalkot and Confluence of Krishna River at Chicksangam).

The upper portion of Ghataprabha River, which contains small rocky patches and the survey stretch, is maximum dry in nature and availability of water is negligible. This causes the practical inability to use any type of boat for sounding in this area.

The downstream of the river was being observed that it's been widened and though the water was present, it was insufficient to carry bathymetric survey, which being led us to carry the survey in the topographic method. Mobilization commenced in earnest on 10th Feb 2016 and was completed on 25th Mar 2016.

The following observation has been made.

- The survey area is 111.76km, from the barrage at Malali Village towards downstream.
- River width varied between 100m to 300m.
- The work of Topography is also very much time consuming and not feasible due to rocks and cliffs on both the banks.

2.2 Survey Resources and Methodology

The actual survey was commenced on 10th Feb and completed on 25th Mar 2016. The survey was undertaken on a scale of 1:10,000, with a survey line spacing kept at 100 m and plotted on UTM Projection at Zone 43N as directed in the contract specification.

2.2.1 Survey Launch

The bathymetric survey was unable to conduct due to the unavailability of sufficient navigable water in the river stretch.

2.2.2 Survey Equipment

Following equipment were employed for the topographic survey.

Equipment	Make	Eqpt. Serial No.	Qty. Employed
DGPS Sets	Trimble R4	5320436971, 5147477181, 5411458719, 5049457042	4
Auto Level	Sokkia Auto level & Accessories	260242, 229490	2
ETS	Electronic Total Station	120595 & 120768	2
Software	TBC	Version 12	1
Software	AUTOCAD	2012	1
Software	Microsoft Office	2013	1

Table 2 - Survey Equipment Used

2.2.3Topographic Survey

The survey was commenced on 10th Feb 2016 and completed on 25th Mar 2016. The weather was sunny/cold throughout the period during survey operations. The weather was favorable with moderate hot climate 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 20 m interval. The plotting of the chart was done on UTM Projection at Zone 43N 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, sand patches
- 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

The details of all spot levels are provided in the respective sheets being presented along with this report. Additionally, a soft copy of the same in XYZ format is being handed over as deliverable data.

Figure 5 - Spot leveling by DGPS

2.2.4 Bathymetric Survey and Survey Launch

The bathymetric survey by survey launch for the Ghataprabha River was not able to be conducted due to non-availability of sufficient water depth throughout the river.

2.2.5 Calibration

The equipment used for the survey was calibrated by the equipment supplier. The equipment calibration certificates are placed at Annexure-14 to this report.

2.3 Description of Bench Marks (B.M.) Reference Level

The GTS station near to the Kaladgi was recovered and the value of 536.10m above MSL was collected from Asst. Engineer, PWD Bagalkot. The PWD Chinchakhandi GTS (530.296m MSL) provided by Assistant Engineer, PWD, Bagalkot, Karnataka,

Kaladgi station was used as the initial reference for vertical control and the Reference Level value of the same was transferred IWAI-BM-GTP-06 and IWAI-BM-GTP-07 through Auto Level (optical leveling method).

The station was used as cross verification of MSL values of the initial reference. The vertical control and the Reference Level vale of the same were transferred through Auto Level. The leveling data for establishing the reference level for the newly constructed benchmark pillars are placed at Annexure –10 to this report. The final accepted WGS 84 coordinates and details of station & IWAI Benchmark established during the conduct of the survey are as follows:

Figure 6 - PWD Benchmark upon Chinchakhandi Bridge, referred to GTP-03

Sl.No.	Station	Chainage (km)	Latitude	Longitude	Ht. above MSL (m)	Source/ Type
1	IWAI BM GTP01	111.91	16°19'57.0375"N	75°11'17.7769"E	529.113	Online Processed
2	IWAI BM GTP02	101.63	16°19'37.0022"N	75°15'50.7605"E	530.773	BL Processed
3	IWAI BM GTP03	90.97	16°16'26.5031"N	75°19'12.0430"E	525.852	BL Processed
4	IWAI BM GTP04	81.02	16°15'18.9257"N	75°21'20.1311"E	522.802	BL Processed
5	IWAI BM GTP05	70.64	16°13'43.6214"N	75°24'7.5995"E	524.179	BL Processed
6	IWAI BM GTP06	60.89	16°14'14.0042"N	75°27'32.8230"E	521.674	BL Processed
7	IWAI BM GTP07	51.11	16°13'48.4392"N	75°31'21.3265"E	520.309	BL Processed
8	IWAI BM GTP08	41.09	16°13'43.3104"N	75°35'48.9635"E	518.378	BL Processed
9	IWAI BM GTP09	28.75	16°12'14.0051"N	75°40'50.7808"E	519.693	BL Processed
10	IWAI BM GTP10	18.56	16°14'30.7246"N	75°43'57.2871"E	526.34	BL Processed
11	IWAI BM GTP11	12.17	16°16'14.4317"N	75°46'25.0470"E	519.472	BL Processed
12	PWD BM KALADGI	54.17	16°12'4.6351"N	75°29'38.7000"E	536.100	BL Processed

Table 3 - Accepted Station coordinates (WGS-84)

The details of horizontal and vertical control established and methodology followed for the conduct of the survey are placed at Annexure-8.

2.4 Tidal Influence Zone and tidal variation

The survey stretch of Ghataprabha River is non-tidal water body and no influence of tidal force was observed throughout the survey period.

2.5 Methodology to fix Chart Datum / Sounding Datum

The Ghataprabha River is of 111.76km stretch which is between Chicksangam to Malali. There are many other various barrages present in the survey stretch of the Ghataprabha River. The water depth by an average of 0.1m to 0.2m is available near the barrages. The water level is recoded as dry (dead level) in the records held by the dam authorities.

2.5.1 Sounding Datum

The Ghataprabha River is to 111.76km stretch between Chicksangam to Malali. The entire River stretch is divided into per-km stretches and the least MSL value obtained during the conduct of a topographic survey for the stretch is considered as Chart Datum for the Dredging Volume calculations.

2.5.2 Datum Calculation

The datum for calculation of dredge volume needs to be adopted as per the gradient of the river and the average water level of the river. The datum for calculation of dredge volume was accepted as the least spot height in the per-km stretch for the entire river. The newly established sounding datum is established by assuming the least value of the spot height for every 01km of the river stretch.

Km Stretch	Least Level w.r.t MSL	Established CD		Km Stretch	Least Level w.r.t MSL	Established CD
0 - 1	506.135	506.135		60 - 61	510.23	510.23
1 - 2	506.014	506.014		61 - 62	510.228	510.228
2 - 3	506.125	506.125		62 - 63	510.236	510.236
3 - 4	506.012	506.012		63 - 64	510.235	510.235
4 - 5	506.011	506.011		64 - 64.6	510.248	510.248
5 - 6	506.135	506.135		64.6 - 65	511.345	511.345
6 - 7	506.014	506.014		65 - 66	510.263	510.263
7 - 8	506.011	506.011		66 - 67	510.292	510.292
8 - 9	506.012	506.012		67 - 68	510.826	510.826
9 - 10	506.125	506.125		68 - 69	511.156	511.156
10 - 11	506.014	506.014		69 - 70	511.818	511.818
11 - 12	506.142	506.142		70 - 70.6	512.444	512.444
12 - 13	506.146	506.146		70.6 - 71	514.875	514.875
13 - 14	506.159	506.159		71 - 72	512.602	512.602
14 - 15	506.213	506.213		72 - 73	513.163	513.163
15 - 16	506.183	506.183		73 - 74	513.136	513.136
16 - 17	506.145	506.145		74 - 75	513.156	513.156
17 - 18	506.192	506.192		75 - 76	513.156	513.156
18 - 19	506.204	506.204		76 - 76.9	513.153	513.153
19 - 20	506.214	506.214		76.9 - 77	513.136	513.136
20 - 21	506.238	506.238		77 - 78	513.23	513.23
21 - 22	506.265	506.265		78 - 79	513.236	513.236
22 - 23	506.304	506.304		79 - 79.8	513.248	513.248

Km Stretch	Least Level w.r.t MSL	Established CD		Km Stretch	Least Level w.r.t MSL	Established CD
23 - 24	506.32	506.32		79.8 - 80	516.014	516.014
24 - 25	506.368	506.368		80 - 81	514.125	514.125
25 - 26	506.371	506.371		81 - 82	514.256	514.256
26 - 27	506.394	506.394		82 - 82.9	514.21	514.21
27 - 28	506.415	506.415		82.9 - 83	515.651	515.651
28 - 29	506.857	506.857		83 - 84	514.263	514.263
29 - 30	506.481	506.481		84 - 85	514.443	514.443
30 - 31	506.515	506.515		85 - 86	514.75	514.75
31 - 32	507.066	507.066		86 - 86.1	517.606	517.606
32 - 33	506.628	506.628		86.1 - 87	515.645	515.645
33 - 34	506.642	506.642		87 - 88	516.236	516.236
34 - 35	506.658	506.658		88 - 89	516.263	516.263
35 - 35.2	506.673	506.673		89 - 90	516.596	516.596
35.2 - 36	506.875	506.875		90 - 91	517.236	517.236
36 - 37	507.058	507.058		91 - 92	518.052	518.052
37 - 38	507.152	507.152		92 - 93	517.387	517.387
38 - 38.5	507.248	507.248		93 - 93.8	517.381	517.381
38.5 - 39	507.436	507.436		93.8 - 94	519.821	519.821
39 - 40	507.598	507.598		94 - 95	517.812	517.812
40 - 41	507.656	507.656		95 - 96	517.94	517.94
41 - 42	507.958	507.958		96 - 97	517.827	517.827
42 - 43	508.016	508.016		97 - 98	518.452	518.452
43 - 44	508.104	508.104		98 - 99	518.263	518.263
44 - 45	508.215	508.215		99 - 99.6	519.292	519.292
45 - 46	508.225	508.225		99.6 - 100	518.721	518.721
46 - 47	508.318	508.318		100 - 101	519.125	519.125
47 - 48	508.336	508.336		101 - 102	519.256	519.256
48 - 49	508.572	508.572		102 - 103	520.123	520.123
49 - 50	508.719	508.719		103 - 103.8	519.07	519.07
50 - 51	509.086	509.086		103.8 - 104	519.217	519.217
51 - 52	509.136	509.136		104 - 105	519.178	519.178
52 - 52.8	509.216	509.216		105 - 106	519.113	519.113
52.8 - 53	511.638	511.638		106 - 107	519.363	519.363
53 - 54	509.263	509.263		107 - 108	519.665	519.665
54 - 55	509.275	509.275		108 - 109	520.815	520.815
55 - 56	509.334	509.334		109 - 110	521.378	521.378
56 - 57	509.718	509.718		110 - 111	521.77	521.77
57 - 58	509.811	509.811		111 - 111.7	522.145	522.145
58 - 59	509.874	509.874		111.7 - 111.76	522.029	522.029
59 - 60	510.156	510.156				

Table 4 - Established CD for Stretch-wise

2.6 Average of 06 years minimum Water Levels used

Ghataprabha River is non-tidal river body having the primary source of water receiving from dams and ends up in drying summer.

Mudhol CWC GAUGE 2000-2006

WL values in m.

Min/Max	2000	2001	2002	2003	2004	2005	2006
Jan Min.		522.340	522.340	523.990	**521.330**	524.705	521.570
Jan Max.		523.260	524.270	524.185	524.195	524.900	524.265
Feb Min.		523.150	523.210	**521.390**		523.680	523.980
Feb Max.		523.220	524.330	524.150		524.800	524.260
Mar Min.		522.820	**521.110**	522.400	521.360	521.480	521.705
Mar Max.		524.090	523.870	523.220	525.700	525.780	524.300
Apr Min.		521.650	521.810	521.620	521.750	521.490	**521.250**
Apr Max.		523.670	524.370	522.240	525.620	525.700	525.490
May Min.			521.500	521.535	521.490	521.900	521.465
May Max.			522.300	524.540	522.245	524.980	525.550
Jun Min.		**521.420**	521.390	523.030	521.410	**521.300**	521.370
Jun Max.		**521.850**	524.030	525.053	525.220	525.310	526.350
Jul Min.	521.685	521.695	521.705	521.740	521.420	521.710	522.090
Jul Max.	527.440	525.960	523.568	524.425	523.030	530.380	529.505
Aug Min.	**521.545**	521.755	521.680	522.045	522.510	523.035	522.560
Aug Max.	524.880	524.615	526.750	523.255	528.410	532.340	531.395
Sep Min.	521.990	521.543	521.860	522.238	521.660	523.150	522.175
Sep Max.	525.880	524.755	523.400	522.660	522.725	531.660	527.540
Oct Min.	522.060	521.580	521.380	522.225	521.510	522.290	521.600
Oct Max.	526.245	526.650	522.980	523.180	523.560	526.785	524.060
Nov Min.	521.750	521.650	521.320	521.460	521.475	521.375	521.360
Nov Max.	522.100	521.840	522.070	523.420	522.480	522.165	522.440
Dec Min.	521.710	521.690	521.465	522.480	522.435	521.495	521.500
Dec Max.	521.930	522.450	524.180	524.205	524.925	521.810	524.100
Yearly Min.	**521.545**	**521.420**	**521.110**	**521.390**	**521.330**	**521.300**	**521.250**
Yearly Max.	**527.440**	**526.650**	**526.750**	**525.053**	**528.410**	**532.340**	**531.395**
6yr. Min.				**521.110**			
6yr. Max.				**532.340**			
6yr. Ave. Min.				**521.300**			
6yr. Ave. Max.				**527.774**			
Value of Chart Datum (CD) adopted					**521.300**		

Table 5 - Mudhol CWC gauge details form 2000-2006

Bagalkot CWC GAUGE 1994-2000

WL values in m.

Min/Max	1994	1995	1996	1997	1998	1999	2000
Jan Min.	507.897	507.857	507.942	507.727	507.697	507.985	508.162
Jan Max.	508.127	508.367	508.017	508.162	508.027	508.187	509.177
Feb Min.	507.837	507.757	507.297	507.872	507.787	507.907	508.057
Feb Max.	508.037	508.027	507.967	507.997	507.897	508.215	508.167
Mar Min.	506.967	507.167	**506.882**	507.247	507.057	507.602	507.477
Mar Max.	507.867	507.947	507.587	508.177	507.867	508.027	508.057
Apr Min.	506.787	506.887		506.927	**506.417**	506.972	507.047
Apr Max.	506.967	508.287		507.202	507.047	507.717	507.657
May Min.	**506.647**	507.027	507.727	506.917	506.847	**506.867**	**506.917**
May Max.	508.002	508.187	507.812	507.992	507.247	508.227	507.987
Jun Min.	507.672	**506.877**	507.457	**506.762**	506.842	507.717	507.282
Jun Max.	509.037	508.637	509.322	508.957	509.267	511.817	508.322
Jul Min.	508.782	507.377	507.712	509.432	507.827	509.697	507.977
Jul Max.	512.942	509.697	510.102	512.792	512.247	514.077	512.597
Aug Min.	508.627	507.677	508.082	510.877	510.137	509.787	508.567
Aug Max.	510.767	509.002	510.057	514.777	511.667	513.707	514.257
Sep Min.	508.055	507.927	508.137	508.347	509.820	508.897	514.187
Sep Max.	511.257	509.387	509.647	513.657	511.267	510.072	516.187
Oct Min.	508.127	508.057	508.162	507.947	509.847	510.112	
Oct Max.	509.027	509.397	510.807	509.627	511.827	511.827	
Nov Min.	507.937	507.957	508.137	508.097	508.267	509.532	
Nov Max.	508.467	508.667	508.527	509.057	509.737	510.207	
Dec Min.	507.667	507.912	508.047	507.947	508.137	509.187	
Dec Max.	507.967	508.157	508.187	508.527	508.267	509.527	
Yearly Min.	**506.647**	**506.877**	**506.882**	**506.762**	**506.417**	**506.867**	**506.917**
Yearly Max.	**512.942**	**509.697**	**510.807**	**514.777**	**512.247**	**514.077**	**516.187**
6yr. Min.				**506.417**			
6yr. Max.				**516.187**			
6yr. Ave. Min.				**506.787**			
6yr. Ave. Max.				**512.425**			
Value of Chart Datum (CD) adopted					**506.787**		

Table 6 - Bagalkot CWC guage details from 1994-2000

2.7 Transfer of Sounding Datum

The Ghataprabha River is non-tidal river and lowest MSL level of per km stretch is considered as the datum value for the computing sounding datum at different stretches since the river is dry.

2.8 Table indicating tidal variation at different observation points

The survey stretch of Ghataprabha River is non-tidal river and the river dries fully during the summer season.

