TRACTEBEL

ENGIE

CONSULTANCY SERVICES FOR PREPARATION OF TWO STAGE DPR OF CLUSTER VI OF PROPOSED 53 NATIONAL WATERWAYS

FEASIBILITY REPORT-NETRAVATHI RIVER (78KM) - (NW-74)
Project No. P.009050
Document No. P.009050-W-10204-D08
Final Report

Karnataka and Kerala | INDIA

Inland Waterways Authority of India (IWAI) - Government of India Ministry of Shipping - Head Office

29 September 2016

Report

Rev.02

RESTRICTED

CATEGORY-II WATERWAYS: STAGE-I REPORTS

SALIENT FEATURES AT A GLANCE

<table>
<tr><th>Sl. No.</th><th>Particulars</th><th>Details</th></tr>
<tr><td>1.</td><td>Name of Consultant</td><td>Tractebel Engineering Pvt. Ltd.</td></tr>
<tr><td>2.</td><td>Cluster Number & State(s)</td><td>Cluster-VI & Karnataka</td></tr>
<tr><td>3.</td><td>Waterway stretch, NW#</td><td>Netravathi River (78 km), NW-74</td></tr>
<tr><td>4.</td><td><u>Navigability status</u></td><td></td></tr>
<tr><td>a)</td><td>Tidal & non tidal portions (from…….to, length, average tidal variation)</td><td>Tidal (Chainage 0.0 km to Chainage 23.50 km, average tidal variation of 0.9 m), Non Tidal (Chainage 23.50 km to Ch 80.48 km, average water depth 0.58 m)
Tidal Variation is 1.68m/0.03m upto 23.50km.</td></tr>
<tr><td>b)</td><td>LAD status (w.r.t.CD)
i) Survey period (9th & 10th Feb., 2016)
ii) < 1.0 m (km)
iii) 1.0 m to 1.5 m (km)
iv) 1.5 m to 2.0 (km)
v) >2.0 m (km)

vi) < 1.0 m (km)
vii) 1.0 m to 1.5 m (km)
viii) 1.5 m to 2.0 (km)
>2.0 m (km)</td><td>
<table>
<tr><th>0-5 (km)</th><th>5-10 (km)</th><th>10-15 (km)</th><th>15-23 (km)</th><th>23-24 (km)</th><th>24-30 (km)</th><th>30-36 (km)</th></tr>
<tr><td>0.21</td><td>0.22</td><td>0.28</td><td>0.70</td><td>0.40</td><td>0.24</td><td>6.00</td></tr>
<tr><td>0.40</td><td>1.34</td><td>0.52</td><td>1.52</td><td>0.10</td><td>0.28</td><td>-</td></tr>
<tr><td>0.60</td><td>1.00</td><td>0.76</td><td>1.76</td><td>0.20</td><td>2.77</td><td>-</td></tr>
<tr><td>3.79</td><td>2.44</td><td>3.44</td><td>4.01</td><td>0.30</td><td>2.71</td><td>-</td></tr>
</table>
<table>
<tr><th>36-44 (km)</th><th>44-53 (km)</th><th>53-62 (km)</th><th>62-71 (km)</th><th>71-80.48 (km)</th><th>Total (km)</th></tr>
<tr><td>0.07</td><td>8.70</td><td>8.30</td><td>8.50</td><td>7.73</td><td>41.36</td></tr>
<tr><td>0.02</td><td>0.20</td><td>0.60</td><td>0.35</td><td>0.90</td><td>6.23</td></tr>
<tr><td>0.09</td><td>0.10</td><td>0.10</td><td>0.15</td><td>0.85</td><td>8.39</td></tr>
<tr><td>7.82</td><td>-</td><td>-</td><td>-</td><td>-</td><td>24.50</td></tr>
</table>
</td></tr>
<tr><td>c)</td><td>Cross Structures
i) Dams, weirs, barrage 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) 5 Nos. (3 Barrage, 2 Dams), No Navigational locks
ii) 10 no. of Bridges, HC: 35 m to 50 m, VC: 4.0 m to 14.0 m
6 no. HT line, HC: 50 m to 100 m , VC: 10.0 m to 14.0 m
3 no. Electric Line, HC: 50 m, VC: 5 m to 10.0 m
2 no. Cable, HC : 50.0 m to 80.0 m, VC: 4.0 m to 9.0 m
Out of 2 dams, Netravathi Dam is located at the end.
Out of 10 bridges, one bridge is under construction (Ch 31.5km).
Apart from above, eleventh bridge is located at the end (HC: 30 m, VC: 4.0m).
(VC are above MHWS / HFL)</td></tr>
<tr><td>d)</td><td>Avg. discharge & no. of days</td><td>325.7 cumecs in 4900 days (observed at Bantwal G & D site since Jan 2000 to May 2013). High variation in Discharge has been observed.</td></tr>
<tr><td>e)</td><td>Slope (1 in……)</td><td>1 in 3840 from Ch 0.00km to Ch 23.40km,
1 in 1575 From Ch 23.40km to Ch 36.00km,</td></tr>
</table>

Sl. No.	Particulars	Details
		1 in 1588 from Ch 36.00km to Ch 64.60km and 1 in 322 from Ch 64.60km to Ch 79.11km.
5.	Traffic Potential	
a)	Present IWT operations, ferry services, tourism, cargo, if any	Ferry Services are operational at 3 routes, namely, Sajipanadu-Thumbe, Jalakadakatte-Parangipet and Adyar-Pavoor. Cargo Operations at confluence of Netravathi & Gurupur river (Old Mangalore Port to Lakshadweep Islands).
b)	Important industries within 50 km	BASF India Limited, Bharat Petroleum LPG Bottling Plant, Total LPG India, Strides Arco Lab & Speciality Ltd., Mangalore Chemicals & Fertilizers, Mangalore Refinery & Petrochemicals Ltd (For Details Refer Annexure 4.1)
c)	Distance of Rail & Road from Industry	All these industries are located near Baikampady & NMPT. Distance to nearest Railway Station – 10 km (Thokur Station) Distance to nearest Highway – 3 km (NH-66)
6.	Consultant's recommendation for going ahead with Stage-II (DPR preparation)	Recommended for development as Class-II waterway for Ch 0.00 km to 23.10km.
7.	Any other information/comment	Three barrages and two dams (one at end stretch) exist in the entire stretch. First barrage is located at Ch 23.50km and mostly shallow depth is observed in upper stretch, therefore waterway can be confined upto this location. Two bridges before 23.5km have sufficient vertical and horizontal clearance (HC: 40 m to 50m; VC: 12m to 14 m). MHWS –1.68m, HTL—1.68m, LTL—0.03m, Average Tidal Variation—0.90m, Chart Datum—0.95m, Port Name—New Mangalore Port

Date: 29-09-2016

Consultant signature

CONSULTANCY SERVICES FOR PREPARATION OF TWO STAGE DETAILED PROJECT REPORT OF PROPOSED 53 NATIONAL WATERWAYS

NETRAVATHI RIVER

(NW-74)

CLUSTER - VI

KARNATAKA AND KERALA, INDIA

			Arun Kumar	Shaloo Puri	Mithilesh Kumar
02	29.09.2016	For Acceptance	Arun Kumar	Shaloo Puri	Mithilesh Kumar
Rev.	Date	Description	Prepared By	Checked By	Approved By

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LIST OF ABBREVIATIONS

Abbreviations	Acronyms
BFL	Bombay Floating Light
CD	Chart Datum
Ch	Chainage
CRZ	Coastal Regulation Zone
CWC	Central Water Commission
DGPS	Differential Global Positioning System
DMIC	Delhi Mumbai Industrial Corridor
DPR	Detailed Project Report
FSL	Full Supply Level
GAIL	Gas Authority of India Ltd.
HC	Horizontal Clearance
IO	Iron Ores
IOCL	Indian Oil Corporation Ltd.
IWAI	Inland Waterways Authority of India
IWT	Inland Water Transport
KIOCL	Kudremukh Iron Ore Company Limited
KP	Km Points
LAD	Least Available Depth
MHWS	Mean High Water Spring
MMTPA	Million Metric Tonne Per Annum
MnT	Million Tonnes
MOEFCC	Ministry of Environment, Forest & Climate Change
MOS	Ministry of Shipping
MRPL	Mangalore Refineries and Petrochemicals Ltd.
MSME	Micro Small & Medium Enterprises
MTPA	Metric Tonne per Annum
NH	National Highway
NMPT	New Mangalore Port Trust
NW	National Waterway
OMPT	Old Mangalore Port Trust
PGCIL	Power Grid Corporation of India Limited
PWD	Public Works Department
SEB	State Electricity Board
SH	State Highway
UPCL	Udupi Power Corporation Ltd
VC	Vertical Clearance
WRD	Water Resources Department
WRIS	Water Resources Information System of India

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Annexure 3.3	Bathymetric Survey as Received from Hydrographic Surveyor
Annexure 3.4	Photos Captured by Survey Team during Reconnaissance Survey
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Annexure 3.6	River Bed Profile as per Single Line Bathymetric & Topographic Survey
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EXECUTIVE SUMMARY

A. Introduction

The available water resource in the globe can be used and utilized in various ways whereas Inland Water Transport (IWT) is one among them. The water bodies can be utilized for IWT also. India has been bestowed with vast water bodies consisting of rivers, canals, backwaters, creeks and lakes and having the potential for development of efficient waterways transport network. However, when compared to the development of IWT in certain countries, the same is to be geared up in our country. IWT mode remains underdeveloped and its share in overall internal cargo transport remains abysmally low. IWT sector presently has a meager modal share of 0.1% in India compared to 42% in European Union, 8.7% in China and over 8% in USA. This is a great economic opportunity loss to the country.

Based on various earlier studies on IWT, subsequent to the recommendations of National Transportation Policy Committee (NTPC 1980) and in order to give more thrust to the Inland water transport mode duly keeping in view the major benefits of this mode viz., Cheaper operational cost on comparison / Higher fuel efficiency / Eco friendly nature of the mode, the IWT development system is under consideration in our country. The potential through IWT mode can be used as an alternate and supplementary mode of transportation in certain favorable conditions.

India has about 14,500 km of navigable waterways which comprise of rivers, canals, backwaters, creeks, etc., out of which about 5200 km of the river and 4000 km of canals can be used by mechanized crafts. About 55 million tonnes of cargo is being moved annually by Inland Water Transport (IWT). Its operations are currently restricted to a few stretches in the Ganga-Bhagirathi-Hooghly Rivers, the Brahmaputra River, the Barak River, the rivers in Goa, the backwaters in Kerala, inland waters in Mumbai and the deltaic regions of the Godavari - Krishna Rivers.

Inland Waterways Authorities of India (IWAI), a statutory body under Ministry of Shipping, Government of India intends to explore the navigational potential of newly declared national waterways across the country for year round commercial navigation.

National Waterways Act, 2016 has come into force to make provisions for existing national waterways and to provide for the declaration of certain inland waterways to be national waterways and also to provide for the regulation and development of the said waterways for the purposes of shipping and navigation and for matters connected therewith or incidental thereto. There are now a total of one hundred and eleven national waterways altogether across the country which includes five existing national waterway besides 106 newly declared waterways as national waterway through National Waterways Act, 2016. The objective is to promote integrated development of waterways throughout the country so as to have a considerable and maximum

mode shift to IWT which can reduce the density in rail/road apart from the environmental benefits of IWT mode.

It has been planned to study in two stages comprising of feasibility study in stage-I followed by preparation of DPR in stage-II and recommending thereafter the possibility of composite and integrated development of proposed newly declared national waterway to achieve navigation and to develop water transport facilities. This report presents study detail of stage-I of national waterway of Netravathi River in the state of Karnataka. Netravathi River has been designated as national waterway-74 with its description in the gazette notification as, 78 km length of the river from Netravathi Dam, Dharmsthala Lat 12°57'55.23"N, Long 75°22'10.19"E to confluence with Arabian sea at Bengre Lat 12°50'42.73"N, Long 74°49'28.86"E.

Sl. No.	Introductory Consideration	Description of the River
1	Name of the river / canal	Netravathi River (NW-74)
2	State/ District through which river passes	The Netravathi River passes through Chikamangaluru & Dakshin Kannad Distt of Karnataka State.
3	Length of the river / canal	The length of the Netravathi main stream in the catchment from the origin to the outfall in the Arabian Sea is about 103.0km. Out of the total length of 103.0 km of river, 78 km length of the river from Netravathi Dam, Dharmsthala Lat 12°57'55.23"N, Long 75°22'10.19"E to confluence with Arabian sea at Bengre Lat 12°50'42.73"N, Long 74°49'28.86"E has been declared as new national waterway and proposed to undertake the two stages DPR. The index map of Netravathi River showing proposed waterway stretch, topographic features and road networks are shown in **Figure 1.1 & Figure 1.2**.
4	Catchment Area	The total catchment area of Netravathi River basin is 3657 sqkm

B. Methodology Adopted

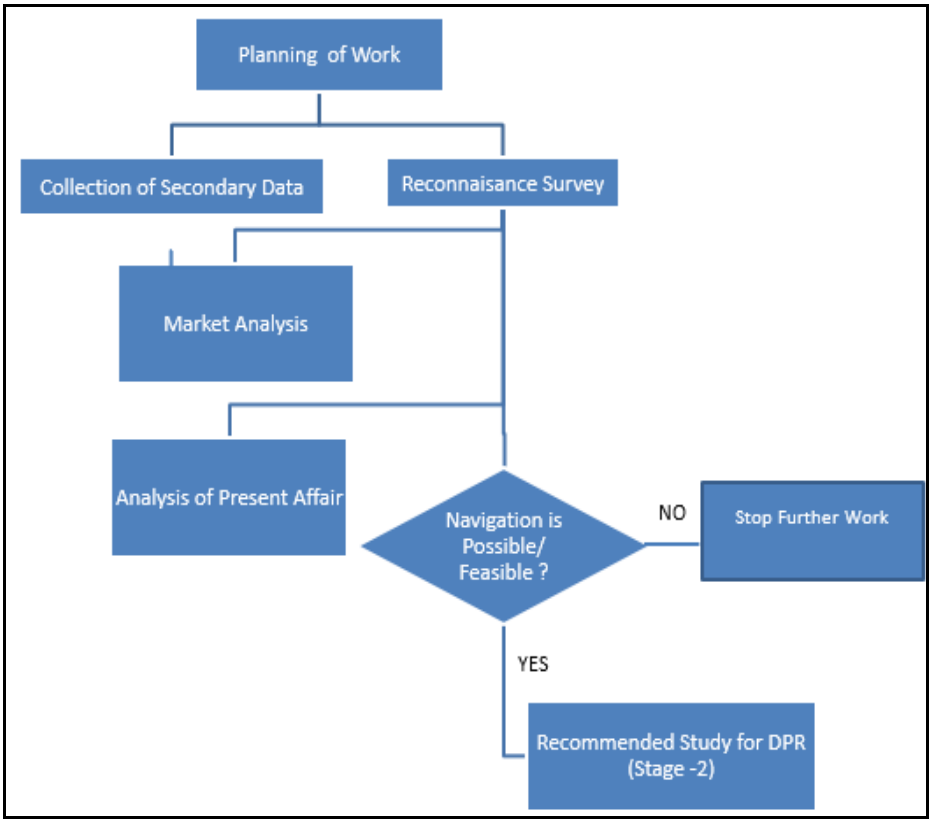
The feasibility of the navigation in the considered waterway has been examined from the following three perspectives:

A. the physical system: - It includes the study of hydrographic characteristics of the channel/stability of channel/water depth/width of river/ LAD/ port/ infrastructure/ cross over structure/ sediment analysis/ physical constraints/ hindrances etc.

B. The current functions: - It covers the current utilization of the river – existing navigation/ ferry services/ jetties/ cross over structures/ irrigation facilities/ dam/ barrage/ canals/ fishery/mining etc.

C. the market potential:- This aspect covers ferry services, existing cargo movement, existing rail & road network, population served, local produces, industrial establishment, future potential, transfer of cargo movement to inland waterways transport system etc.

Work Execution for stage-I study has been depicted through following diagram.



Execution Diagram of Stage I

C. Collection of Data and Analysis

Reconnaissance survey has been conducted through expert agency for collection of primary data and various secondary data have also been collected from different sources e.g. benchmark, G & D data & chart datum from IWAI, Govt. of India / MSME, Govt. of India/ Cargo Movement Data for the Year 2014 and 2015 provided by IWAI, Govt. of India/ Directorate of Ports & IWT, Karnataka / Directorate of Industries, Karnataka / New Mangalore Port office / Old Mangalore Port office / WRD, Govt. of Karnataka / Malpe Port office / IOCL, Govt. of India undertaking / respective district authorities of State Govt. of Karnataka and information available in the public domain through web.

A review of the existing data available with the State Agencies and Central Water Commission for the proposed Inland Waterways has been done for determining the nature, extent, adequacy, validity of the available data and identifying the data gaps.

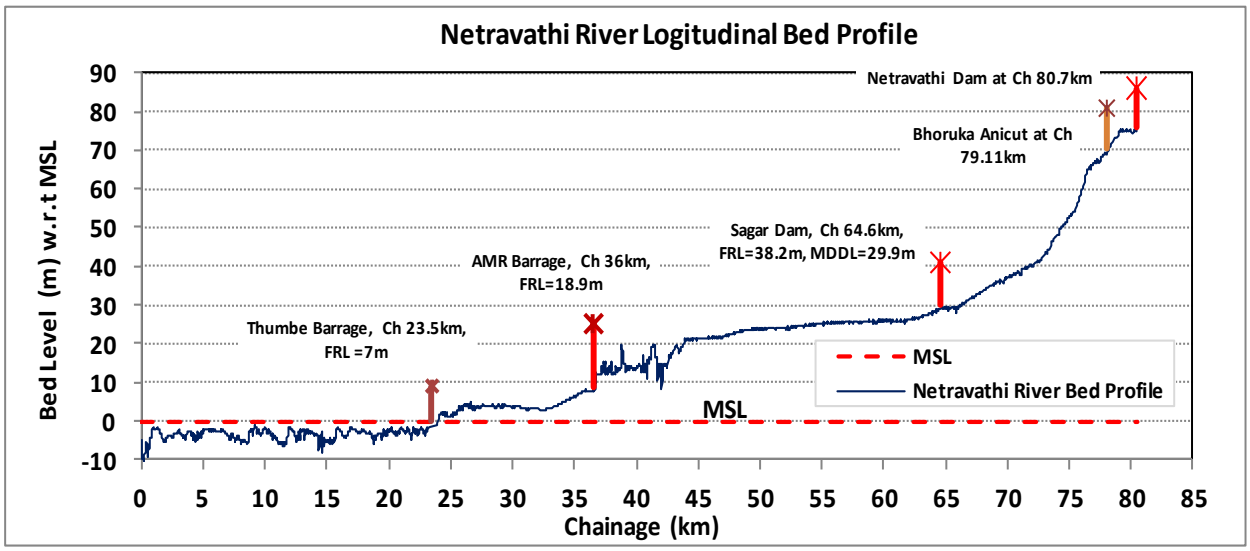
D. Observations and Inferences

Following conclusions have been derived for establishing the navigability of the proposed waterway;

1. The river length as given by IWAI is 78.0km, whereas the total surveyed length along the river to capture the thalweg is 80.48km. The deepest channel route has been reckoned as 80.48km. All inferences derived for identifying the navigable length had been derived with reference to deepest channel length (80.48km).
2. There are two Dams, two Barrages and one Anicut exist along the surveyed route. Details of structures as given in **Table 3.22** are placed below. These structures divide the proposed waterway into Five distinct structures with varying water levels and hence deterrent for throughput navigation for the entire stage by IWT. Navigation locks are required to overcome the navigation barrier due to these structures.

Sl. No.	Name of Structure	Chainage (km)	Location		Details
			Latitude	Longitude	
1.	Thumbe Barrage (Karnataka Urban Water Supply & Drainage Board)	23.50	12°52'19.27"	75°0'18.28"	FRL: 7.00m HFL: 11.89m
2.	AMR Barrage (AMR Power Pvt. Ltd)	36.00	12°52'51.77"	75°5'38.95"	FRL: 18.90m
3.	Sagar Dam (Sagar Power Pvt. Ltd)	64.60	12°51'20.28"	75°19'27.45"	FRL: 38.2m MDDL: 29.90m
4.	Bhoruka Anicut (Bhoruka Power Pvt. Ltd)	79.11	12°57'29.63"	75°21'34.65"	Top Level: 79.00m Height :4m (13.5MW= 3 x 4.5MW)
5.	Netravathi Dam, Dhramsthala	80.70	12°57'54.22"	75°22'10.3"	-

3. The observed bed profile of Netravathi River waterways as shown in **Figure 3.21** is placed below.



4. The river is tidal affected up to 23.50km. 30.4% of the surveyed length has water depth more than 2 m i.e. for about 24.50km, however not continuous. {Reach starting from 0.00km (At confluence of river Netravathi River with the Arabian Sea / Gurupur River)}.
5. The lengths of the waterway, where a depth more than 2.0m, 1.5m and 1.0m with reference to the Chart Datum / MDDL / Appropriate levels have been compiled in the main report. The brief of this is given in **Table 3.15** and being reproduced below:

Chainage (Km)	Depth Available		Length of River (Km)			
	Max. (m)	Min. (m)	>2m	1.5-2.0m	1-1.5m	<1m
0.0-5	9.23	0.68	3.79	0.60	0.40	0.21
5-10	5.13	0.32	2.44	1.00	1.34	0.22
10-15	7.04	0.60	3.44	0.76	0.52	0.28
15-23	5.12	0.65	4.01	1.76	1.52	0.70
23-23.5	1.85	0.82	-	0.17	0.08	0.21
Sub Total			**13.68**	**4.29**	**3.86**	**1.62**
Thumbe Barrage at Ch 23.50km						
23.5-24	4.99	4.51	-	-	-	0.55
24-30	4.70	0.51	2.71	2.77	0.28	0.24
30-36	0.97	0.49	-	-	-	6.00
36-44	14.43	0.70	7.82	0.09	0.02	0.07
44-53	1.60	0.40	-	0.10	0.20	8.70
53-62	1.60	0.40	-	0.10	0.60	8.30
62-71	1.60	0.40	-	0.15	0.35	8.50
71-80.48	1.60	0.40	-	0.85	0.90	7.73
Sub Total			**10.53**	**4.06**	**2.35**	**40.09**
Grand Total			**24.21**	**8.35**	**6.21**	**41.71**

6. The existing Bridges and Power Cables in the stretch downstream of Thumbe Barrage (Ch 23.50km) are having sufficient clearances.
7. Feasibility study suggests that the river is generally navigable without any obstruction, up to Ch 23.10km (up to the Cable).

The above description & classification of the waterway has been presented schematically based on the survey observation and duly keeping in view the river classification criteria in **Table 3.27** as reproduced below:

Criteria	Classification																			
Length of waterway from start (km)	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80
Chainage length in %	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%
Depth availble	C-II						Needs Dredging		All Class			Needs Dredging								
Raod Bridge Vert. Clearance	All Class											C-I								
Raod Bridge Hor. Clearance	C-II																			
HT Line Vert. Clearance	All Class			Needs Raising of HT Base																
Bend Radius	C-V								C-II								C-I			
Index	All Class		Class-V		Class-IV		Class-III		Class-II		Class-I									

E. Cargo Feasibility

Considering the proximity of Netravathi River to Gurupur River, NMPT and OMPT Ports, a possibility of moving cargo 1.15-1.45 MMTPA exists. The details are as follows:

POL/LPG: Hazardous Cargo: 0.85-1.15 MMTPA

Container: 0.2 MMTPA, 12,000 TEUS

Building Material: 40,000 MTPA

Food Grains/Fisheries: 50,000 MTPA

Fertilizers: 3,000 MTPA

Passenger movement is also significant and likely to grow to 7 lakhs per annum in next 10 years. A tourist potential of 20,000 persons in next 10 years is also anticipated.

F. SWOT Analysis

SWOT analysis has been carried out for deriving meaningful information specifying the objective of the study for development of the waterway for year round commercial navigation and identifying the internal & external factors that are favorable and unfavorable in the development of the waterway.

Strength

1. 30% of the 80.48km has waterway having more than 2m water depth available for navigation.
2. More than 2.0m depth is available for a length of 13.70km starting from 0.00km (At confluence of Netravathi River with Arabian Sea / Gurupur River) in the initial 23kms of the proposed waterway, however not continuous. Certain small shoals were observed, which may have to be attended by Dredging.
3. The maximum tidal fluctuation of 1.68m has been observed and this will strengthen the safe mobility of vessels in the waterway.
4. Approximately 5 lacs of population are residing in the Mangalore Taluka and Bantwal Taluka.
5. Three Ferry Routes are under operation with Passenger mobility of 1 lakh per annum.
6. 8000 – 10000 passengers per annum are moving through OMPT to Lakshadeep islands.
7. NMPT, OMPT and Gurupur River are well connected through the Netravathi River.

8. Bharati Ship Yard is on the banks of Gurupur River / Netravathi River
9. Fishing activity is flourishing in the Old Mangalore Port area.
10. Good Road and Rail connectivity exists through Mangalore city.
11. Ullal Town; Somanatha; Dargah of Syed Mohammed Shereeful Madani are in the vicinity of Netravathi River.

Weakness

1. Presently, the IWT movement is meagre.
2. Fishing Potential may have to be encouraged.
3. The presence of series of Dams and Barrages is an obstruction for throughput navigation.
4. Presence of Rock outcrops in the upper reaches is an obstruction for safe navigation.

Opportunity

1. 30% of the 80.48km is having more than 2m water depth available for navigation, which can be used advantageously for the mobility of hinterland cargo.
2. More than 2.0m is available for 13.70km length is available, in the initial 23kms of the proposed waterway starting from 0.00km (At confluence of Netravathi River with Arabian Sea / Gurupur River), however not continuous, which can be used advantageously for the mobility of hinterland cargo, since the balance stretch can be managed by Dredging activity.
3. The maximum tidal fluctuation of 1.68m, as observed, can be an opportunity for the safe mobility of vessels in the waterway.
4. The interconnectivity to NMPT, OMPT and Gurupur River may establish through put of IWT traffic.
5. Ro – Ro operation, if established, decongestion of Mangalore City Roads may be possible.
6. The existing fishing activity (through the OMPT) will get encouragement with the development of this River.
7. With the existence of three Ferry Routes on the Netravathi River, Passenger mobility will flourish, if the Waterway is developed.
8. With the presence of Ullal Town; Somanatha; Dargah of Syed Mohammed Shereeful Madani in the nearby catchment, Tourism may flourish, if the Waterway is developed.
9. The presence of Bharati Ship Yard on the banks of Gurupur River / Netravathi River may attract good mobility of Repair Infrastructure.
10. The present Rail and Road connectivity though may be competing with IWT may also be an opportunity for creating an efficient intermodal hub for IWT.
11. Diversion of Hazardous cargo mobility through IWT may be an opportunity.
12. Policies are to be firmed up for development of IWT in this stretch.

Threat

1. The Panvel Edappally Highway in the study area may create competing mode of transport.
2. NH 13, NH 17, NH 48, NH 234, SH 73 and SH 275 in the hinterland may be a competing mode, if not effectively used for intermodal connectivity.
3. The Hazardous cargo presently is being moved through the thickly populated Mangalore city area, which can be avoided with the IWT development on River Netravathi and River Gurupur with inter connectivity though the Ports in the vicinity.
4. The Netravathi River banks covered by mangrove trees may invite some socio-environmental issues and may require statutory approvals and clearances to construct the jetties/terminal/ports/intermodal connectivity.

G. Development Cost (Tentative)

The reconnaissance survey data with regard to physical constraints may have cost implications for making the river stretch navigable to the required standards. Henceforth the development of the proposed national water way involves physical interference in the form of dredging, construction of terminals at the identified locations, modification of HT Lines at crossing locations to provide a minimum vertical clearance of 20.1m (with respect to 220 kVA) or the case may be combined with some unforeseen expenses. Moderate dredging effort has been envisaged with an average dredging of 1.0m required in 9.3km of the length of proposed waterway (initial 23.10kms) reckoned with reference to ascertained data. The cost of dredging has been considered @ INR 230 per cum. The cost of terminal has been estimated @ INR 10.0 crore each for two Ro-Ro terminals. The existing Bridges and Power Cables in the initial 23.1km are having sufficient Navigational clearances for the proposed Class of Waterway. Hence, no modification is required. The cost of navigational aids for day/night navigation has been considered as INR 200 lacs. 10% of the amount for dredging, terminal construction and night navigation has been envisaged as unforeseen. The tentative total cost of development to make the river navigable round the year to achieve safe navigation for the required classification of vessel mobility has been estimated to INR 33.70 crore. (Reproduced the Table 5.1)

Sl. No.	Name of Waterway	Length of Waterway	Dredging Required (w. r. to 2m draft & 40.0m width)	Dredging Cost @ INR 230/ cum	Ro–Ro Terminal Proposed	Ro-Ro Terminal Cost @ INR 10 Cr each	Cost of Modification of Bridge / Transmission line	Night Navigation	Total cost including 10% unforeseen
		(km)	(km)	INR in Cr.)	(Nos)	(INR in Cr.)	(INR in Cr.)	(INR in Cr.)	(INR in Cr.)
1	Netravathi River	23.10 / 80.48	9.3	8.6	1	20.00	--	2.00	33.70

H. Classification of Waterway

The Ministry of Shipping, Road Transport and Highways (Inland Waterways Authority of India) has classified the Inland waterways into seven categories for rivers and canals for safe plying of self propelled vessels up

to 2000 DWT and tug-barge formation in push tug + four barge units of carrying capacity up to 8000 DWT (Ref: IWAI, Gazette Notification dated 26th January 2007).