2.9 Salient features of Dam, Barrages, Barrage

The details of Dams, Barrages were collected during the conduct of surveys and the details are as follows:

2.9.1 Salient Features of Bannidinni Barrage

Salient Features of Bannidinni Barrage		
1	River / Basin	Ghataprabha
2	Latitude	16°13'16.63"N
3	Longitude	75°37'51.27"E
4	District	Bagalkot
5	Location	Bannidinni Village
6	No. of gates	14
7	Length	103m
8	Width	7.500m

Table 7 - Salient Features of Bannidinni Barrage

2.9.2 Salient Features of Yadahalli Barrage

Salient Features of Yadahalli Broken Barrage		
1	River / Basin	Ghataprabha / Krishna
2	Latitude	16°13'51.33"N
3	Longitude	75°37'9.60"E
4	District	Bagalkot
5	Location	Yadahalli village
6	No. of Deck	73
7	Length	483 m
8	Width	12.586

Salient Features of Yadahalli Broken Barrage


Table 8 - Yadahalli Barrage details

2.9.3 Salient Features of Kaladgi Barrage

Salient Features of Kaladgi Barrage		
1	River / Basin	Ghataprabha
2	Latitude	16°13'5.27"N
3	Longitude	75°30'43.98"E
4	District	Bagalkot
5	Location	Kaladgi village
6	No. of Lock	14
7	Length	194m
8	Width	8.45m
		

Table 9 - Kaladgi Barrage details

2.9.4 Salient features of Katarki Barrage

Salient Features of Katarki Barrage		
1	River / Basin	Ghataprabha/Krishna
2	Latitude	16°13'36.94"N
3	Longitude	75°29'26.84"E
4	District	Bagalkot
5	Location	Katarki Village

Salient Features of Katarki Barrage		
6	No. of Deck	73
7	Length of Barrage	200m.
8	Total Ayacut (Acre)	360 Ha.
9	Water Utilization (TMC)	N-A


Table 10 - Katarki Barrage details

2.9.5 Salient Features of Alagundi Barrage

Salient Features of Alagundi Barrage		
1	River / Basin	Ghataprabha
2	Latitude	16°15'13.41"N
3	Longitude	75°25'47.36"E
4	District	Bagalkot
5	Location	Alagundi village
6	No. of Gates	14
7	Length of Barrage	113.7m
8	Width	6.31m

Table 11 - Alagundi Barrage Details

2.9.6 Salient Features of Machakanur Barrage

Salient Features of Machakanur Barrage		
1	River / Basin	Ghataprabha
2	Latitude	16°13'46.00"N

Salient Features of Machakanur Barrage		
3	Longitude	75°24'7.92"E
4	District	Bagalkot
5	Location	Kasba-jambgi village
6	No. of Deck	20
7	Length of Barrage	105.01
8	Width	7.01
9	Total Ayacut (Acres)	2.36Ha
10	Water utilization (TMC)	N-A-
		

Table 12 - Machaknur Barrage Details

2.9.7 Salient Features of Jambgi Barrage

Salient Features of Jambgi Barrage		
1	River / Basin	Ghataprabha
2	Latitude	16°13'49.59"N
3	Longitude	75°21'17.56"E
4	District	Bagalkot
5	Location	Kasba-jambgi village
6	No. of Deck	25
7	Length of Barrage	63.82
8	Width of Barrage	5.02m
9	Total Ayacut (Acres)	0.98ha
10	Water utilization (TMC)	N/A
		

Table 13 - Jambgi Barrage Details

2.9.8 Salient Features of Bidri Barrage

Salient Features of Bidri Barrage		
1	River / Basin	Ghataprabha
2	Latitude	16°14'58.06"N
3	Longitude	75°21'50.74"E
4	District	Bagalkot
5	Location	Bidri village
6	No. of Deck	11
7	Length of Barrage	89.2m
8	Width	5.23m
9	Total Ayacut (Acres)	1.23ha
10	Water utilization (TMC)	N/A
		

Table 14 - Bidri Barrage Details

2.9.9 Salient Features of Marakatti Barrage

Salient Features of Marakatti Barrage		
1	River / Basin	Ghataprabha
2	Latitude	16°16'15.31"N
3	Longitude	75°21'39.84"E
4	District	Bagalkot
5	Location	Baragi village
6	No. of Deck	17
7	Length of Barrage	107.2m
8	Width	5.63m
9	Total Ayacut (Acres)	0.65ha
10	Water utilization (TMC)	N-A
		

Table 15 - Marakatti Barrage Details

2.9.10 Salient Features of Ingalagi Barrage

Salient Features of Ingalagi Barrage		
1	River / Basin	Ghataprabha
2	Latitude	16°17'39.84"N
3	Longitude	75°21'2.82"E
4	District	Bagalkot
5	Location	Ingalagi village
6	No. of Deck	32
7	Length of Barrage	164.27m
8	Width	5.36m
9	Total Ayacut (Acres)	1.36ha
10	Water utilization (TMC)	N-A

Table 16 - Ingalagi Barrage Details

2.9.11 Salient Features of Jeeragal Barrage

Salient Features of Jeeragal Barrage		
1	River / Basin	Ghataprabha
2	Latitude	16°17'34.68"N
3	Longitude	75°18'27.21"E
4	District	Bagalkot
5	Location	Mudhol Taluk
6	No. of Deck	17
7	Length of Barrage	85.5
8	Width	6.34
9	Total Ayacut (Acres)	1.52ha
10	Water utilization (TMC)	N/A

Table 17 - Jeragal Barrage Details

2.9.12 Salient Features of Mudhol Barrage

Salient Features of Mudhol Barrage		
1	River / Basin	Ghataprabha
2	Latitude	16°19'30.68"N
3	Longitude	75°16'51.77"E
4	District	Bagalkot
5	Location	Mudhol village
6	No. of Deck	20
7	Length of Barrage	87.2m
8	Width	2.42m
9	Total Ayacut (Acres)	3.21ha
10	Water utilization (TMC)	N-A
		

Table 18 - Mudhol Barrage Details

2.9.13 Salient Features of Jaliber Barrage

Salient Features of Jaliber Barrage		
1	River / Basin	Ghataprabha
2	Latitude	16°19'19.19"N
3	Longitude	75°14'41.18"E
4	District	Bagalkot
5	Location	Jaliber village
6	No. of Deck	34
7	Length of Barrage	91.44m
8	Width	4.64m
9	Total Ayacut (Acres)	2.36Ha
		

Table 19 - Jaliber Barrage Details

2.9.14 Salient Features of Malali Barrage

Salient Features of Malali Barrage		
1	River / Basin	Ghataprabha
2	Latitude	16°20'0.82"N
3	Longitude	75°11'23.31"E
4	District	Bagalkot
5	Location	Nagaral village
6	No. of Deck	6
7	Length of Barrage	37.3m
8	Width	2.98m
9	Total Ayacut (Acres)	1.56Ha

Table 20 - Malali Barrage Details

2.10 Erected IWAI Benchmark Pillars

New bench Mark Pillars were constructed as per specification at suitable locations as specified in the contract. The extension of horizontal control was made by the baseline processing of 06 hourly DGPS observations carried out with the nearest reference station. The value of these benchmarks w.r.t. MSL was obtained by auto leveling from the PWD Chinchakhandi GTS (530.296m MSL) provided by Assistant Engineer, PWD, Bagalkot, Karnataka, PWD Kaladgi GTS (536.100m MSL).

The final accepted co-ordinates and reduced level (R.L) values of these Bench Marks and other station established for setting up of reference DGPS base stations are as below:

Sl. No	Station	Chainage (km)	Location	Latitude (N) Longitude (E)	Easting (E) Northing (N)	Height above MSL (m)	CD w.r.t. MSL (m)	BM Height w.r.t. CD (m)
1	IWAI BM GTP01	111.91	Malali	16°19'57.0375"N 75°11'17.7769"E	520109.8288 1805725.688	529.113	522.029	7.084
2	IWAI BM GTP02	101.63	Jaliber	16°19'37.0022"N 75°15'50.7605"E	528210.1676 1805119.045	530.773	519.256	11.517
3	IWAI BM GTP03	90.97	Chinchakhandi	16°16'26.5031"N 75°19'12.0430"E	534191.6774 1799274.042	525.852	517.236	8.616
4	IWAI BM GTP04	81.02	Jambgi	16°15'18.9257"N 75°21'20.1311"E	537996.8743 1797203.839	522.802	514.199	8.603

Sl. No	Station	Chainage (km)	Location	Latitude (N) Longitude (E)	Easting (E) Northing (N)	Height above MSL (m)	CD w.r.t. MSL (m)	BM Height w.r.t. CD (m)
5	IWAI BM GTP05	70.64	Machakanur	16°13'43.6214"N 75°24'7.5995"E	542973.4882 1794284.57	524.179	512.602	11.577
6	IWAI BM GTP06	60.89	Kaladgi	16°14'14.0042"N 75°27'32.8230"E	549063.7726 1795230.962	521.674	510.23	11.444
7	IWAI BM GTP07	51.11	Hiresansi	16°13'48.4392"N 75°31'21.3265"E	555849.0137 1794461.65	520.309	509.136	11.173
8	IWAI BM GTP08	41.09	Chabbi	16°13'43.3104"N 75°35'48.9635"E	563794.7672 1794325.747	518.378	507.956	10.422
9	IWAI BM GTP09	28.75	Veerapur	16°12'14.0051"N 75°40'50.7808"E	572764.0474 1791609.434	519.693	506.481	13.212
10	IWAI BM GTP10	18.56	Sangondi	16°14'30.7246"N 75°43'57.2871"E	578286.6867 1795829.749	526.34	506.214	20.126
11	IWAI BM GTP11	12.17	Siraguppi	16°16'14.4317"N 75°46'25.0470"E	582661.0473 1799032.727	519.472	506.142	13.330

Table 21 - Accepted Benchmark coordinates w. r. t CD

2.11 Chart Datum / Sounding Datum and Reductions Details

Due to unavailability of water in Ghataprabha River, the spot leveling by topographic method was attempted for the entire survey stretch of Ghataprabha River. The least MSL level for the per-kilometer stretch was obtained as the established Chart Datum. The details of topo level converted as depth for volume calculation are forwarded as soft copy along with the report.

2.12 HFL values of Bridges/Cross Structures

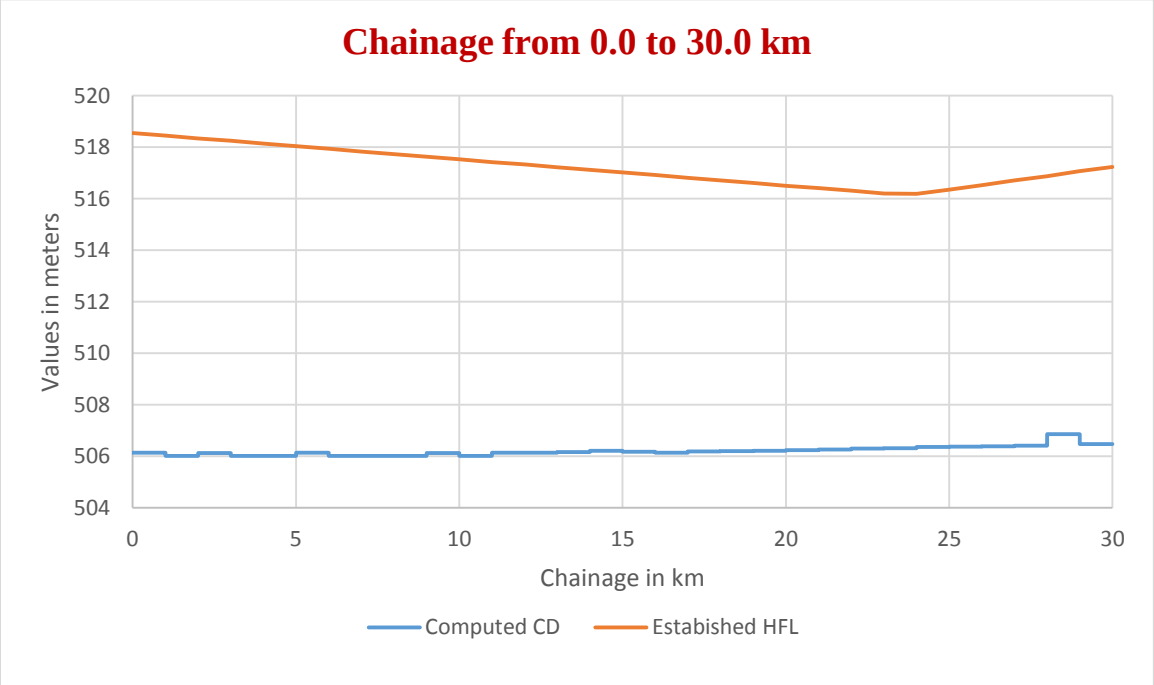
The established HFL value of 519.600m, 516.187m, 531.404m w.r.t MSL for the CWC Gauges of Almatti Dam, Bagalkot and Mudhol was provided by Asst. Eng. Minor Irrigation Department, Bagalkot. The HFL value for the remaining survey stretch is computed for the Ghataprabha River. The details of established and computed HFL values for the entire stretch are as follows:

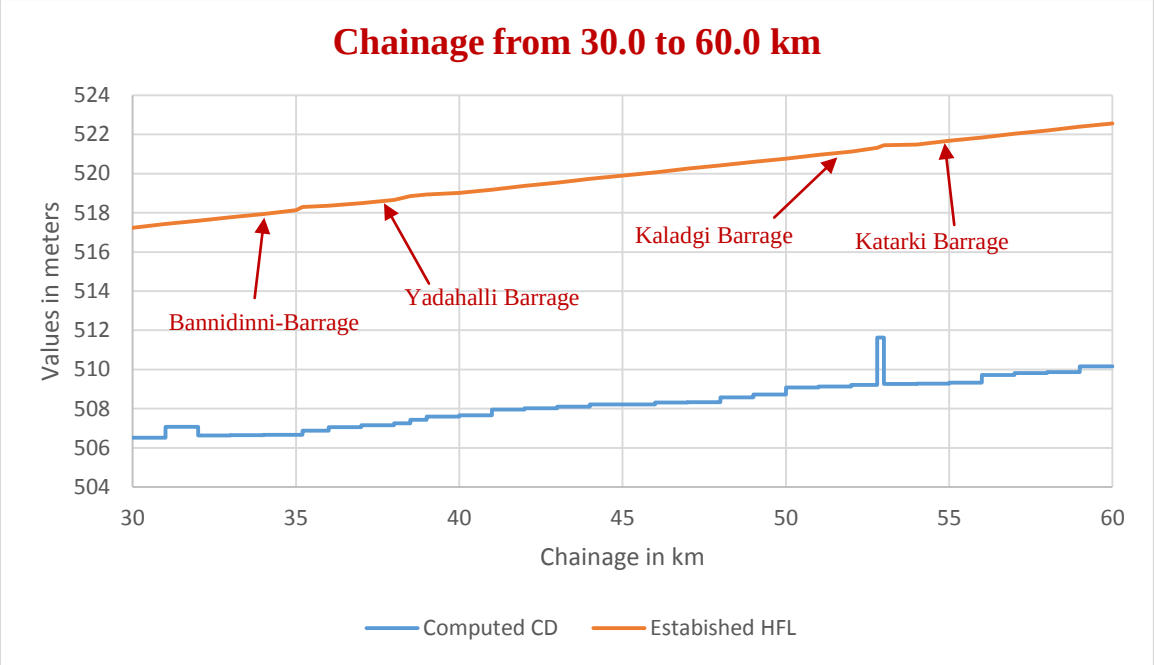
Sl#	Location and description of CWC gauge Barrages / Weirs / Anicut / Barrages / Aqueducts	Cross-structure details	Chainage (km)	Established HFL / FRL w.r.t. MSL (m)	Computed HFL at Cross-Structures w.r.t. MSL (m)
	A	B	C	D	E
1	Almatti Dam	Dam	-8.23	519.600	-
2	CWC Bagalkot	Gauge	23.24	516.187	-
3	Bannidinni Barrage	Barrage	35.25	-	518.356
4	Yadahalli barrage	Barrage	38.59	-	518.932
5	Yadahalli Bridge	Highway Bridge	38.74	-	518.960
6	Kaladgi Barrage	Barrage	52.82	-	521.457
7	Katarki Barrage	Barrage	56.04	-	522.033
8	Alagundi Barrage	Barrage	64.69	-	523.570
9	Machakanur Barrage	Barrage	70.63	-	524.640

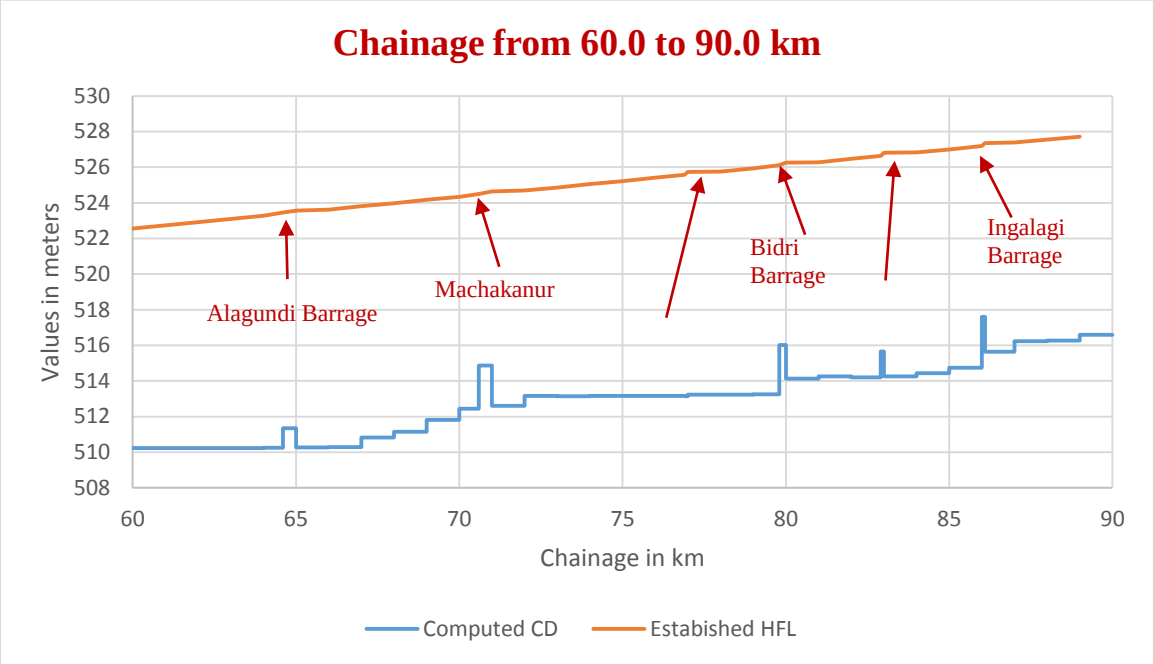
Sl#	Location and description of CWC gauge Barrages / Weirs / Anicut / Barrages / Aqueducts	Cross-structure details	Chainage (km)	Established HFL / FRL w.r.t. MSL (m)	Computed HFL at Cross-Structures w.r.t. MSL (m)
10	Jambgi Barrage	Barrage	77.00	-	525.765
11	Bidri Barrage	Barrage	79.85	-	526.259
12	Marakatti barrage	Barrage	82.90	-	526.808
13	Ingalagi Barrage	Barrage	86.13	-	527.384
14	Chinchakhandi Bridge	Highway Bridge	91.02	-	528.235
15	Jeeragal Barrage	Barrage	93.82	-	528.729
16	Mudhol Bridge	Highway Bridge	99.51	-	529.744
17	Mudhol Barrage	Barrage	99.62	-	529.771
18	Jaliber Barrage	Barrage	103.84	-	530.512
19	CWC Mudhol	Gauge	108.91	531.404	-
20	Malali Barrage	Barrage	111.76	-	531.939

Table 22 - HFL values of Bridges/Cross Structures

2.13 Graph: Sounding Datum and HFL vs Chainage




Chainage from 30.0 to 60.0 km
Values in meters
524
522
520
518
516
514
512
510
508
506
504
30
35
40
45
50
55
60
Chainage in km
Bannidinni-Barrage
Yadahalli Barrage
Kaladgi Barrage
Katarki Barrage
Computed CD
Estabished HFL


Chainage from 60.0 to 90.0 km
Values in meters
530
528
526
524
522
520
518
516
514
512
510
508
60
65
70
75
80
85
90
Chainage in km
Alagundi Barrage
Machakanur
Bidri Barrage
Ingalagi Barrage
Computed CD
Estabished HFL

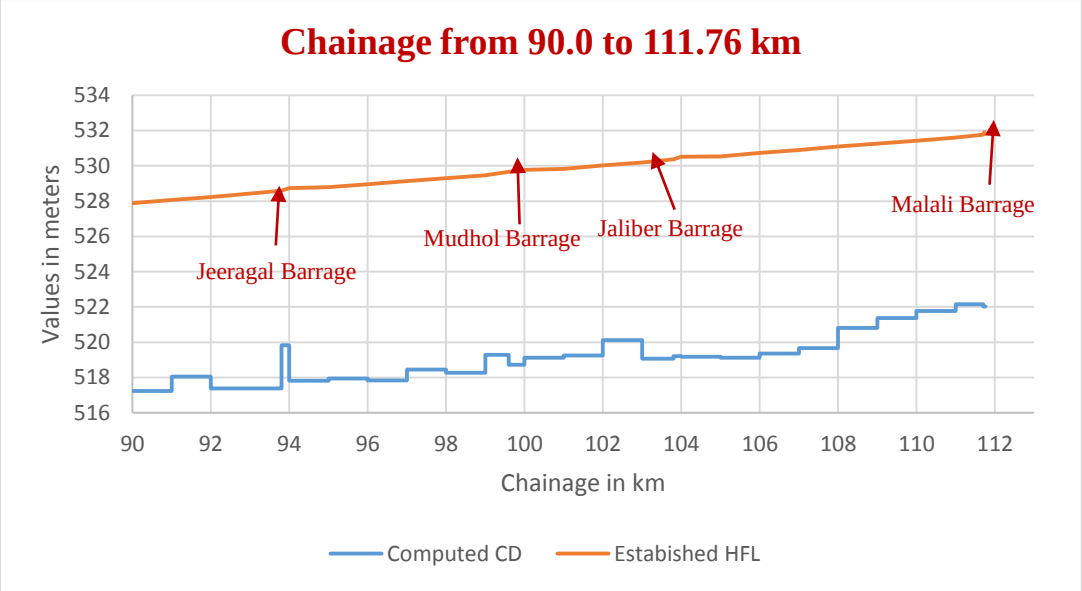


Figure 7 - Sounding Datum and HFL vs Chainage

2.14 Average Bed Slope

The average bed slope of Ghataprabha River is as follows:

Reach and River-bed Level (RBL)		River-bed Level Change (m) ()	Distance (km) (B)	Slope (A/B)
From	To			
Ch. 0 - RBL_506.251	Ch. 30 - RBL_506.686	0.435	30	1 : 0.015
Ch. 30 - RBL_506.686	Ch. 60 - RBL_510.263	3.577	30	1 : 0.119
Ch. 60 - RBL_510.263	Ch. 90 - RBL_517.825	7.562	30	1 : 0.252
Ch. 90 - RBL_517.825	Ch. 111.76 - RBL_522.029	4.204	21.76	1 : 0.193

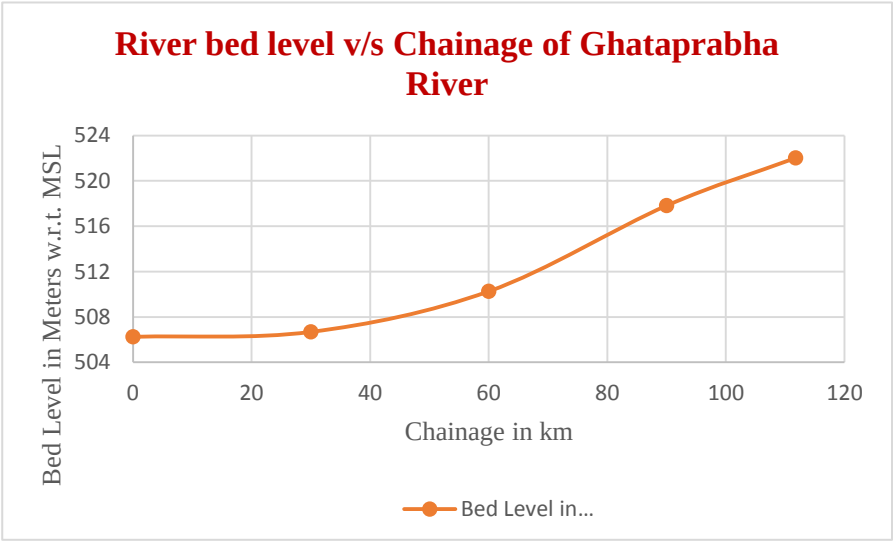


Table 23 - Average Bed Slope

2.15 Details of Dam, Barrages, Weirs, Anicut, etc.

Sl No	Structure Name	Chainage (km)	Location	Position (Lat Long)	Position (UTM)	Length (m)	Width (m)	Height w.r.t. HFL (m)	Present Condition
				Left Bank	Left Bank				
				Right Bank	Right Bank				
01	Bannidinni Barrage	35.25	Bannidinni Village	**Left Bank:** 16°13'13.8471"N 75°37'55.1122"E	**Left Bank:** 567542.571 1793431.610	103	7.5	0.456	Operational
				Right Bank: 16°13'17.1566"N 75°37'50.2092"E	**Right Bank:** 567396.695 1793532.858				
02	Yadahalli barrage	38.59	Yadahalli village	**Left Bank:** 16°13'48.5488"N 75°37'8.5956"E	**Left Bank:** 566158.340 1794493.726	483	12.586	5.735	Operational
				Right Bank: 16°13'53.8652"N 75°37'10.9895"E	**Right Bank:** 566228.914 1794657.305				
03	Kaladgi Barrage	52.82	Kaladgi village	**Left Bank:** 16°13'4.5385"N 75°30'45.3909"E	**Left Bank:** 554785.578 1793109.980	194	8.45	0.622	Operational
				Right Bank: 16°13'5.5462"N 75°30'43.0585"E	**Right Bank:** 554716.255 1793140.771				
04	Katarki Barrage	56.04	Katarki Village	**Left Bank:** 16°13'33.3400"N 75°29'25.8800"E	**Left Bank:** 552422.908 1793989.215	200	9.02	8.418	Operational
				Right Bank: 16°13'39.4100"N 75°29'27.8200"E	**Right Bank:** 552480.055 1794175.871				
05	Alagundi Barrage	64.69	Alagundi village	**Left Bank:** 16°15'10.6200"N 75°25'48.9300"E	**Left Bank:** 545976.021 1796963.940	113.7	6.31	0.632	Operational
				Right Bank: 16°15'15.5700"N 75°25'46.3500"E	**Right Bank:** 545899.120 1797115.882				
06	Machakanur Barrage	70.63	Kasba-jambgi village	**Left Bank:** 16°13'43.7010"N 75°24'7.9795"E	**Left Bank:** 542984.764 1794287.038	105.01	7.01	1.746	Operational
				Right Bank: 16°13'47.1728"N 75°24'8.0684"E	**Right Bank:** 542987.194 1794393.723				
07	Jambgi Barrage	77.00	Kasba-jambgi village	**Left Bank:** 16°13'48.2711"N 75°21'17.4101"E	**Left Bank:** 537920.934 1794418.116	63.82	5.02	2.132	Operational
				Right Bank: 16°13'50.5456"N 75°21'17.4997"E	**Right Bank:** 537923.473 1794488.010				
08	Bidri Barrage	79.85	Bidri village	**Left Bank:** 16°14'58.0782"N 75°21'50.2267"E	**Left Bank:** 538891.321 1796564.818	89.2	5.23	2.844	Operational
				Right Bank: 16°14'57.8769"N 75°21'52.5298"E	**Right Bank:** 538959.696 1796558.754				
09	Marakatti barrage	82.90	Baragi village	**Left Bank:** 16°16'15.4855"N 75°21'39.0637"E	**Left Bank:** 538555.773 1798942.764	107.2	5.63	1.797	Operational

Sl No	Structure Name	Chainage (km)	Location	Position (Lat Long)	Position (UTM)	Length (m)	Width (m)	Height w.r.t. HFL (m)	Present Condition
				Left Bank	Left Bank				
				Right Bank	Right Bank				
				Right Bank: 16°16'14.3476"N 75°21'42.0655"E	**Right Bank:** 538644.928 1798907.957				
10	Ingalagi Barrage	86.13	Ingalagi village	**Left Bank:** 16°17'37.4826"N 75°21'1.6294"E	**Left Bank:** 537440.403 1801460.400	164.27	5.36	4.869	Operational
				Right Bank: 16°17'42.3821"N 75°21'3.9112"E	**Right Bank:** 537507.860 1801611.066				
11	Jeeragal Barrage	93.82	Zunjarakopp	**Left Bank:** 16°17'34.3400"N 75°18'25.7600"E	**Left Bank:** 532814.892 1801356.388	85.5	6.34	2.092	Operational
				Right Bank: 16°17'34.9500"N 75°18'28.6500"E	**Right Bank:** 532900.629 1801375.261				
12	Mudhol Barrage	99.62	Mudhol village	**Left Bank:** 16°19'30.2200"N 75°16'50.5700"E	**Left Bank:** 529985.084 1804913.017	87.2	2.42	0.169	Operational
				Right Bank: 16°19'31.0900"N 75°16'53.5300"E	**Right Bank:** 530072.875 1804939.871				
13	Jaliber Barrage	103.84	Jaliber Village	**Left Bank:** 16°19'17.9400"N 75°14'40.5600"E	**Left Bank:** 526127.929 1804530.714	91.44	4.64	2.635	Operational
				Right Bank: 16°19'21.2800"N 75°14'41.8400"E	**Right Bank:** 526165.786 1804633.389				
14	Malali Barrage	111.76	Channal Old Village	**Left Bank:** 16°20'0.2396"N 75°11'23.5803"E	**Left Bank:** 520281.926 1805824.239	37.3	2.98	4.258	Operational
				Right Bank: 16°20'1.5120"N 75°11'23.1356"E	**Right Bank:** 520268.695 1805863.324				

Table 24 - Cross Structures w.r.t. MSL

2.16 Details of Locks

No Locks are present in the survey stretch of Ghataprabha River.

2.17 Details of Aqueducts

No Aqueducts are present in the survey stretch of Ghataprabha River.

2.18 Details of existing Bridges and Crossings over waterway

Sl No	Structure Name and for road / rail	Chainage (km)	Type of Structure (RCC / Iron / Wooden)	Location	Position (Lat Long)	Position (UTM)	Length (m)	Width (m)	No of Piers	Horizontal clearance (clear distance Between piers) (m)	Vertical clearance w.r.t. HFL (m)	Remarks (complete / under - construction), in use or not, condition
					Left Bank Right Bank	Left Bank Right Bank						
1	Yadahalli Bridge	38.74	RCC	Yadahalli	**Left Bank:** 16°13'46.131"N 75°37'3.6250"E **Right Bank:** 16°13'58.151"N 75°37'10.972"E	**Left Bank:** 566011.001 1794419.001 Right **Bank:** 566227.999 1794789.000	483	12.586	12	40.250	7.204	Complete & Operational
2	Chinchakhandi Bridge	91.02	RCC	Chinchakhandi	**Left** Bank**:** 16°16'22.146"N 75°19'8.1721"E **Right** Bank**:** 16°16'27.187"N 75°19'10.235"E	**Left Bank:** 534077.000 1799139.999 **Right Bank:** 534137.999 1799295.000	140	10.484	11	12.750	4.340	Complete & Operational
3	Mudhol Bridge	99.51	RCC	Mudhol	**Left** Bank**:** 16°19'26.967"N 75°16'48.944"E Right **Bank:** 16°19'27.415"N 75°16'54.337"E	**Left Bank:** 529936.999 1804813.001 **Right Bank:** 530097.000 1804826.999	130	11.984	12	10.810	1.597	Complete & Operational

Table 25 - Bridges crossing over waterway

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

No other cross structures found in the survey stretch of Ghataprabha River.

2.20 Details High Tension Lines / Electric lines / Tele-communication lines.

Sl No	Type of line	Chainage (km)	Location	Position (Lat Long)	Position (UTM)	Vertical clearance w.r.t. HFL(m)	Remarks (complete / under - construction)
				Left Bank / Right Bank	Left Bank / Right Bank		
1	HTP	35.74	Bannidinni Village	**Left Bank:** 16°13'1.2180"N 75°37'45.7858"E **Right Bank:** 16°13'2.7841"N 75°37'42.3968"E	**Left Bank:** 567266.874 1793042.686 **Right Bank:** 567166.110 1793090.501	16.285	Complete
2	HTP	50.39	Siraguppi Village	**Left Bank:** 16°14'11.7275"N 75°31'24.7927"E **Right Bank:** 16°14'12.6314"N 75°31'22.1781"E	**Left Bank:** 555950.086 1795177.516 **Right Bank:** 555872.399 1795205.092	19.915	Complete
3	HTP	69.03	Chikkur Village	**Left Bank:** 16°13'22.9282"N 75°24'54.8014"E **Right Bank:** 16°13'25.2323"N 75°24'54.2938"E	**Left Bank:** 544376.034 1793651.512 **Right Bank:** 544360.821 1793722.281	23.661	Complete
4	HTP	69.11	Chikkur Village	**Left Bank:** 16°13'22.2332"N	**Left Bank:** 544309.999	24.355	Complete

Sl No	Type of line	Chainage (km)	Location	Position (Lat Long) Left Bank / Right Bank	Position (UTM) Left Bank / Right Bank	Vertical clearance w.r.t. HFL(m)	Remarks (complete / under - construction)
				75°24'52.5756"E **Right Bank:** 16°13'26.3400"N 75°24'51.2600"E	1793630.023 **Right Bank:** 544270.687 1793756.136		
5	HTP	80.32	Kasba Jambgi Village	**Left Bank:** 16°15'7.2463"N 75°21'40.2796"E **Right Bank:** 16°15'8.8090"N 75°21'40.8452"E	**Left Bank:** 538595.562 1796846.008 **Right Bank:** 538612.266 1796894.055	21.532	Complete
6	HTP	85.46	Baragi Village	**Left Bank:** 16°17'23.7820"N 75°21'14.4805"E **Right Bank:** 16°17'24.2408"N 75°21'16.2661"E	**Left Bank:** 537822.509 1801040.072 **Right Bank:** 537875.476 1801054.261	20.186	Complete
7	HTP	107.02	Uttur Village	**Left Bank:** 16°19'23.0736"N 75°13'34.3069"E **Right Bank:** 16°19'27.4140"N 75°13'33.5749"E	**Left Bank:** 524161.886 1804686.186 **Right Bank:** 524140.019 1804819.531	19.383	Complete

Table 26 - High Tension Lines

2.21 Current Meter and Discharge Details

Current meter observation is not done in Ghataprabha River due to non-availability of water.