As per the above Classification of Inland Waterways, the entire waterway of Netravathi River (NW-74) of initial 23.1km length has been classified based on the available minimum water depth, bottom width, minimum vertical and horizontal clearances of cross over structures and bend radius in the river. The classification of Netravathi River is described below. (Reproduced the Table 5.2).

Chainage (km)	Minimum Depth (m)	Bottom Width (m)	Minimum Vertical Clearance (m)	Minimum Horizontal Clearance (m)	Bend Radius (m)	Classification of Waterway (Proposed)
0.0 – 23.10	0.32	150	5.0 (LT Line)	40.0 (Bridge)	490	**Class – II**

The initial 23.10km study stretch of the waterway is amenable for development as Class II waterway as explained above. However, considerable Dredging is required. Smoothening of the bend at one location may be essential.

The above stretch of the waterway, hence, can be considered under Class II, which is navigable without any hindrance and shall be used for plying self-propelled vessel of carrying capacity up to 300 DWT (approximate size 45m overall length, 8m moulded breadth and 1.2m loaded draft) or one tug and two barges combination of 600 DWT (approximate size 110m overall length, 8m breadth and 1.2m loaded draft).

I. Recommendation

The national waterway-74 of Netravathi River has been identified having potential for development as waterway of **Class II** for the initial 23.10km study stretch, as described above. This stretch of the river is, therefore, recommended for stage-II study for preparation of Detailed Project Report (DPR) to establish the viability for implementation as a project.

Accordingly, the national waterway NW-74 of Netravathi River is proposed for development as **Class II** waterway in the stretch of the waterway as depicted below: (As at Table 3.28).

River Stretch	0.00km 23.10km		23.65km 78.00km
Classification	Class-II		NOT RECOMMENDED
Horizontal clearance (m)	40		
Vertical clearnce (m)	5		
Minimum Depth (m)	1.4		
Bottom Width (m)	40		
Self Propelled Vessel			
Dead Weight Tonnage	300		
Vessel size (m)	45 x 8 x 1.2		
Tug + Barge			
Dead Weight Tonnage	600		
Vessel size (m)	110 x 8 x 1.2		

Note:

1. Vertical clearances of cross over structures have been reckoned with MHWS of 1.68m upto Ch 23.50km and details are described in Para 3.3.5.

2. The depths have been reckoned in the tidal stretch with reference to the chart datum of 0.95m (below mean sea level) and in non tidal stretch it is reckoned with reference to the MDDL of respective Dam and barrages coming along the survey route.

3. MHWS –1.68m, HTL—1.68m, LTL—0.03m, Average Tidal Variation—0.90m, Chart Datum—0.95m, Port Name—New Mangalore Port

CHAPTER 1: INTRODUCTION

1.1 Introduction to Inland Waterways

The Inland Waterways Authority of India (IWAI) came into existence on 27th October 1986 for development and regulation of inland waterways for shipping and navigation. Inland Waterways Authority of India (IWAI) is the statutory authority in charge of the waterways in India. The Authority primarily undertakes projects for development and maintenance of IWT infrastructure on national waterways through grant received from Ministry of Shipping. The head office of the Authority is at Noida, UP. It does the function of building the necessary infrastructure in these waterways, surveying the economic feasibility of new projects and also administration. The Authority also has its regional offices at Patna, Kolkata, Guwahati and Kochi and sub-offices at Allahabad, Varanasi, Bhagalpur, Farakka, Swaroopganj, Hemnagar, Dibrugarh (Assam), Dhubri, Kollam, Vijayawada (Andhra Pradesh) and Bhubaneshwar (Odisha).

India has about 14,500 km of navigable waterways which comprise rivers, canals, backwaters, creeks, etc., out of which about 5200 km of the river and 4000 km of canals can be used by mechanized crafts. About 55 million tonnes of cargo is being moved annually by Inland Water Transport (IWT), a fuel - efficient and environment - friendly mode. Freight transportation by waterways is highly underutilized in India compared to other large countries and geographic areas like the United States, China and the European Union. Its operations are currently restricted to a few stretches in the Ganga-Bhagirathi-Hooghly Rivers, the Brahmaputra River, the Barak River, the rivers in Goa, the backwaters in Kerala, inland waters in Mumbai and the deltaic regions of the Godavari - Krishna Rivers.

Besides these organized operations by mechanized vessels, country boats of various capacities also operate in various rivers and canals and substantial quantum of cargo and passengers are transported in this unorganized sector as well. The total cargo moved (in tonne kilometers) by the inland waterway was just 0.1% of the total inland traffic in India. There now are one hundred and eleven national waterway across the country which includes five existing national waterway besides 106 waterway which have been declared recently as national waterways through a central legislation.

1) National Waterway 1

The Ganga - Bhagirathi - Hooghly river system between Haldia (Sagar) & Allahabad.

Estd.	= October 1986.
Length	= 1620 km
Fixed terminals	= G R Jetty 2, Kolkata, Pakur, Farakka, Gaighatt (Patna) & Allahabad.
Floating terminals	= Kolkata, Diamond Harbour, Katwa, Bahrampur, Jangipur, Bhagalpur, Semaria, Doriganj, Ballia, Ghazipur, Varanasi, Chunar, Allahabad.
Cargo Movement	= 3 million tonnes Approx.

2) National Waterway 2

Sadiya — Dhubri stretch of Brahmaputra river.

Estd = September 1988.

Length = 891 km

Fixed terminals = Pandu

Floating terminals = Dhubri, Jogighopa, Tezpur, Silghat, Jamgurhi, Bogibil, Dibrugarh, Saikhowa and Sadiya

Cargo Movement = 2.0 million tonnes Approx.

3) National Waterway 3

Kottapuram-Kollam stretch of the West Coast Canal, Champakara Canal and Udyogmandal Canal.

Estd = February 1993

Length = 205 km

Fixed terminals = Kottapuram, Aluva, Bolgatty, Willingdon Island, Maradu (Kochi), Cherthala (Vaikom), Thannermukkom, Alappuzha, Thrikkunnapuzha, Kayamkulam (Ayiramthengu), Chavara and Kollam.

Cargo Movement = 1.0 million tonnes Approx.

4) National Waterway 4

Kakinada–Pondicherry stretch of canals and the Kaluvelly Tank, Bhadrachalam – Rajahmundry stretch of River Godavari and Wazirabad – Vijayawada stretch of River Krishna.

Estd = November 2008

Length = 1095 km

Tentative Cargo Potential = 2.0 million tonnes Approx which can go up to 4.0 million tonnes in next 15 years or so.

5) National Waterway 5

Talcher–Dhamra stretch of the Brahmani River, the Geonkhali - Charbatia stretch of the East Coast Canal, the Charbatia–Dhamra stretch of Matai river and the Mangalgadi - Paradip stretch of the Mahanadi River Delta.

Established = November 2008

Length = 623 km

Tentative Cargo Potential = Coal from Talcher to Dhamra and Paradip ports is the most important potential cargo for this waterway. Immediately after the development of the waterway, it is estimated in the DPR that about 11.0 million tonnes of cargo can be transported per year which can go up to 23.0 million tonnes in next 15 years or so.

6) 106 Newly Declared National Waterways

For newly declared national waterways, IWAI is carrying out feasibility studies /DPR preparation through a number of consultants.

1.2 Project Background of the Present Study

IWAI, Ministry of Shipping, Government of India intends to explore the potential of additional waterways across the country for year round commercial navigation. For this, it is planned to study in two stages comprising of feasibility study followed by preparation of DPR and recommending thereafter the possibility of composite and integrated development of proposed waterways to achieve navigation and to develop water transport facilities across India.

106 more waterways across the country have been declared as new national waterways through a bill passed in the Parliament in March 2016 with contention that the measure is aimed at providing a cheaper mode of transport and reducing traffic burden on the roads. These new 106 new national waterways will be in addition to the five existing National Waterways. The proposed legislation is aimed at integrated development of inland waterways throughout the country since the waterways is "lagging behind" road and rail sectors. Promotion of waterways is a priority as it is a cheaper mode of transportation, being economical compared to roads and railways, and at the same time it is environment friendly too.

Feasibility study shall examine the viability of navigational routes and therefore potential to develop waterway transport facility is to be established. This shall be followed by preparation of Detailed Project Report (DPR) for those feasible waterways, which would include detailed hydrographic surveys and investigation, traffic survey, proposed location for terminals and cost assessment etc. Tractebel Engineering had been awarded two of the clusters i.e. Cluster-6 & Cluster-7 consisting of the rivers/canals/creeks for two stage studies, screen the rivers with respect to navigational feasibility and subsequently prepare a Detailed Project Report for the development of Inland Waterways. This report deals with the study of **Cluster-6** which consists of rivers/creeks of Karnataka and Kerala (length-487 km) and described in **Table 1.1** as shown below:-

Table 1.1: List of Rivers/Creeks Karnataka and Kerala under Cluster-6 (length-487.0 km)

Sl. No.	Name of Rivers/ Creeks	National Water Way (NW)	Length (km)	State
1.	West Coast Canal	3	160	Kerala
2.	Alappuzha- Changanassery Canal	8	28	Kerala
3.	Alappuzha- Kottayam – Athirampuzha Canal	9	38	Kerala
4.	Kottayam-Vaikom Canal	59	28	Kerala
5.	Gurupur River	43	10	Karnataka
6.	Kabini River	51	23	Karnataka
7.	Kali River	52	54	Karnataka
8.	**Netravathi**	**74**	**78**	**Karnataka**
9.	Panchagangavali (Panchagangoli) River	76	23	Karnataka
10.	Sharavati River	90	29	Karnataka

Sl. No.	Name of Rivers/ Creeks	National Water Way (NW)	Length (km)	State
11.	Udayavara River	105	16	Karnataka
	Total		**487**	

The layout plan of the all eleven rivers/creeks covered in Cluster-6, showing the location and Index Map of **Netravathi River** is shown in **Figure 1.1 & Figure 1.2** respectively.

Figure 1.1: Location Map of the proposed Waterway of Cluster-6 in Karnataka and Kerala

Figure 1.2: Index Map of Netravathi River

1.3 Objective of the Study

IWAI, Ministry of Shipping, Government of India intends to explore the potential of additional waterways across the country for commercial navigation.

The objective of the study shall necessarily include:

1. To Explore the Potential of Year Round Commercial Navigation on the Proposed National Waterways by Conducting Feasibility Studies.
2. Recommending thereafter the possibility of Composite and Integrated development of proposed waterways under **Cluster-6** consisting of Creeks/ Rivers to achieve navigation and to develop water transport facilities on these waterways.

After carrying out the feasibility study, if there is scope for navigation and potential to develop waterway transport facility, a Detailed Project Report needs to be prepared for those waterways which would include detailed hydrographic surveys and investigation, traffic survey, proposed location for terminals and cost assessment, viability etc.

1.4 Scope of the Assignment

The complete scope of assignment shall include the study in 2 stages:

1. **Stage-I** is only for feasibility of the waterway for navigation, which may have the potential for year round navigation or at least for a few months in a year.
2. **Stage-II** would consist of the detailed hydrographic survey, topographic survey, detailed traffic survey including the divertible traffic, selection of terminal locations and preparation of detailed project report including the returns /viability analysis for implementation as a project.

This report covers the activities of Stage-I only for feasibility of the **Netravathi River** for navigation, which may have the potential for year round navigation or at least for a few months in a year.

Stage-I consists of the following activities:

A. Reconnaissance Survey

B. Collection and review of available data

C. Feasibility Report

1.5 Methodology Adopted

The Stage-I Feasibility Study of the Inland Waterway stretches is based on three approaches:

The physical system

The current functions

The market potential

1.5.1 Physical System

The potential for inland navigation strongly depends on the physical environment. Success of navigation will depend on:

- the stability of the channel: frequent variations of channel positions requires river conservancy measures;
- the regime: in most cases good navigation conditions are required most of the time for fluvial navigation to develop as a competitive transport mode, if such conditions are not met other – more reliable - modes of transportation will be used, making it difficult to get a return on the investments required for navigation (ships, maintenance, port infrastructure):
    - The regime which defines the variability of water depth, draught and water level (position of port infrastructure, vertical clearance at bridges).
    - Sediment supply: certain stretches are characterized by high sediment supply; developing such sections would require high maintenance efforts to keep the channels at depth; it must be economically and technically feasible to maintain a balance between dredging and sediment supply; therefore, the decision to construct of barrages to increase the water depth, must be taken with care, as these may act as sediment traps.
- Hydrographic characteristics of the channel: depth and width of the channel. The fairway design shall conform to channel geometry. The discharge should guarantee sufficient water depth alternatively, weirs, canals could be constructed to allow required water depth for safe navigation.

From a quick scan of satellite images it becomes clear that the morphological and hydrological conditions of the different rivers vary strongly, even within the same river. Satellite images provide a complete, accessible and qualitative data source for a first appraisal of potential.

Morphological features can be easily derived from satellite images. The morphological analysis of river using satellite images, therefore, has been used as a basis for a first, but reliable appraisal of the physical potential of the river (for navigation) shall be carried out. Such analysis is, therefore, proposed as one of the methods in stage-I.

It should be pointed out, however, that the period in which the satellite images have been taken may strongly affect the appearance: otherwise dry sections may well be flooded in monsoon season. A careful evaluation shall be contemplated. Also, information obtained from water managers such as CWC, and local authorities will be a useful complement to evaluate navigability.

1.5.2 Current Functions

Current functions of the river have also been taken into consideration:

- navigation, present in certain areas – it's relevant to know why, how it's organized:
    - transportation of people (including the tourism potential) and goods
- structures aligned to rivers

- crossing infrastructure
  - bridges: vertical clearance, may even be absent for navigation
  - weirs, barrages: water supply, regulation, hydro-power
  - ferry terminals: variations in water levels and terminal infrastructure
- fishery
- mining, occurs along certain rivers, and depends on (the often) shallow channels for processing
- Presence of forest and wild life sanctuaries on the banks will be advantage to IWT
- Irrigation/ water supply, the available water may be shared between different functions, barrages exist to tap water for supply – as Indian agriculture is important for the GDP and the employment of most of the population, equilibrium must be found between available water resources and additional uses such as use for navigation.

1.5.3 Market Potential

Historically, economic demand is a driving force behind waterway development. In several cases waterways were constructed and developed for specific industries. Also navigation was developed using existing irrigation or water supply canals. Further, the accessibility also was another driving force, when alternative mode development was difficult/ uneconomical.

In an emerging economy such as India the presence of waterways probably will also stimulate further economic development. While train and railroad networks connect cities and industrial areas independently of the hydrographic network, now it must be analyzed where the hydrographic network can establish alternative and new links between cities. In navigable portions such links would be logical.

Environmental concerns as viz. the emissions, consequences on air pollution and climate change, and social and economic pressure of congestion, led to a boost of inland navigation projects in all around the world. Such development can also be expected in India, as the development of waterways may be economically and socially more beneficial than the construction of the road and rail networks, not necessarily as a substitute, but to be developed in parallel, in a multi-modal transportation system.

The current scope for Stage-I is executed as per following framework shown in **Figure 1.3**.

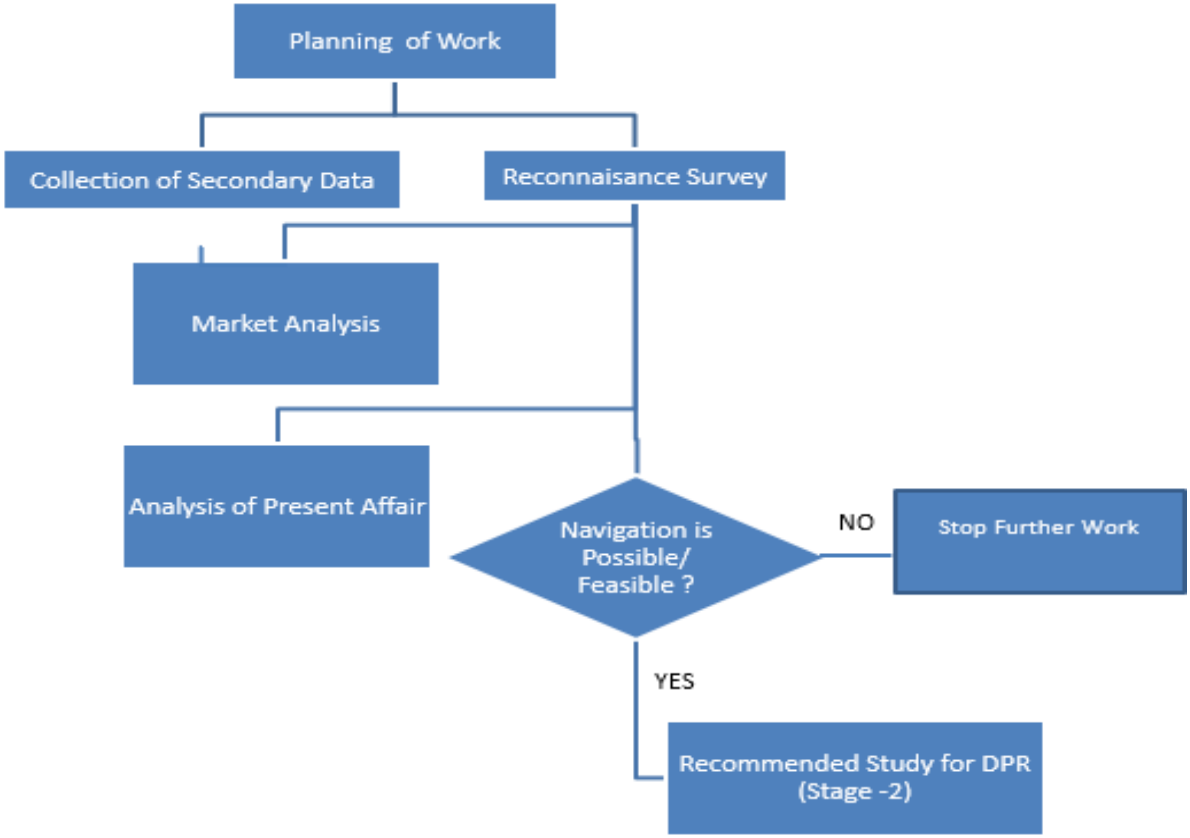


Figure 1.3: Execution Diagram of Stage-I

1.6 Collection of Data

For evaluating the feasibility of the waterway in **Netravathi River** for year round navigation, the reconnaissance survey for collecting the Primary data has been taken up. Secondary data have also been collected from various sources. IWAI issued a letter in the name of M/s Tractebel, to all the concerned stakeholders for data collection from State/ Central Government.

(A) **Primary Data:** M/s Tractebel Engineering Pvt. Ltd. has appointed a separate survey agency **M/s Geoinfosys Technologies** for carrying out the reconnaissance survey for collection of following primary data:

(i) Single line longitudinal survey (Bathymetric survey or Topographic survey);

(ii) Details (horizontal and vertical clearances above High Flood Level of bridges, aqueducts, electric lines, telephone lines, pipe lines, cables en-route etc;)

(iii) Details of locations of permanent structures viz. Bridges, Barrages, Dams, Locks, Jetties, ports etc;

(iv) Photographs of important structures along the route;

(v) Topographical features of the proposed Inland Waterways;

(vi) Typical physical features along the alignment i.e. land use pattern;

(vii) Preliminary identification of stretches having year round flow;

(viii) Critical depth for navigational purpose;

(ix) Preliminary Traffic identification on the proposed Inland Waterways;

(x) Inland Waterway width, Terrain, Bridges and structures across the proposed Inland Waterways;

(xi) Urban areas (location & extent);

(xii) Geologically sensitive areas environmental features;

(xiii) Critical areas requiring detailed investigations;

(xiv) Soil (textural classifications) (only visual inspection at every 10km);

(xv) Drainage conditions;

(xvi) Existing utility services along the alignment;

(xvii) Present Status of navigation on different sub stretches of the waterway;

All the data derived from the above reconnaissance surveys shall be utilized for planning and programming the detailed surveys and investigations. All reconnaissance field studies including the traffic surveys have been taken up and the classification of proposed waterway has been carried out as per IWAI guidelines on this matter. The list of data collected and source of data is being enclosed as **Annexure 1.1**.

(B) **Secondary Data:** The following secondary data had been collected from concerned authorities as well as available on public domain.

(i) Benchmark Data from IWAI, Noida

(ii) Chart Datum data from New Mangalore Port

(iii) Industry Details from District Industry Centre, Dakshin Kannad, Govt of Karnataka

(iv) Import Export data of commodities from Old Mangalore Port Trust Office

(v) Agriculture Data from Deptt of Agriculture, Dakshin Kannad, Govt of Karnataka

All the data derived from the above reconnaissance surveys details shall be utilized for determining the navigability of the proposed national waterway. A review of the existing data available with the State Agencies and Central Water Commission for the proposed Inland Waterways has been done for determining the nature, extent, adequacy, validity of the available data and identifying the data gaps. Feasibility Report is to be prepared for the proposed national waterway based on the available data, reconnaissance survey and the market analysis. The structure of the report has been elaborated in succeeding section 1.9 of this chapter.

1.7 Expected Outcome of the Assignment

Combining knowledge on the physical constraints, actual and future uses of the river and the valley, economic potential and needs, or absence thereof, allows the characterization of the river for development as a waterway.

The reconnaissance survey data with regard to physical constraints may have cost implications for making the river stretch navigable. The potential of possible navigation in the stretches of proposed inland waterways have been determined using raw water depths reduced to the chart datum in the area of tide affected rivers. To define the navigability of river/creeks, several gradations can be distinguished:

- No or limited effort: navigable (for a specific draught) without measures;
- Limited to moderate effort: e.g. occasional dredging works at a limited number of location;
- Moderate to high: frequent dredging over a considerable length or large number of locations;
- High to very high: the construction of one or more weirs and or locks, or the construction of a canal;

In accordance to the above criteria, the stretch of the proposed waterway of **Netravathi River** under Cluster-6 has been defined in the context of availability of navigable depth (more than 2m). Taking into account for further development in the stretches of less than 2m depth, the solutions for the navigation shall be proposed.

Combining economic potential and physical characteristics allows categorizing the river or specific stretches for navigation potential on the basis of following criteria.

(i) Water Availability
(ii) Flow Depth
(iii) Vertical & Horizontal Clearance
(iv) Nautical continuity
(v) Economic & social parameters

The analyses of physical and economic parameters have been the basis of a suggestion for classification of Inland waterways for further study. The waterways shall be classified between categories of Class-I to Class VII as per description derived from the compilation of Inland Waterways Authority of India (Classification of Inland Waterways in India) Regulations, 2006. Referring the data derived from the reconnaissance single beam bathymetry survey, cargo traffic details, market potential, vertical and horizontal clearances with respect to existing cross over structures, the proposed waterway has been classified into seven categories on the basis of IWAI guidelines for safe plying of self-propelled vessels up to 2000 Dead Weight Tonnage (DWT) and tug-barge formation in push-tow units of carrying capacity up to 8000 DWT. A recommendation of a selection of proposed inland waterway stretch has been done (based on IWAI classification) for further analysis and preparation of DPR in Stage-II.

1.8 Description of Netravathi River (NW-74)

Netravathi River originates from Bangrabalige valley, Yelaneeru Ghat in Kudremukh in Chikkamagaluru district of Karnataka, India. It flows through the famous pilgrimage place Dharmasthala and is considered as one of the Holy Rivers of India. The combined stream passes over a rocky bed to Buntwal and flows for a distance of 35km in plain area and joins Arabian Sea at Mangalore old port, south of Mangalore city. The total catchment area of Netravathi River basin is 3657 sq-km. Catchment receives an average annual rainfall of

about 5363mm. The total length of the river from origin to its outfall in the Arabian Sea is 103.0km. The detail description of the river has been compiled in **Table 1.2**.

Table 1.2: Description of Netravathi River (NW-74)

Sl No.	Introductory Consideration	Description of the River
1	Name of the river / canal	Netravathi River (NW-74)
2	State/ District through which river passes	The Netravathi River passes through Chikamangaluru & Dakshin Kannad Distt of Karnataka State.
3	Length of the river / canal	The length of the Netravathi main stream in the catchment from the origin to the outfall in the Arabian Sea is about 103.0km. Out of the total length of 103.0 km of river, 78 km length of the river from Netravathi Dam, Dharmsthala Lat 12°57'55.23"N, Long 75°22'10.19"E to confluence with Arabian sea at Bengre Lat 12°50'42.73"N, Long 74°49'28.86"E has been declared as new national waterway and proposed to undertake the two stage DPR.
4	Map	The index map of Netravathi River showing proposed waterway stretch, topographic features and road networks are shown in **Figure1.2**. The section of the Netravathi River under feasibility study for inland waterway showing reconnaissance survey routes is presented in **Drawing No. P.009050-W-20201-008 R0 (Sheet-9)**
Characteristic of River		
5	River Course	Netravathi River originates from Bangrabalige valley, Yelaneeru Ghat in Kudremukh in Chikkamagaluru district of Karnataka. It flows through the famous pilgrimage place Dharmasthala and is considered as one of the Holy Rivers of India. The combined stream passes over a rocky bed to Buntwal and flows for a distance of 35km in plain area and joins Arabian Sea at Mangalore old port, south of Mangalore city. The catchment receives an average annual rainfall of about 5363mm.
6	Tributaries / Network of Rivers / Basin	Netravathi River has a relatively large catchment area and its tributaries are small feeder streams and canals.
7	Catchment Area	The total catchment area of Netravathi River basin is 3657 sq. km.

1.9 Structure of the Feasibility Study Report (FSR)

The Feasibility Study Report for proposed Inland Waterways of Netravathi River has been prepared and emphasize that which stretches of proposed inland waterways has potential of possible navigation. Only for those stretches of proposed inland waterways, which have potential of possible navigation, Stage-II study for preparation of DPR shall be carried out.

The Feasibility Study Report starts with a comprehensive report in form of executive summary giving description of the methods used for the data collection overview of the collected data followed by a description of the Present State of Affairs, Reconnaissance Survey and findings of Market Potential.

The executive summary concludes with Waterway Navigation Potential of the proposed waterway on Netravathi River followed with recommendations for going ahead with classification of river. The structure of FSR shall be as below;

I. **Executive Summary:** Executive summary shall describe the suitability of the proposed waterway in terms of its navigability and market potential. It shall contain a brief statement of the characteristics of the river, present use of the river, data captured in the reconnaissance survey, hindrances, acceptability of the waterway, enhanced connectivity to the region, capability to decongest the existing mode of transport, important aspects for techno commercial viability etc. The background information, concise analysis and main conclusions shall form part of the document. It will help to understand the overall scenario and decide the suitability of development of a specific waterway.

II. **Introduction:** This chapter shall describe about the Project Background of the present study, objective of the assignment, scope of the assignment, methodology adopted, outcome of the assignment, River characteristics and structure of the feasibility study report is presented.

III. **Analysis of Present State of Affairs**: In which the details about the existing town/ city/ taluka/ historical & tourist places, current utilization of proposed waterway, status of goods transport, road and rail transport as well as existing river facilities. The quantitative and qualitative description of the current utilization of proposed inland waterways are provided in the report. In addition, the descriptions about the status of goods transport, including utilization of road and transport services as well as river facilities have been covered.

IV. **Reconnaissance Survey:** The analysis of the data collected in the reconnaissance survey has been done to reflect the possibility of year round flow in the proposed Inland Waterways to achieve the commercial navigation. Bathymetry survey details, observed bed profiles and soil texture classification @ 10 km are compiled in this section. Observed waterway bed profile has been plotted with respect to existing Chart Datum in case of tidal affected rivers else the bed profile relates to CWC/ Irrigation water level data or FSL in case of canal. Maps of proposed Inland Waterways have been generated and referred with at the relevant locations indicating existing cross structures viz. bridges, jetties, established chart datum locations, dams, barrages, HT line, LT line, water pipe line, cables etc.

V. **Market Analysis:** The analysis of the market and potential usage of proposed Inland Waterways have been carried out. In the analysis, it has been examined both the existing market and the potential future market. The details of available existing Industries along the waterway, type of production in these industries, ferry services, cargo movement, type of crop along the waterway, previous history of movement of cargo in the waterway etc. have been collected and included in the report. All the data have been collected after discussion with local people while conducting reconnaissance survey etc. and also after interaction with State Govt. Officials, Irrigation / Water Resources Departments and various interconnected stakeholders.

VI. **Observations and Inferences**: In which the observations and Inferences of the feasibility study is presented in context of stretches of proposed inland waterways, which have potential of possible navigation for the approval of Stage 2. Technical Feasibility has been discussed which shall establish the navigability and potential usage of proposed Inland Waterway. The stretches of proposed inland waterways which have potential of possible navigation have been categorized and classified between categories of Class-I to Class VII as per description derived from classification of rivers/canals by Inland Waterways Authority of India Regulations, 2006. SWOT Analysis of Proposed Waterway has also been described covering the overall aspect of the proposed waterway in terms of its Strength, weakness, Opportunity and Threat to decide the suitability and the ranking of the waterway.

CHAPTER 2: ANALYSIS OF PRESENT STATE OF AFFAIRS

In order to establish the feasibility of waterways the present state of affairs as existing today along proposed inland waterway on Netravathi River (NW-74) is studied. Out of total 103.0km length of the river, 78 km has been proposed by IWAI for feasibility study. This chapter provides details about the current affairs, status of goods transport including utilization of road and rail transport along or near by the waterway.

2.1 Current Utilization

Netravathi River originates from Bangrabalige valley (Yelaneeru Ghat) in Chikkamagaluru district of Karnataka, and meets Arabian Sea at Bengre (Mangalore). This river flows through the famous pilgrimage place Dharmasthala and is considered as one of the Holy Rivers of India.