2.22 Water Samples

Water Samples were not collected in Ghataprabha River due to non-availability of water.

3 Description of Waterway

The waterway of Ghataprabha River within survey limits can be broadly divided into four stretches in accordance with the gradient of the river. The details are as follows:

3.1 Sub-Stretch-01: Chicksangam to Veerapur (Chainage 0.0km to 30.0km)

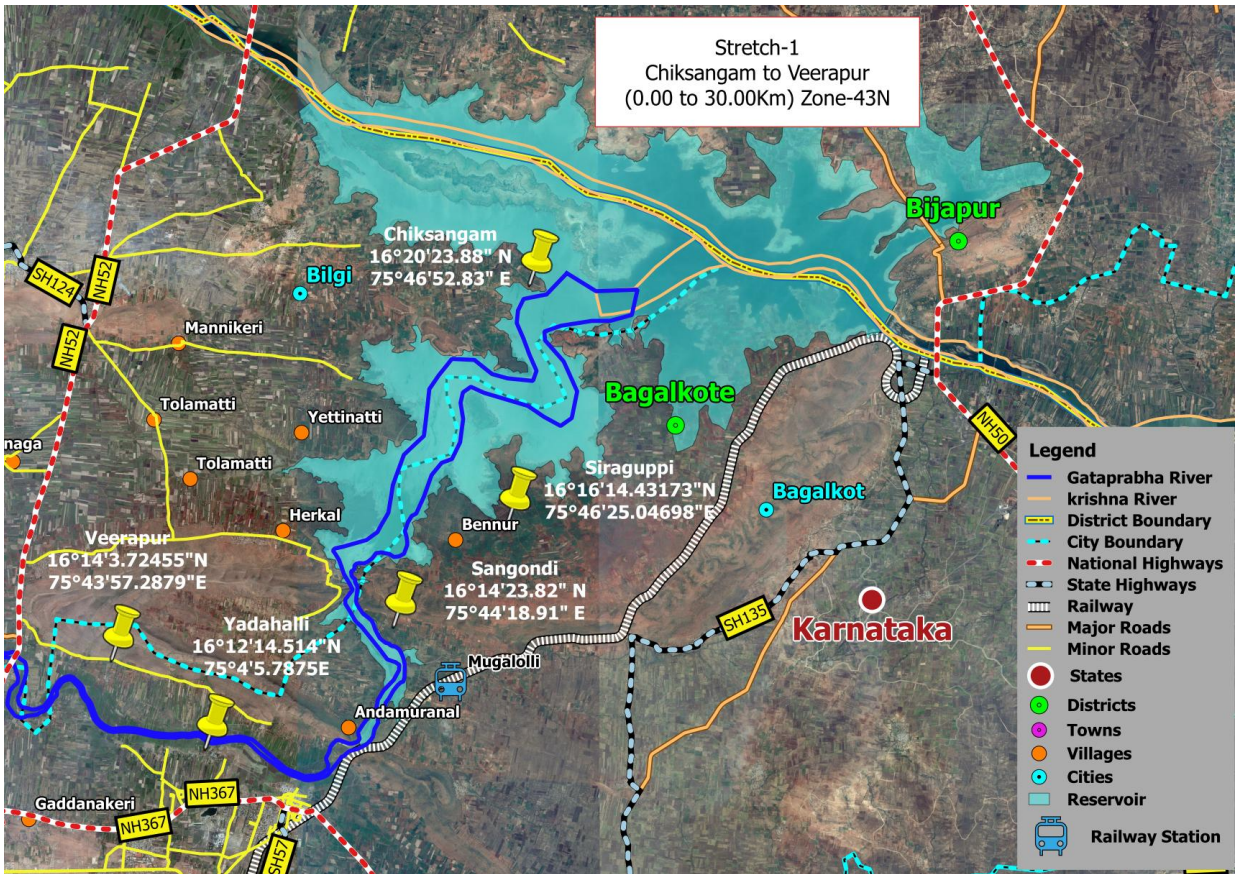


Figure 8 - Stretch-1 Chicksangam to Veerapur

- **Bathymetry Survey**
  a) No bathymetric survey is conducted due to the unavailability of water
- **Topographic Survey**
  b) 30km of the length of the stretch for which the topographic survey has been carried out.

This stretch is between 0 to 30.0km chainage of Chicksangam to Veerapur Village. This stretch forms the upstream portion of the Chicksangam Temple, which is the confluence point of Ghataprabha and Krishna River. Basically it's a Holy place where people usually take bath.

Figure 9 - Temple at confluence of Krishna (0.0 km chianage)

Chicksangam is a small Village/hamlet in the Bilagi Taluk in Bagalkot District of Karnataka State, India. It comes under Chicksangam Panchayath. It belongs to Belgaum Division. It is located 25km towards north from District Bagalkot.

Chikkmuramatti, Chick Hodlur, Muttatti, Mangur, Godihal are the nearby villages to Chicksangam. Chicksangam is surrounded by Bagalkot Taluk towards south, Basavana Bagewadi Taluk towards north, Muddebihal Taluk towards east, and Hungund Taluk towards south. Muddebihal, Bijapur, Mudhol, Talikota are the nearby cities to Chicksangam.

Konamatti, Honiyaal, Girisagar Veerapure, Sindangi, Kadampur, Andamuranal, Yankanchi Sangondi, are the nearby villages around this stretch. Near to the Girisagar the river is being merged with Krishna basin. The river is being widened a lot of width of 31km approx., at this region.

Veerapur village is a big village found in this stretch, which is located in Bagalkot Tehsil of Bagalkot district in Karnataka, India. It is situated 3.7km away from sub-district Bagalkot.

Sitimani Railway Station, Jadrama Kunti Railway Station are the very nearby railway stations upon this stretch. Bagalkot Railway Station (near to Bagalkot), Mugalolli Railway Station (near to Bagalkot) are the railway stations reachable from nearby towns. However, Hubli Junction Railway Station is major railway station 145km near to this stretch. During the survey as per the discussion with the local inhabitants the river stretch acquires water in Monsoon season and availability of water is up to winter. Once summer starts the river became quite dry.

There are no major industry found in this stretch. Basically, people depend upon the cultivation of Beans, Bajra, Grapes, peanuts, the river water is being useful for cultivation of the above.

During survey it was being observed that LIS/ Barrage were constructed near to Herkal village. As per discussion with the site engineer the following details are being archived and mentioned below.

Accordingly, the proposal for Construction of Herkal (South) Lift Irrigation Scheme from Ghataprabha River near Herkal village, Bagalkot District was prepared. The Lift Irrigation Scheme proposed was for the irrigating available area between GRBC and MLBC of 10745 Ha and filling up of 8 tanks viz., Kalasakoppa tank, Anwal tank, Kainkatti tank, Saganur tank, Malagi tank, Kerur tank, Jammanakatti tank and Katageri tank covering an area of 1375 Ha. The estimated cost of the proposal was ₹30000.00 Lakhs.

Figure 10 - Under construction Barrage at Herkal Village (16.85 km chainage)

As per the suggestions of MD, KBJNL, Bengaluru, now the scheme is proposed for irrigating available area between GRBC and MLBC of 6000 Ha and filling up of 8 tanks viz., Kalasakoppa tank, Anwal tank, Kainkatti tank, Saganur tank, Malagi tank, Kerur tank, Jammanakatti tank and Katageri tank. The total area considered under the scheme is 6000 Ha is utilizing 1.326 TMC of water. The Salient feature to be adopted of the same one is being mentioned below.

i) Required Discharge , Q = 3.031 Cumecs
ii) Required Discharge for 8 Tanks, Q = 1.086 Cumecs
iii) Total Discharge, Q = 4.117 Cumecs
iv) Length of Intake canal = 1700m
v) Total Length of Raising Main up to DC = 18200m

vi) Lowest Water Level = 513.00m

vii) Delivery Point Level = 630.00m

viii) Static Head = 117.00m

ix) Delivery Chamber = 12.65 X 12.65 X 2.55m

x) Diameter and Thickness of MS Raising Main = 1800mm of 10 mm thick up to 9.0km and 1650mm of 10mm thick from 9.0km to 18.20km.

xi) Next to Peak discharge 2.604Cumecs

xii) No. of Pumps = 3 (2 working + 1 stand by)

xiii) Discharge per Pump = 1.35 Cumecs

xiv) Capacity of each Pump = 2194KW (2945HP)

xv) Power requirement = 10 MVA

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.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
I	0	30	0.000	0.000	30000	1,288,123.60	1,288,123.60	-0.300	0.000	30000	1,621,110.75	1,621,110.75
II	0	30	0.000	0.000	30000	1,961,975.91	1,961,975.91	-0.300	0.000	30000	2,390,015.82	2,390,015.82
III	0	30	0.000	0.000	30000	2,965,178.80	2,965,178.80	-0.300	0.000	30000	3,496,350.11	3,496,350.11
IV	0	30	0.000	0.000	30000	3,577,895.07	3,577,895.07	-0.300	0.000	30000	4,132,620.06	4,132,620.06

Table 27 - Dredging Quantity Details

3.1.1 Observed and reduced Bed Profile of the stretch

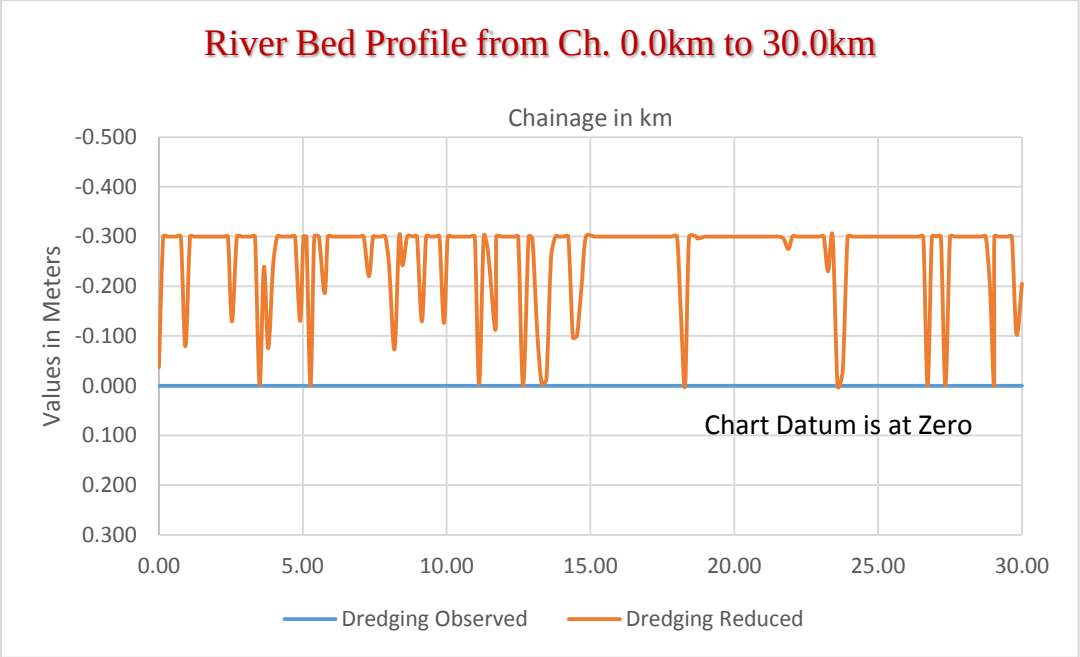


Figure 11 - River Bed Profile

3.2 Sub-Stretch 02: Veerapur to Sharadal (Chainage 30.0km to 60.0km)

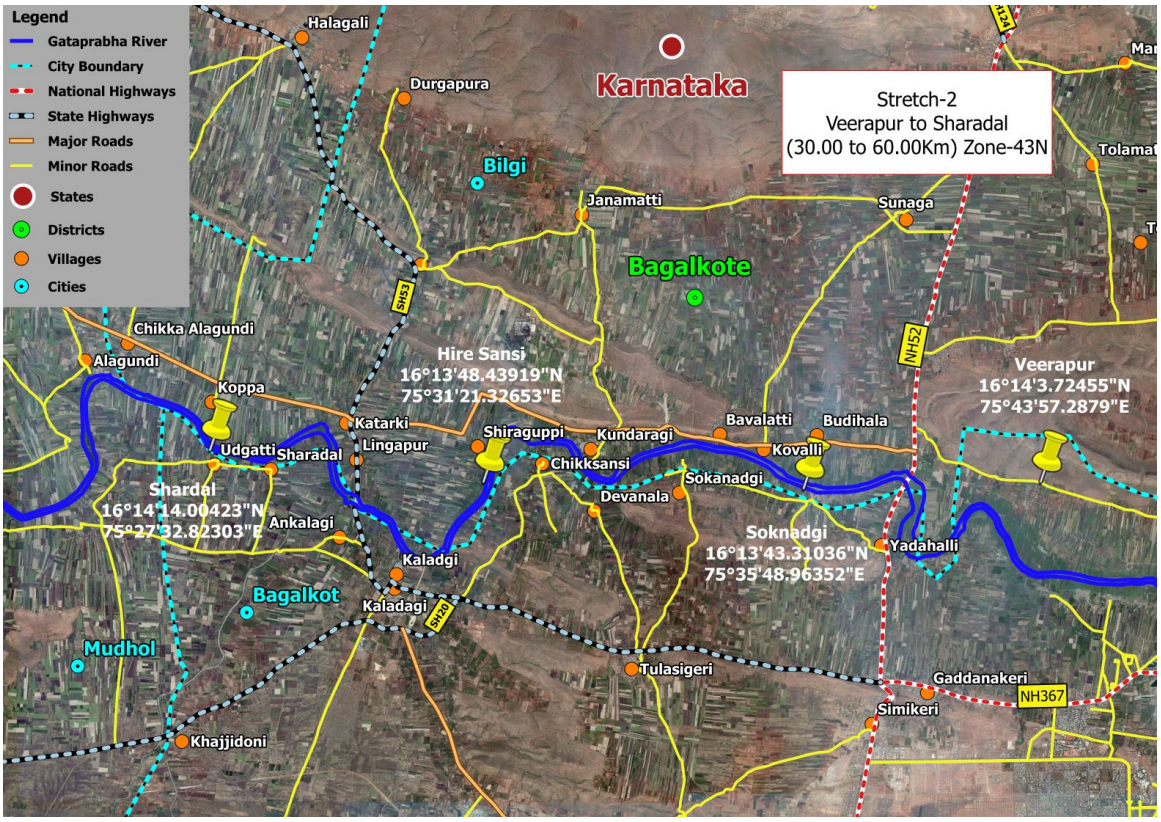


Figure 12 - Stretch-2 Veerapur to Sharadal

- **Bathymetry Survey**
  a) No bathymetric survey is conducted due to the unavailability of water
- **Topographic Survey**
  b) 30km of the length of the stretch for which the topographic survey has been carried out.

This stretch is between 30.0 to 60.0km chainage of Veerapur to Sharadal. Due to protected nature of the river banks the encroachment to the waterways is not found in this stretch.

Yadahalli and Kaladgi are well known villages situated on right bank of this stretch. This is well connected to the road network. Yadahalli village is located in Bagalkot Tehsil of Bagalkot district in Karnataka, The total geographical area of Yadahalli village is 703.63 hectares. Yadahalli has a total population of 1,601 people. There are about 308 houses in Yadahalli village. Bagalkot is the nearest town to Yadahalli which is approximately 14km away. Mudhol, Ramdurg, Bagalkot Mahalingpur and Muddebihal are the nearby cities to Yadahalli.

Kaladgi is a small Village/hamlet in the Bagalkot Taluk in Bagalkot District of Karnataka State, India. It comes under Kaladgi Panchayat. It belongs to Belgaum Division. It is located 22km towards west from District Bagalkot. The Kaladgi gram Panchayat area is bounded on the north by the banks of the Ghataprabha River, to the east is the Chikka-Shellikeri gram Panchayat area, to the south is the Yandageri village area of Badami Taluka, and to the west is the Khajidoni gram Panchayat area. Kaladgi is famous for fruits like Pomegranates, Sapota and Grapes, etc. These fruits are exported all over India as well abroad.

Kaladgi has very well-known temple called Sri Gurulingeswara Matha. Sri. Chandrashekhara Swamiji is current guru/Swamiji of this temple. Also in this place is a fine temple of Basavanna, built out of famous Shellikeri Blackstone. This is 15km away from this stretch.

This Stretch is well connected by Karnataka State Highway 20. The National Highway 218 (India) passing through Bagalkot (Gaddangiri Cross) connects at about 12km and another National Highway 13 (India) passing through Bagalkot (Ilkal, Hunagund) connect at 50km. The nearest Railway station is Bagalkot. All these modes of transports connect Kaladgi to Hubli, Bijapur, Raichur and Belgaum by road and connect Kaladgi to Gadag and Bijapur by train.

The Hire Sansi village is located in Bagalkot Tehsil of Bagalkot district in Karnataka. It is situated 20km away from Bagalkot, which is both districts & sub-district headquarter of the Hire Sansi village. Bagalkot is the nearest town to Hire-Sansi which is approximately 20km away.