The total length of the river is about 103.0km before joining the sea. The river is under tidal effect of the Arabian Sea (backwater effect) up to Brahmarakotlu about 23.5 km from sea. There are three barrages and two dams existing across the proposed stretch of Netravathi River (NW-74) waterway. Cargo movement is only at the mouth of the river i.e. at Old Mangalore Port (OMPT) at Ch. 1 km. OMPT has handled 0.12 Million Metric Tonne Per Annum of cargo in year 2014-2015. Passenger transport is significant in this waterway and about 1.36 lakh passengers are using ferry services per year. Ferry services are operating and connecting Sajipanadu-Thumbe, Jalakadakatte-Parangipet and Adyar-Povoor through various routes. Details of existing structures along and across Netravathi River waterway are presented in following sections.

2.1.1 Existing Waterway Structures

There is one port and three ferry routes, Five diversion structures (Three Barrages and two Dams) used for Power generation and Water Supply are existing in this waterway. **Table 2.1** below provides the details of existing facilities along Netravathi River waterway with current utilization status.

Table 2.1: Existing Facilities on Netravathi River (NW 74)

Sl. No.	Existing Facility	Coordinates	Chaingae (Km)	Current Utilization
1.	Old Mangalore Port	12° 50' 59.89" N 74° 50' 7.30" E	1.00	Majorly handles building material, food grains and chemicals
2.	Adyar – Pavoor Ferry	12° 51' 49.78" N 74° 54' 58.99" E	11.50	Ferry Service
3.	Farangipete Ferry	12° 52' 20.51" N 74° 57' 21.58" E	15.90	Jalakadakatte-Parangipet Ferry Service
4.	Thumbe Ferry	12° 51' 45.03"N 74° 59' 28.57"E	21.60	Sajipanadu-Thumbe Ferry Service
5.	Barrage	12° 52 '19.27" N 75° 0 '18.28" E	23.50	By Karnataka Urban Water Supply & Drainage Board
6.	Barrage AMR Power Pvt. Ltd	12° 52' 51.77"N 75° 5' 38.95" E	36.00	24.5 MW Run-Off river Hydropower Project

Sl. No.	Existing Facility	Coordinates	Chaingae (Km)	Current Utilization
7.	Barrage Sagar Power Pvt. Ltd	12° 51' 20.28" N 75° 19' 27.45" E	64.60	Hydropower Projects
8.	Dam Bhoruka Power Pvt. Ltd	12° 57' 29.63" N 75° 21' 34.65" E	79.11	
9.	Netravathi Dam Dhramsthala	12° 57' 54.22" N 75° 22'10.30" E	80.70	Water supply facilities

Figures 2.1 to 2.2 show some of the above mentioned facilities.

Figure 2.1: Karnataka Urban Water Supply & Drainage Board Dam

Figure 2.2: Netravathi Dam

2.1.2 Crossing Over Netravathi River (NW-74) Water Way

Apart from the existing waterway facilities on banks of the river as described in 2.1.1, two railway bridges, nine road bridges and one foot bridge exists in the study stretch of the river. **Table 2.2** shows the inventory of existing structures on Netravathi River waterway.

Table 2.2: Details of Rail and Road Bridges across Netravathi River (NW-74)

Sl. No.	Name of Structure	Chain age (km)	Vertical Clearance above MHWS/HFL (m)	Horizontal Clearance (m)	Center Position	
					Latitude	Longitude
1.	Railway Bridge 2nos.	3.43	12.0	50	12°50'19.79"	74°51'23.71"
2.	Bridge Mumbai Highway 2nos.	3.82	14.0	40	12°50'21.88"	74°51'36.28"
3.	Railway Bridge	27.05	6.0	40	12°52'17.96"	75°2'7.31"
4.	Bridge Manglore Mysore Highway	28.00	4.0	40	12°52'36.09"	75°2'28.72"
5.	Bridge Manglore-Mysore Highway	28.36	4.0	50	12°52'48.23"	75°2'29.75"
6.	Bridge Near Jakribettu Village (under construction)	31.50	-	-	12°53'53.95"	75°3'22.66"
7.	Bridge Uppinangady	55.34	4.0	35	12°50'29.17"	75°14'53.75"
8.	Bridge Near Valal	62.30	0.5	3	12°50'57.67"	75°18'16.16"
9.	Foot Over Bridge Near Valal	62.45	9.0	50	12°50'57.44"	75°18'21.5"
10.	Old Bridge Dharmsthala	80.00	0.5	3	12°57'50.4"	75°21'53.97"
11.	New Bridge Dharmsthala	80.14	4.0	30	12°57'52.22"	75°21'54.76"

2.2 Connectivity of Waterway

Proposed stretch of Netravathi River waterway lies in the coastal area of Dakshina Kannada district which is well connected with the state capital, surrounding district headquarters, tehsils and villages through road and rail. **Figure 2.3** shows road and rail connectivity of the area adjacent of Netravathi River in the study stretch.

Figure 2.3: View of Rail and Road Network around Netravathi River

In **Figure 2.3**, Netravathi River is shown in blue color whereas yellow and black colors represent the road and rail network respectively around the Netravathi River.

2.2.1 Important Places

Netravathi River is in the vicinity of various important places of Dakshina Kannada district. **Table 2.3** shows the distance of Netravathi River from nearby important places.

Table 2.3: List of District/Town/Taluka from Netravathi River Waterway (Length-78.0 km)

Sl. No.	Important Places	Category	Distance from Creek/River (km)	Bank
1.	Mangalore	Taulka, City & Commercial Centre	1.5	Right Bank
2.	Mudipa	Village	0.75	Left Bank
3.	Permannur	Village	1.1	Left Bank
4.	Bajal Jalligudde	Village	0.75	Right Bank
5.	Pandeswara	Village	1.15	Left Bank
6.	Adyar	Village	0.75	Right Bank
7.	Pavoor Uliya	Village	0.65	Left Bank
8.	Arkula	Village	0.3	Right Bank
9.	Farangipete	Village	0.35	Right Bank
10.	Inoli	Village	1.0	Left Bank
11.	Pudu	Village	1.15	Right Bank
12.	Thumbe	Town	1.0	Right Bank
13.	Sajipamuda	Village	1.75	Left Bank
14.	Bantwal	Taulka	2.0	Right Bank
15.	Shamboor	Village	0.5	Left Bank
16.	Allipade	Village	1.0	Right Bank
17.	Sarapady	Village	1.2	Right Bank
18.	Maninalkur	Village	1.5	Right Bank
19.	Mani	Village	2.52	Left Bank
20.	Uppinangadi	Town	0.5	Left Bank
21.	Iianthila	Village	1.5	Right Bank
22.	Nellyadi	Village	12	Left Bank
23.	Guruvayankere	Village	13	Right Bank
24.	Dharamsthala	Village	1.5	Left Bank

2.2.2 Road Connectivity

Netravathi River in the study stretch is well connected with Mumbai Highway, Mangalore Mysore highway, and is surrounded by national highway number NH-234, NH-48, NH-17 & NH-13 on right bank and left bank respectively. The roads surrounding Netravathi River connects to National Highway throughout the length by existing nine road bridges.

2.2.3 Rail Connectivity

Railway transport in Netravathi River catchment is developed under the Southern Railways. The start and end point of study stretch of the river is connected to railway route. The nearest main railway station is Mangalore

central railway station at 1.5 km on right bank. Mangalore Central is one of the major railway stations in the Karnataka state. Trains from here connect the city to prominent state capitals of India like Chennai, Bangalore, Thiruvananthapuram (via Southern Railway) and Mumbai (via Konkan Railways).

2.3 Status of Goods Transport

Status of goods transport through River waterway is detailed in **Chapter 4 on Market Analysis of this report**.

2.4 Conclusion

a) Total length of Netravathi River is 103.00km before joining the sea. The river is under tidal influence of Arabian Sea (backwater effect) up to Brahmarakotlu (about 23.5km).

b) Out of 103.0km, beyond 23.5 km there are three barrages and two dams across the proposed water way.

c) Currently, initial 1.0km stretch of water way is used by Old Mangalore Port.

d) Passenger transport is significant in this waterway and about 1.36 lakh passengers are using ferry services per year. Ferry services are operating and connecting Sajipanadu-Thumbe, Jalakadakatte-Parangipet and Adyar-Povoor through various routes.

e) Netravathi River in the study stretch is well connected with National Highway and is surrounded by national highway NH-234, NH-48, NH-17 & NH-13 on right bank and left bank.

f) Railway transport in Netravathi river catchment is developed under the Southern Railways. The study stretch of the river is well connected with Mangalore Central railway station.

g) Two railway bridges, nine road bridges and one foot bridge are existing in the study stretch of the river.

CHAPTER 3 RECONNAISSANCE SURVEY

3.1 River Profile

Netravathi River originates at Bangrabalige valley, Yelaneeru Ghat in Kudremukh in Chikkamagaluru district of Karnataka, India. It flows through the famous pilgrimage place Dharmasthala and is considered as one of the Holy Rivers of India. Kumaradhara River (which originates from Kumara-Parvata near Subramanya range of Western Ghats) joins the river Netravathi at Uppinangadi village. The combined stream passes over a rocky bed to Buntwal and flows for a distance of 35km in plain area and joins Arabian Sea at Mangalore old port, south of Mangalore city. Earlier in the last century it was known as the Bantwal River. This river is the main source of water to Bantwal and Mangalore. The total catchment area of Netravathi River basin is 3657 sq-km (Ref. HP Hydrology Project, MoWR & CWC; http://hydrology-project.gov.in/Surface%20Water.html). The catchment area has been verified from Google Earth and has been found to be in order. The catchment receives an average annual rainfall of about 5363mm. The total length of the river from origin to its outfall in the Arabian Sea is 103.0km. A map showing Netravathi catchment basin is shown in **Figure 3.1**. Beltangadi, Neriya Hole, Haridravathi, Hurlihole, Nandihole, Hilkunj, Mavinahole, Yenne Hole and Nagodi Hole are the tributaries of Netravathi River. Yettina Hole and Kumardhara are major tributaries of Netravathi River.

Figure 3.1 indicates that the lower stretch of the river is expected to be tidal affected zone. Given the size of the river, lower part of the study stretch may have navigation potential. IWAI expects the lower 78.00km, shown in green color in Figure 3.1, to have potential for navigation and thus, the subject of study under this assignment.

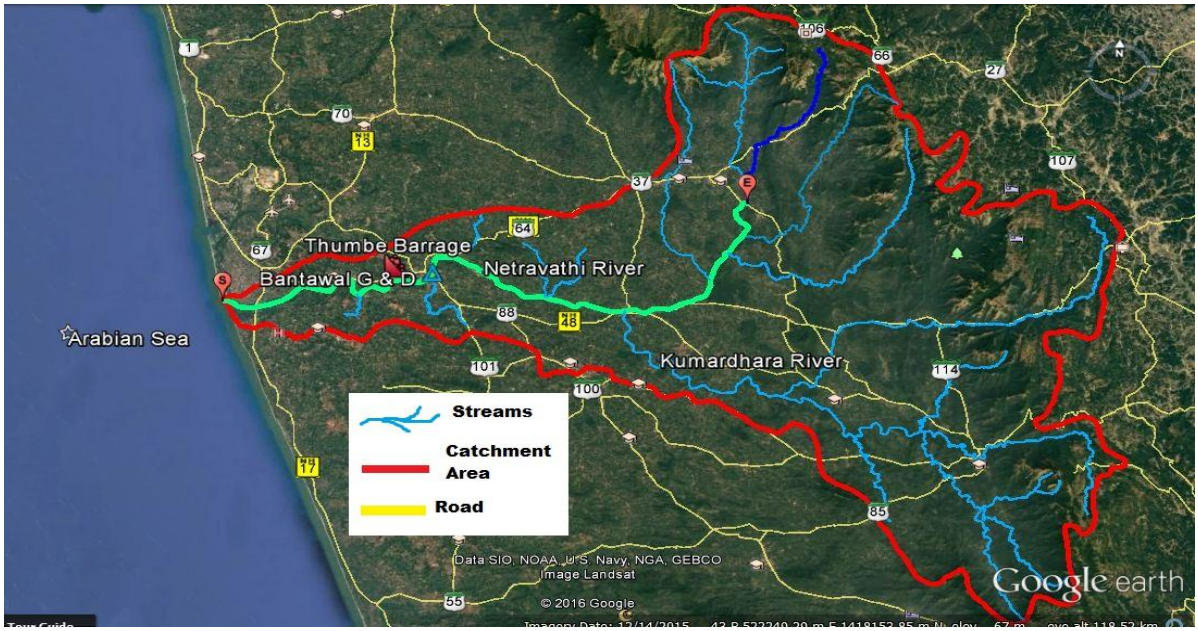


Figure 3.1: Catchment Area of Netravathi River

The stretch of the Netravathi River considered for assessment of navigation potential is defined as below:

78.00 km length of the river from Arabian Sea Mouth at Bengre to Netravathi Dam, Dharmsthala.	From: 13°20'57.24"N, 74°41'28.22"E	Up to: 12°57'55.23"N, 75°22'10.19"E	National Waterway:74

3.2 Reconnaissance Survey

This section presents a stretch-wise description of Netravathi River. It also covers the Hydrological analysis of collected data viz., maximum and minimum water depths. The route map of Netravathi River is shown in **Figure 3.2** below.

Figure 3.2: Route Map of Netravathi River

3.2.1 Methodology of Survey

Single line longitudinal survey (Bathymetric survey or Topographic survey) was carried out along the deepest depths or lowest height lands, with the help of DGPS using Automatic Hydrographic Survey System **(Figure 3.3)**. Bathymetric survey in the proposed waterway has been carried out in the deepest route. Deepest route has been accessed by taking two or three longitudinal line soundings at equal intervals. Topographic survey, wherever required, has been taken up at lowest ground levels, which can be decided on visual assessment.

Along with the bathymetry, other relevant data/information like horizontal and vertical clearances above high flood level of bridges, cross structures, electric lines, telephone lines, pipe lines, cables en-route were collected along with their coordinates and locations.

Soil samples were also collected along the survey area at about 10.0km interval. Texture of the collected soil samples was analyzed visually.

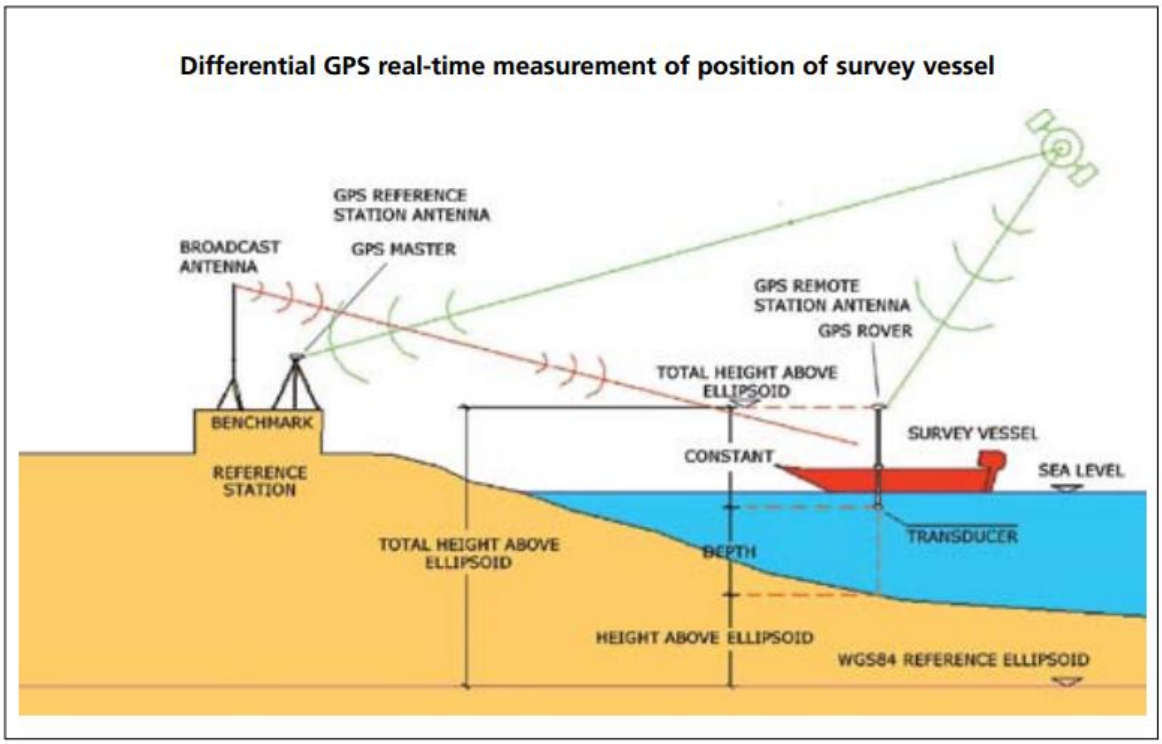


Figure 3.3: Differential GPS real-time measurement of position of survey vessel

The survey was conducted in WGS84 datum; UTM Projection (Zone 43 N, CM 075^0 E). The specification of the Echo sounder (Bathy-500DF) used for carrying out the survey and other inter related details are tabulated in **Table 3.1.**

Table 3.1: Bathy-500DF

Particulars	**Specification**
Depth Ranges	Units of 0-15, 0-30, 0-60, 0-120, 0-240, 0-480, 0-960, 0-1920 feet or 0-5, 0-10, 0-20, 0-40, 0-80, 0-320, 0-640 meters
Phasing	0-120, 60-180, 120-240, 180-300, etc. (displays 120ft range at 60 ft increments up to 1800-1920) feet, auto or 0-40, 20-60, 40-80, 60-100, 80-120, etc. (displays 40m range at 20m increments up to 600-640) meters, auto
Chart Record	8.5 inch x 90 feet High Contrast Thermal Paper
Digital Display	LCD (4 lines x 16 characters) 0.25 inch characters (Depth Display: 0.75 inch characters) (Back-lighting: Electro-luminescent)
Resolution	0.01 units for depths less than 100 meters;
Accuracy	Meets or exceeds all current IHO hydrographic requirements for single beam echo sounders At 33 Khz= 5 cm +/- 0.1% of depth At 200Khz= 1cm +/- 0.1% of depth
Frequency	Interleaved Dual Frequency Selections of: 33/210kHz or 50/210kHz or any single frequency (all user selectable & changeable via keypad) from these: 33kHz, 40kHz, 50kHz, 210kHz (Acoustic output = 600 watts)

Particulars	Specification
Depth Alarms	Shallow and Deep (selected by keypad)
Sound Velocity	4,600-5,250 feet/second (1393-1590 meters/second) (user selected via keypad)
Offset	0 to +30 feet or meters (allows the user, via keypad, to adjust for the net sum of transducer depth and tide)
Geographic Position	NMEA-0183 GGA or GLL Format from GPS/DGPS
Data I/O Compatibility	COM 1 provides bi-directional interface to PC or other peripheral device; This port accepts external annotation from external sources such as hydrographic software. COM 2 accepts GPS/DGPS inputs and provides additional (from COM 1) data outputs.
Data Outputs	-ODEC dt (Time, Lat, Long, Depth Hi, Depth Lo) -PMC dt (True Depth & Status) Atlas DESO-25 -Odom Digitrace -Odom Echotrac -NMEA DBT -NMEA DBS
Heave Compensation	Compatible with Teledyne TSS Format
Input Power	11-30 volts DC (1.5 amps @ 12v. 0.5 amp @ 30v.) or 115/230 volts AC 50/60 hertz (20 watts)
Dimensions	Height (including handle) 19 inches Width 17.5 inches Depth 9 inches
Weight	35lbs. (Recorder with P01540 Transducer)

The layout diagram of the equipment used for bathymetric survey has been shown in **Figure 3.4** below.

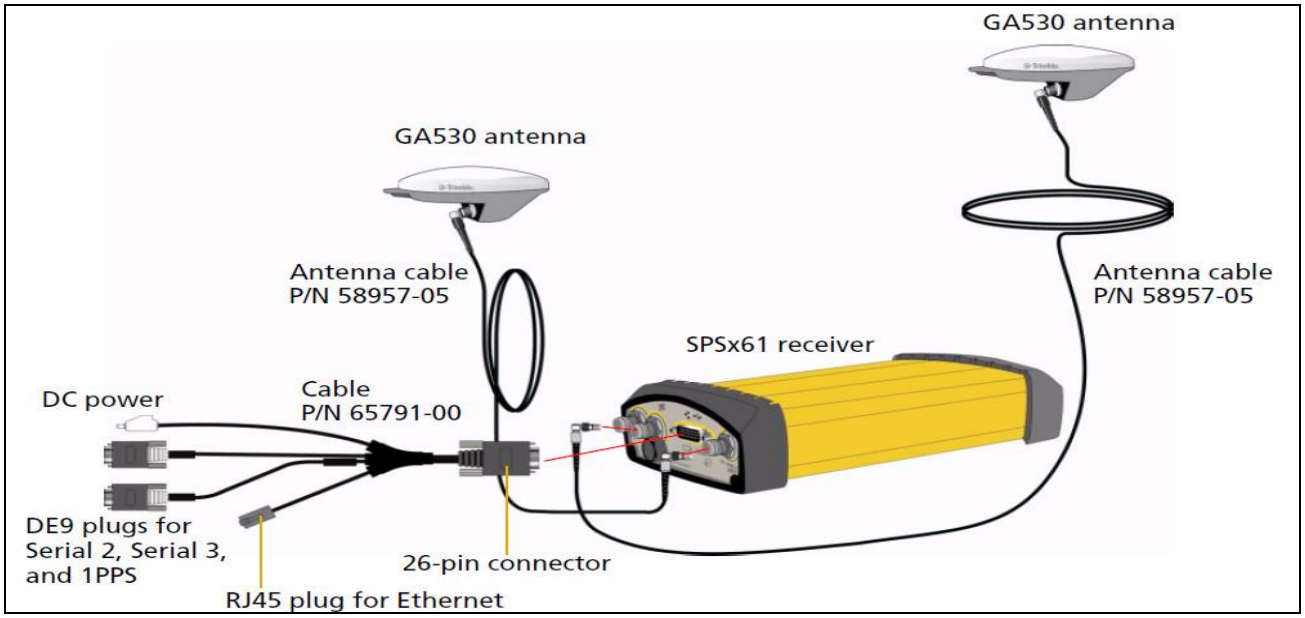


Figure 3.4: Equipment Diagram

Team surveying at site with equipment mounted on the boat is depicted in **Figure 3.5** as shown below:

Figure 3.5: Team Surveying at Site with Equipment Mounted on the Boat

The survey data has been processed using the latest version of "Hypack" software, thus to ensure a quality output of the survey.

An overview chart for Netravathi River bathymetry is enclosed as **Annexure 3.1**

3.2.2 Chart Datum of the Proposed Waterway

The water depths have been determined as a result of all soundings reduced to Chart Datum (the lowest tide level observed for a considerable period at specific location) in the area. Tidal heights predicted using New Mangalore Port data were used to reduce the raw water depths to Chart Datum. New Mangalore Port is nearer to the Netravathi River. Therefore, tidal heights predicted using New Mangalore Port data were used to reduce the raw water depths to Chart Datum *(Ref: Indian Tide Tables, 2016, Survey of India)*. The locations with coordinates of Chart Datum obtained from New Mangalore Port Trust (**Annexure 3.2**) have been used to reduce the soundings along the surveyed stretch as compiled in **Table 3.2**.

Table 3.2: Details of Chart Datum Used for Data Reduction for Tidal Portion upto Ch 23.19km

Sl. No.	Location	Latitude	Longitude	Z_0 *(m)
1.	New Mangalore Port	12° 55'	74° 48"	0.95

**- Below Mean Sea Level*

Details of MDDL/FRL used for Data Reduction for Non-Tidal Portion from Ch 23.50km to Ch 78.00km

Sl. No.	Name of Structure	Chainage (km)	Location		Details
			Latitude	Longitude	
1.	Thumbe Barrage (Karnataka Urban Water Supply & Drainage Board)	23.50	12°52'19.27"	75°0'18.28"	FRL: 7.00m HFL: 11.89m
2.	AMR Barrage (AMR Power Pvt. Ltd)	36.00	12°52'51.77"	75°5'38.95"	FRL: 18.90m
3.	Sagar Dam (Sagar Power Pvt. Ltd)	64.60	12°51'20.28"	75°19'27.45"	FRL: 38.2m MDDL: 29.90m
4.	Bhoruka Anicut (Bhoruka Power Pvt. Ltd)	79.11	12°57'29.63"	75°21'34.65"	Top Level: 79.00m Height :4m (13.5MW= 3 x 40.5MW)
5.	Netravathi Dam, Dhramsthala	80.70	12°57'54.22"	75°22'10.3"	Beyond the study Stretch

3.2.3 Bathymetry and Site Data Collected

A. Netravathi River (Ch 0.0km to Ch 5.00km)

Netravathi River waterway starts from the Arabian Sea at Bengre (Lat 12° 50' 42.73" N, Lon 74° 49' 28.86" E). In the starting up to Ch 3.0km, residential area is on the right bank. Mangroves were observed on the left bank. Railway Bridge crosses at Ch 3.43km. Kochi Panvel Highway Bridge crosses at CH 3.82km. At Ch 4.75km, river bifurcates into two streams and it makes a shoal in the centre of the river.

The minimum depth recorded with respect to Chart Datum in this section is 0.68m at Ch 0.93km and the maximum depth is 9.23m at Ch 0.20km as given below in **Table 3.3.** The stretch is shown in **Figure 3.6**.

Table 3.3: Maximum – Minimum Depth in Netravathi River from Ch 0.00km – Ch 5.00km

Maximum –Minimum Depth			
Chainage (km)		Reduced Water Depth (m) w. r. t. Chart Datum	
From	To	Max	Min
0.0	5.0	9.23	0.68

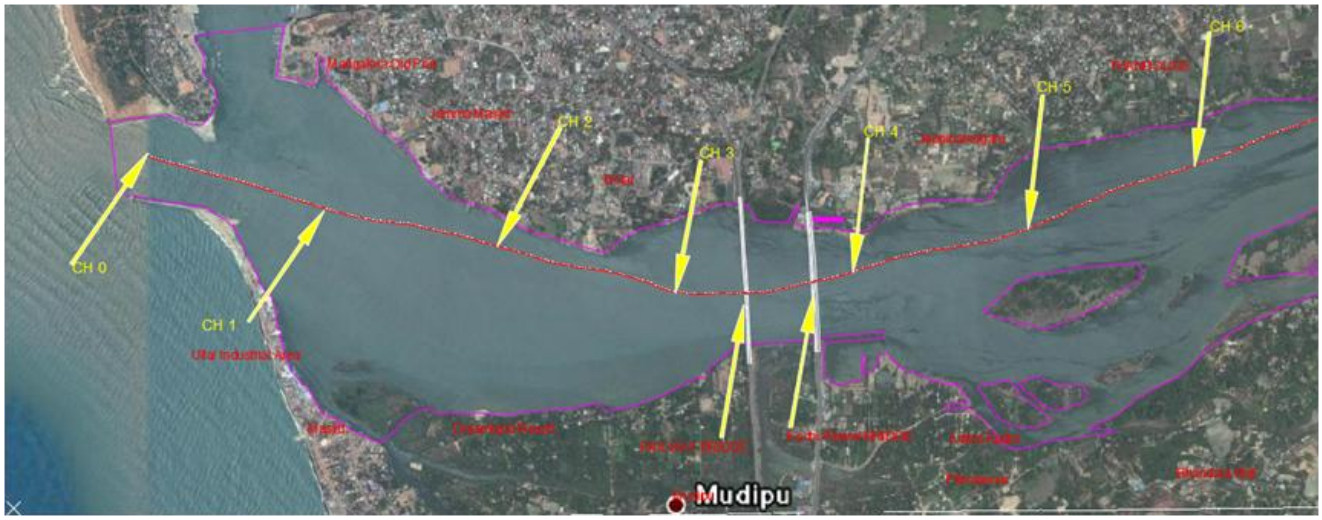


Figure 3.6: Route Chart of the Survey from Ch 0.00km to Ch 5.00km

B. Netravathi River (Ch 5.00km to Ch 10.00km)

At Ch 5.0km and Ch 6.0km there are shoals in the middle and left side of the river. Residential area on the right side and forest area on the left side have been observed. HT line crosses at Ch 7.35km. Island is observed at Ch 8.7km. Few habitation was observed on the Island. The minimum depth w. r. t. Chart Datum recorded in this section is 0.32m at Ch 9.14km and the maximum depth is 5.13m at Ch 8.58km as given below in **Table 3.4.** The stretch is shown in **Figure 3.7**.

Table 3.4: Maximum – Minimum Depth in Netravathi River from Ch 5.00km to Ch 10.00km

Maximum –Minimum Depth			
Chainage (km)		Reduced Water Depth (m) w. r. t. Chart Datum	
From	To	Max	Min
5.0	10.0	5.13	0.32

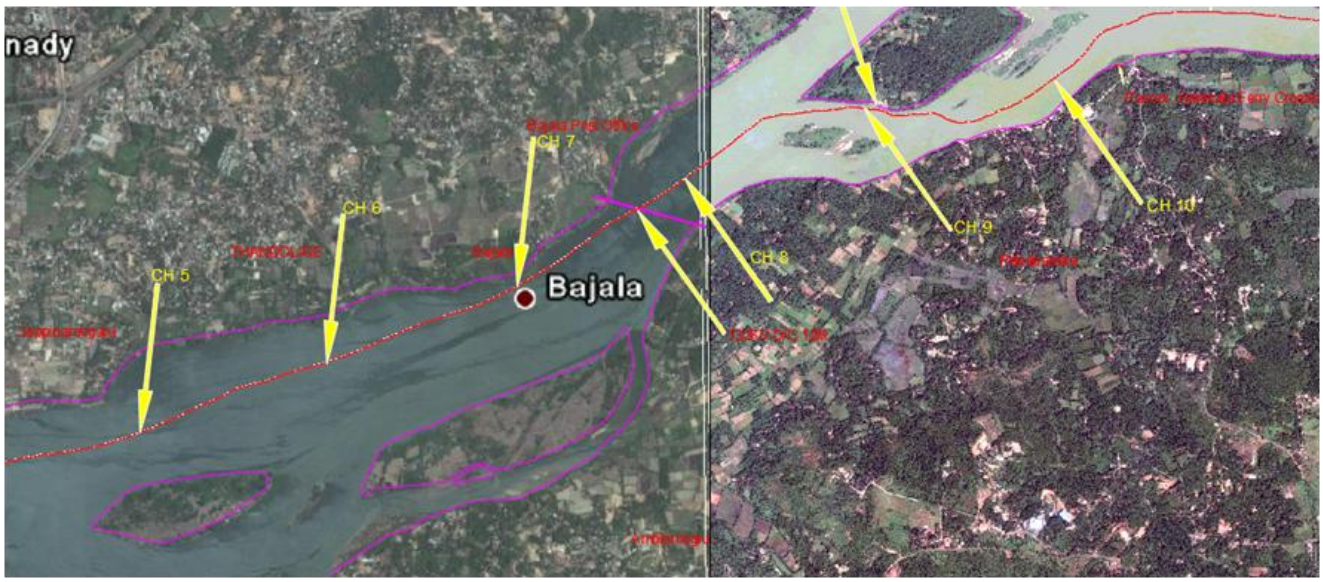


Figure 3.7: Route Chart of the Survey from Ch 5.00km to Ch 10.00km

C. Netravathi River (Ch 10.00km to Ch 15.00km)

Forest area and agriculture area are observed on the left bank whereas residential areas on the right bank are observed in this stretch. Ravoor Harekala Ferry Crossing is seen at Ch 10.45km. An Island is seen from Ch 11.4km to Ch 13.9km stretch in the middle of river. Infant Jesus Chapel is seen on this Island.

The minimum depth w. r. t. Chart Datum recorded in this section is 0.6m at Ch 12.01km and the maximum depth is 7.04m at Ch 14.64km as given below in **Table 3.5.** The stretch is shown in **Figure 3.8**.

Table 3.5: Maximum – Minimum Depth in Netravathi River from Ch 10.00km to Ch 15.00km

Maximum –Minimum Depth			
Chainage (km)		Reduced Water Depth (m) w. r. t. Chart Datum	
From	To	Max	Min
10.0	15.00	7.04	0.6

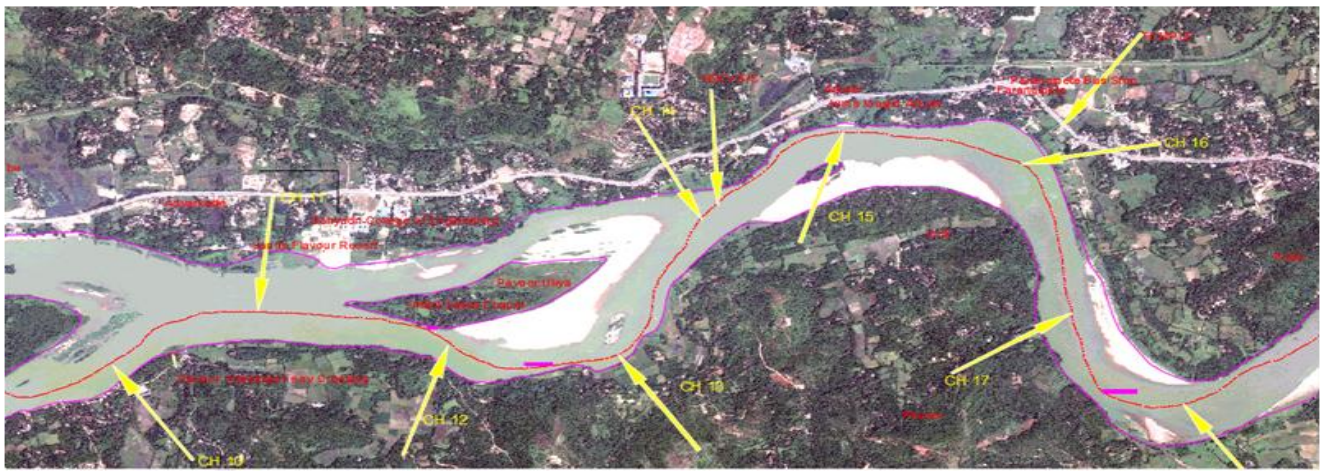


Figure 3.8: Route Chart of the Survey from Ch 10.00km to Ch 15.00km

D. Netravathi River (Ch 15.00km to Ch 23.0.00km)

Bar is observed at Ch 15.0km, where sand is visible. Mangroves are observed on both the bank in this stretch. Masjid Arkula is seen near right bank. Stones are observed in the center of river from Ch 20.00km to 23.00km. The minimum depth w. r. t. Chart Datum recorded in this section is 0.65m at Ch 22.63km and the maximum depth is 5.12m at Ch 18.75km as given below in **Table 3.6.** The stretch is shown in **Figure 3.9**.

Table 3.6: Maximum – Minimum Depth in Netravathi River from Ch 15.00km to Ch 23.00km

Maximum –Minimum Depth			
Chainage (km)		Reduced Water Depth (m) w. r. t. Chart Datum	
From	To	Max	Min
15.0	23.0	5.12	0.65

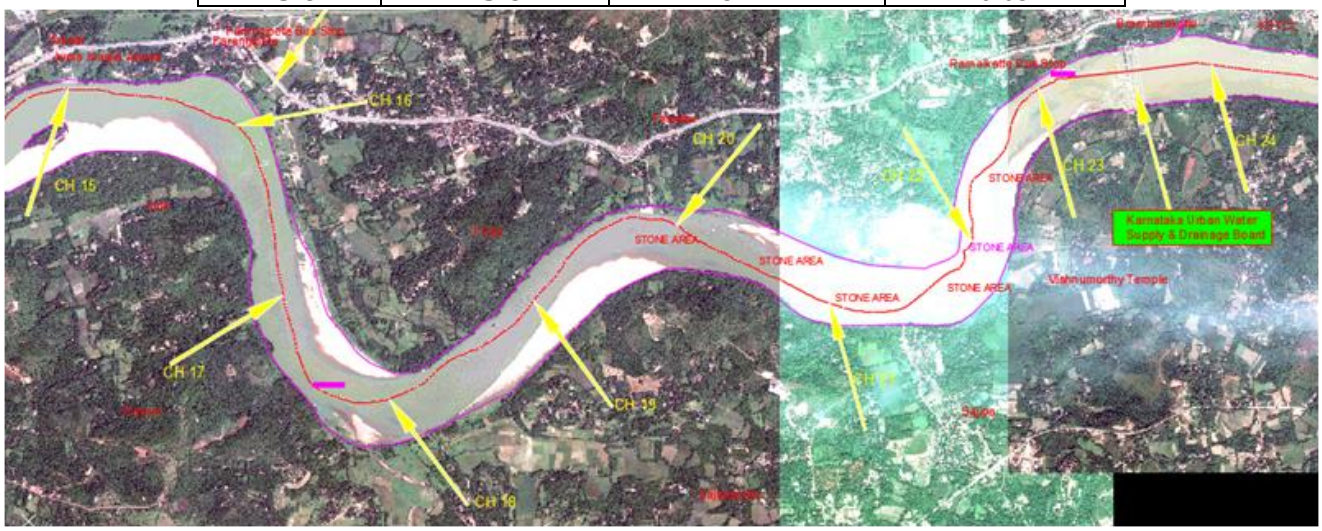


Figure 3.9: Route Chart of the Survey from Ch 15.00km to Ch 23.00km

E. Netravathi River (Ch 23.00km to Ch 24.0.00km)

Bramharakotlu village is on the right bank at Ch 23.5km. Karnataka Urban Water Supply & Drainage Board dam also known as Thumbe Barrage is observed on the river at Ch 23.5km. Water is supplied to Mangalore town from this barrage. Exposed rocks in banks are observed in this stretch.

The minimum depth recorded in this section is 0.82m at Ch 23.03km and the maximum depth is 4.99m at Ch 23.95km as given below in **Table 3.7.** The stretch is shown in **Figure 3.10**.

Table 3.7: Maximum – Minimum Depth in Netravathi River from Ch 23.00km to Ch 24.00km

Maximum –Minimum Depth			
Chainage (km)		Reduced Water Depth (m)	
From	To	Max	Min
23.0	**24.00**	4.99	0.82

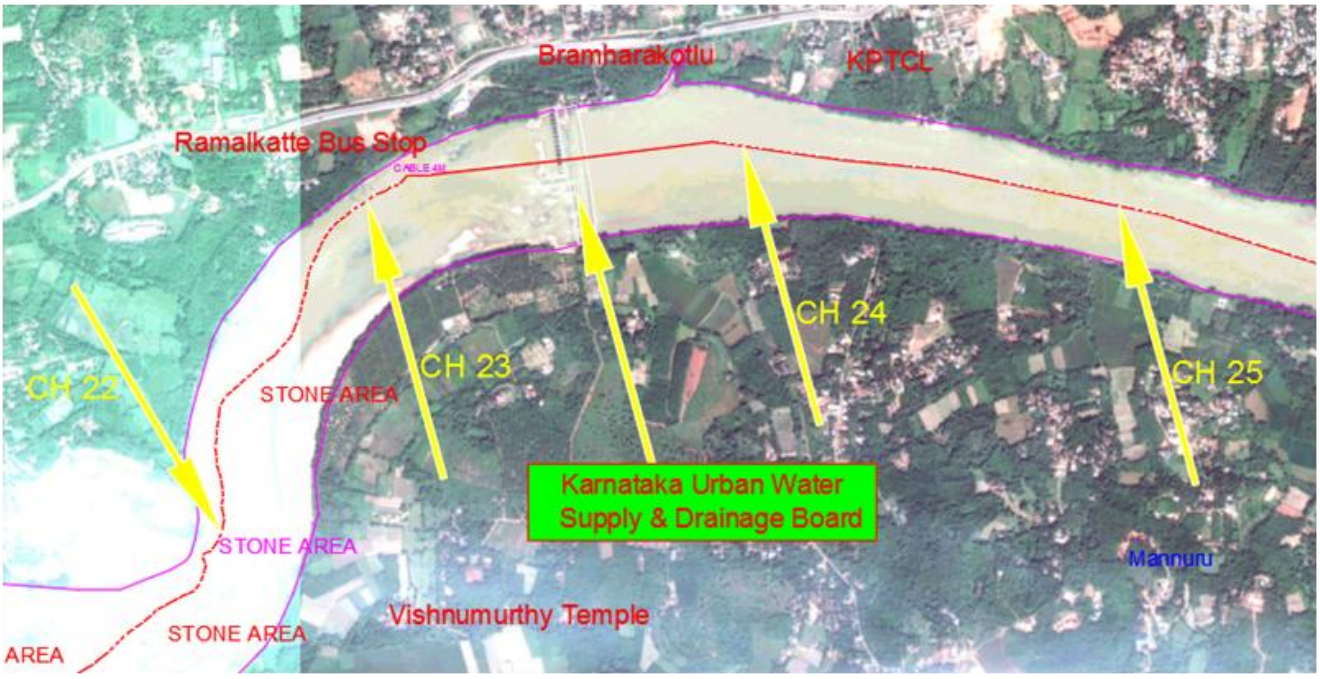


Figure 3.10: Route Chart of the Survey from Ch 23.00km to Ch 24.00km

F. Netravathi River (Ch 24.00km to Ch 30.0.00km)

Residential area on the right bank and forest area on the left bank are observed. Railway Bridge crosses the river at Ch 27.05km. Nandawara Village is on the right bank and Bantwal Village is on the right bank. Mangalore Mysore highway bridges cross the river at Ch 28.00km and at 28.36km. HT line crosses the river at Ch 28.4km. Shoal is observed in the river from this bridge up to 29.4km. Hindupura village is on the right bank at Ch 30.00km.

The minimum depth recorded in this section is 0.51m at Ch 29.97km and the maximum depth is 4.7m at Ch 24.94km as given below in **Table 3.8.** The stretch is shown in **Figure 3.11**.

Table 3.8: Maximum – Minimum Depth in Netravathi River from Ch 24.00km to Ch 30.00km

Maximum –Minimum Depth			
Chainage (km)		Reduced Water Depth (m)	
From	To	Max	Min
24.0	**30.0**	4.7	0.51

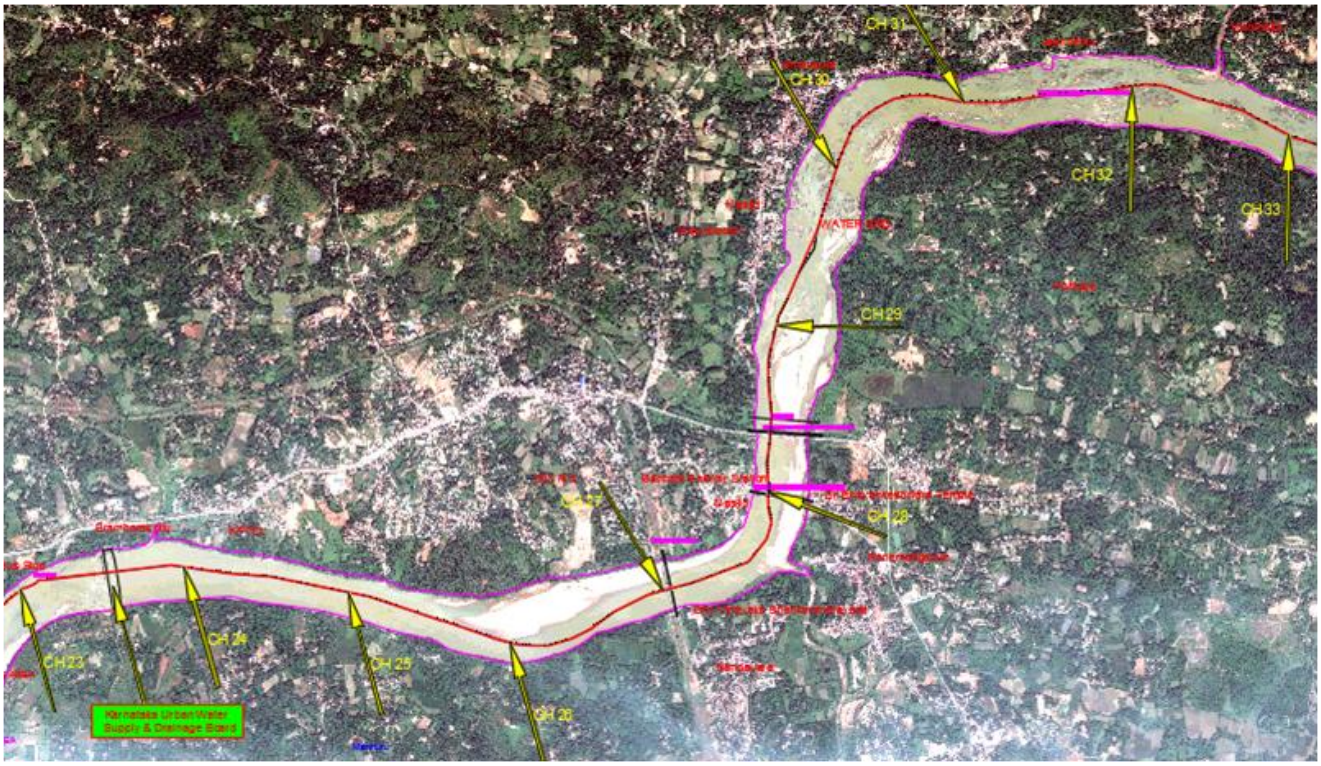


Figure 3.11: Route Chart of the Survey from Ch 24.00km to Ch 30.00km

G. Netravathi River (Ch 30.00km to Ch 36.00km)

The river has shallow water depth; hence survey boat cannot go this stretch of the river and hence topographic survey was done. In this stretch forest area is seen on the left bank. Jakribettu and Manihalla village are on the right bank. Bridge under construction is observed at Ch 31.5km. Bar is observed at Ch 34.5km. AMR power Pvt. Ltd. barrage is at Ch 36.00km.

The minimum depth recorded in this section is 0.49m at Ch 34.72km and the maximum depth is 0.97m at Ch 31.12km as given below in **Table 3.9.** The stretch is shown in **Figure 3.12**.

Table 3.9: Maximum – Minimum Depth in Netravathi River from Ch 30.00km to Ch 36.00km

Maximum –Minimum Depth			
Chainage (km)		Reduced Water Depth (m)	
From	To	Max	Min
30.	**36.0**	0.97	0.49

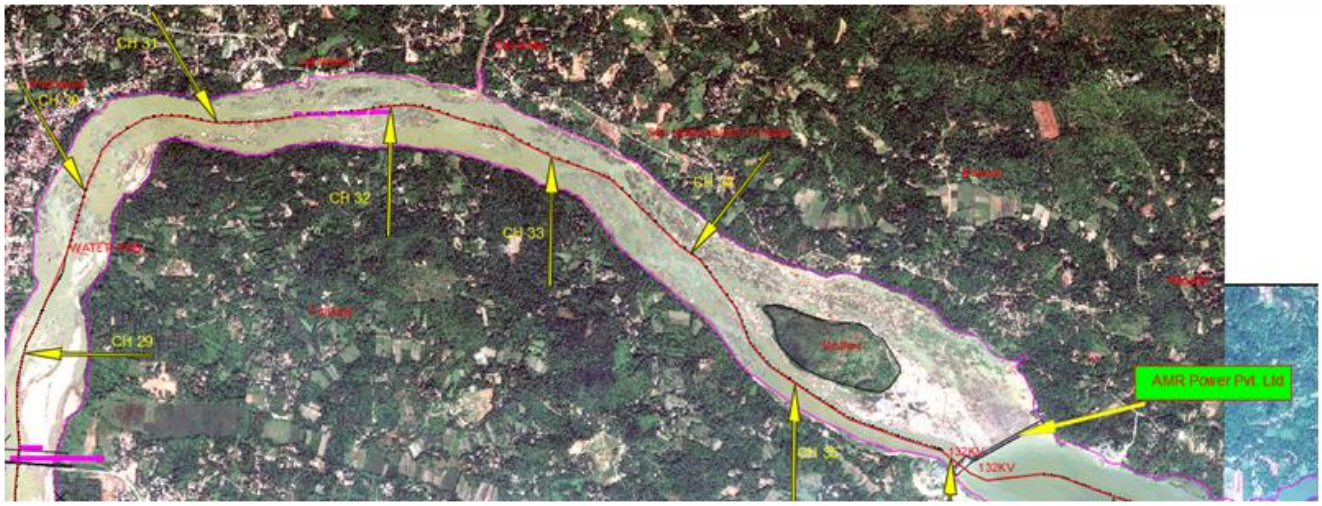


Figure 3.12: Route Chart of the Survey from Ch 30.00km to Ch 36.00km

H. Netravathi River (Ch 36.00km to Ch 44.00km)

Forest area is seen on both the banks from Ch 37.0km to Ch 44.0km. Sharabeshwara Temple is seen on right bank at Ch 40.90km.

The minimum depth recorded in this section is 0.7m at Ch 43.95km and the maximum depth is 14.43m at Ch 42.08km as given below in **Table 3.10.** The stretch is shown in **Figure 3.13**.

Table 3.10: Maximum – Minimum Depth in Netravathi River from Ch 36.00km to Ch 44.00km

Maximum –Minimum Depth			
Chainage (km)		Reduced Water Depth (m)	
From	To	Max	Min
36.0	**44.00**	13.85	0.7

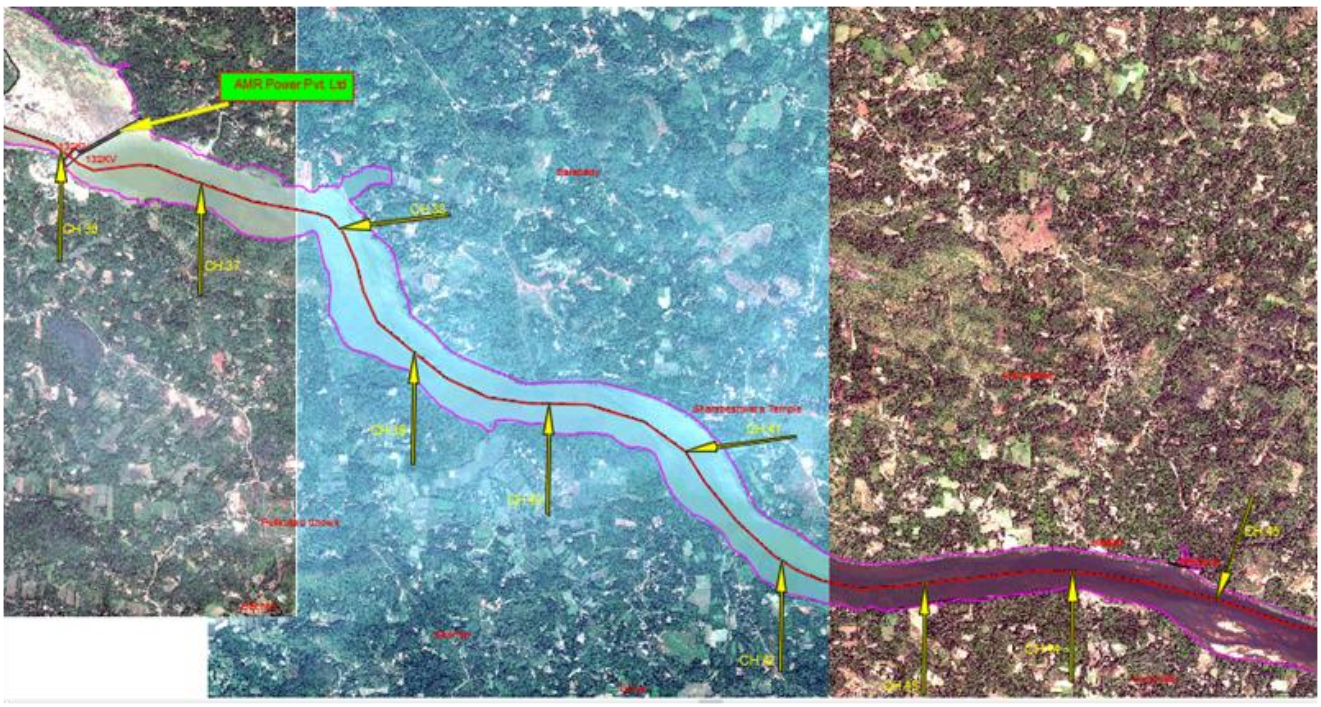


Figure 3.13: Route Chart of the Survey from Ch 36.00km to Ch 44.00km

I. Netravathi River (Ch 44.00km to Ch 53.00km)

Due to non-availability of sufficient water depth for survey boat, topography survey is done in this stretch. Forest area is seen on both the banks.

The minimum depth recorded in this section is 0.4m at Ch 44.71km and the maximum depth is 1.6m at Ch 52.53km as given below in **Table 3.11.** The stretch is shown in **Figure 3.14**.

Table 3.11: Maximum – Minimum Depth in Netravathi River from Ch 44.00km to Ch 53.00km

Maximum –Minimum Depth			
Chainage (km)		Reduced Water Depth (m)	
From	To	Max	Min
44.0	**53.0**	1.6	0.4

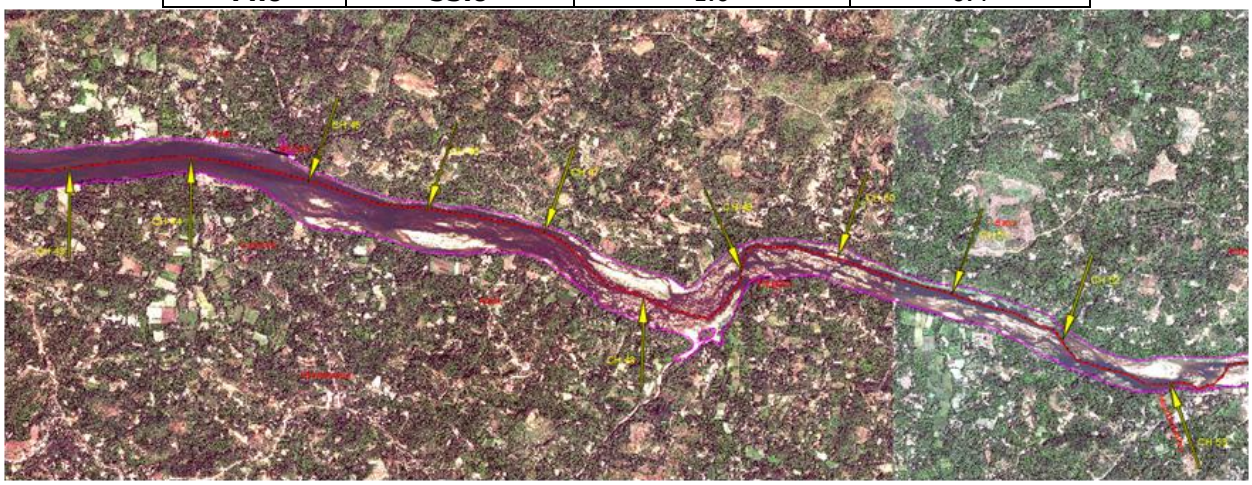


Figure 3.14: Route Chart of the Survey from Ch 44.00km to Ch 53.00km

J. Netravathi River (Ch 53.00km to Ch 62.00km)

Due to shallow water depth topography survey is done in this section. On both the side of the river, forest area is seen. There is a bridge over the river @55.3km.

The minimum depth recorded in this section is 0.4m at Ch 53.17km and the maximum depth is 1.6m at Ch 59.44km as given below in **Table 3.12.** The stretch is shown in **Figure 3.15**.

Table 3.12: Maximum – Minimum Depth in Netravathi River from Ch 53.00km to Ch 62.00km

Maximum –Minimum Depth			
Chainage (km)		Reduced Water Depth (m)	
From	To	Max	Min
53.0	62.0	1.6	0.4

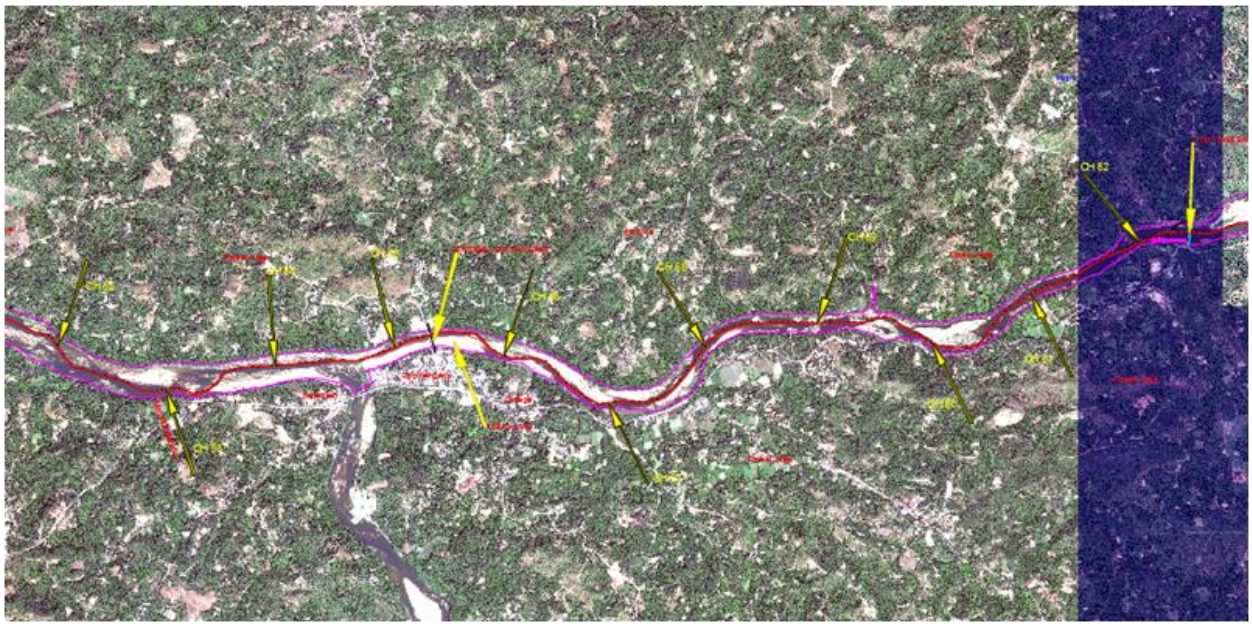


Figure 3.15: Route Chart of the Survey from Ch 53.00km to Ch 62.00km

K. Netravathi River (Ch 62.00km to Ch 71.00km)

Due to shallow water depth, topography survey is done in this section. On both the sides of the river, forest area is seen. Bridges cross the river at Ch 2.3km, foot over bridge at Ch 64.6km. Sagar Dam is at Ch 64.6km which is run by Sagar Power Pvt. Ltd.

The minimum depth recorded in this section is 0.4m at Ch 63.07km and the maximum depth is 1.6m at Ch 69.7km as given below in **Table 3.13.** The stretch is shown in **Figure 3.16** and **Figure 3.17**.