Muranal, Kesanur, Annadinni, Yadahalli, Sokanadgi, Devnal, Hiresansi, Chick Sansi, Ankalagi, Shardadal are nearby villages which is present right bank of this stretch and all are being well connected to the road as well Bagalkot is the nearest railway station.

Katarki, Lingapur, Siraguppi, Kundargai, Venkatpura, Kovalli, Bdhiaah, Kadalpatti are the nearest villages of left of the river which are situated to the left bank of this stretch is also being well connected to the road network.

In this stretch, near Bannidinni village which is situated left bank of this stretch a barrage is being constructed, named Bannidinni barrage. This is small barrage and also as per the local villagers only monsoon time its operational it is being used by farmers by their own lift. There are 4 nos. of Barrages named as Bannidinni barrage, Yadahalli Barrage,

Kaladgi barrage, Katarki barrage. Also near to Yadahalli a Highway Bridge is being constructed upon NH218 which is well connected to Gulbarga and Bijapur.

Figure 13 - Yadahalli Bridge (38.7 km chianage)

The entire stretch is fully dry and bathy survey could not able to carried out.

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.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
I	30	35.2	0.000	0.000	5200	223,136.91	1,511,260.51	-0.300	0.000	5200	281,576.65	1,902,687.40
	35.2	38.5	0.000	0.000	3300	140,739.38	1,651,999.89	-0.300	0.000	3300	176,330.03	2,079,017.43
	38.5	52.8	0.000	0.000	14300	614,280.59	2,266,280.48	-0.300	0.000	14300	773,681.25	2,852,698.68
	52.8	56	0.000	0.000	3200	137,029.96	2,403,310.44	-0.300	0.000	3200	169,810.90	3,022,509.58
	56	60	0.000	0.000	4000	171,375.76	2,574,686.20	-0.300	0.000	4000	212,930.19	3,235,439.77
II	30	35.2	0.000	0.000	5200	339,880.50	2,301,856.41	-0.300	0.000	5200	415,932.74	2,805,948.56
	35.2	38.5	0.000	0.000	3300	214,373.34	2,516,229.75	-0.300	0.000	3300	260,830.15	3,066,778.71
	38.5	52.8	0.000	0.000	14300	935,622.30	3,451,852.05	-0.300	0.000	14300	1,143,078.52	4,209,857.23
	52.8	56	0.000	0.000	3200	208,710.50	3,660,562.55	-0.300	0.000	3200	251,542.74	4,461,399.97
	56	60	0.000	0.000	4000	261,034.97	3,921,597.52	-0.300	0.000	4000	315,488.10	4,776,888.07
III	30	35.2	0.000	0.000	5200	513,691.39	3,478,870.19	-0.300	0.000	5200	609,188.19	4,105,538.30
	35.2	38.5	0.000	0.000	3300	324,001.55	3,802,871.74	-0.300	0.000	3300	382,546.38	4,488,084.68
	38.5	52.8	0.000	0.000	14300	1,414,047.43	5,216,919.17	-0.300	0.000	14300	1,674,512.62	6,162,597.30
	52.8	56	0.000	0.000	3200	315,447.90	5,532,367.07	-0.300	0.000	3200	369,677.03	6,532,274.33
	56	60	0.000	0.000	4000	394,517.55	5,926,884.62	-0.300	0.000	4000	463,398.53	6,995,672.86
IV	30	35.2	0.000	0.000	5200	619,839.65	4,197,734.72	-0.300	0.000	5200	719,854.46	4,852,474.52
	35.2	38.5	0.000	0.000	3300	390,950.48	4,588,685.20	-0.300	0.000	3300	452,336.72	5,304,811.24
	38.5	52.8	0.000	0.000	14300	1,706,221.61	6,294,906.81	-0.300	0.000	14300	1,979,025.25	7,283,836.49
	52.8	56	0.000	0.000	3200	380,629.90	6,675,536.71	-0.300	0.000	3200	437,545.11	7,721,381.60
	56	60	0.000	0.000	4000	476,037.47	7,151,574.18	-0.300	0.000	4000	548,316.81	8,269,698.41

Table 28 - Dredging Quantity Details

3.2.1 Observed and reduced Bed Profile of the stretch

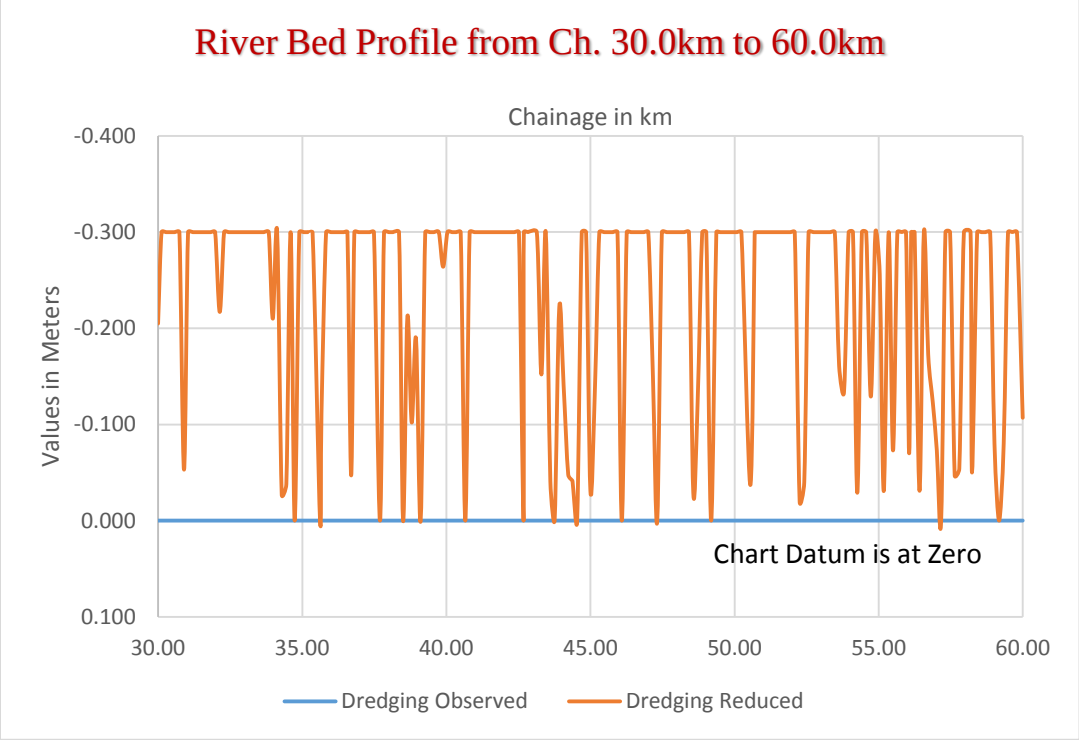


Figure 14 - River Bed Profile

3.3 Sub Stretch 03: Sharadal to Chinchakhandi (Chainage 60.0km to 90.0km)

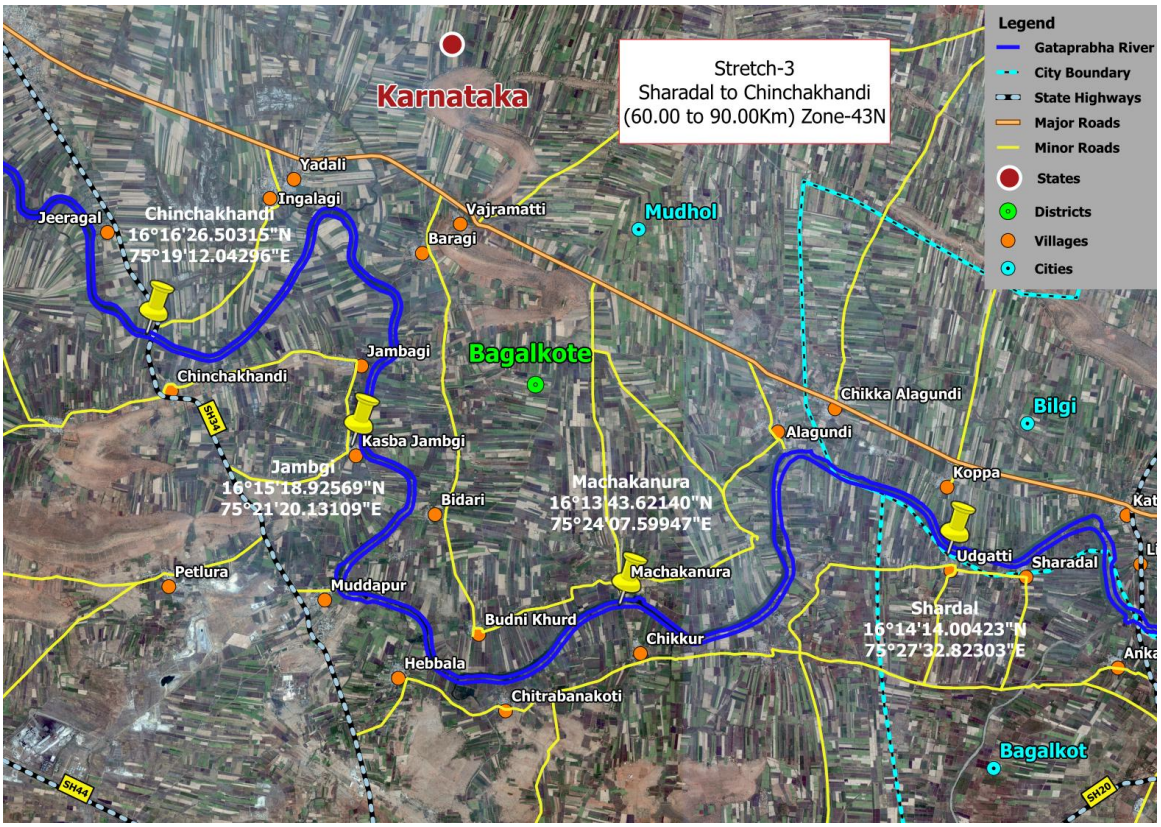


Figure 15 - Stretch-3 Sharadal to Chinchakhandi

- **Bathymetry Survey**
  a) No bathymetric survey is conducted due to the unavailability of water
- **Topographic Survey**
  b) 30km of the length of the stretch for which the topographic survey has been carried out.

This stretch is between 60.0 to 90.0km chainage of Sharadal. There is Mudhol Barrage and overhead crossovers are present on this stretch such as a bridge. Sharadal village is a small village present at right bank of the river stretch, located in Bagalkot Tehsil of Bagalkot district in Karnataka, India. It is situated 35km away from Bagalkot, which is both districts & sub-district headquarter of Sharadal village. Machakanur, Jambgi, Chinchakhandi, Alagundi Junnur and Ankalagi are the famous villages under this stretch, which is well connected to road network; Bagalkot is the nearest railway station around 30km from this stretch.

This Stretch is well connected by road. Karnataka State highway 34 passes through Chinchakhandi in between Lokapur and Mudhol. The nearest railway station is Bagalkot.

All these modes of transports connect to Hubli, Bijapur, Raichur and Belgaum by road. Dharwar railway station is the major railway station situated at a distance of 111.76km. In this stretch Chinchakhandi village is located in Mudhol Tehsil of Bagalkot district in Karnataka, India. It is situated 8km away from Mudhol and 52km away from district Bagalkot.

The total geographical area of the village is 1049.71 hectares Mudhol is the nearest town to Chinchakhandi

Uddayati, Chikkur, Budhinaal, Timmapur, Hebbal, Kasba Jambgi, Bidri are the villages present of the right bank of this stretch. Jeeragal, Ingalagi, Baragi, Marakatti, Anantapur, Machakanur, Budri, Alagundi, Kopper are the villages present in between 5 km on the left bank of the river stretch. All these villages are being well connected by road. Though there is no rail network throughout this stretch Bagalkot is the nearest railway station.

The both sides of the river bank are fully cultivated area. Bajra, Sugarcane, Beans are the three mostly cultivated crops in this stretch.

During the survey, we found 6 Barrages named as Jeeragal, Ingalagi, Marakatti, Machakanur, Bidri, and Alagundi. Surrounded near to the barrage is fully dry. As per the local people, the water from these barrages are used by farmers during the monsoon season.

The entire stretch is fully dry so Bathy Survey could not able to carry out.

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.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
I	60	64.6	0.000	0.000	4600	197,692.82	2,772,379.02	-0.300	0.000	4600	248,976.37	3,484,416.14
	64.6	70.6	0.000	0.000	6000	257,626.73	3,030,005.75	-0.300	0.000	6000	322,002.63	3,806,418.77
	70.6	77	0.000	0.000	6400	275,234.42	3,305,240.17	-0.300	0.000	6400	349,274.20	4,155,692.97
	77	79.8	0.000	0.000	2800	119,493.33	3,424,733.50	-0.300	0.000	2800	152,020.53	4,307,713.50
	79.8	82.9	0.000	0.000	3100	132,445.54	3,557,179.04	-0.300	0.000	3100	168,638.09	4,476,351.59
	82.9	86.1	0.000	0.000	3200	135,594.65	3,692,773.69	-0.300	0.000	3200	172,593.54	4,648,945.13
	86.1	90	0.000	0.000	3900	167,043.11	3,859,816.80	-0.300	0.000	3900	213,032.55	4,861,977.68
II	60	64.6	0.000	0.000	4600	301,115.00	4,222,712.52	-0.300	0.000	4600	368,180.72	5,145,068.79
	64.6	70.6	0.000	0.000	6000	392,408.19	4,615,120.71	-0.300	0.000	6000	476,360.95	5,621,429.74
	70.6	77	0.000	0.000	6400	419,217.44	5,034,338.15	-0.300	0.000	6400	515,197.96	6,136,627.70
	77	79.8	0.000	0.000	2800	181,999.51	5,216,337.66	-0.300	0.000	2800	224,096.92	6,360,724.62
	79.8	82.9	0.000	0.000	3100	201,730.65	5,418,068.31	-0.300	0.000	3100	248,521.76	6,609,246.38
	82.9	86.1	0.000	0.000	3200	206,515.23	5,624,583.54	-0.300	0.000	3200	254,082.76	6,863,329.14

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.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
	86.1	90	0.000	0.000	3900	254,430.15	5,879,013.69	-0.300	0.000	3900	314,075.15	7,177,404.29
III	60	64.6	0.000	0.000	4600	455,098.71	6,381,983.33	-0.300	0.000	4600	539,647.79	7,535,320.65
	64.6	70.6	0.000	0.000	6000	593,069.88	6,975,053.21	-0.300	0.000	6000	698,887.53	8,234,208.18
	70.6	77	0.000	0.000	6400	633,598.03	7,608,651.24	-0.300	0.000	6400	753,766.14	8,987,974.32
	77	79.8	0.000	0.000	2800	275,077.57	7,883,728.81	-0.300	0.000	2800	327,691.86	9,315,666.18
	79.8	82.9	0.000	0.000	3100	304,897.85	8,188,626.66	-0.300	0.000	3100	363,279.08	9,678,945.26
	82.9	86.1	0.000	0.000	3200	312,111.45	8,500,738.11	-0.300	0.000	3200	371,297.99	10,050,243.25
	86.1	90	0.000	0.000	3900	384,546.52	8,885,284.63	-0.300	0.000	3900	459,083.13	10,509,326.38
IV	60	64.6	0.000	0.000	4600	549,134.46	7,700,708.64	-0.300	0.000	4600	637,746.09	8,907,444.50
	64.6	70.6	0.000	0.000	6000	715,614.52	8,416,323.16	-0.300	0.000	6000	826,578.02	9,734,022.52
	70.6	77	0.000	0.000	6400	764,524.22	9,180,847.38	-0.300	0.000	6400	890,317.91	10,624,340.43
	77	79.8	0.000	0.000	2800	331,916.34	9,512,763.72	-0.300	0.000	2800	386,980.98	11,011,321.41
	79.8	82.9	0.000	0.000	3100	367,904.78	9,880,668.50	-0.300	0.000	3100	428,976.95	11,440,298.36
	82.9	86.1	0.000	0.000	3200	376,594.93	10,257,263.43	-0.300	0.000	3200	438,467.18	11,878,765.54
	86.1	90	0.000	0.000	3900	464,001.97	10,721,265.40	-0.300	0.000	3900	541,955.78	12,420,721.32

Table 29 - Dredging Quantity Details

3.3.1 Observed and reduced Bed Profile of the stretch

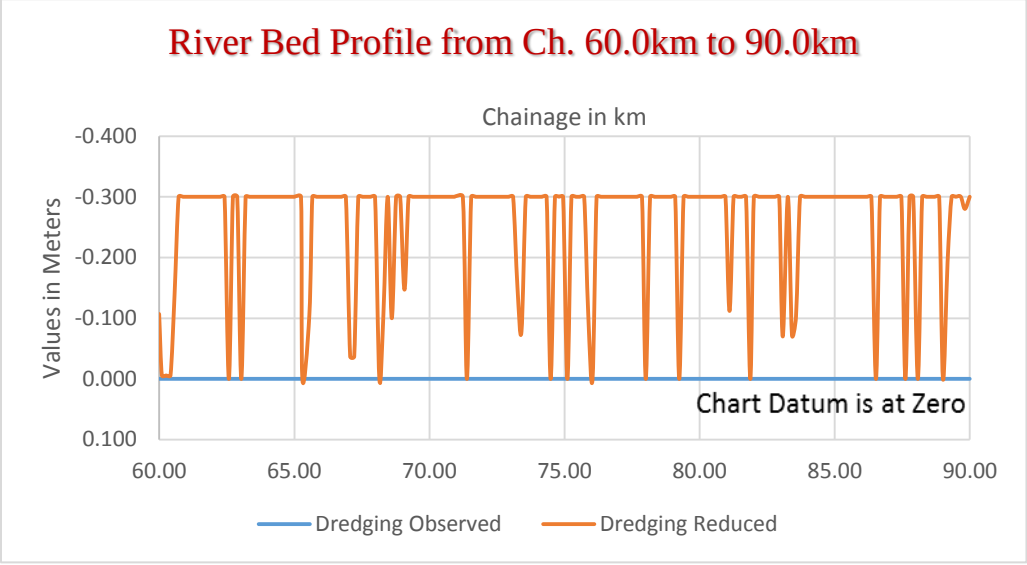


Figure 16 - River Bed Profile

3.4 Sub-Stretch 04: Chinchakhandi to Malali (Chainage 90.0km to 111.76km)

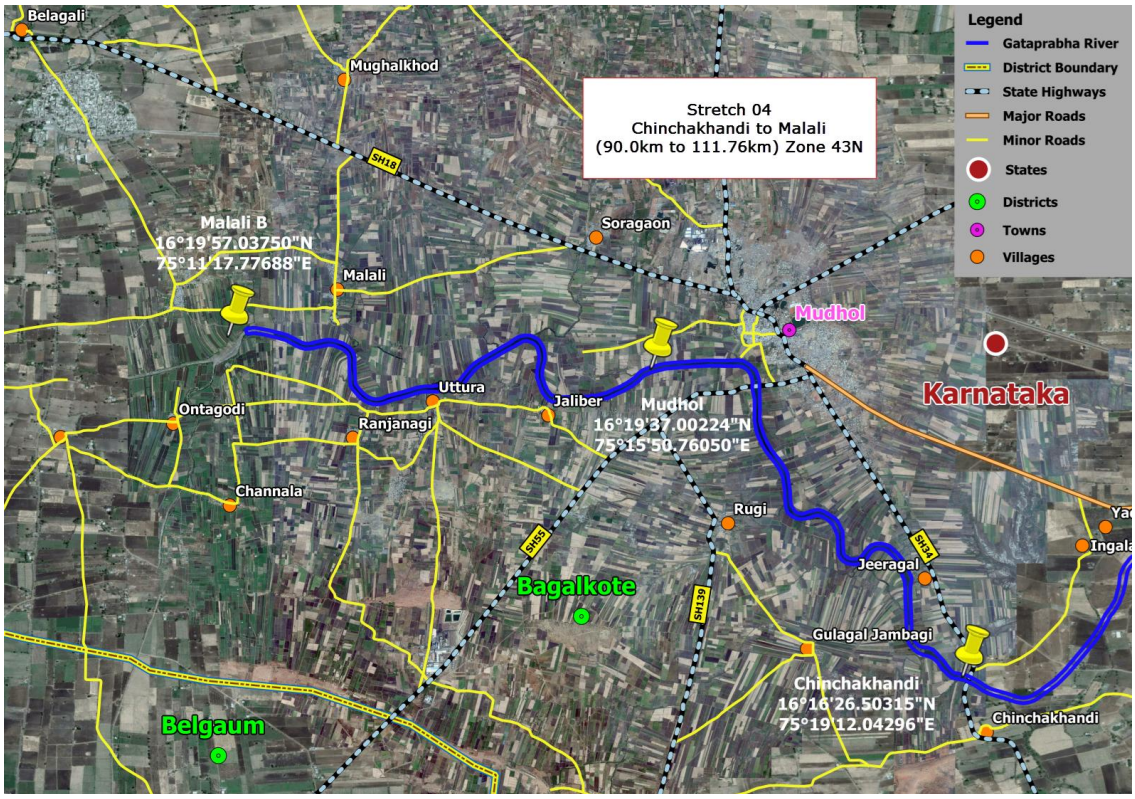


Figure 17 - Stretch-4 Chinchakhandi to Malali

- **Bathymetry Survey**
  a) No bathymetric survey is conducted due to the unavailability of water
- **Topographic Survey**
  b) 21.76km of the length of the stretch for which the topographic survey has been carried out.

This stretch is between 90.0 to 111.76km chainage of Chinchakhandi. Due to protected nature of the river banks the encroachment to the waterways in not found in this stretch. Mudhol is the nearby city to this stretch. This is well connected by road from district Bagalkot.

Mudhol is a town previously known as "'Muduoolalu"' in the Bagalkot District in the Northern part of the South Indian state of Karnataka. It is about 60km from the district Bagalkot town on the left bank of the Ghataprabha River. It is famous for a breed of dog known as the Mudhol Hound.

There is an old underground Shiva Temple (called as "Nelagudi" which means Under Ground Temple). The town is noted for its grinding stones. Mahalingpura is a town about

19km to the northwest of Mudhol. Its earlier name, Naragatti, was subsequently renamed Mahalingpura in honour of Sant Mahalingeshwara.

There is no railway station near to Mudhol in less than 10km. Bagalkot Railway Station (near to Bagalkot), Mugalolli Halt Railway Station (near to Bagalkot) are the Railway stations reachable from nearby towns. However Sangli Railway Station is a major railway station 105km near to Mudhol.

The upstream and downstream of stretch is filled with rocks. The hydro survey could not be undertaken due to non-availability of sufficient depths. No navigation is possible due to the non-availability of sufficient navigable water.

Gulagal, Rugi, Jaliber, Uttur, Ranjanagi, Channal old are the villages present right bank of the river stretch and well connected to road networks. Nagaral, Malali, Mugalkhod, Soragaon, Mudhol and Malapur are the village's present left bank of the river stretch. All the villages are connected to the well road network and though there is no rail network Bagalkot is the nearest railway station near to this stretch approx. Distance of 70km.

Mudhol Jaliber and Malali are three barrages present in this stretch. This is used by farmers for their irrigation purposes. During monsoon is it is own lift by farmers, is noticed from the local villagers.

Sugarcane and Bajra is being found and cultivated by local people, on the both sides of the banks in this stretch. Though Mudhol is a famous place so no industries is being available near to the stretch. A Bridge is constructed by PWD Karnataka upon this stretch. The Bridge is constructed upon Ghataprabha on State Highway Number 34, which is connected in between Bagalkot and Belgavi.

Figure 18 - Chinchakhandi Bridge (91.06 km chainage)

Figure 19 - Mudhol Bridge (99.56 km chainage)

Due to unavailability sufficient water in this stretch cannot be calculated as a perfect waterway.

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.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
I	90	93.8	0.000	0.000	3800	162,996.59	4,022,813.39	-0.300	0.000	3800	207,714.06	5,069,691.74
	93.8	99.6	0.000	0.000	5800	245,665.12	4,268,478.51	-0.300	0.000	5800	311,553.56	5,381,245.30
	99.6	103.8	0.000	0.000	4200	180,375.61	4,448,854.12	-0.300	0.000	4200	226,771.21	5,608,016.51
	103.8	111.76	0.000	0.000	7960	333,167.25	4,782,021.37	-0.300	0.000	7960	417,307.30	6,025,323.81
II	90	93.8	0.000	0.000	3800	248,267.33	6,127,281.02	-0.300	0.000	3800	306,040.88	7,483,445.17
	93.8	99.6	0.000	0.000	5800	374,132.02	6,501,413.04	-0.300	0.000	5800	459,656.32	7,943,101.49
	99.6	103.8	0.000	0.000	4200	274,748.59	6,776,161.63	-0.300	0.000	4200	335,348.51	8,278,450.00
	103.8	111.76	0.000	0.000	7960	507,424.75	7,283,586.38	-0.300	0.000	7960	617,448.62	8,895,898.62
III	90	93.8	0.000	0.000	3800	375,235.66	9,260,520.29	-0.300	0.000	3800	447,255.31	10,956,581.69
	93.8	99.6	0.000	0.000	5800	565,382.00	9,825,902.29	-0.300	0.000	5800	672,499.27	11,629,080.96
	99.6	103.8	0.000	0.000	4200	415,233.84	10,241,136.13	-0.300	0.000	4200	491,583.96	12,120,664.92
	103.8	111.76	0.000	0.000	7960	766,825.88	11,007,962.01	-0.300	0.000	7960	905,666.28	13,026,331.20
IV	90	93.8	0.000	0.000	3800	452,776.93	11,174,042.33	-0.300	0.000	3800	528,104.44	12,948,825.76
	93.8	99.6	0.000	0.000	5800	682,183.12	11,856,225.45	-0.300	0.000	5800	794,317.54	13,743,143.30
	99.6	103.8	0.000	0.000	4200	501,029.48	12,357,254.93	-0.300	0.000	4200	581,046.85	14,324,190.15
	103.8	111.76	0.000	0.000	7960	925,260.76	13,282,515.69	-0.300	0.000	7960	1,070,862.45	15,395,052.60

Table 30 - Dredging Quantity Details

3.4.1 Observed and reduced Bed Profile of the stretch

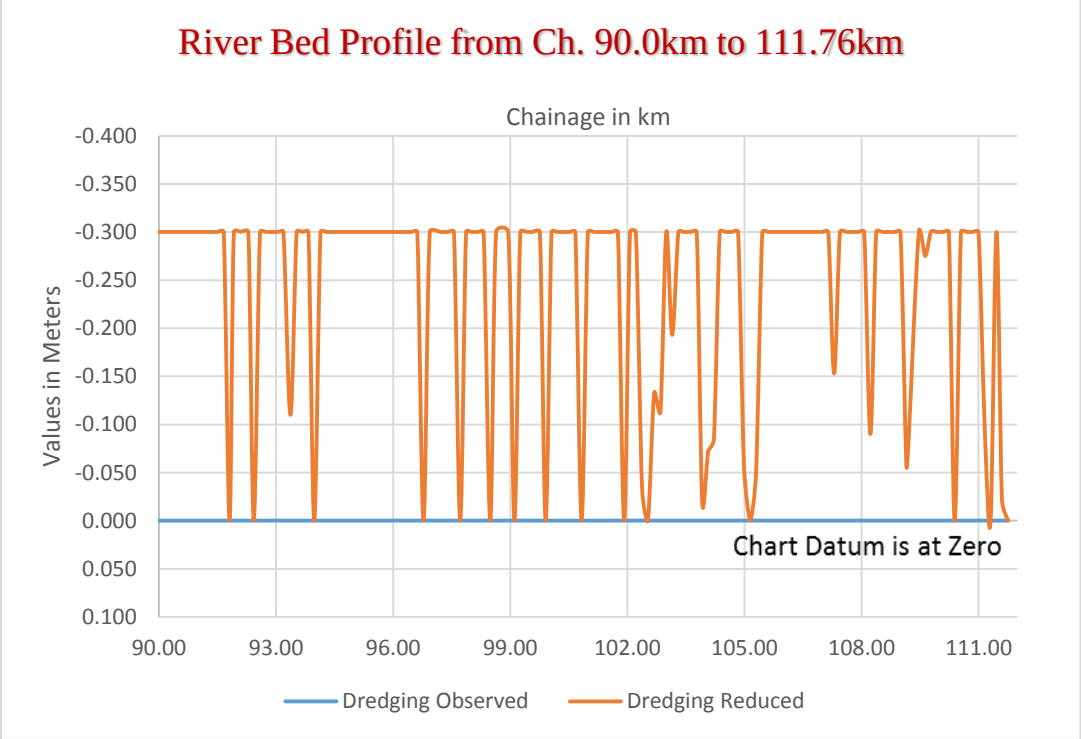


Figure 20 - River Bed Profile

3.5 Other aspects of waterway

3.5.1 Details of Irrigation Canals and Outlets

Ingalagi Barrage is the main source of water for cultivation. Katarki Barrage is the main source for irrigation area. Irrigation area covers about 385 hectares.

3.5.2 Irrigation/Drinking water

There is a reservoir built near Ghataprabha, across the Ghataprabha River, to store water for irrigation. The first stage started in 1897 and comprised a 71km-long left bank canal from the Dupdal weir, across the Ghataprabha River near Ghataprabha, into the Gokak Canal. It provided irrigation to an extent of 425,000 hectares. The second stage of the reservoir project comprised a left bank canal from Dupdal weir from 72km to its full extent of 109km across the Ghataprabha River near Hidkal, up to a height of 650.14 meters.

The Ghataprabha Reservoir has storage of about 659 million cubic meters, providing irrigation to a total extent of 1,396,000 hectares of land, inclusive of the area under stage-I. The next stage of the project includes raising the Full Reservoir Level of to 662.94 meters. This would create gross storage of 1.448 billion cubic meters, channelized into a 202km long right bank canal and the 86km long Chikodi Branch Canal. This would

irrigate 191,386 hectares of land and bring the total area under the project to 3,310,000 hectares.

3.5.3 Crops

Agriculture is the main occupation of the people in the district. The geographical area is 658777ha and the newly sown area is 469783ha which us 71.3 of the geographic area. The major crops grown area Jowar, Maize, Wheat, Bajra, sugarcane, sunflower, pulses, and groundnut. Net irrigated area is 212872 ha which constitutes 45.3% of the newly sown area and the remaining 54.7 of the rain fed.

Out of the net irrigated area, nearly 60% are through surface water resources and the remaining 40% through groundwater. A major dam has been built across the Krishna at Almatti in Basavanna Bagewadi Taluk of Bijapur district, which provides irrigation facility of Karnataka, Telangana, and Andhra Pradesh. Thus the Krishna the Malaprabha and the Ghataprabha canal systems cater to the irrigation needs in parts of Mudhol, Jamkhandi, Bilgi, and Badami taluks of the district.

	Major Field Crops cultivated	**Area ('000 ha)***					
		Kharif		***Rabi***		***Summer***	***Total***
		Irrigated	**Rainfed**	**Irrigated**	**Rainfed**		
1	Sorghum	3.045	2.194	20.048	114.735	-	140.02
2	Sugarcane	65.74	-	15.98	-	2.33	84.04
3	Maize	44.41	-	20.43	-	2.83	67.67
4	Greengram	0.006	19.90	-	-	-	19.91
5	Groundnut	0.980	1.20	-	-	16.61	18.79
6	Chickpea	-	0.002	0.069	0.035	0.11	0.22

Production and Productivity of major crops)	**Kharif**		**Rabi**		**Summer**		**Total**	
	Production ('000 t)	**Productivity (kg/ha)**	**Production ('000 t)**	**Productivity (kg/ha)**	**Production ('000 t)**	**Productivity (kg/ha)**	**Production ('000 t)**	**Productivity (kg/ha)**
Sorghum	122.5	2200	90.2	750	-	-	102.4	814
Sugarcane	5439.6	90000	763.8	95000	96.9	95000	6,300.3	90000
Maize	223.9	4000	85.3	4000.0	7.2	4000	316.4	4000
Greengram	13.0	349	-	-	-	-	13.0	349
Groundnut	7.1	1250	-	-	35.2	1250	42.3	1250
Chickpea	-	-	36.5	550.0	-	-	36.5	550

3.5.4 Industries

Bagalkot is the main hub for cement, agriculture, sugar, silk and handloom industries. It is one of the two handloom units (the other is Dharwad) in India from where woven khadi is obtained and transported to Karnataka Khadi Gramodyoga Samyukta Sangha, based in Hubli, which is the only licensed flag production and supply unit in India. Many new industries are planning to begin in Bagalkot.

A new cement industry had been registered and are waiting for the permission to commissioning. There are other small-scale industries like Cement Pipe Industry which produce cement pipes, Bangle Industries, which produce bangles, Match Stick Industries, Agarbatti Industries and Plastic Bag Industries etc. in Bagalkot. On the outskirts of Bagalkot city, there are many small-scale industries set up. These come under the Vidyagiri area of Bagalkot city, which is the latest extension of the city. Small-scale industries like Ceramic Tile Industry, tyre industry, Stone Cutting and polishing Industry, Milk Dairy etc. are running successfully.

At Gaddanakeri there are many limestone industries and brick industries. The limestone industries produces lime for whitewash and painting. The brick industries produce bricks required for the construction of houses. There are local oil industries and oil refineries which produce oil from groundnuts, sunflower, sesame, orientale, cotton etc.

3.5.5 Important cities/towns

The Major town situated near to Ghataprabha River is Mudhol on the starting chainage and Bagalkot at the end chainage. The areas are well connected by road and public transport system in the cities.

3.5.6 Road Network

3.5.6.1 National Highway

The National Highway no 161 (old number NH 218) from Hubli to Bidar via Bijapur, Jewargi, Gulbarga, Humnabad passes through Bagalkot.

3.5.6.2 State Highway

The state highway passing through Bagalkot connects NH 169 (formerly called NH-13) running from Solapur to Mangalore at about 40 km from Bagalkot near Almatti dam. It is connected to Belgaum by road and connected to Hubli. World class State Highway Belgaum to Raichur passes through Bagalkot.