Table 3.13: Maximum – Minimum Depth in Netravathi River from Ch 62.00km to Ch 71.00km

Maximum –Minimum Depth			
Chainage (km)		Reduced Water Depth (m)	
From	To	Max	Min
62.0	71.0	1.6	0.4

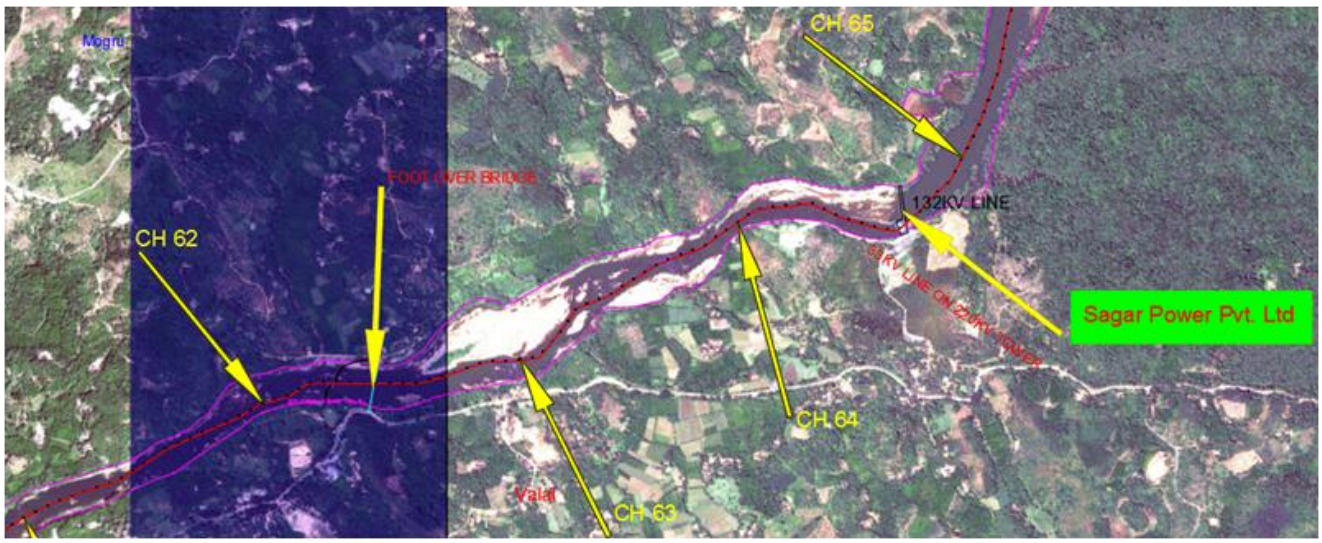


Figure 3.16: A-Route Chart of the Survey from Ch 62.00km to Ch 71.00km

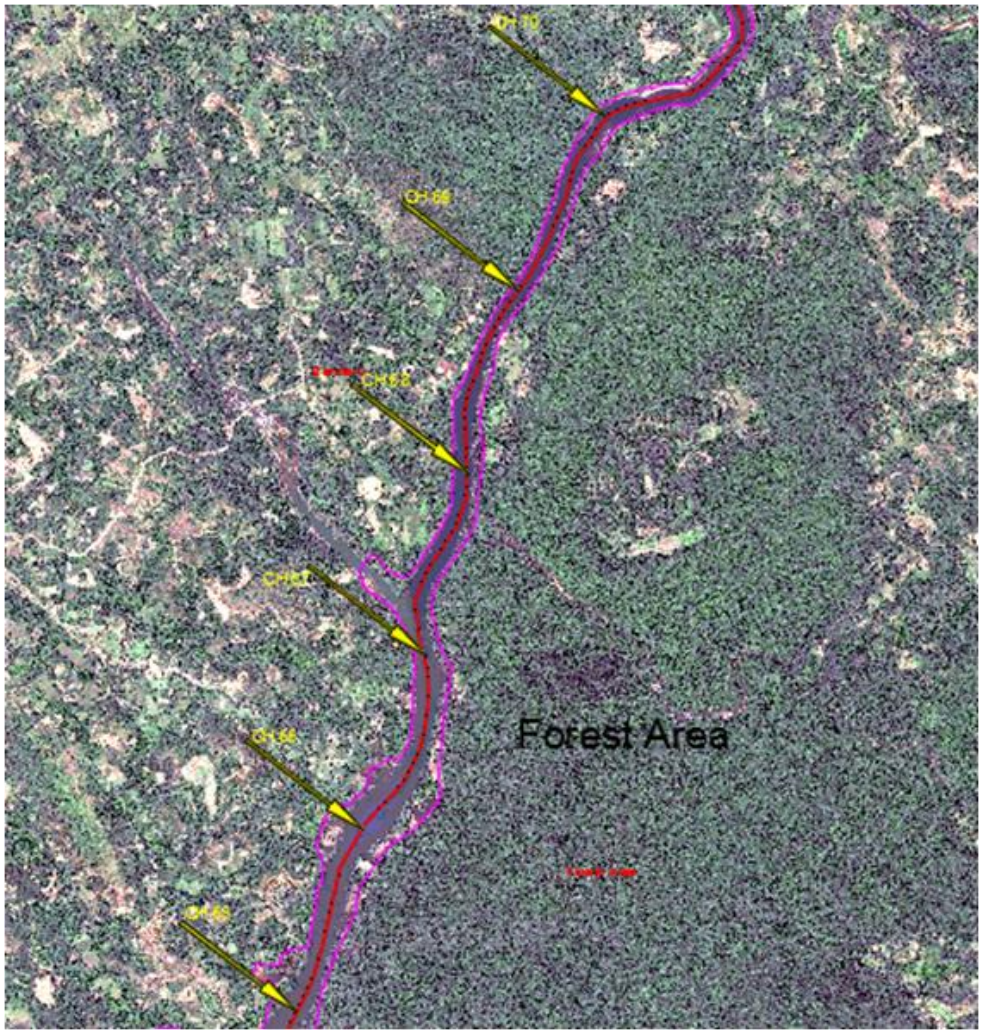


Figure 3.17: B-Route Chart of the Survey from Ch 62.00km to Ch 71.00km

L. Netravathi River (Ch 71.00km to Ch 80.48km)

Due to shallow water depth, topography survey is done in this section. Forest area is observed on both the banks in this stretch. Old bridge and New Bridge Dharmsthala crosses the river at Ch 80.0km and 80.1km respectively. Bhoruka anicut is at Ch 79.1km, which is being operated by Bhoruka Power Pvt. Ltd. Netravath dam is at Ch 80.7km located at the end of the waterway stretch.

The minimum depth recorded in this section is 0.4m at Ch 76.44km and the maximum depth is 1.6m at Ch 80.18km as given below in **Table 3.14.** The stretch is shown in **Figure 3.18** to **Figure 3.20**.

Table 3.14: Maximum – Minimum Depth in Netravathi River from Ch 71.00km to Ch 80.48km

Maximum –Minimum Depth			
Chainage (km)		Reduced Water Depth (m)	
From	To	Max	Min
71.00	**80.48**	1.6	0.4

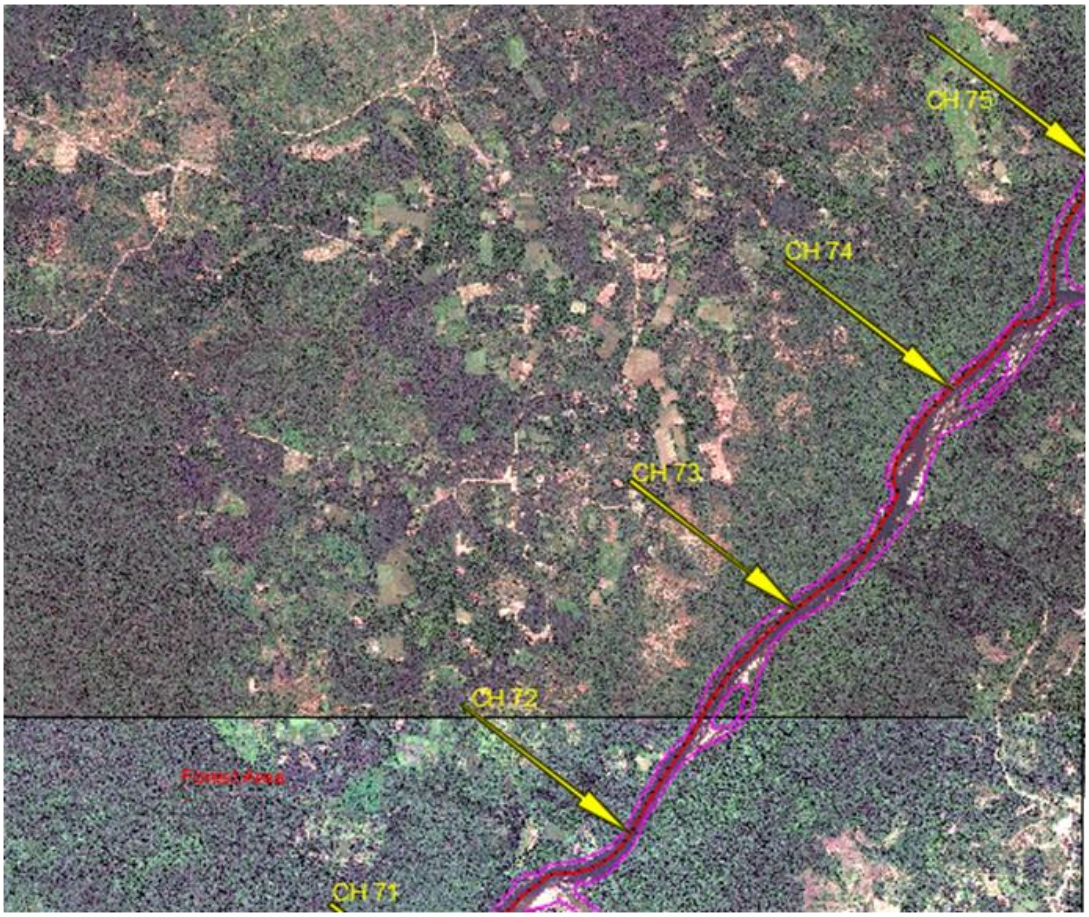


Figure 3.18: A-Route Chart of the Survey from Ch 71.00km to Ch 80.48km

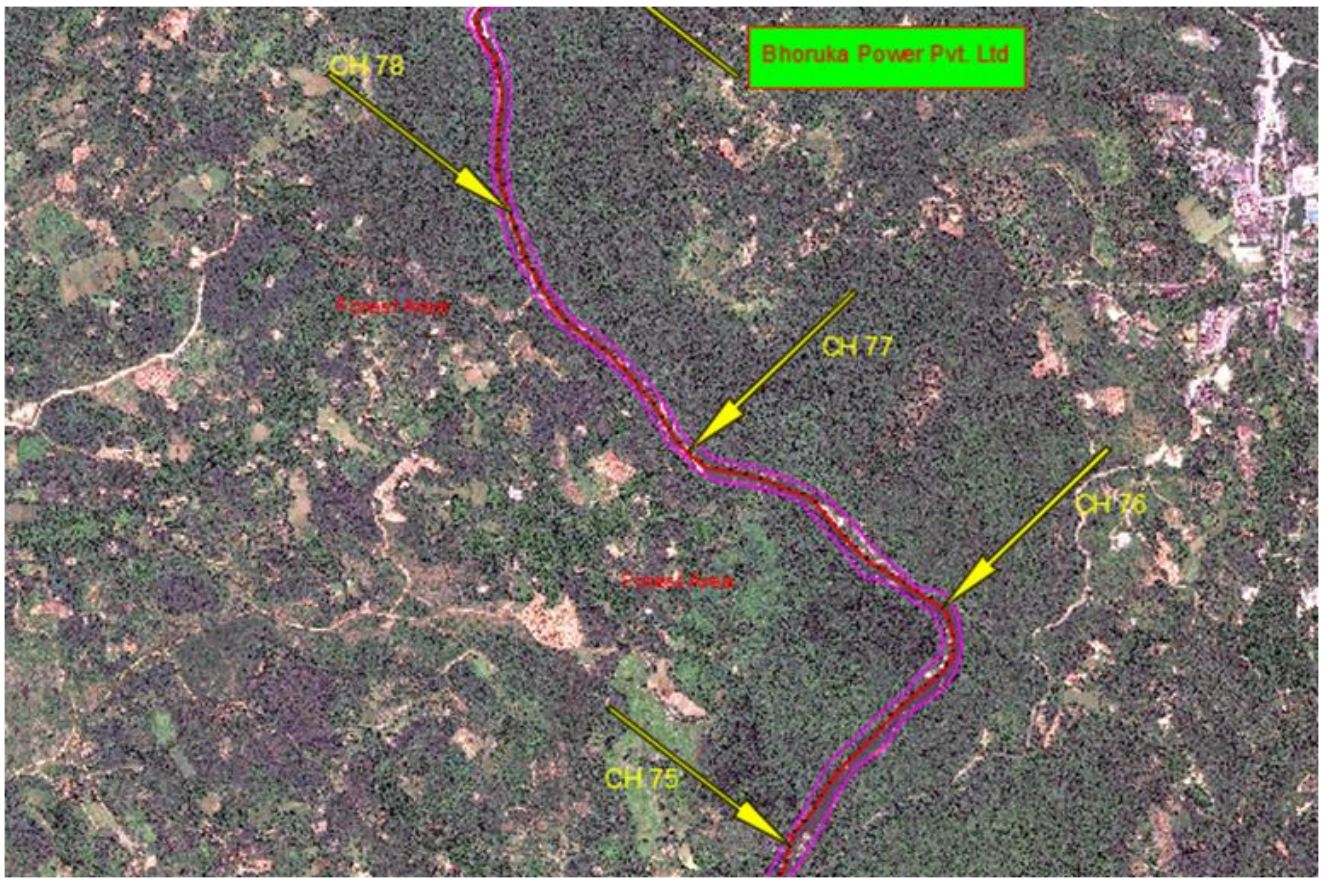


Figure 3.19: B-Route Chart of the Survey from Ch 71.00km to Ch 80.48km

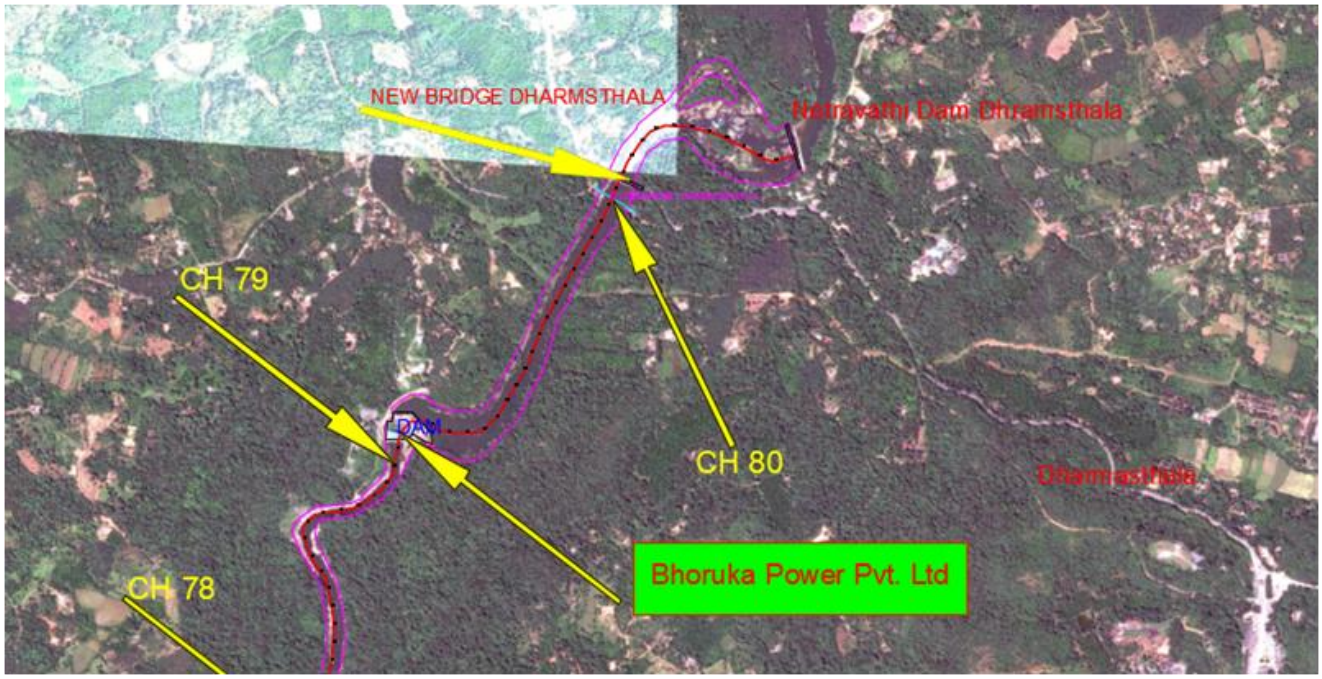


Figure 3.20: C-Route Chart of the Survey from Ch 71.00km to Ch 80.48km

The maximum and minimum reduced depths in the small intervals have been summarized in **Table 3.15** which describes the length of stretch showing various ranges of water depth available.

Table 3.15: Maximum – Minimum Depth in Netravathi River from Ch 0.00km to Ch 80.48km

Chainage (Km)	Depth Available		Length of River (Km)			
	Max. (m)	Min. (m)	>2m	1.5-2.0m	1-1.5m	<1m
0.0-5	9.23	0.68	3.79	0.60	0.40	0.21
5-10	5.13	0.32	2.44	1.00	1.34	0.22
10-15	7.04	0.60	3.44	0.76	0.52	0.28
15-23	5.12	0.65	4.01	1.76	1.52	0.70
23-23.5	1.85	0.82	-	0.17	0.08	0.21
Sub Total			**13.68**	**4.29**	**3.86**	**1.62**
Thumbe Barrage at Ch 23.50km						
23.5-24	4.99	4.51	-	-	-	0.55
24-30	4.70	0.51	2.71	2.77	0.28	0.24
30-36	0.97	0.49	-	-	-	6.00
36-44	14.43	0.70	7.82	0.09	0.02	0.07
44-53	1.60	0.40	-	0.10	0.20	8.70
53-62	1.60	0.40	-	0.10	0.60	8.30
62-71	1.60	0.40	-	0.15	0.35	8.50
71-80.48	1.60	0.40	-	0.85	0.90	7.73
Sub Total			**10.53**	**4.06**	**2.35**	**40.09**
Grand Total			**24.21**	**8.35**	**6.21**	**41.71**

The above data indicates that even in the start stretch of the waterway, required water depth of 2.0m and above is not available in continuous stretch. This may be due to the frequent undulation of hard river bed profile. However, the availability of water depth is 1.4m (for Class II) and above up to 23.00km of the waterway under study except at some places where marginal dredging requirement has been observed. It is confirming the availability of 1.4m and above water in 29% of river in the proposed stretch under study. Thereafter, shallow water depth has been observed up to the end of waterway except some patches. Water depth of 2.0 and above is observed in upstream submergence area of the structures i.e. Thumbe barrages (Ch 23.5km) and AMR Dam (Ch 36.00km). Thumbe barrage separates tidal water and river free flow water. Since, cross structures create obstruction for throughout navigability, provision of lock or similar structure shall require at each barrage/dam structure for the navigability. This may lead burden of additional cost on the project. Due to rocky bed, required dredging in shallow patches will not be cost effective. Therefore, it is advisable to keep the waterway stretch upto downstream of Thumbe barrage i.e. Ch 23.5km.

It may be noted that the above depths have been reckoned with CD. Since the study stretch of Netravathi River is under tidal influence upto Ch 23.5km, the available effective depths would be more than 0.9m (average tide height) which will be advantageous for safe navigation. The tides are semi-diurnal in nature which provides a tidal window of 6.00 hours, wherein the tide can be advantageously used for navigation. The detailed hydrographic survey information indicating location, observed water depth at each point of data reading has been given in **Annexure 3.3**.

3.2.4 Soil Texture Classification

The soil texture has been observed during the reconnaissance survey. The observed soil texture at 10km interval has been given in **Table 3.16**.

Table 3.16: Soil Texture in Netravathi River at 10.0km Interval

Chainage (Km)	Longitude	Latitude	Depth (m)	Soil Texture
0.00	74°49 '33.47"	12°50 '44.57"	4.91	Coastal Alluvial
10.00	74°54 '44.53"	12°51 '27.1"	1.47	Red loamy
20.01	74°58 '50.82"	12°51 '52.69"	1.67	Red loamy
30.10	75°2 '41.18"	12°53 '42.36"	0.57	Red loamy /Rocky patches
40.00	75°7 '16.63"	12°51 '53.5"	8.28	Red loamy /Rocky patches
50.04	75°12 '12.36"	12°50 '48.57"	0.70	Red loamy /Rocky patches
60.03	75°17 '13.6"	12°50 '27.22"	0.80	Red loamy /Rocky patches
70.04	75°20 '30.96"	12°53 '55.81"	0.50	Red loamy /Rocky patches
80.48	75°22 '10.3"	12°57 '54.22"	0.70	Red loamy /Rocky patches

From the above table, it is observed that red loamy soil is found in the most parts of the river under study stretch with coastal alluvial soil in the initial stretch of the waterway. Exposed rock is observed on the banks in the upper stretches.

3.3 Classification of Waterways

The Ministry of Shipping, Road Transport and Highways (Inland Waterways Authority of India) has classified the Inland waterways into seven categories for rivers and canals for safe plying of self propelled vessels up to 2000 Dead Weight Tonnage (DWT) and tug-barge formation in push-two units of carrying capacity up to 8000 DWT (Ref: IWAI, Gazette Notification 2006). The classification criteria of waterways are mentioned in **Table 3.17** for Rivers and in **Table 3.18** for canals.

Table 3.17: Classification of Inland Waterways for Rivers

Class of Waterways	Rivers				
	Minimum Depth (m)	Bottom Width (m)	Bend Radius (m)	Vertical Clearance (m)	Horizontal Clearance (m)
I	1.2	30	300	4	30
II	1.4	40	500	5	40
III	1.7	50	700	7	50
IV	2.0	50	800	10	50
V	2.0	80	800	10	80
VI	2.75	80	900	10	80
VII	2.75	100	900	10	100

Table 3.18: Classification of Inland Waterways for Canals

Class of Waterways	Rivers				
	Minimum Depth (m)	Bottom Width (m)	Bend Radius (m)	Vertical Clearance (m)	Horizontal Clearance (m)
I	1.5	20	300	4	20
II	1.8	30	500	5	30
III	2.2	40	700	7	40
IV	2.5	50	800	10	50
V	-	-	-	-	-
VI	3.5	60	900	10	60
VII	-	-	-	-	-

The vessel sizes for self propelled or tug and barge combination for different classes of waterways is described in **Table 3.19**.

Table 3.19: Classification of Vessel Size

Class of waterways	Self Propelled Vessel Tonnage (Size, L x B x Draft in m)	Tug and Barges Combination Tonnage (Size, L x B x Draft in m)
I	100 (32 x 5 x 1)	200 (80 x 5 x 10)
II	300 (45 x 8 x 1.2)	600 (110 x 8 x 1.2)
III	500 (58 x 9 x 1.5)	1000 (141 x 9 x 1.5)
IV	1000 (70 x 12 x 1.8)	2000 (170 x 12 x 1.8)
V	1000 (70 x 12 x 1.8)	4000 (170 x 24 x 1.8)
VI	2000 (86 x 14 x 2.5)	4000 (210 x 14 x 2.5)
VII	2000 (86 x 14 x 2.5)	8000 (210 x 28 x 2.5)

Vertical Clearance for power cables or telephone lines or cables for any transmission purpose for all classes:

- Low Voltage Transmission lines and Telephone line 16.5m
- High Voltage Transmission line not exceeding 110 kV 19.0m
- High Voltage Transmission line exceeding 110 kV 19.0m +1 cm per each additional kV

In case of underwater pipelines, power cables and other cables, norms are to be decided as per site condition and navigational requirement.

Reference level for vertical clearance for different types of channels

- For Rivers:- Over the Navigational High Flood Level (NHFL), which is the highest flood level at frequency of 5 % in any year over a period of last twenty years;
- For Tidal Canals:- Over the highest high water level;
- For Other Canal:- Over designed full supply level (FSL);

The above classification for rivers and channels shall be effective if:

- Minimum depth of channel is available for about 330 days in a year (about 90% days in a year).
- Vertical clearance at cross structure over the waterways is available at least in central 75% portion of each of the spans in the entire width of the waterways.

The data gathered through the reconnaissance study has been analyzed from the parameters mentioned herein above and conclusions have been made with regard to the class of navigation channel that the relevant stretch of Netravathi River falls into. Furthermore, it is to be determined whether the entire 78.00km stretch can be classified under one class of channel or there is a possibility and advantage of developing sub-reaches under different classes of navigation channel.

3.3.1 Cross Over Structures

The details of High Tension lines, Low Tension lines, Cables and Bridges crossing the Netravathi River are given below in **Table 3.20** and **Table 3.21**.

Table 3.20: Details of High Tension and Electric Lines across Netravathi River

Sl. No.	Cross-Structure Name	Chainage (km)	Position (Above vessel track)		Vertical Clearance above MHWS/HFL (m)	Horizontal Clearance (m)
			Latitude	Longitude		
1.	HT Line	7.76	12°51'07.61"	74°53'39.05"	12	80
2.	LT Line	9.13	12°51'24.16"	74°54'17.53"	5	50
3.	LT Line	11.91	12°51'36.27"	74°55'43.33"	8	50
4.	HT Line	12.51	12°51'28.65"	74°56'00.48"	14	100
5.	Cable	14.08	12°52'00.86"	74°56'33.52"	9	80
6.	Cable	23.10	12°52'20.15"	75°00'01.49"	4	50
7.	HT Line	28.50	12°52'52.77"	75°02'27.37"	13	50

Sl. No.	Cross-Structure Name	Chainage (km)	Position (Above vessel track)		Vertical Clearance above MHWS/HFL (m)	Horizontal Clearance (m)
			Latitude	Longitude		
8.	HT Line	35.80	12°52'52.80"	75°05'32.97"	13	50
9.	HT Line	55.46	12°50'30.99"	75°14'57.26"	10	70
10.	HT Line	64.40	12°51'17.57"	75°19'23.09"	10	50
11.	HT Line	64.75	12°51'18.98"	75°19'28.54"	12	50
12.	LT Line	74.50	-	-	10	50

Table 3.21: Details of Bridges across Netravathi River

Sl. No.	Name of Structure	Chainage (km)	Vertical Clearance above MHWS/HFL (m)	Horizontal Clearance (m)	Center Position	
					Latitude	Longitude
1.	Railway Bridge 2nos.	3.43	12.0	50	12°50'19.79"	74°51'23.71"
2.	Bridge Mumbai Highway 2nos.	3.82	14.0	40	12°50'21.88"	74°51'36.28"
3.	Railway Bridge	27.05	6.0	40	12°52'17.96"	75°2'7.31"
4.	Bridge Manglore Mysore Highway	28.00	4.0	40	12°52'36.09"	75°2'28.72"
5.	Bridge Manglore-Mysore Highway	28.36	4.0	50	12°52'48.23"	75°2'29.75"
6.	Bridge Near Jakribettu Village (under construction)	31.50	-	-	12°53'53.95"	75°3'22.66"
7.	Bridge Uppinangady	55.34	4.0	35	12°50'29.17"	75°14'53.75"
8.	Bridge Near Valal	62.30	0.5	3	12°50'57.67"	75°18'16.16"
9.	Foot Over Bridge Near Valal	62.45	9.0	50	12°50'57.44"	75°18'21.5"
10.	Old Bridge Dharmsthala	80.00	0.5	3	12°57'50.4"	75°21'53.97"
11.	New Bridge Dharmsthala	80.14	4.0	30	12°57'52.22"	75°21'54.76"

From the above information, there is no hindrance in the waterway from Ch 0.00km to Ch 7.76km from HT/ LT line. Support base of HT, LT lines and cable lines will have to be raised to about 6.0m and 13.0m respectively to get the required clearance. However horizontal clearance of about 50.0m is available and sufficient for Class II standard.

The vertical clearance up to Railway Bridge, Ch 27.05km is sufficient for all class. The vertical clearance at other bridges fulfill the criteria for Class I.

The horizontal clearance of about 40.0m is available and sufficient for Class II standard except at Uppinangady Bridge, Ch 55.34km. The horizontal clearance on the classification has been provisioned for two lane

navigation. With due caution and with single lane mobility under the bridge (without any change in the structure modification), the class of the waterway can be considered as Class II.

New Dharmsthala Bridge at Ch 80.14 has a vertical clearance of 4.0m and located at the upstream end of the proposed waterway; hence its clearance has not been considered for analysis. Also, old and local bridges may be demolished, hence not considered for analysis.

Photos of important structures such as dams, barrages, bridges, and transmission lines as taken during site visit are shown in **Annexure 3.4**.

3.3.2 Dams, Barrages and Reservoirs

There are two Dams, two Barrages and one Anicut exist along the surveyed route. Details of structures are given in **Table 3.22** below. Navigation locks are required to overcome the navigation barrier due to these structures.

Table 3.22: Details of Dams/Barrages across Netravathi River

Sl. No.	Name of Structure	Chainage (km)	Location		Details
			Latitude	Longitude	
1.	Thumbe Barrage (Karnataka Urban Water Supply & Drainage Board)	23.50	12°52'19.27"	75°0'18.28"	FRL: 7.00m HFL: 11.89m
2.	AMR Barrage (AMR Power Pvt. Ltd)	36.00	12°52'51.77"	75°5'38.95"	FRL: 18.90m
3.	Sagar Dam (Sagar Power Pvt. Ltd)	64.60	12°51'20.28"	75°19'27.45"	FRL: 38.2m MDDL: 29.90m
4.	Bhoruka Anicut (Bhoruka Power Pvt. Ltd)	79.11	12°57'29.63"	75°21'34.65"	Top Level: 79.00m Height :4m (13.5MW= 3 x 4.5MW)
5.	Netravathi Dam, Dhramsthala	80.70	12°57'54.22"	75°22'10.3"	-

3.3.3 Bends along the Route

On the proposed waterway route, there are many bends in Netravathi River, which are given below in **Table 3.23.**

Table 3.23: River Bend Radius in Netravathi River

Sl. No.	Chainage (Km)	Radius (m)	Sl. No.	Chainage (Km)	Radius (m)
1.	8.50	800	16.	49.10	475
2.	9.60	1350	17.	57.20	670
3.	13.00	900	18.	58.10	700
4.	15.50	890	19.	64.00	385
5.	17.80	600	20.	64.80	335

Sl. No.	Chainage (Km)	Radius (m)	Sl. No.	Chainage (Km)	Radius (m)
6.	19.70	1020	21.	67.20	450
7.	21.80	490	22.	69.90	500
8.	23.25	1025	23.	70.50	440
9.	26.00	900	24.	71.20	350
10.	27.50	450	25.	71.90	340
11.	30.50	550	26.	75.80	150
12.	37.90	360	27.	78.50	50
13.	40.50	1050	28.	79.20	120
14.	42.30	1070	29.	80.20	90
15.	48.30	680			

River bend radius before 27.50km is sufficient for **Class V** vessel with minimal smoothening of bends at some locations. River bend radius from 27.5km to 64.00km can be classified under **Class II**. Thereafter, the river takes sharp bends at various locations and can be classified under **Class I** by smoothening of bends.