3.5.6.3 Major District Roads

Gulbarga and Yadgir districts had a good road network. A map with major road network is shown below:

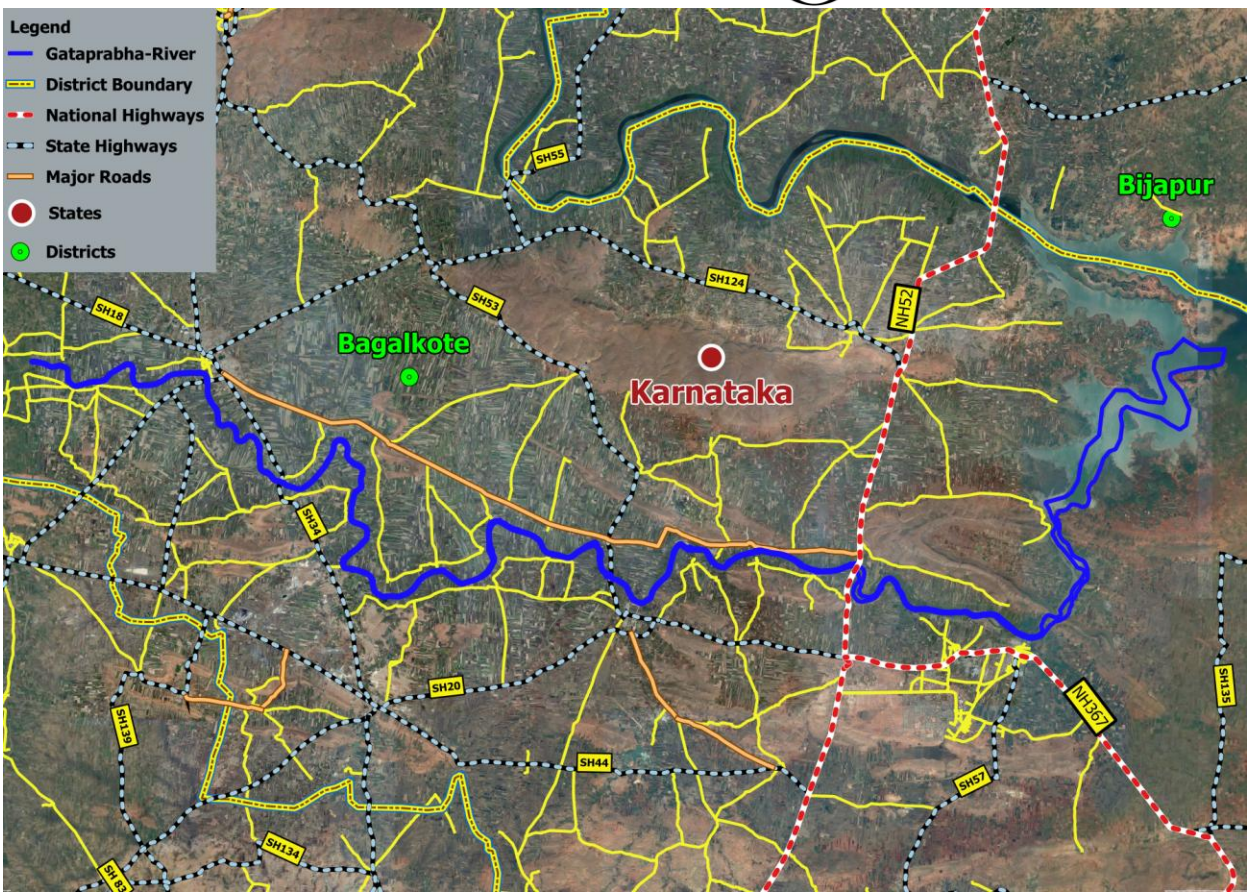


Figure 21 - Road Network

3.5.7 Railway Network

Bagalkot is connected by a broad gauge railway line (Gadag-Hotgi line) to Bijapur of the South Western Railway (SWR) towards the north and to Gadag junction on the South Western Railway towards the south. Bagalkot is connected with direct trains to Bijapur, Solapur, Gadag, Dharwad, Bellary, Mysore, Bengaluru, Hubli, Hyderabad, Mumbai and Ahmedabad. Bagalkot is under South Western Railway (SWR)

The nearest major airports to Bagalkot are the Belgaum Airport which is 121kms and the Dabolim Airport in Goa which is 218km from Bagalkot.

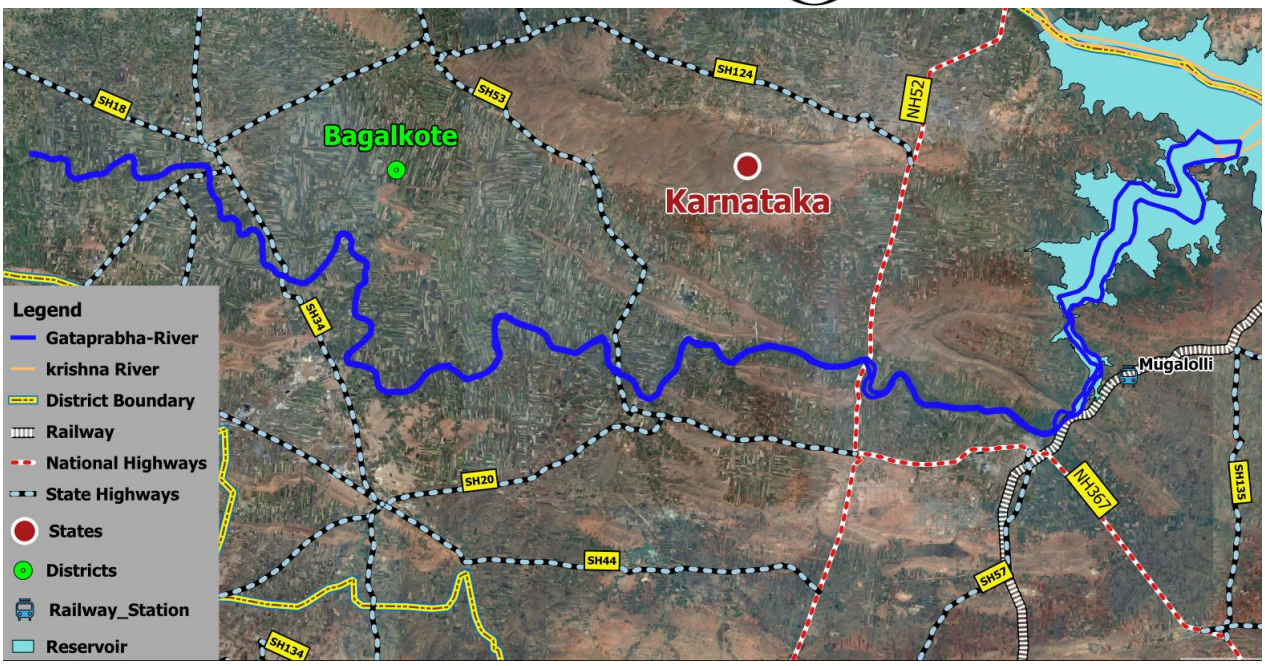


Figure 22 - Railway Stations

3.5.8 Land Use

In Bagalkot District, the land use is divided into Forest area, Cultivation area and Net area Shown.

- Geographical area – 658.9 ha
- Cultivable area – 2.0 ha
- Forest area – 81.1 ha
- Land under nonagricultural use – 28.80 ha
- Permanent pastures – 3.4 ha
- Cultivable wasteland – 2.2 ha
- Barren and uncultivable land – 24.8ha

3.5.9 Construction Material

The Bagalkot district is having a cluster of cement industries and limestone. The distinct stone is popularly known as "Malakheda Stone".

3.5.10 Conditions of banks

Bank is somehow protected along the river details is being attached on Annexure-6.

3.5.11 Jetties and Terminals

Lack of the jetties and Terminals along the river.

3.5.12 Cargo Movement

Lack of the cargo movements along the river.

3.5.13 Passenger Ferry Services

No Passenger Ferry Services available in the river.

3.5.14 Historic importance

Historically it is the home land of great Chalukya Dynasty. Aihole is place described as the laboratory for architecture rather university of Indian architecture. Badami is famous internationally for caves carved in monolithic single stone in the period of Immadi Pulakeshi-I along with historical famous temples of Pattadakal, Mahakuteshwar temple in Mahakuta, Shivayogmandir and Banashankari temple in Badami. Mudhol is the birth place of great poet "Ranna". Bilagi taluka Galagali village is famous for Galava Maharshi. Jamakhandi was the capital city during the period of "Patawardhana" Kingdom.

Kudalsangam the place where the great social revolutionist of 12th century lord "Basavanna" was educated. The galaxy of sharana's lived in this Holy Land is itself a matter of pride. Ghataprabha River meets with Krishna River at Chicksangam, which is a very holy place.

Figure 23 - Pattadakal Temple

3.5.15 Tourism

Bagalkot town is the district headquarters of the Bagalkot district situated in Karnataka State. Bagalkot (Bagalakote) district was carved out of Bijapur and made as a separate district in 1997. The earlier name of Bagalkot was 'Bagadige'. Bagalkot was the capital of the Chalukya Empire of South India. This region was also under the rule of Vijayanagara, Peshwas, Hyder Ali of Mysore, Marathas, and East India Company.

Bagalkot is mostly preferred by travellers. The best season or months to visit places in Bagalkot are February, November, December. There are 37 tourist places in Bagalkot.

The main attraction here is Aihole, Badami, and Pattadakallu which are known for their historical monuments and temples.

Annual tourist footfalls in Bagalkot district is nearly 35 laks per year (2014 tourist data). Thus, the average tourist footfalls in each tourist destination will be 5 lakhs.

Chicksangam as well as the Giri sagar is the tourism place, where people called that to wash away their faultiness at the merging point of Ghataprabha and Krishna.

4 Terminals

4.1 Details of terminal survey carried out

In this River, stretch could not find any adequate proposed terminal, due to the unavailability of water in this stretch.

5 Fairway Development

5.1 Fairway Dimensions

As per the specification of the survey, dredging quantity was required to be estimated for a channel dimension of 50m x 2m with Side slope of 1:5, along with the deepest route.

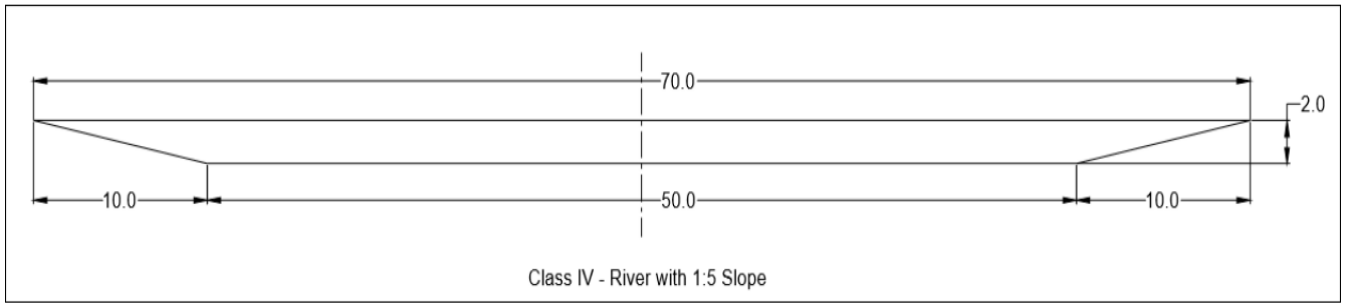
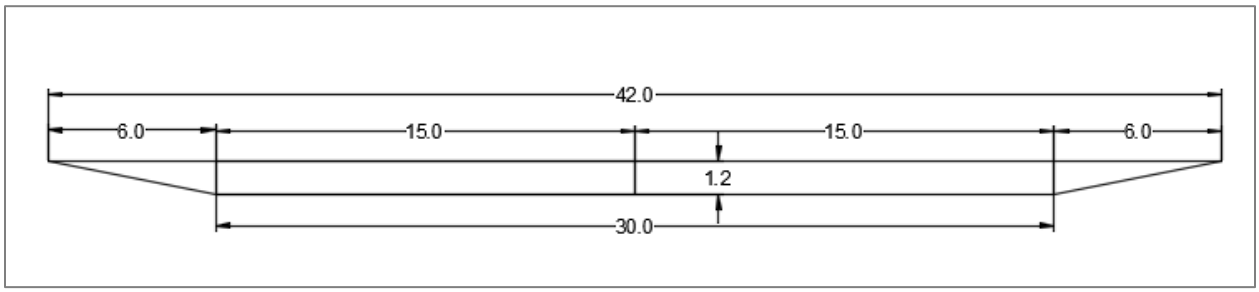


Figure 24 - Fairway Channel Dimensions 50m X 2m

5.2 Calculation of Dredging Quantity

The dredge volume calculations were accomplished using the HYPACK dredge volume computation utility. A channel profile of the dimensions mentioned at para 2.3.9 in the RFP. For clarity and ease of calculations, the complete channel profile was divided into segments of 1km each (enclosed at Annexure 3). The Tin v/s Channel with Hypack Standard algorithm was used to calculate the dredge volume in each segment. The stretch wise summary of the dredge volume is as follows:

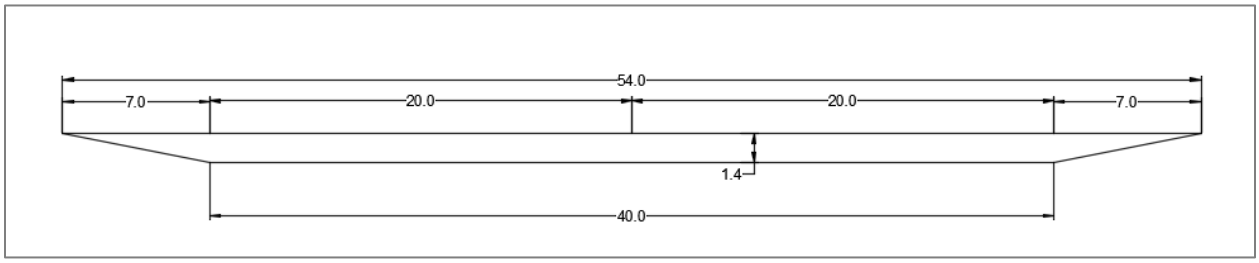
Class I



Class I													
Location		Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
From	To	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
Chiksangam	Veerapur	0	30	0.000	0.000	30000	1,288,123.60	1,288,123.60	-0.300	0.000	30000	1,621,110.75	1,621,110.75
Veerapur	Bannidinni	30	35.2	0.000	0.000	5200	223,136.91	1,511,260.51	-0.300	0.000	5200	281,576.65	1,902,687.40
Bannidinni	Yadahalli	35.2	38.5	0.000	0.000	3300	140,739.38	1,651,999.89	-0.300	0.000	3300	176,330.03	2,079,017.43
Yadahalli	Kaladgi	38.5	52.8	0.000	0.000	14300	614,280.59	2,266,280.48	-0.300	0.000	14300	773,681.25	2,852,698.68
Kaladgi	Sharadal	52.8	56	0.000	0.000	3200	137,029.96	2,403,310.44	-0.300	0.000	3200	169,810.90	3,022,509.58
Sharadal	Alagundi	56	60	0.000	0.000	4000	171,375.76	2,574,686.20	-0.300	0.000	4000	212,930.19	3,235,439.77
Alagundi	Machakanur	60	64.6	0.000	0.000	4600	197,692.82	2,772,379.02	-0.300	0.000	4600	248,976.37	3,484,416.14
Machakanur	Machakanur Barrage	64.6	70.6	0.000	0.000	6000	257,626.73	3,030,005.75	-0.300	0.000	6000	322,002.63	3,806,418.77
Machakanur Barrage	Bidri	70.6	77	0.000	0.000	6400	275,234.42	3,305,240.17	-0.300	0.000	6400	349,274.20	4,155,692.97
Bidri	Baragi	77	79.8	0.000	0.000	2800	119,493.33	3,424,733.50	-0.300	0.000	2800	152,020.53	4,307,713.50
Baragi	Marakatti	79.8	82.9	0.000	0.000	3100	132,445.54	3,557,179.04	-0.300	0.000	3100	168,638.09	4,476,351.59
Marakatti	Ingalagi	82.9	86.1	0.000	0.000	3200	135,594.65	3,692,773.69	-0.300	0.000	3200	172,593.54	4,648,945.13
Ingalagi	Chinchakhandi	86.1	90	0.000	0.000	3900	167,043.11	3,859,816.80	-0.300	0.000	3900	213,032.55	4,861,977.68
Chinchakhandi	Zunjarakopp	90	93.8	0.000	0.000	3800	162,996.59	4,022,813.39	-0.300	0.000	3800	207,714.06	5,069,691.74
Zunjarakopp	Mudhol village	93.8	99.6	0.000	0.000	5800	245,665.12	4,268,478.51	-0.300	0.000	5800	311,553.56	5,381,245.30
Mudhol village	Jaliber	99.6	103.8	0.000	0.000	4200	180,375.61	4,448,854.12	-0.300	0.000	4200	226,771.21	5,608,016.51
Jaliber	Malali	103.8	111.76	0.000	0.000	7960	333,167.25	4,782,021.37	-0.300	0.000	7960	417,307.30	6,025,323.81
					Total	**111760**	**4,782,021.37**	**4,782,021.37**			**Total**	**111760**	**6,025,323.81**	**6,025,323.81**

Table 31 - Stretch wise Class I Dredge Volumes

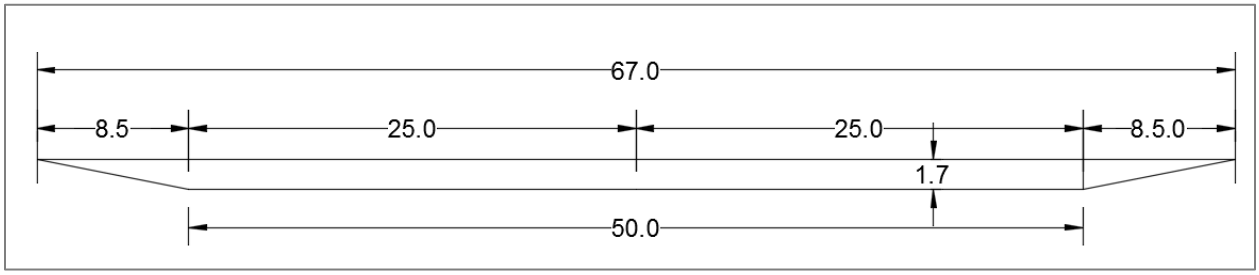
Class II



Class II													
Location		Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
From	To	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
Chiksangam	Veerapur	0	30	0.000	0.000	30000	1,961,975.91	1,961,975.91	-0.300	0.000	30000	2,390,015.82	2,390,015.82
Veerapur	Bannidinni	30	35.2	0.000	0.000	5200	339,880.50	2,301,856.41	-0.300	0.000	5200	415,932.74	2,805,948.56
Bannidinni	Yadahalli	35.2	38.5	0.000	0.000	3300	214,373.34	2,516,229.75	-0.300	0.000	3300	260,830.15	3,066,778.71
Yadahalli	Kaladgi	38.5	52.8	0.000	0.000	14300	935,622.30	3,451,852.05	-0.300	0.000	14300	1,143,078.52	4,209,857.23
Kaladgi	Sharadal	52.8	56	0.000	0.000	3200	208,710.50	3,660,562.55	-0.300	0.000	3200	251,542.74	4,461,399.97
Sharadal	Alagundi	56	60	0.000	0.000	4000	261,034.97	3,921,597.52	-0.300	0.000	4000	315,488.10	4,776,888.07
Alagundi	Machakanur	60	64.6	0.000	0.000	4600	301,115.00	4,222,712.52	-0.300	0.000	4600	368,180.72	5,145,068.79
Machakanur	Machakanur Barrage	64.6	70.6	0.000	0.000	6000	392,408.19	4,615,120.71	-0.300	0.000	6000	476,360.95	5,621,429.74
Machakanur Barrage	Bidri	70.6	77	0.000	0.000	6400	419,217.44	5,034,338.15	-0.300	0.000	6400	515,197.96	6,136,627.70
Bidri	Baragi	77	79.8	0.000	0.000	2800	181,999.51	5,216,337.66	-0.300	0.000	2800	224,096.92	6,360,724.62
Baragi	Marakatti	79.8	82.9	0.000	0.000	3100	201,730.65	5,418,068.31	-0.300	0.000	3100	248,521.76	6,609,246.38
Marakatti	Ingalagi	82.9	86.1	0.000	0.000	3200	206,515.23	5,624,583.54	-0.300	0.000	3200	254,082.76	6,863,329.14
Ingalagi	Chinchakhandi	86.1	90	0.000	0.000	3900	254,430.15	5,879,013.69	-0.300	0.000	3900	314,075.15	7,177,404.29
Chinchakhandi	Zunjarakopp	90	93.8	0.000	0.000	3800	248,267.33	6,127,281.02	-0.300	0.000	3800	306,040.88	7,483,445.17
Zunjarakopp	Mudhol village	93.8	99.6	0.000	0.000	5800	374,132.02	6,501,413.04	-0.300	0.000	5800	459,656.32	7,943,101.49
Mudhol village	Jaliber	99.6	103.8	0.000	0.000	4200	274,748.59	6,776,161.63	-0.300	0.000	4200	335,348.51	8,278,450.00
Jaliber	Malali	103.8	111.76	0.000	0.000	7960	507,424.75	7,283,586.38	-0.300	0.000	7960	617,448.62	8,895,898.62
					Total	**111760**	**7,283,586.38**	**7,283,586.38**		**Total**	**111760**	**8,895,898.62**	**8,895,898.62**

Table 32 - Stretch wise Class II Dredge Volumes

Class III

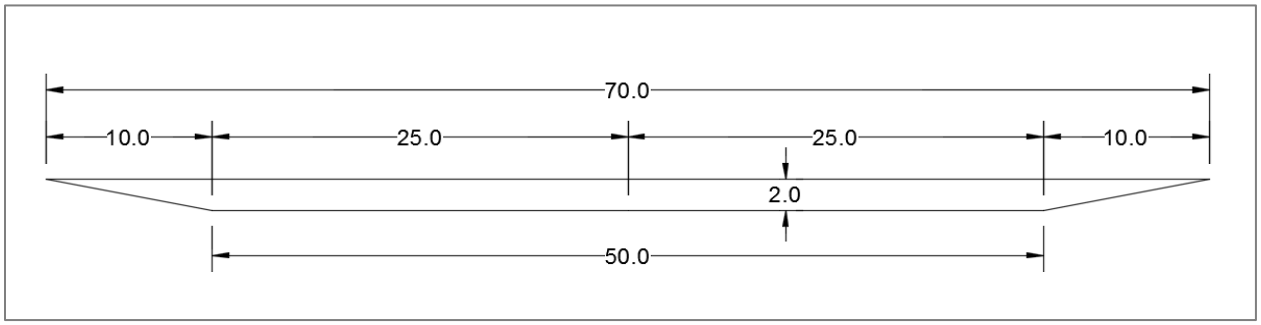


Class III													
Location		Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
From	To	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
Chiksangam	Veerapur	0	30	0.000	0.000	30000	2,965,178.80	2,965,178.80	-0.300	0.000	30000	3,496,350.11	3,496,350.11

Class III													
Location		Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
From	To	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
Veerapur	Bannidinni	30	35.2	0.000	0.000	5200	513,691.39	3,478,870.19	-0.300	0.000	5200	609,188.19	4,105,538.30
Bannidinni	Yadahalli	35.2	38.5	0.000	0.000	3300	324,001.55	3,802,871.74	-0.300	0.000	3300	382,546.38	4,488,084.68
Yadahalli	Kaladgi	38.5	52.8	0.000	0.000	14300	1,414,047.43	5,216,919.17	-0.300	0.000	14300	1,674,512.62	6,162,597.30
Kaladgi	Sharadal	52.8	56	0.000	0.000	3200	315,447.90	5,532,367.07	-0.300	0.000	3200	369,677.03	6,532,274.33
Sharadal	Alagundi	56	60	0.000	0.000	4000	394,517.55	5,926,884.62	-0.300	0.000	4000	463,398.53	6,995,672.86
Alagundi	Machakanur	60	64.6	0.000	0.000	4600	455,098.71	6,381,983.33	-0.300	0.000	4600	539,647.79	7,535,320.65
Machakanur	Machakanur Barrage	64.6	70.6	0.000	0.000	6000	593,069.88	6,975,053.21	-0.300	0.000	6000	698,887.53	8,234,208.18
Machakanur Barrage	Bidri	70.6	77	0.000	0.000	6400	633,598.03	7,608,651.24	-0.300	0.000	6400	753,766.14	8,987,974.32
Bidri	Baragi	77	79.8	0.000	0.000	2800	275,077.57	7,883,728.81	-0.300	0.000	2800	327,691.86	9,315,666.18
Baragi	Marakatti	79.8	82.9	0.000	0.000	3100	304,897.85	8,188,626.66	-0.300	0.000	3100	363,279.08	9,678,945.26
Marakatti	Ingalagi	82.9	86.1	0.000	0.000	3200	312,111.45	8,500,738.11	-0.300	0.000	3200	371,297.99	10,050,243.25
Ingalagi	Chinchakhandi	86.1	90	0.000	0.000	3900	384,546.52	8,885,284.63	-0.300	0.000	3900	459,083.13	10,509,326.38
Chinchakhandi	Zunjarakopp	90	93.8	0.000	0.000	3800	375,235.66	9,260,520.29	-0.300	0.000	3800	447,255.31	10,956,581.69
Zunjarakopp	Mudhol village	93.8	99.6	0.000	0.000	5800	565,382.00	9,825,902.29	-0.300	0.000	5800	672,499.27	11,629,080.96
Mudhol village	Jaliber	99.6	103.8	0.000	0.000	4200	415,233.84	10,241,136.13	-0.300	0.000	4200	491,583.96	12,120,664.92
Jaliber	Malali	103.8	111.76	0.000	0.000	7960	766,825.88	11,007,962.01	-0.300	0.000	7960	905,666.28	13,026,331.20
					Total	**111760**	**11,007,962.01**	**11,007,962.01**		**Total**	**111760**	**13,026,331.20**	**13,026,331.20**

Table 33 - Stretch wise Class III Dredge Volumes

Class IV



Class III													
Location		Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
From	To	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
Chiksangam	Veerapur	0	30	0.000	0.000	30000	3,577,895.07	3,577,895.07	-0.300	0.000	30000	4,132,620.06	4,132,620.06
Veerapur	Bannidinni	30	35.2	0.000	0.000	5200	619,839.65	4,197,734.72	-0.300	0.000	5200	719,854.46	4,852,474.52
Bannidinni	Yadahalli	35.2	38.5	0.000	0.000	3300	390,950.48	4,588,685.20	-0.300	0.000	3300	452,336.72	5,304,811.24

Class III													
Location		Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
From	To	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
Yadahalli	Kaladgi	38.5	52.8	0.000	0.000	14300	1,706,221.61	6,294,906.81	-0.300	0.000	14300	1,979,025.25	7,283,836.49
Kaladgi	Sharadal	52.8	56	0.000	0.000	3200	380,629.90	6,675,536.71	-0.300	0.000	3200	437,545.11	7,721,381.60
Sharadal	Alagundi	56	60	0.000	0.000	4000	476,037.47	7,151,574.18	-0.300	0.000	4000	548,316.81	8,269,698.41
Alagundi	Machakanur	60	64.6	0.000	0.000	4600	549,134.46	7,700,708.64	-0.300	0.000	4600	637,746.09	8,907,444.50
Machakanur	Machakanur Barrage	64.6	70.6	0.000	0.000	6000	715,614.52	8,416,323.16	-0.300	0.000	6000	826,578.02	9,734,022.52
Machakanur Barrage	Bidri	70.6	77	0.000	0.000	6400	764,524.22	9,180,847.38	-0.300	0.000	6400	890,317.91	10,624,340.43
Bidri	Baragi	77	79.8	0.000	0.000	2800	331,916.34	9,512,763.72	-0.300	0.000	2800	386,980.98	11,011,321.41
Baragi	Marakatti	79.8	82.9	0.000	0.000	3100	367,904.78	9,880,668.50	-0.300	0.000	3100	428,976.95	11,440,298.36
Marakatti	Ingalagi	82.9	86.1	0.000	0.000	3200	376,594.93	10,257,263.43	-0.300	0.000	3200	438,467.18	11,878,765.54
Ingalagi	Chinchakhandi	86.1	90	0.000	0.000	3900	464,001.97	10,721,265.40	-0.300	0.000	3900	541,955.78	12,420,721.32
Chinchakhandi	Zunjarakopp	90	93.8	0.000	0.000	3800	452,776.93	11,174,042.33	-0.300	0.000	3800	528,104.44	12,948,825.76
Zunjarakopp	Mudhol village	93.8	99.6	0.000	0.000	5800	682,183.12	11,856,225.45	-0.300	0.000	5800	794,317.54	13,743,143.30
Mudhol village	Jaliber	99.6	103.8	0.000	0.000	4200	501,029.48	12,357,254.93	-0.300	0.000	4200	581,046.85	14,324,190.15
Jaliber	Malali	103.8	111.76	0.000	0.000	7960	925,260.76	13,282,515.69	-0.300	0.000	7960	1,070,862.45	15,395,052.60
					Total	**111760**	**13,282,515.69**	**13,282,515.69**		**Total**	**111760**	**15,395,052.60**	**15,395,052.60**

Table 34 - Stretch wise Class IV Dredge Volumes

6 Conclusion

The aim is to undertake bathymetric survey, topographic survey, collection of data on cargo movement, industry survey, tourism facilities etc. in the project area; prepare detailed hydrographic survey charts, topographic survey charts, and feasibility report.

6.1 Description of Waterways

The surveyed stretch of Ghataprabha River is 111.76km in length and is not being explored for any navigational possibility. This survey stretch starts from the Chicksangam to Malali. The stretch wise minimum and maximum width range, average width and average slope of the waterway are as below:-

Sl. No.	Location		Chaiange (km)		Width Range of the waterway		Average Width	Average Slope in (m/km)
	From	To	From	To	Min	Max		
1	Chiksangam	Veerapur	0	30	79.83	1737	646.17	1 : 0.015
2	Veerapur	Sharadal	30	60	20.43	380.90	134.84	1 : 0.119
3	Sharadal	Chinchakhandi	60	90	97.48	231.91	112.04	1 : 0.252
4	Chinchakhandi	Malali	90	111.76	96.52	159.20	104.77	1 : 0.193

Table 32 - Stretch wise Average width and slope of waterway

6.2 Methods for making waterway feasible

The waterway may be developed as a Class IV navigational river by carrying out capital dredging to achieve the navigability. The class-wise details of reduced dredging quantities of the waterways are as tabulated below:-

Reduced w.r.t. CD Dredging Values					
Class	**0 – 30 (km)**	**30 – 60.0 (km)**	**60.0– 90.0 (km)**	**90.0 – 111.76 (km)**	**Total**
I	1,621,110.75	1,614,329.02	1,626,537.91	1,163,346.13	**6,025,323.81**
II	2,390,015.82	2,386,872.25	2,400,516.22	1,718,494.33	**8,895,898.62**
III	3,496,350.11	3,499,322.75	3,513,653.52	2,517,004.82	**13,026,331.20**
IV	4,132,620.06	4,137,078.35	4,151,022.91	2,974,331.28	**15,395,052.60**

Table 33 - Class-wise Reduced Dredging quantity

Due to the continuous gradient of the river and the water level will not be available during the summer season the navigation aspect will not be fulfilled throughout the year. The barrage with navigational lock is required to maintain the minimum depth required for navigation and regulate the water level in the river. No cargo movement or passenger movement is envisaged through this river. The class-wise details of reduced depth at different stretches of the waterways are as tabulated below:-

Sl. No.	**Chaiange (km)**		**< 1.2**		**1.2 - 1.4**		**1.5 - 1.7**		**1.8 - 2.0**		**> 2.0**	
	From	**To**	**Availability of Depth (km)**	**% of availability**	**Availability of Depth (km)**	**% of availability**	**Availability of Depth (km)**	**% of availability**	**Availability of Depth (km)**	**% of availability**	**Availability of Depth (km)**	**% of availability**
1	0	30	30	100%	0	0 %	0	0 %	0	0 %	0	0 %
2	30	60	30	100%	0	0 %	0	0 %	0	0 %	0	0 %
3	60	90	30	100%	0	0 %	0	0 %	0	0 %	0	0 %
4	90	111.76	21.76	100%	0	0 %	0	0 %	0	0 %	0	0 %
Total			**111.76**	**100%**	**0**	**0 %**	**0**	**0 %**	**0**	**0 %**	**0**	**0 %**

Table 34 – Class-wise availability of reduced depth of the waterway

6.3 Modifications/ improvement measures

Improvement measures for design and depth improvement are required for the first phase of the development. River banks being not prominent and no signs of erosion of river banks are found in the entire stretch of Ghataprabha River. The limitation for improvement of navigational aspects includes the gradient of the river, non-availability of the water throughout the period and the presence of various Barrages. In view of this, the

survey stretch of Ghataprabha is not viable for development for inland navigational channel. The class-wise modification details of cross structure and high tension line clearance are as tabulated below:-

Bridges Clearances less than Class			High Tension lines Clearances less than Class	
Class	**Horizontal**	**Vertical**	**Horizontal**	**Vertical**
I	2	1	0	01
II	2	2		
III	3	2		
IV	3	3		

Table 35 - Bridges and HTL Clearances less than Class no.

6.4 Recommendation

There is no major scope for a navigational aspect of the waterway due to its geographic condition and non-availability of water throughout the region. The river banks are well connected with the road network and major distribution of settlements are there near to Bagalkot and Mudhol cities. The road is a near parallel on both sides throughout the river stretch. On discussion with the Assistant engineers of KBJNL, Karnataka, no scope for the future development of the river was recommended for navigational purpose. There are no major industries present in the area. No scope for the future development of the river was recommended for navigational purpose and the survey Stretch is not-viable for developing as navigable channel.

The purpose of the survey was for assessing the river stretch from Chicksangam to Malali for the development of water transport facilities in the new National Waterway (NW-41). All conspicuous objects within and in the vicinity of the survey area have been fixed. The deliverable sheets contain mean sea level values of elevation information, important landmarks with the state of the river banks. The survey is considered complete in all respects.

7 Details of Annexures

Volume - II