The pictorial detailed information showing the proposed waterway indicating various cross-structures (i.e. bridges, transmission lines etc.), major industrial locations and important places along the waterway have been shown in **Drawing No P009050-W-20201-008 R0** (Sheet 1 to 9). Drawing also depicts various information such as Jetties, Rail and Road location along the waterway.

3.3.4 Gauge & Discharge data

In the Netravathi River catchment, Central Water Commission (CWC) has hydrological observatory station at Bantwal, which is located within the study area. Long term data on daily basis for the period of 13 years (January, 2000 to May, 2013) of Bantwal Gauge and Discharge site have been provided by IWAI as given in **Annexure 3.5**. The details of Gauge station are presented in **Table 3.24** below.

Table 3.24: Details of Bantwal Gauge Station

General Details	
Station Name	Bantwal
Station Code	WN00G9
Operational Status	Existing
Activity	HO
Station Type (Current)	GDSQ
Tehsil/Taluk	Mangalore
District	South Canara
State	Karnataka
Latitude (DMS)	12°52’51” N

General Details	
Longitude (DMS)	75°02'23" E
Altitude (m)	1.00
Distance to Outlet (km)	0
Topo Sheet No.	48P1
Catchment Area (sq. Km)	3184
Basin	West Flowing River (WFR) from Tadri to Kanyakumari
Independent River	Netravathi
Nearest GST BM	GST MB at Pane Mangalore traverler's bungalow
Type of River	Perenial
Station Bank	Right
Method of Discharge Obs.	Wading/Boat/Bridge
Zero of Gauge (m)	1.00
U/S Gauge Line Dist. (m)	400
D/S Gauge Line Dist. (m)	400

Based on the observed daily data, the maximum and minimum water level at Bantwal site in each year is given in **Table 3.25** below. Observed data for the year 2013 is available till 31st May.

Table 3.25: Summary of Bantwal Gauge and Discharge Data (2000-2013)

Year	Data Type (HZS=Absolute Gauge; HHS=With M.S.L.)	Mean Gauge (m)	
		Minimum	**Maximum**
2000	HZS	0.740	7.200
2001	HZS	0.614	7.110
2002	HZS	0.620	6.550
2003	HZS	0.120	6.130
2004	HZS	0.920	7.835
2005	HZS	0.290	8.200
2006	HZS	0.610	8.000
2007	HZS	0.460	8.220
2008	HZS	0.539	9.600
2009	HZS	0.510	8.420
2010	HZS	0.620	7.930
2011	HZS	1.075	6.490
2012	HZS	0.300	8.245
2013	HZS	1.340	2.990
	Average	0.63	7.35
	Minimum	**0.12**	2.99
	Maximum	1.34	**9.60**
	Avg. (last six yrs.)	**0.58**	

Minimum mean gauge of 0.12m (6th June, 2006) and maximum mean gauge of 9.60m (13th August, 2008) were observed. The average of minimum mean gauge from each year is 0.63m. As suggested by the IWAI, the average minimum mean gauge of last six years (yr 2007 to yr 2012) can be considered as Chart datum for the free surface flow river stretch. Based on the data available at this stage of study, minimum water depth of **0.58m** may be available every time for navigation.

However, in the non tidal region, since the waterway is under dam submersion, the respective MDDL have been considered for reckoning the reduced depths.

3.3.5 Bed Profile of Waterway

All soundings were reduced to Chart Datum in the area. Tidal heights are predicted using New Mangalore Port data to reduce the raw water depths to Chart Datum up to the tidal effected stretch i.e. upto the Ch 23.5km (downstream of Thumbe barrage site). The main purpose of Thumbe barrage is to supply water to the Mangalore town. Therefore, fresh water is available and hence free from tides water effects in the upstream region of Thumbe barrage. Hence, normal free flow condition is considered in the upper stretch from Thumbe barrage. The observed sounding from Ch 23.5km till end stretch were reduced to Chart Datum based on the mean minimum water depth observed at Bantwal Gauge site. The observed bed profile of Netravathi River waterways is shown below in **Figure 3.21** and presented in **Annexure 3.6**.

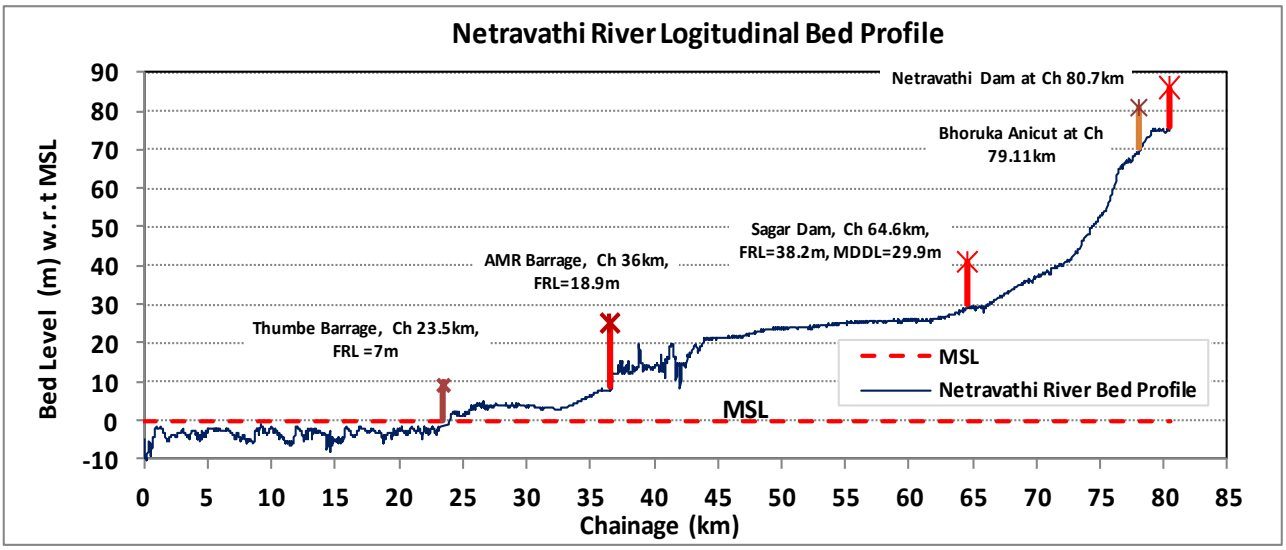


Figure 3.21: Longitudinal River Bed Profile of Netravathi River from Ch 0.00km to Ch 80.48km

The following key observations are made from Figure 3.21:

(i) The tidal effect of the Arabian Sea has been observed in the Netravathi River end before Karnataka Urban Water Supply & Drainage Board (Thumbe Barrage). The tide in the region is Semi-Diurnal characteristics.

(ii) As observed from the site, the study stretch generally has the soil texture as red loamy along with coastal alluvial in the starting stretch. Exposed rock in the bank is also observed after Ch 20.00km.

(iii) The initial one third of the river stretch from the mouth is flatter, which gradually becomes steeper having overall average slope of 1 in 1060 in 80.48km of the river stretch under study.

(iv) There are four structures (dams/barrage), which causes obstruction for navigation (Netravathi dam has not taken into account, being the end of the stretch).

Reduced water depth profile is shown in **Figure 3.22** below. Figure indicated that initially water depth varies as per the bed profile under tidal zone. Sudden rise in water depth at Ch 36.00km is due to submerged water in the upstream storage area of AMR barrage. Thereafter, minimal constant water depth of about 0.7m to 1.5m is available up to the end stretch. Due to constant shallow water depth, it may not be advisable to construct navigation waterways after Ch 44.00km. However, the major obstruction structures at various locations constrain the navigability up to Ch 23.5km.

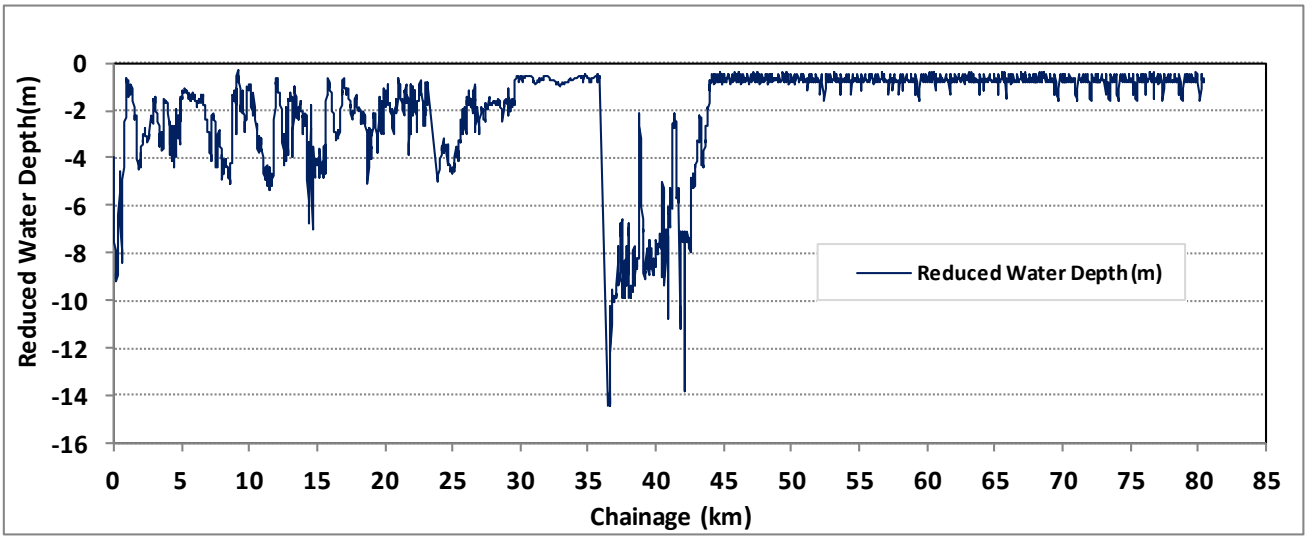


Figure 3.22: Reduced Water Depth Profile of Netravathi River from Ch 0.00km to Ch 80.48km

Based on the river condition and existence of structures, the navigable stretch is feasible up to Ch 23.5km. The observed bed profile for tidal affected zone of Netravathi River waterways up to Ch 23.5km is shown below in **Figure 3.23** and presented in **Annexure 3.7**.

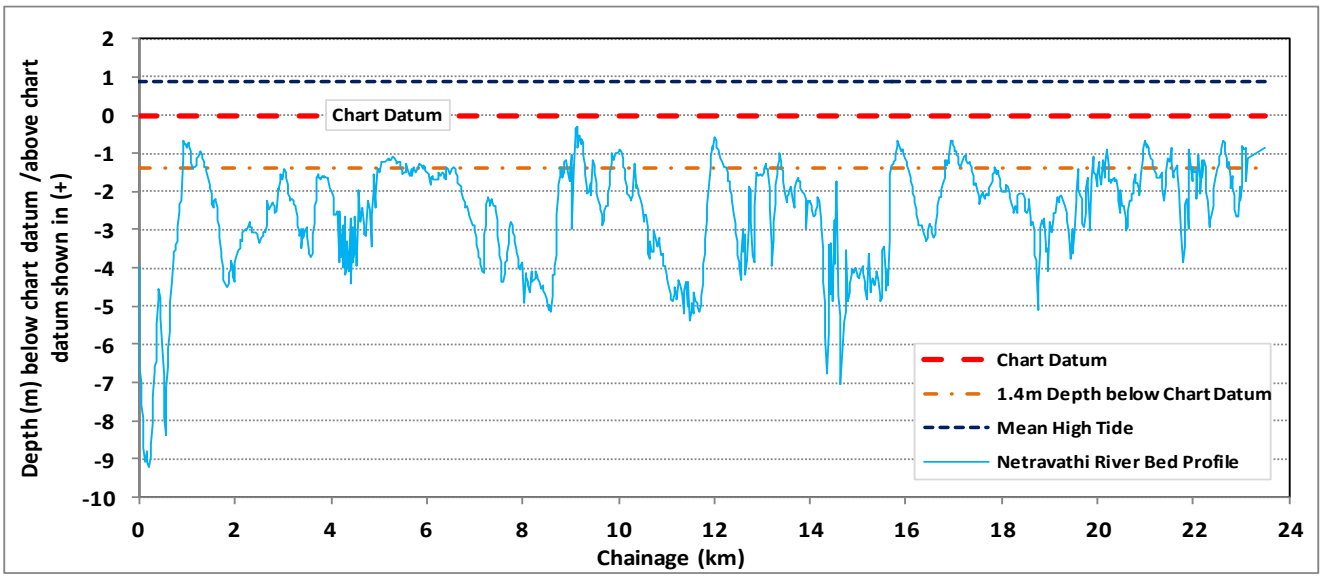


Figure 3.23: Longitudinal River Bed Depth Profile of Netravathi River from Ch 0.00km to Ch 23.5km

Figures 3.23 also shows the Chart Datum line, 1.4m below the Chart Datum line and mean tide variation 0.90m above Chart Datum. However, high tides in this region were observed in the range of about 0.03 to 1.68m (MHWS) *(Ref: Indian Tide Tables, 2016, Survey of India)*. The following key observations are made from Figure 3.23:

(i) Significant undulation is observed in the bed profile.

(ii) With some minimum dredging at various locations, a minimum depth of 1.40m for **Class II** may be achieved.

3.4 Tidal Effect on Navigability of Netravathi River

The tidal effect on the river navigability may be put to an advantage in order to optimize the cargo movement from import ships and taking bulk cargo to a jetty located upstream of the river bank near the industrial units for planned bulk consumption of the cargo. Industrial units e.g. steel plants/ thermal & gas based plants/ cement plants/ oil terminals are either operational or have been planned near the coast line as a preferred location either on the river banks near the mouth of the river or in creeks meeting high sea.

Shallow waterways in these rivers and creeks put a restriction on movement of large ships which calls for unloading of the cargo from ships at high sea into smaller Vessels. These Vessels transport the cargo to smaller jetties of the plants. Normally, there is a travel restriction of the movement of Vessels by variation in the available draft in the river/creek due to tide. If the available draft in the river is adequate to sail a particular type of Vessel, the Vessel can move into the river/creeks or vice versa; else they wait for the high tide. Thus, movements of the Vessels through the river depend upon the depth available, which is affected by the tide.

3.4.1 Present Usability of Netravathi River

With the information gathered during the reconnaissance survey, the study stretch is being used for fishing. Tide dependent water level in the Netravathi River can be used advantageously for the smooth movement of the Vessels in the River.

3.4.2 Chart Datum & Variation in Navigation Depth

The depth variation in the Netravathi River has been established from 0.32m to 9.23m with respect to Chart Datum during the reconnaissance survey. The tide tables are available for the region and water level in the creek can be forecasted at any point of time. It helps in knowing that a particular type of Vessel can sail in the creek at given point of time. The tidal variation is of the order of 0.90m with it maximum depth of 1.68m in Netravathi as per the records available for this region *(ref: Indian Tide Tables, 2016, Survey of India)*. Hence, it is noted that if the high tide is considered for navigation, a higher water depth is actually available for navigation along the waterway although water depth with respect to Chart Datum shall depict a lower depth corresponding to the Least Available Depth (LAD). So, conceptually, navigation in a tidal river is more effective considering the tidal effect which is observed in such cases elsewhere. Arabian Sea at the confluence location of Netravathi River has a semidiurnal tide having two high and two low water each tidal day, with relatively small differences in the respective highs and lows effect which provides a tidal cycle of 6.0 hours.

The speed of the cargo Vessels is normally 8 knots in a still river and the travel time of these Vessels may be about 2.0 hours inclusive of the docking time in the study stretch. Hence, a six hour tidal window shall be advantageously used for optimization of Vessel movement from sea to destined location as well as for unloading the material and the low tide shall be made use of to sail from local jetty to the high sea with a lower draft requirement of empty Vessel which is again available during the low tide. Similar considerations shall be effective for other industrial units that are already either planned or that may be planned in future on this waterway. This shall also facilitate the classification of the water way either in one category or into various categories with a consideration of river length being actively used currently, and future possibilities for cargo movement beyond the present use.

3.4.3 Benefits of Tidal Effect

The above contention for using tidal window using high tide for facilitating navigation shall help to decide many other logistics which may consist of exact Vessel size, loading time, unloading time, facilities available at loading and unloading locations etc. A better insight into tidal information shall help to decide the following:

(i) Classification of the waterway;
(ii) Vessel Size;
(iii) Scheduling of Vessel movement;
(iv) Number of Vessels for defined quantity of the cargo;
(v) Flotilla Combination;

(vi) Different size of Vessels instead of only one size;

(vii) Handling facilities at the terminal location;

(viii) Desirability and quantum of dredging required;

(ix) Vessel allocation decision;

The benefits of tidal effect will be more useful in operation of Vessels and in improving the efficiency of vessel operation.

3.5 Agencies to be approached for Clearances, if any

Based on the reconnaissance survey, interaction with the local people and consultation with the government officials, information regarding clearances and approvals required from the concerned authorities for operation of National Waterway NW-74 (Netravathi River) has been given in **Table 3.26**.

Table 3.26: List of Clearances and Approvals Required

Environment Clearance	Forest Clearance	Wildlife Clearance	Coastal Regulation Zone (CRZ) Clearance	Consent to Establish/ Operate	No Objection Certificate from Directorate of Fisheries	NOC from WRD/PWD/ Railways
√	To be ascertained at DPR Stage-II	To be ascertained at DPR Stage-II	√	√	√	√

3.5.1 Compilation of Data in Feasibility Format

The field information gathered through single line bathymetry survey, data collection from IWAI, data collection from various agencies, site visit and information derived from web has been compiled in the format as provided by IWAI for the Netravathi River. The consolidated data shall be useful in deriving basic information about each of the waterway in IWAI format enclosed in **Annexure 3.8**.

3.6 Conclusion

Based on the survey observation, the classification of proposed waterways based on various criteria has been summarized in below **Table 3.27**.

Table 3.27: Classification of Proposed Waterway

Criteria	Classification																			
Length of waterway from start (km)	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80
Chainage length in %	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%
Depth availble	C-II						Needs Dredging		All Class			Needs Dredging								
Raod Bridge Vert. Clearance	All Class								C-I											
Raod Bridge Hor. Clearance	C-II																			
HT Line Vert. Clearance	All Class		Needs Raising of HT Base																	
Bend Radius	C-V								C-II								C-I			
Index	All Class		Class-V		Class-IV		Class-III		Class-II		Class-I									

Finally, with due consideration of all aspects, the classification of the proposed Netravathi Waterway in light of technical navigability may be adopted as shown in **Table 3.28** below:

Table 3.28: Final Conclusion for Possible Navigation

River Stretch	0.00km 23.10km		23.65km 78.00km
Classification			
	Class-II		**NOT RECOMMENDED**
Horizontal clearance (m)	40		
Vertical clearnce (m)	5		
Minimum Depth (m)	1.4		
Bottom Width (m)	40		
Self Propelled Vessel			
Dead Weight Tonnage	300		
Vessel size (m)	45 x 8 x 1.2		
Tug + Barge			
Dead Weight Tonnage	600		
Vessel size (m)	110 x 8 x 1.2		

The cable line crossing at Ch 23.10km is just 400m downstream of the barrage at Ch 23.50km. Terminating the waterway at Ch 23.10km will be most cost effective.

The above conclusion has been drawn keeping in view the present river condition and linking the same with various characteristics of classification viz., available draft; vertical clearance under Rail Bridge / Road Bridge/ HT Line and Bend Radius etc.

In order to consider for 23.10km stretch as **Class II**, smoothening of bend along with moderate dredging is essential.

Barrage and dam structures existing on the Netravathi River are obstacles for throughput navigation. Dams/barrage structures, as discussed above, lies above Ch 23.50km. Also, shallow water depths were observed beyond Ch 23.10km with rock outcrops in the river. Therefore, river reach up to Ch 23.10km stretch is feasible for navigation.

CHAPTER 4 MARKET ANALYSIS

Netravathi River is located in the state of Karnataka in India. The river originates from Bangrabalige valley, Yelaneeru Ghat in Kudremukh in Chikkamagaluru District. It merges with the Kumaradhara River at Uppinangadi before flowing into the Arabian Sea, south of Mangalore city, where it meets Gurupur River as well.

The river flows through the famous pilgrimage places such as Dharmasthala, Beltangadi, Bantwal and Mangalore Talukas of Dakshin Kannada and is considered to be one of the Holy rivers of India. This river is the main source of water to Bantwal and Mangalore.

The navigable length of the River is 23.50km. Based on the deepest bathymetry single line survey carried out during the study and as per the classification of "Inland water ways" as per Ministry of Shipping, Govt. of India notification, it can be classified as "Class II" for the entire study stretch (**Refer Map 4.1**).
Old Managalore Port (OMPT) is in the vicinity of the West Bank of the River and New Mangalore Port (NMPT) is 10 km Northwards from OMPT.

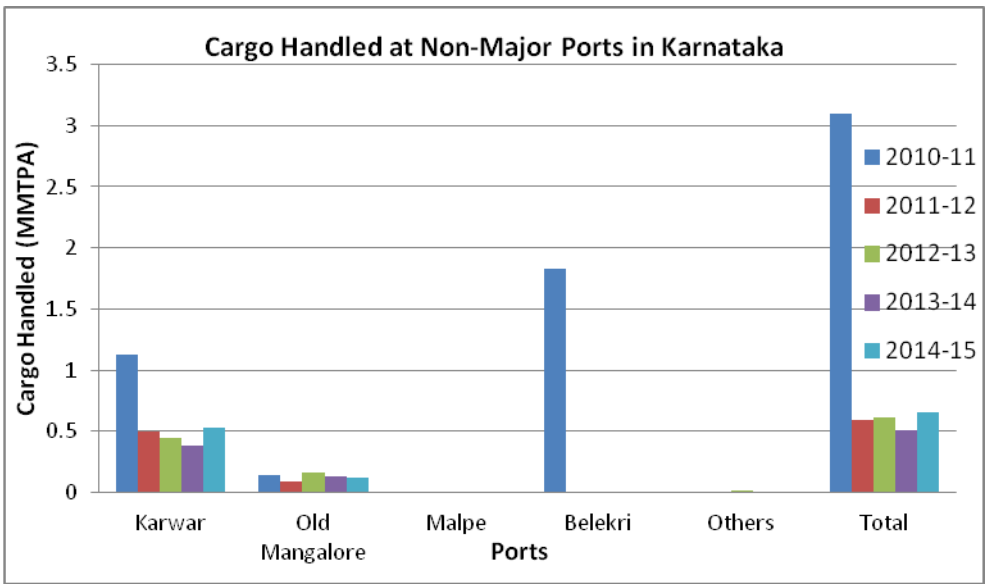


Figure 4.1: Cargo handled at Non Major Ports in Karnataka (MMTPA)

In the year 2014-15, out of 0.65 MMTPA of cargo handled at all nine Non-Major Ports in Karnataka, about 0.12 MMTPA (18%) (**Figure 4.1**) was handled at Old Mangalore Port. NMPT handled 36.56 MMTPA; 6.29 % of all major ports traffic in India during the same period.

4.1 Existing Traffic

- **Cargo:** At present, no cargo traffic is moving in Netravathi River, except at the confluence of Netravathi River and Gurupur River, where the cargo from Old Mangalore Port is moving to Lakshadweep Islands.

- **Passengers:** Ferry services are operational at the following three locations:
  - Sajipanadu-Thumbe
  - Jalakadakatte-Parangipet
  - Adyar-Pavoor

More than 1.0 lakh passengers are using the Ferry services to cross Netravathi River and about 8,000 – 10,000 passengers per annum move through Old Mangalore Port to Lakhsadweep islands (**Table 4.1**).

Table 4.1: Old Mangalore Port: Passengers Handled

Year	Embarked	Disembarked
2010-11	2,277	2,310
2011-12	790	789
2012-13	844	820
2013-14	3,976	3,561
2014-15	5,550	5,204
2015-16*	2,552	2,116

Source: Old Mangalore Port
*Complete Data not available yet

4.2 Future Cargo Potential

Netravathi River (length of 78 km) and Gurupur River (length of 10 km) merge with Arabian sea at the same confluence area. Netravathi River is also in the vicinity of Old and New Mangalore Ports which is handling 0.12 MMTPA and 36.5 MMTPA of cargo annually (2014-15). Stakeholder consultation was also done to determine the existing traffic scenario & potential future traffic (Refer **Annexure 4.2**). Thus, a possibility of moving cargo through Netravathi River exists, which is being examined as follows:

- **Cargo from New Mangalore Port:** Out of the 36.56 MMTPA of cargo handled at New Mangalore Port, Overseas cargo to coastal cargo percentage is 86:14 (%) (**Table 4.2**), with import to export percentage being 80:20 (%). The major commodities handled are POL crude, POL products for MRPL and Coal for UPCL (**Table 4.3**). The container traffic is also increasing and about 62,000 TEUs are handled annually. As per the business plan prepared for NMPT, the cargo is likely to increase to 84 MMTPA with container traffic increasing to 2.55 lakh TEU's in the next 10 years.

Table 4.2: Traffic Handled at New Mangalore Port in 2014-15 (MMTPA)

Sl. No	COMMODITY	Overseas			Coastal			Grand Total
		Unloaded	Loaded	Total	Unloaded	Loaded	Total	
1.	Total	**25.6**	**6.06**	**31.66**	**2.72**	**2.18**	**4.9**	**36.56**

Source: Major Ports Statistics of India

Table 4.3: Commodity wise Cargo Handled at New Mangalore Port (MMTPA)

Sl. No	COMMODITY	2013-14	2014-15	2025-26 Projected
1.	POL Crude (MRPL)	14.94	14.4	17.00
2.	POL products (MRPL)	7.85	6.7	13.07
3.	Coal (UPCL)	2.92	2.7	7.00
4.	Coal – Others	5.42	5.4	
5.	Edible Oil	0.55	0.68	1.68
6.	Maize	0.084	0.006	
7.	Cement	0.21	0.33	0.56
8.	Iron Ore (KIOCL)	3.12	1.31	20.09
9.	LPG	1.48	1.56	1.50
10.	Other Cargo	2.76	3.35	23.24
	Total	**39.36**	**36.56**	**84.14**
	Container TEU	**50,126**	**62,808**	**2,55,000**

Source: Major Ports Statistics of India, NMPT Business Plan

Mangalore in particular and Dakshina Kannada district in general are well connected by road, rail, sea and air. National Highway NH-66 (Kanyakumari – Mumbai) and the Konkan Railways pass through the length of the district from North to South along the coast. National Highway NH-75 from Mangalore to Bangalore passes through the breadth of the district from West to East. National Highway NH-169 extends from Mangalore to Solapur, SH-73 extends from Mangalore to Vellupuram and SH-275 Mani to Mysore. Apart from Konkan railways, there are two major rail lines namely Mangalore – Bangalore and Mangalore – Calicut. Mangalore International Airport is located at a distance of about 14km from the city at Kenjar.

Considering the ideal location of the district and presence of good infrastructure facilities like port, industrialization has crept in and many major industries like Mangalore Chemicals and Fertilisers Ltd (MCF), Mangalore Refineries and Petrochemicals Ltd. (MRPL) and few Liquefied Petroleum Gas (LPG) bottling plants as well as Petroleum Oil & Lube Products (POL) depots have come up in the district during last few decades. In addition to these, number of other hazardous chemicals, both toxic and flammable are imported at New Mangalore Port Trust (NMPT) and distributed to various places both within and outside the district, making it the hub of movement of various hazardous chemicals.

Various POL products that are produced at Mangalore Refineries and Petrochemicals Ltd. are transported to other parts of Karnataka as well as to neighbouring states by Road Tankers. Similarly, various other hazardous chemicals imported at NMPT are also transported by Road Tankers. These tankers mostly ply on the NH-66, NH-275 and NH-75. As MRPL is not located on the National Highway, the tankers take other district roads to approach the National Highway. Similarly, the tankers may take detour from the National Highway to other roads to reach their final destination in far-flung areas in the district. About 105 Tankers with POL and LPG products are moving from NMPT towards Mani Junction and further to Uppinagady and 15 Tankers are moving from NMPT towards Thalapady State Border on daily basis (**Table 4.4**). These routes are running in parallel to Netravathi and Gurupur River (**Figure 4.2**), there is a definite case of moving this Hazardous cargo through Gurupur/Netravathi River through Ro-Ro services.

Table 4.4: Chemicals handled at New Mangalore Port (MTPA)

S. No	Road No	Segment From: To	Important towns Junctions and Route	Details of Hazardous chemical movement	
				Chemicals	Tankers per Day
1	NH66NH73NH75	Surathkal-NMPT-Pumpwell Circle-Mani Junction-Uppinangady	Baikampadi, Kulai,Hosabettu, Kulur, Kottara KPT,	LPG POL products	45 60
2	NH66	Surathkal-NMPT-Pumpwell cIrcle-Thalapady (State Boder)	Ullala, Paramunur, Kotekar	LPG POL products	3 12

Source: Disaster Management Plan, Dakhshina Kannada

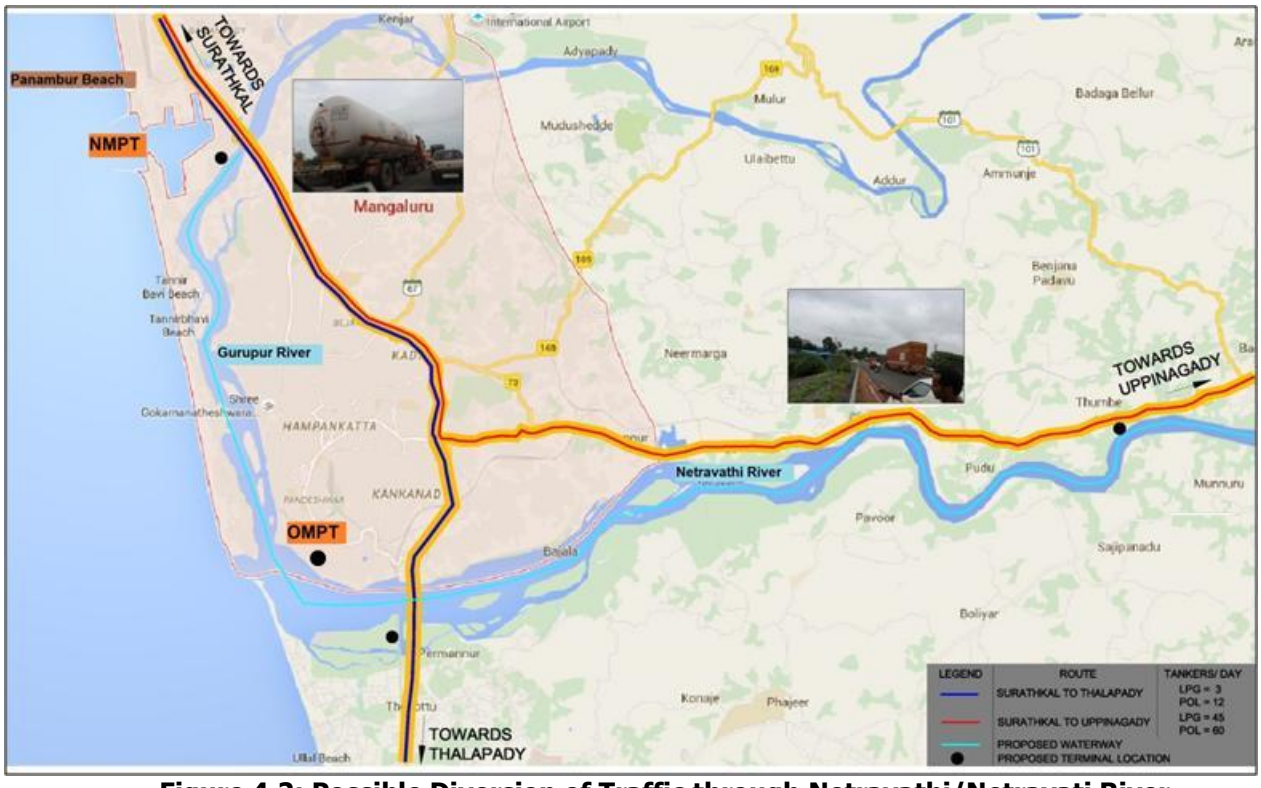


Figure 4.2: Possible Diversion of Traffic through Netravathi/Netravati River

As it can be seen from the figure that about daily 100 POL and LPG Tankers (0.75-1.0MMTPA) are passing through the congested area of the city through NH-66 till Pumpwell circle and then eastward to Mani – Uppinagady through NH-73 and NH-75. Similarly daily 15 Tankers (0.1-0.15MMTPA) are moving from NMPT through NH-66 towards Thalapady. This hazardous cargo can move through Gurupur/Netravathi River by making Ro-Ro Terminal facilities at NMPT, OMPT, near Road Bridge on NH-66 on Netrawati and near Thumbe water Barrage facility.

In addition, NMPT has a container Berth B1 (**Figure 4.3**), handling 60,000 containers per annum and as per discussions, more than 20 percent (12,000 TEUS annualy: 0.2 MMTPA) are coming from Bangalore in eastern Karnataka via NH-73 & NH-66 towards NMPT. This cargo can also be moved through Gurupur/Netravathi River combination till NMPT.

These are very preliminary observations and issues like Land availabilty at NMPT for Ro-Ro Terminal facility, clearances under the Railway and Road Bridge on Netravathi River, High Tension Line on East Bank of Gurupur River at NMPT and Rocky nature of Netravathi River are to be examined. This will be studied in detail at DPR stage.

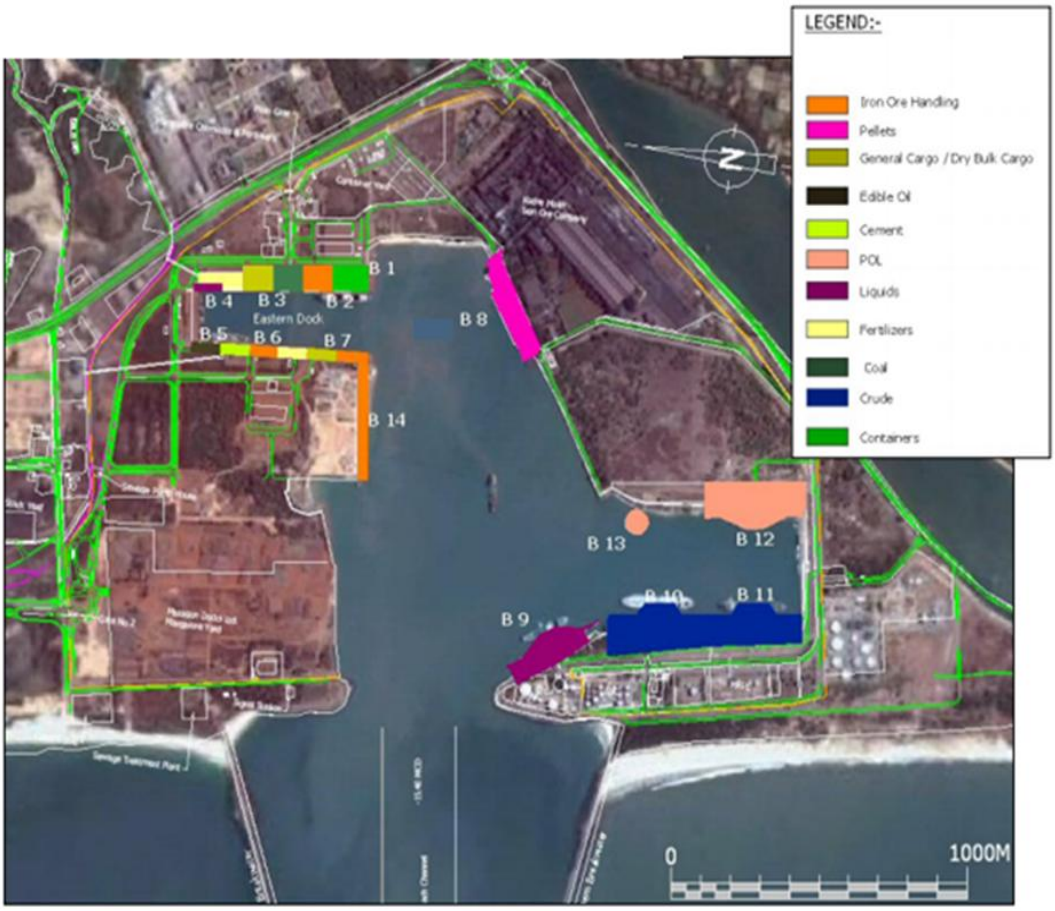


Figure 4.3: Spatial Cargo Distribution per Berth at NMPT

- **Cargo from Old Mangalore Port:** Old Mangalore Port at the West end of Netravathi River is a designated port for handling cargo to Lakshadweep islands, loading 100,000 MTPA (92%) of cargo to the islands through sailing vessels. The commodities handled at Old Mangalore Port in 2015-16 are (**Table 4.5**).
- **Building materials:** (**88,581 MTPA**): Building material comprising of Cement, Sand, Granite and Steel are loaded for supply to Lakshadweep Islands.
- **Food Grains (13,347 MTPA):** Rice, other Food Grains and Salt are supplied from this port to Lakshadweep Island.

Table 4.5: Cargo Handled from 2011-12 to 2015-16 at Old Mangalore Port (MTPA)

Commodities	2011-12		2012-13		2013-14		2014-15		2015-16	
	Unloaded	Loaded	Unloaded	Loaded	Unloaded	Loaded	Unloaded	Loaded	Unloaded	Loaded
Building Material	**70**	**50,375**	**352**	**69,205**	**417**	**95,002**	**89**	**93,405**	**122**	**88,581**
Cement	-	*16,594*	-	*14,302*	-	*16,686*	-	*13,429*	-	*17,495*
Granite Boulders	**70**	*5,621*	-	*18,530*	-	*25,060*	-	*44,189*	-	
Granite Jelly	-	*16,511*	-	*14,312*	-	*22,984*	-		-	*37,661*
Sand	-	*1,010*	-	*13,308*	-	*18,200*	-	*26,645*	-	*24,939*
Clay Bricks/Tiles	-	*10,639*	-	*8,753*	-	*10,717*	-	*7,462*	-	*5,782*
Timber	-		-		-	*260*	-	*328*	-	*417*
Steel/Scrap	-		**352**		**417**	*1,095*	**89**	*1,352*	**122**	*2,287*
Food Grains	**1,897**	**7,853**	**2,098**	**7,055**	**822**	**8,110**	**1,089**	**12,505**	**337**	**13,347**
Rice	-	*5,450*	-	*6,365*	-	*3,595*	-	*4,686*	-	*4,210*
Sugar	-	*1,512*	-	*690*	-		-		-	
Salt	-		-		-		**1**		**1**	*698*
Food Grain	-		-		-	*4,515*	-	*7,819*	-	*8,439*
Copra	**1,877**		**2,075**		**597**		**865**		**208**	
Coconut shells	-		-		**86**		-		-	
Mass/Dry fish	**20**		**23**		**139**		**223**		**128**	
SMR Cattle Feed	-	*891*	-		-		-		-	
POL	**7**	**122**	-	-	-	**9**	-	-	-	-
Oxygen Cylinder	-		-		-	*9*	-		-	
Petrol ATF	-	*84*	-		-		-		-	
LPG Gas	**7**	*38*	-		-		-		-	
Chemicals	**5,390**		**6,978**		**9,858**		**10,468**		**8,759**	
Soda Ash	**5,390**		**6,978**		**9,858**		**10,468**		**8,759**	
Others	**8,575**	**13,702**	**7,810**	**41,535**	**284**	**5,762**	**225**	**10,319**	**575**	**7,311**
Misc	**8,575**	*13,702*	**7,810**	*41,535*	**270**	*5,581*	**206**	*10,227*	**563**	*7,135*
Vehicle	-		-		**14**	*181*	**19**	*92*	**12**	*176*
Total	**15,939**	**72,052**	**17,238**	**117,795**	**11,381**	**108,883**	**11,871**	**116,229**	**9,793**	**109,239**

- **Other (7,311 MTPA)**: Other miscellaneous items and vehicles are also moved to Lakshadweep Island through this port.
- **Chemicals (8,759 MTPA):** A small quantity of Soda Ash has been regularly unloaded at Old Mangalore Port.

Granite and Laterite, about 40,000 MTPA can also move through Netravathi River. This will be examined in detail at DPR stage.

Table 4.6: Ores Availability in Netravathi Catchment Area

Sl. No	Year	Mangalore (T)	Bantwal (T)
1.	Quartz	-	-
2.	Building Granite	2,85,703	1,65,000
3.	Laterite Stone	21,315	4,474
4.	Dolerite	303.3 (cum)	-
5.	Lime Shell	624	-
6.	Lime Clinker	-	-
Total		3,07,642 MT/303.3 cu m	1,69,474

Source: Perspective Plan of Dakhsina Kannada District

- **Food grains:** About 14 lakh MT of Food grains, Rice, Pulses and Horticulture products are produced in the Talukas of Mangalore and Buntwal and a part of it can be transported through Gurupur River/Netravathi River to OMPT and NMPT. As per preliminary estimates about 3-4 % about 50,000 Tonnes of cargo can be transferred to IWT. This possibility will be examined in detail at DPR stage.

Table 4.7: Major Food Grain Production in Netravathi Catchment Area

Taluka	Rice		Pulses		Total	
	Area (Ha)	Production (T)	Area (Ha)	Production (T)	Area (Ha)	Production (T)
Mangalore	21,290	61,641	4,380	1,680	25,670	63,321
Buntwal	16,520	48,485	650	192	17,170	48,677
Sub Total	**37,810**	**1,10,126**	**5,030**	**1,872**	**42,840**	**1,11,998**
Dakshina Kannada	59,500	1,74,133	6,060	2,403	65,560	1,76,536

Source: Agricultural Department, Dakhsina Kannada District

Table 4.8: Major Horticulture Production in Dakshin Kannada District

Sl. No	Year	Production (T)
1.	Coconut	11,81,900
2.	Arecanut	51,358
3.	Cashewnut	39,423
4.	Rubber	18,706
5.	Banana	78,140
Total		**13,69,527**

Source: Perspective Plan of Dakhsina Kannada District

- **Fisheries:** About 1.5 lakh tonnes of Marine fisheries are produced, a part of it is stuffed in ice box and moved through trucks to various parts of the District from old Mangalore Port. To avoid congestion in the city, some of these trucks can move through Netravathii River through Ro-Ro Terminals, if provided.

Table 4.9: Fisheries in Dakshina Kannada District

Sl. No	Year	Marine Fish (T)
1.	2011-12	1,37,435
2.	2012-13	1,38,146
3.	2013-14	1,48,272
4.	2014-15	1,50,525
5.	2015-16	1,51,458

Source: Fisheries Department, Dakhsina Kannada District

- **Fertilizers and Chemicals:** About 27,000 Tonnes of Fertilizers (**Table 4.10**) is allotted to Mangalore and Buntwal Talukas of Dakhsina Kannada District. Currently this is moving through Road. A part of it is supplied through MCF near NMPT, out of it about 10% (3000 T) can move through Gurupur River/ Netravathi River through Ro-Ro facilities.

Table 4.10 Allotment of Fertilizers in Netravathi Catchment Area

Fertilizer Allotment 2015-16										
Taluka	**Urea**	**DAP**	**MOP**	**15:15:15**	**10:26:26**	**NPK**	**SSP**	**Rock Phosphate**	**Others**	**Total (T)**
Mangalore	2,300	360	1,640	1,800	2,000	3,850	782	480	560	13,772
Bantwal	2,250	360	1,640	1,800	2,000	3,840	777	480	560	13,707
Sub Total	**4,550**	**720**	**3,280**	**3,600**	**4,000**	**7,690**	**1,559**	**960**	**1,120**	**27,479**
Total DK	10,800	1,750	7,930	9,000	9,000	17,910	3,750	2,400	2,800	41,186

- **Diversion from industries:** Majority of the Industries are in Baikampady area which is closer to NMPT (Refer **Annexure 4.1** & **Map 4.1** for industry details). It is unlikely that cargo from Baikampady will move through Netravathi River.
- **Passengers:** More than 5 lakh people reside in Mangalore and Bantwal Talukas. About 300-400 passengers cross Netravathii River at the three Ferry facilities every day, and as per a study done by Directorate of Ports and Inland Water Transport in Karnataka, the potential of about 5 Lakhs passengers (**Table 4.11**) is projected increase to 7 lakhs in next 10 years exists. This will need additional infrastructure like 26 Ferry Terminals, more Fleet and dredging & maintenance of waterway may be required.

Table 4.11: Potential of Ferry Passengers at Netravathi River

Name of the River	Sl. No	Survey Location	Passenger Traffic		Per Year
			7days	1 day	2005
Netravathi	1.	Pavoor-Adyar	1540	220	80,300
	2.	Arthola-Inolj	2170	310	1,13,150
	3.	Bajal-Ambligolur	-	72	26,280

Name of the River	Sl. No	Survey Location	Passenger Traffic		Per Year
			7days	1 day	2005
	4.	Paringapete-Inoli	-	61	22,265
	5.	Paringapete-Jalakadakatte	-	82	29,930
	6.	Tumbe-Talerogaru	-	71	25,915
	7.	Jakribettu-Narkombu	-	49	17,885
	8.	Navoora-Narkombu	-	10	3,650
	9.	Ajilamagaru-Kadeshivaaya	-	9	3,285
	10.	Serpadi-Barinarur	-	60	21,900
	11.	Talepadavy-Sajapamannur	-	60	21,900
	12.	Talapadi-Mundakodi	-	98	35,770
	13.	Beleyaru-Pavanachalaka	-	14	5,110
	14.	Sajapanadu-Tumbe	-	138	50,370
	15.	Valalu-Mogarj	-	158	57,670
Total			3,740	1,412	5,15,380

Source: Directorate of Ports and Inland Water Transport, GOK: Development of IWT in Karnataka, 2006

- **Tourism:** Ullal is situated on the South bank of the Netravathi river, at a distance of 8 Km from Mangalore. The Somanatha Temple has beautiful sculptures and bears a district Italian influence, attributed to Florentine artists who were present on the coast in the 15th-16th Centuries. The Dargah of Syed Mohammed Shereeful Madani, who is said to have come to Ullal from Madina, 400 years ago is also famous. An Urus is held once in five years here. About 8,000 tourists visited Somnath Temple and the Dargah of Syed Mohammed Shereeful Madani in 2005 and are projected to grow to about 20,000 by 2025 (**Table 4.12**).

Table 4.12 Tourist Traffic Potential of Netravathi River

2005 (Base year)	2010	2015	2020	2025
8,000	10,210	13,031	16,632	21,227

Source: Directorate of Ports and Inland Water Transport, GOK: Development of IWT in Karnataka, 2006

As a part of the preliminary study, Tourist Landing Terminals have been proposed at Ullal and at Old Mangalore Port. This will be examined in detail at DPR stage.

4.3 Conclusions

Considering the proximity of Netravathi River to Gurupur River, NMPT and OMPT Ports, a possibility of moving cargo 1.15-1.45 MMTPA exists. The details are as follows:

POL/LPG: Hazardous Cargo: 0.85-1.15 MMTPA
Container: 0.2 MMTPA, 12,000 TEUS
Building Material: 40,000 MTPA
Food Grains/Fisheries: 50,000 MTPA
Fertilizers: 3,000 MTPA

Passenger movement is also significant and likely to grow to 7 lakhs per annum in next 10 years. A tourist potential of 20,000 persons in next 10 years is also anticipated. This will be examined in detail at DPR stage.

CHAPTER 5 OBSERVATIONS AND INFERENCES

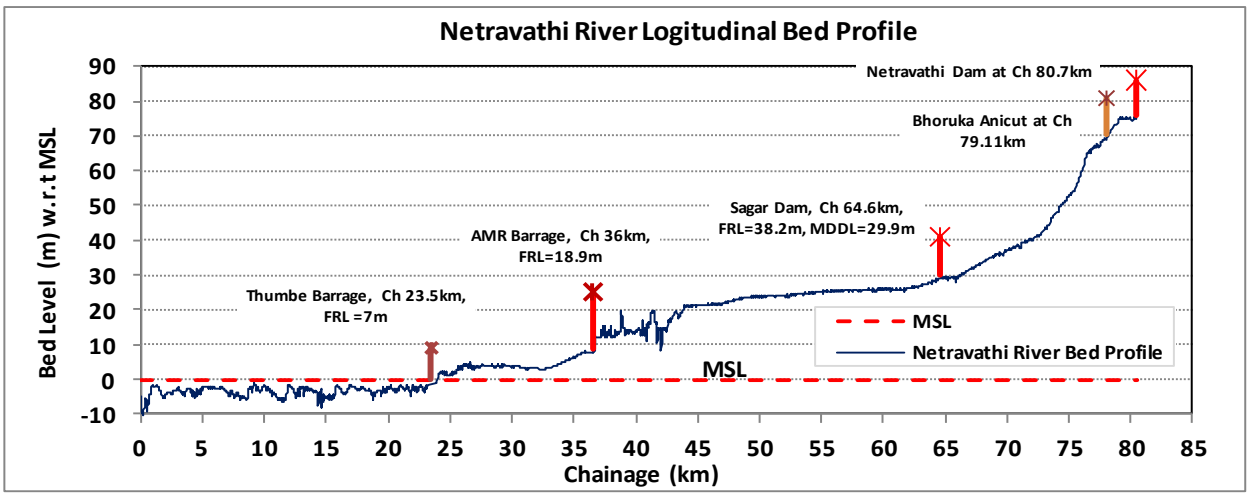
5.1 Waterway Feasibility

Based on the details presented under Chapter-3, following conclusions have been derived for establishing the navigability of the proposed waterway;

1. The river length as given by IWAI is 78.0km, whereas the total surveyed length along the river to capture the thalweg is 80.48km. The deepest channel route has been reckoned as 80.48km. All inferences derived for identifying the navigable length had been derived with reference to deepest channel length (80.48km).
2. There are two Dams, two Barrages and one Anicut exist along the surveyed route. Details of structures as given in **Table 3.22** are placed below. These structures divides the proposed waterway into Five distinct structures with varying water levels and hence deterrent for throughput navigation for the entire stage by IWT. Navigation locks are required to overcome the navigation barrier due to these structures.

Sl. No.	Name of Structure	Chainage (km)	Location		Details
			Latitude	Longitude	
1.	Thumbe Barrage (Karnataka Urban Water Supply & Drainage Board)	23.50	12°52'19.27"	75°0'18.28"	FRL: 7.00m HFL: 11.89m
2.	AMR Barrage (AMR Power Pvt. Ltd)	36.00	12°52'51.77"	75°5'38.95"	FRL: 18.90m
3.	Sagar Dam (Sagar Power Pvt. Ltd)	64.60	12°51'20.28"	75°19'27.45"	FRL: 38.2m MDDL: 29.90m
4.	Bhoruka Anicut (Bhoruka Power Pvt. Ltd)	79.11	12°57'29.63"	75°21'34.65"	Top Level: 79.00m Height :4m (13.5MW= 3 x 4.5MW)
5.	Netravathi Dam, Dhramsthala	80.70	12°57'54.22"	75°22'10.3"	-

3. The observed bed profile of Netravathi River waterways as shown in **Figure 3.21** is placed below.



4. The river is tidal affected up to 23.50km. 30.4% of the surveyed length has water depth more than 2 m i.e. for about 24.50km, however not continuous. {Reach starting from 0.00km (At confluence of river Netravathi River with the Arabian Sea / Gurupur River)}.
5. The lengths of the waterway, where a depth more than 2.0m, 1.5m and 1.0m with reference to the Chart Datum / MDDL / Appropriate levels have been compiled in the main report. The brief of this is given in **Table 3.15** and being reproduced below:

Chainage (Km)	Depth Available		Length of River (Km)			
	Max. (m)	Min. (m)	>2m	1.5-2.0m	1-1.5m	<1m
0.0-5	9.23	0.68	3.79	0.60	0.40	0.21
5-10	5.13	0.32	2.44	1.00	1.34	0.22
10-15	7.04	0.60	3.44	0.76	0.52	0.28
15-23	5.12	0.65	4.01	1.76	1.52	0.70
23-23.5	1.85	0.82	-	0.17	0.08	0.21
Sub Total			**13.68**	**4.29**	**3.86**	**1.62**
Thumbe Barrage at Ch 23.50km						
23.5-24	4.99	4.51	-	-	-	0.55
24-30	4.70	0.51	2.71	2.77	0.28	0.24
30-36	0.97	0.49	-	-	-	6.00
36-44	14.43	0.70	7.82	0.09	0.02	0.07
44-53	1.60	0.40	-	0.10	0.20	8.70
53-62	1.60	0.40	-	0.10	0.60	8.30
62-71	1.60	0.40	-	0.15	0.35	8.50
71-80.48	1.60	0.40	-	0.85	0.90	7.73
Sub Total			**10.53**	**4.06**	**2.35**	**40.09**
Grand Total			**24.21**	**8.35**	**6.21**	**41.71**

6. The existing Bridges and Power Cables in the stretch downstream of Thumbe Barrage (Ch 23.5km) are having sufficient clearances.
7. Feasibility study suggests that the river is generally navigable without any obstruction, up to Ch 23.10km (up to the Cable).

The above description & classification of the waterway has been presented schematically based on the survey observation and duly keeping in view the river classification criteria in **Table 3.27** as reproduced below:

Criteria	Classification																			
Length of waterway from start (km)	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80
Chainage length in %	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%
Depth availble	C-II						Needs Dredging		All Class			Needs Dredging								
Raod Bridge Vert. Clearance	All Class								C-I											
Raod Bridge Hor. Clearance	C-II																			
HT Line Vert. Clearance	All Class		Needs Raising of HT Base																	
Bend Radius	C-V								C-II								C-I			
Index	All Class		Class-V		Class-IV		Class-III		Class-II		Class-I									

5.2 Cargo Feasibility

Considering the proximity of Netravathi River to Gurupur River, NMPT and OMPT Ports, a possibility of moving cargo 1.15-1.45 MMTPA exists. The details are as follows:

POL/LPG: Hazardous Cargo:	0.85-1.15 MMTPA
Container:	0.2 MMTPA, 12,000 TEUS
Building Material:	40,000 MTPA
Food Grains/Fisheries:	50,000 MTPA
Fertilizers:	3,000 MTPA

Passenger movement is also significant and likely to grow to 7 lakhs per annum in next 10 years. A tourist potential of 20,000 persons in next 10 years is also anticipated.

5.3 SWOT Analysis

SWOT analysis has been carried out for deriving meaningful information specifying the objective of the study for development of the waterway for year round commercial navigation and identifying the internal & external factors that are favorable and unfavorable in the development of the waterway.

Strength

1. 30% of the 80.48km has waterway having more than 2m water depth available for navigation.

2. More than 2.0m depth is available for a length of 13.70km starting from 0.00km (At confluence of Netravathi River with Arabian Sea / Gurupur River) in the initial 23kms of the proposed waterway, however not continuous. Certain small shoals were observed, which may have to be attended by Dredging.
3. The maximum tidal fluctuation of 1.68m has been observed and this will strengthen the safe mobility of vessels in the waterway.
4. Approximately 5 lacs of population are residing in the Mangalore Taluka and Bantwal Taluka.
5. Three Ferry Routes are under operation with Passenger mobility of 1 lakh per annum.
6. 8000 – 10000 passengers per annum are moving through OMPT to Lakshadeep islands.
7. NMPT, OMPT and Gurupur River are well connected through the Netravathi River.
8. Bharati Ship Yard is on the banks of Gurupur River / Netravathi River
9. Fishing activity is flourishing in the Old Mangalore Port area.
10. Good Road and Rail connectivity exists through Mangalore city.
11. Ullal Town; Somanatha; Dargah of Syed Mohammed Shereeful Madani are in the vicinity of Netravathi River.

Weakness

1. Presently, the IWT movement is meagre.
2. Fishing Potential may have to be encouraged.
3. The presence of series of Dams and Barrages is an obstruction for throughput navigation.
4. Presence of Rock outcrops in the upper reaches is an obstruction for safe navigation.

Opportunity

1. 30% of the 80.48km is having more than 2m water depth available for navigation, which can be used advantageously for the mobility of hinterland cargo.
2. More than 2.0m is available for 13.70km length is available, in the initial 23kms of the proposed waterway starting from 0.00km (At confluence of Netravathi River with Arabian Sea / Gurupur River), however not continuous, which can be used advantageously for the mobility of hinterland cargo, since the balance stretch can be managed by Dredging activity.
3. The maximum tidal fluctuation of 1.68m, as observed, can be an opportunity for the safe mobility of vessels in the waterway.
4. The interconnectivity to NMPT, OMPT and Gurupur River may establish through put of IWT traffic.
5. Ro – Ro operation, if established, decongestion of Mangalore City Roads may be possible.
6. The existing fishing activity (through the OMPT) will get encouragement with the development of this River.
7. With the existence of three Ferry Routes on the Netravathi River, Passenger mobility will flourish, if the Waterway is developed.

8. With the presence of Ullal Town; Somanatha; Dargah of Syed Mohammed Shereeful Madani in the nearby catchment, Tourism may flourish, if the Waterway is developed.
9. The presence of Bharati Ship Yard on the banks of Gurupur River / Netravathi River may attract good mobility of Repair Infrastructure.
10. The present Rail and Road connectivity though may be competing with IWT may also be an opportunity for creating an efficient intermodal hub for IWT.
11. Diversion of Hazardous cargo mobility through IWT may be an opportunity.
12. Policies are to be firmed up for development of IWT in this stretch.

Threat

1. The Panvel Edappally Highway in the study area may create competing mode of transport.
2. NH 13, NH 17, NH 48, NH 234, SH 73 and SH 275 in the hinterland may be a competing mode, if not effectively used for intermodal connectivity.
3. The Hazardous cargo presently is being moved through the thickly populated Mangalore city area, which can be avoided with the IWT development on River Netravathi and River Gurupur with inter connectivity though the Ports in the vicinity.
4. The Netravathi River banks covered by mangrove trees may invite some socio-environmental issues and may require statutory approvals and clearances to construct the jetties/terminal/ports/intermodal connectivity.

5.4 Development Cost (Tentative)

The reconnaissance survey data with regard to physical constraints may have cost implications for making the river stretch navigable to the required standards. Henceforth the development of the proposed national water way involves physical interference in the form of dredging, construction of terminals at the identified locations, modification of HT Lines at crossing locations to provide a minimum vertical clearance of 20.1m (with respect to 220 kVA) or the case may be combined with some unforeseen expenses. Moderate dredging effort has been envisaged with an average dredging of 1.0m required in 9.3km of the length of proposed waterway (initial 23.10kms) reckoned with reference to ascertained data. The cost of dredging has been considered @ INR 230 per cum. The cost of terminal has been estimated @ INR 10.0 crore each for two Ro-Ro terminals. The existing Briges and Power Cables in the initial 23.1km are having sufficient Navigational clearances for the proposed Class of Waterway. Hence, no modification is required. The cost of navigational aids for day/night navigation has been considered as INR 200 lacs. 10% of the amount for dredging, terminal construction and night navigation has been envisaged as unforeseen. The tentative total cost of development to make the river navigable round the year to achieve safe navigation for the required classification of vessel mobility has been estimated to INR 33.70 crore.

Table 5.1: Tentative Development Cost of Netravathi River Waterway (NW-74)

Sl. No.	Name of Waterway	Length of Waterway	Dredging Required (w. r. to 2m draft & 40.0m width)	Dredging Cost @ INR 230/ cum	Ro–Ro Terminal Proposed	Ro-Ro Terminal Cost @ INR 10 Cr each	Cost of Modification of Bridge / Transmission line	Night Navigation	Total cost including 10% unforeseen
		(km)	(km)	INR in Cr.)	(Nos)	(INR in Cr.)	(INR in Cr.)	(INR in Cr.)	(INR in Cr.)
1	Netravathi River	23.10 / 80.48	9.3	8.6	1	20.00	--	2.00	33.70

5.5 Classification of Waterway

The Ministry of Shipping, Road Transport and Highways (Inland Waterways Authority of India) has classified the Inland waterways into seven categories for rivers and canals for safe plying of self propelled vessels up to 2000 DWT and tug-barge formation in push tug + four barge units of carrying capacity up to 8000 DWT (Ref: IWAI, Gazette Notification dated 26th January 2007).

As per the above Classification of Inland Waterways, the entire waterway of Netravathi River (NW-74) of initial 23.1km length has been classified based on the available minimum water depth, bottom width, minimum vertical and horizontal clearances of cross over structures and bend radius in the river. The classification of Netravathi River is described below.

Table 5.2: Classification of Netravathi River (NW-74)

Chainage (km)	Minimum Depth (m)	Bottom Width (m)	Minimum Vertical Clearance (m)	Minimum Horizontal Clearance (m)	Bend Radius (m)	Classification of Waterway (Proposed)
0.0 – 23.10	0.32	150	5.0 (LT Line)	40.0 (Bridge)	490	**Class – II**

The initial 23.10km study stretch of the waterway is amenable for development as Class II waterway as explained above. However, considerable Dredging is required. Smoothening of the bend at one location may be essential.

The above stretch of the waterway, hence, can be considered under Class II, which is navigable without any hindrance and shall be used for plying self-propelled vessel of carrying capacity up to 300 DWT (approximate size 45m overall length, 8m moulded breadth and 1.2m loaded draft) or one tug and two barges combination of 600 DWT (approximate size 110m overall length, 8m breadth and 1.2m loaded draft).

5.6 Recommendation

The national waterway-74 of Netravathi River has been identified having potential for development as waterway of **Class II** for the initial 23.10km study stretch, as described above. This stretch of the river is,

therefore, recommended for stage-II study for preparation of Detailed Project Report (DPR) to establish the viability for implementation as a project.

Accordingly, the national waterway NW-74 of Netravathi River is proposed for development as **Class II** waterway in the stretch of the waterway as depicted below: (As at Table 3.28).

River Stretch	0.00km 23.10km		23.65km 78.00km
Classification	**Class-II**		**NOT RECOMMENDED**
Horizontal clearance (m)	40		
Vertical clearnce (m)	5		
Minimum Depth (m)	1.4		
Bottom Width (m)	40		
Self Propelled Vessel			
Dead Weight Tonnage	300		
Vessel size (m)	45 x 8 x 1.2		
Tug + Barge			
Dead Weight Tonnage	600		
Vessel size (m)	110 x 8 x 1.2		

ANNEXURE 1.1

DATA COLLECTION & SOURCE OF DATA

Annexure 1.1: Data Collection Source of Data

(Cluster-6)

Sl. no	Name of Authority, place	Contacted Person	Designation	Contact Number	Required Data	Collected Data	Date of Receiving Data	Remarks
KARNATAKA								
1	Water Resources Deparment, Vikas Soudha, Banagalore	---	Additional Chief Secretary	---	River Gauge & Discharge Data/ Structure Detail	----	---	Official Letter Submitted to the Department. Data is Awaited
2	Public Works Ports and Inland Water Transport, Vikas Soudha, Bangalore	---	Principal Secretary	---	River Gauge & Discharge Data/ Structure Detail	Yes	3/4/2016	Official Letter Submitted to the Department. PS suggested to contact Director, Karwar for data collection.
3	Public Works Ports and Inland Water Transport, Karwar	Mr. Captain R Mohan	Director	---	River Gauge & Discharge Data/ Structure Detail/ Chart Datum	---	---	
4	Public Works Ports and Inland Water Transport, Karwar	Mr. Narayanappa	Inland water transport Engineer	9480431148	River Gauge & Discharge Data/ Structure Detail/ Chart Datum	Yes	3/3/2016	Official Letter Submitted to the Department. Data Received in the form of historical reports and studies.
5	public works ports and inland water transport, Karwar	Mr. YaganaKumar	Hydrographic Surveyor	9242850078	River Gauge & Discharge Data/ Structure Detail/ Chart Datum	Yes	3/4/2016	Official Letter Submitted to the Department. Data Received in the form of historical reports and studies.

Annexure 1.1: Data Collection Source of Data

(Cluster-6)

Sl. no	Name of Authority, place	Contacted Person	Designation	Contact Number	Required Data	Collected Data	Date of Receiving Data	Remarks
KERALA								
1	Planing and Economics Affairs, Annex Building, Secretariat, Thiruvanathapuram	Mr. Alok Sheel	Additioan Chief Secretary	0471-2518444	Data on Urban Infrastructure & Transportation	---	---	Official Letter Submitted to the Department. Data is Awaited
2	LSGD - Urban Affairs, Secretariat, Thiruvanathapuram	Mr. APM Mohammed Hanish	Secretary	0471-2327451	Data on Urban Infrastructure & Transportation	---	---	Official Letter Submitted to the Department. Data is Awaited
3	Directorate of industries and commerce, Vikas Bhavan, Thiruvananathapuram	Mr. PM Francis	Director	---	District Industrial Production Data	---	---	Official Letter Submitted to the Department. Data is Awaited
4	Directorate of industries and commerce, Vikas Bhavan, Thiruvananathapuram	Mr. Ramesh Baskar	Additional Direcotor	9495940863	District Industrial Production Data	---	---	Official Letter Submitted to the Department. Data is Awaited
5	Revenue and Disaster Management	Mr. Viswas Mehta	principal Secretary	0471-2518113, 0471-2517162	District Gross Production Data	---	---	Official Letter Submitted to the Department. Data is Awaited
6	Deparment of Transport	Mr. Elaias George	Additional Chief Secretary	---	Transport Related data/ Current Use	---	---	Official Letter Submitted to the Department. Data is Awaited
7	Water Resources Secretariat Thiruvanathapuram	Mr. VJ Kurain	Additional Chief Secretary	---	River Gauge & Discharge Data/ Structure Detail	---	---	Official Letter Submitted to the Department. Data is Awaited
8	Water ResourcesDeptt.Public Offiece, Thiruvanthapuram	Mr. Hari Narayanan	Chief Engineer	---	River Gauge & Discharge Data/ Structure Detail	---	---	Official Letter Submitted to the Department. Data is Awaited
9	Water ResourcesDeptt.Public Offiece, Thiruvanthapuram	Mr. Srileka	Executive Engneer	9895324906	River Gauge & Discharge Data/ Structure Detail	---	---	Official Letter Submitted to the Department. Data is Awaited

ANNEXURE 3.1

OVERVIEW CHART FOR NETRAVATHI RIVER BATHYMETRY

480000 E | 481000 E | 482000 E | 483000 E | 484000 E | 485000 E | 486000 E | 487000 E | 488000 E | 489000 E | 490000 E | 491000 E | 492000 E

1428000 N
1427000 N
1426000 N
1425000 N
1424000 N
1423000 N
1422000 N
1421000 N
1420000 N
1419000 N
1418000 N

Lat. 12°50'42.73"N
Lon. 74°49'28.86"E

Mangalora Old Port
Jamma Masjid
Bolar
Ullal Industrial Area
Masjid
Dreamland Resort
Mudipu
RAILWAY BRIDGE
Kochi Panvel BRIDGE
Jeppinamogaru
Adam Kudru
Permannur
THANDOLIGE
Bajala
Bajala Post Office
Faisal Nagar
Kannur
Dayambu
Adyarkatte
Sahyadri College of Engine
Lands Flavour Resort
Infant Jesı
Pavoor, Harekala Ferry Crossing
Pandeswara
Amblamogru
Bhandara Bail
132KV D/C

CH 0
CH 1
CH 2
CH 3
CH 4
CH 5
CH 6
CH 7
CH 8
CH 9
CH 10
CH 11
CH 12

MATCH LINE–1

LEGEND:

1.4	Sounding
1642000 N	UTM Grid
	BRIDGE
	HT/LT CABLE
	RIVER BOUNDARY
	SHOALS/BARS/ISLAND
	CHAINAGE

GEODETIC INFORMATION

GEODETIC DATUM	:	WGS 1984
ELLIPSOID	:	WGS 1984
SEMI MAJOR AXIS	:	6378137.000 M
SEMI MINOR AXIS	:	6356752.314 M
INVERSE FLATTENING	:	298.257223563
FALSE NORTHING	:	0 M
SCALE FACTOR	:	0.9996 ON CM
UNIT OF MEASUREMENT	:	INTERNATIONAL METRES
PROJECTION	:	UNIVERSAL TRANSVERSE MERCATOR
GRID SYSTEM	:	UTM ZONE 43 N
CENTRAL MERIDIAN	:	75 DEGREE EAST
LATITUDE OF ORIGIN	:	0 DEGREE NORTH
FALSE EASTING	:	500000 M

NOTES:

1. Position Fixing was controlled by Trimble SPS 351 DGPS System.
2. Dual Frequency Echo Sounder Bathy 500 DF working on 200 kHz was used for recording water depths.
3. Depths are in Metres and Decimetres.

REVISION STATUS

Rev	Date	Description	Surveyed by	Processing & Charting by	Checked by	Approved by
0	15 Feb 2016	Final Drawing	AVS	JA	DKV	BS

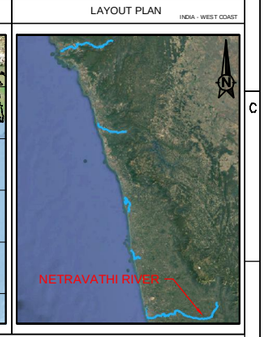
REFERENCE DRAWINGS

Rev. No:	Date:	Drawing No.	Source	Description:
-	-	-	-	-

OVERVIEW PLAN

LAYOUT PLAN

INDIA - WEST COAST



NOT TO SCALE

CLIENT

TRACTEBEL ENGINEERING PVT. LTD.
2nd FLOOR, BUILDING NO-10C,
DLF CYBER CITY,
GURGAON - 122002
HARYANA (INDIA)

SURVEY CONTRACTOR

GEOINFOSYS TECHNOLOGIES
201, Tara Bhavan, Old MB Road,
Lado Sarai, New Delhi - 30

PROJECT TITLE

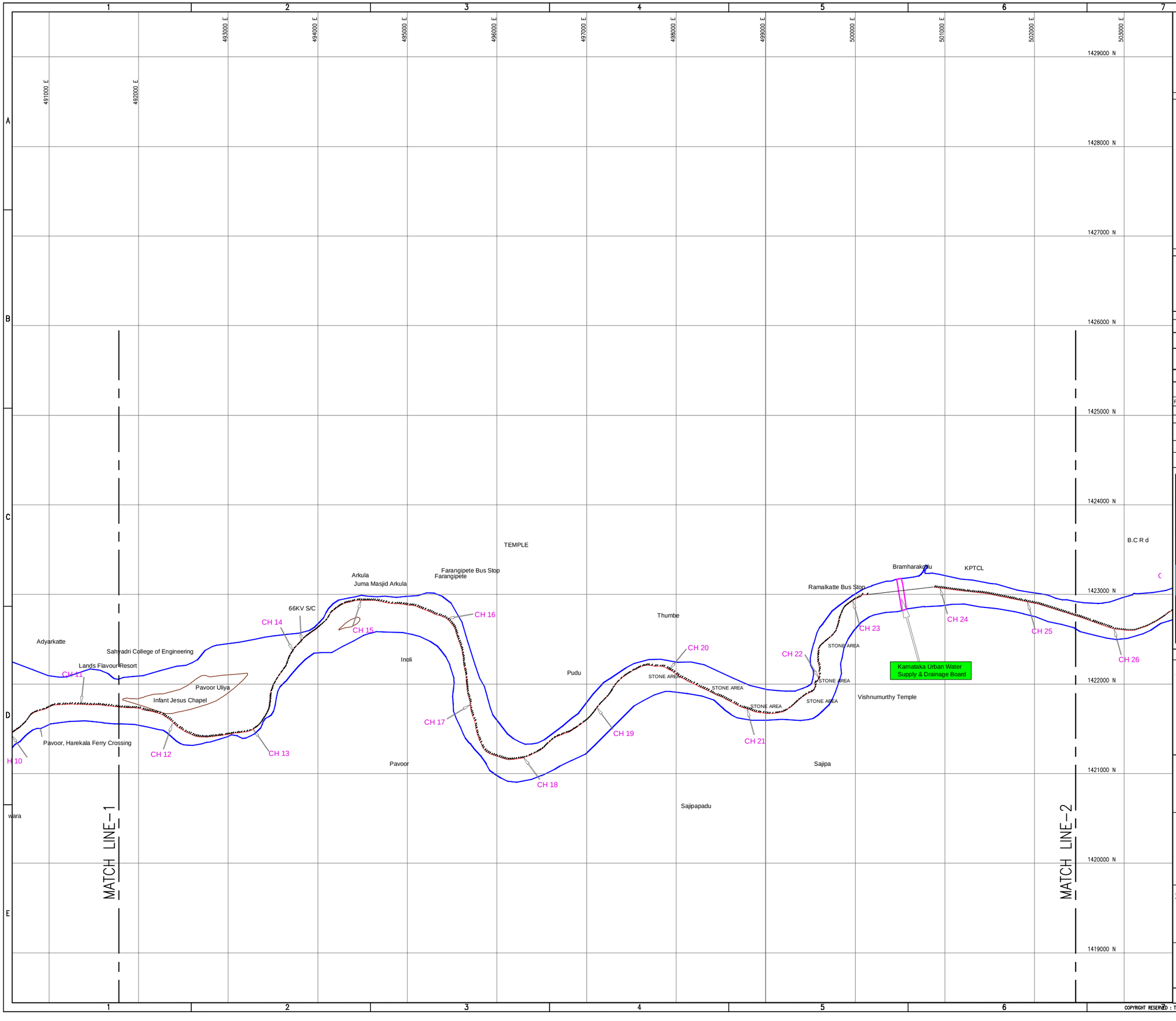
CONSULTANCY SERVICES FOR PREPARATION OF TWO STAGE DETAILDED REPORT OF PROPOSED 53 INLAND WATERWAYS (CLUSTER-VI (KARNATAKA AND KERALA) PROPOSED NATIONAL WATERWAY(NW-74)

CHART SHOWING

ANNEXURE 3.1
OVERVIEW CHART OF NETRAVATHI RIVER BATHYMETRY

SCALE 0 0.40 0.80 1.20 1.60 2.0KM

Sheet: 1 of 6



LEGEND:

1.4	Sounding		
1642000 N	UTM Grid		RIVER BOUNDARY
	BRIDGE		SHOALS/BARS/ISLAND
	HT/LT CABLE	CH72	CHAINAGE

GEODETIC INFORMATION

GEODETIC DATUM	:	WGS 1984
ELLIPSOID	:	WGS 1984
SEMI MAJOR AXIS	:	6378137.000 M
SEMI MINOR AXIS	:	6356752.314 M
INVERSE FLATTENING	:	298.257223563
FALSE NORTHING	:	0 M
SCALE FACTOR	:	0.9996 ON CM
UNIT OF MEASUREMENT	:	INTERNATIONAL METRES
PROJECTION	:	UNIVERSAL TRANSVERSE MERCATOR
GRID SYSTEM	:	UTM ZONE 43 N
CENTRAL MERIDIAN	:	75 DEGREE EAST
LATITUDE OF ORIGIN	:	0 DEGREE NORTH
FALSE EASTING	:	500000 M

NOTES:

1. Position Fixing was controlled by Trimble SPS 351 DGPS System.
2. Dual Frequency Echo Sounder Bathy 500 DF working on 200 kHz was used for recording water depths.
3. Depths are in Metres and Decimetres.

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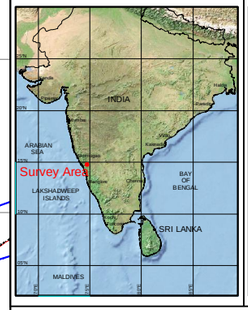
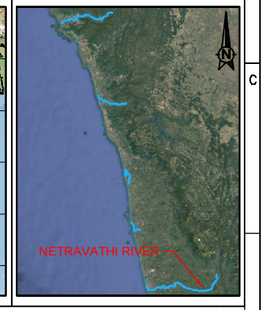
OVERVIEW PLAN



LAYOUT PLAN

INDIA - WEST COAST



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HARYANA (INDIA)

SURVEY CONTRACTOR

GEOINFOSYS TECHNOLOGIES
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PROJECT TITLE

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CHART SHOWING

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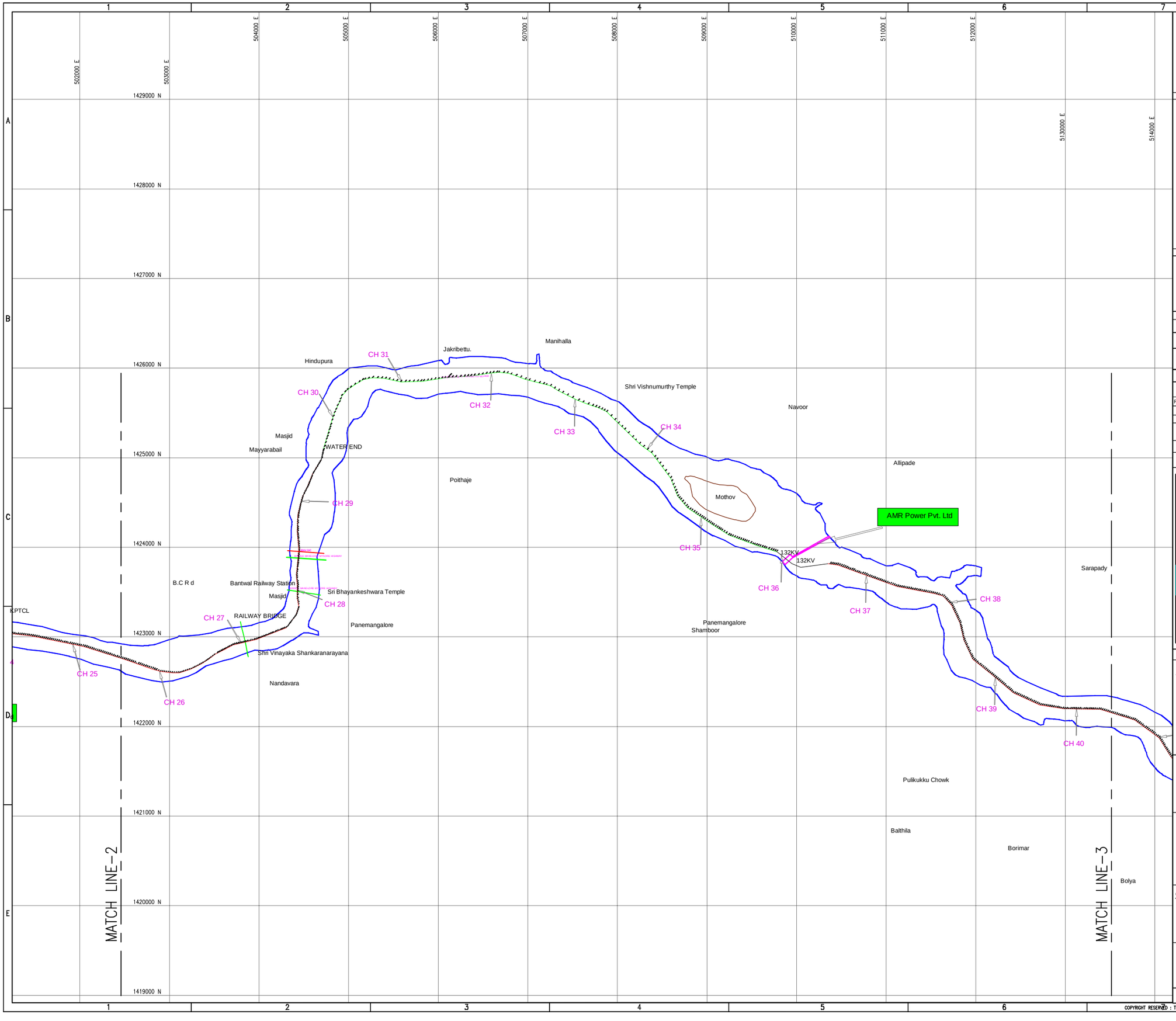
BATHYMETRY

SCALE 0 0.40 0.80 1.20 1.60 2.0KM



LEGEND:

1.4	Sounding		
1642000 N	UTM Grid		RIVER BOUNDARY
	BRIDGE		SHOALS/BARS/ISLAND
	HT/LT CABLE	CH2	CHAINAGE

GEODETIC INFORMATION

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GRID SYSTEM	:	UTM ZONE 43 N
CENTRAL MERIDIAN	:	75 DEGREE EAST
LATITUDE OF ORIGIN	:	0 DEGREE NORTH
FALSE EASTING	:	500000 M

NOTES:

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OVERVIEW PLAN

LAYOUT PLAN

INDIA - WEST COAST

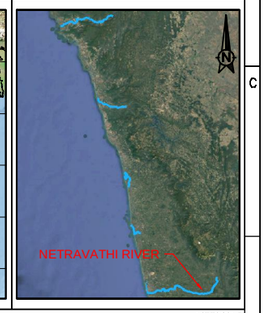

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CHART SHOWING

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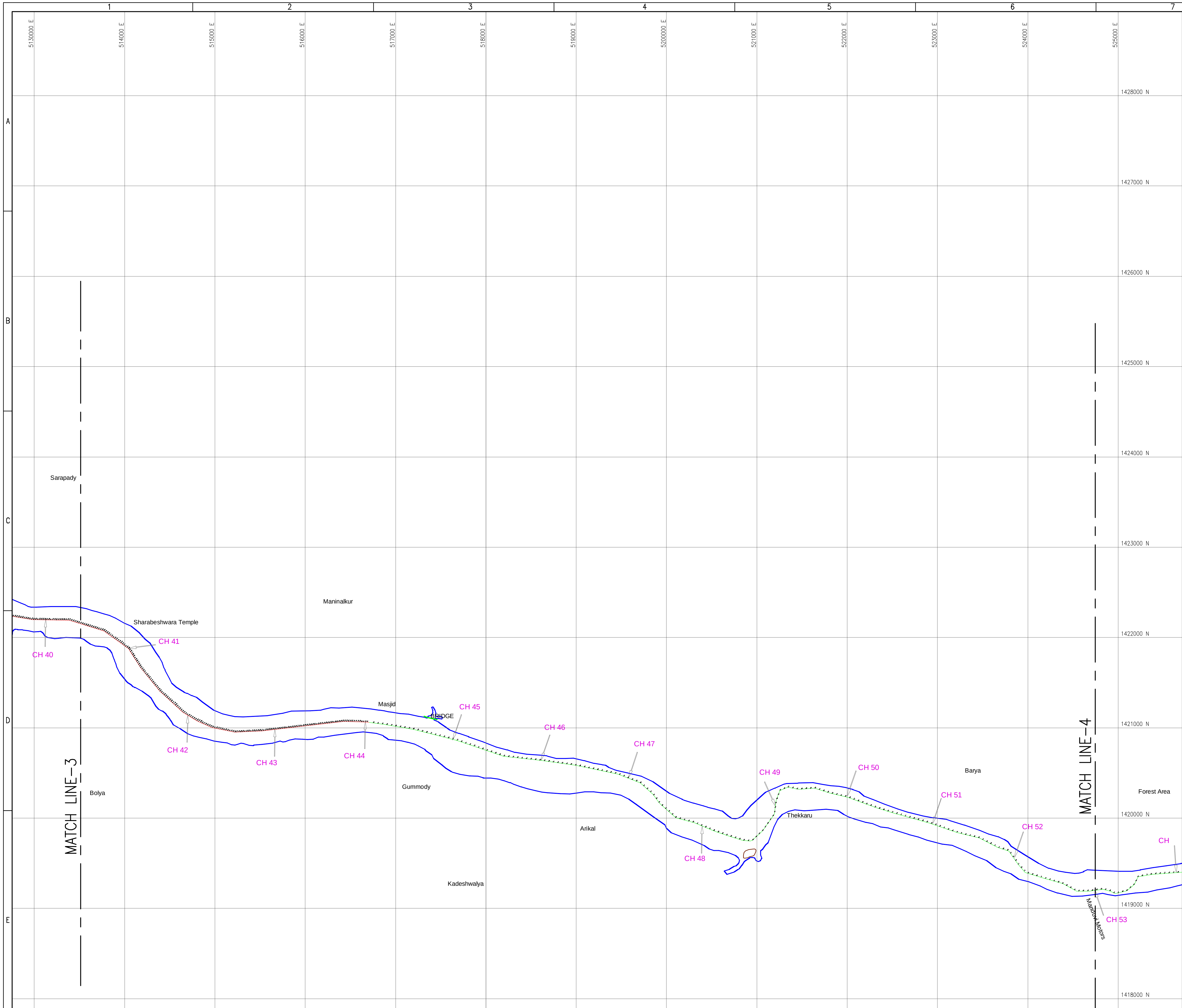
SCALE 0 0.40 0.80 1.20 1.60 2.0KM



LEGEND:

1.4	Sounding		RIVER BOUNDARY
1642000 N	UTM Grid		SHOALS/BARS/ISLAND
	BRIDGE		CHAINAGE
	HT/LT CABLE		

GEODETIC INFORMATION

GEODETIC DATUM	:	WGS 1984
ELLIPSOID	:	WGS 1984
SEMI MAJOR AXIS	:	6378137.000 M
SEMI MINOR AXIS	:	6356752.314 M
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PROJECTION	:	UNIVERSAL TRANSVERSE MERCATOR
GRID SYSTEM	:	UTM ZONE 43 N
CENTRAL MERIDIAN	:	75 DEGREE EAST
LATITUDE OF ORIGIN	:	0 DEGREE NORTH
FALSE EASTING	:	500000 M

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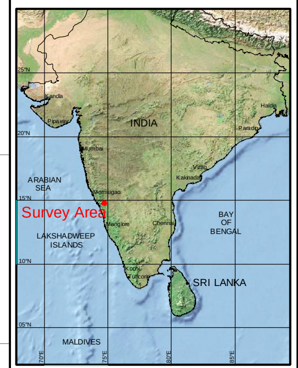
OVERVIEW PLAN



LAYOUT PLAN

INDIA - WEST COAST

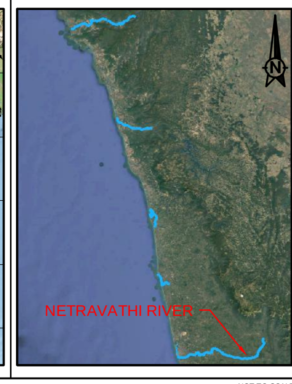


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CHART SHOWING

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SCALE 0 0.40 0.80 1.20 1.60 2.0KM

525000 E 526000 E 527000 E 528000 E 529000 E 530000 E 531000 E 532000 E 533000 E 534000 E 535000 E 536000 E

1428000 N
1427000 N
1426000 N
1425000 N
1424000 N
1423000 N
1422000 N
1421000 N
1420000 N
1419000 N
1418000 N

MATCH LINE–5

MATCH LINE–4

Forest A

Bandaru

Fo

Ilanthila

Forest Area

Forest Area

Valal

Forest Area

Forest Area

Uppinangady

College

Nekkiladi

BRIDGE UPPINANGADY

FOOT OVER BRIDGE

33KV LINE ON 220KV TOWER

Sagar Power Pvt. Ltd

Mathew Motors

CH 52
CH 53
CH 54
CH 55
CH 56
CH 57
CH 58
CH 59
CH 60
CH 61
CH 62
CH 63
CH 64
CH 65
CH 66
CH 67
CH 68
CH 69
CH 70

LEGEND:

1.4	Sounding
1642000 N	UTM Grid
	BRIDGE
	HT/LT CABLE
	RIVER BOUNDARY
	SHOALS/BARS/ISLAND
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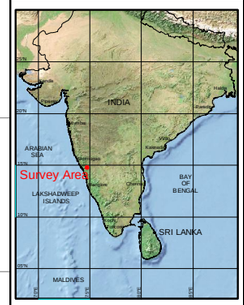
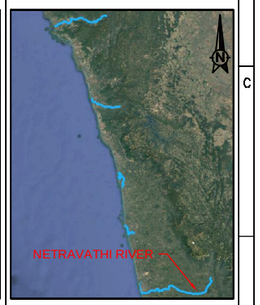


LAYOUT PLAN
INDIA - WEST COAST



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BATHYMETRY

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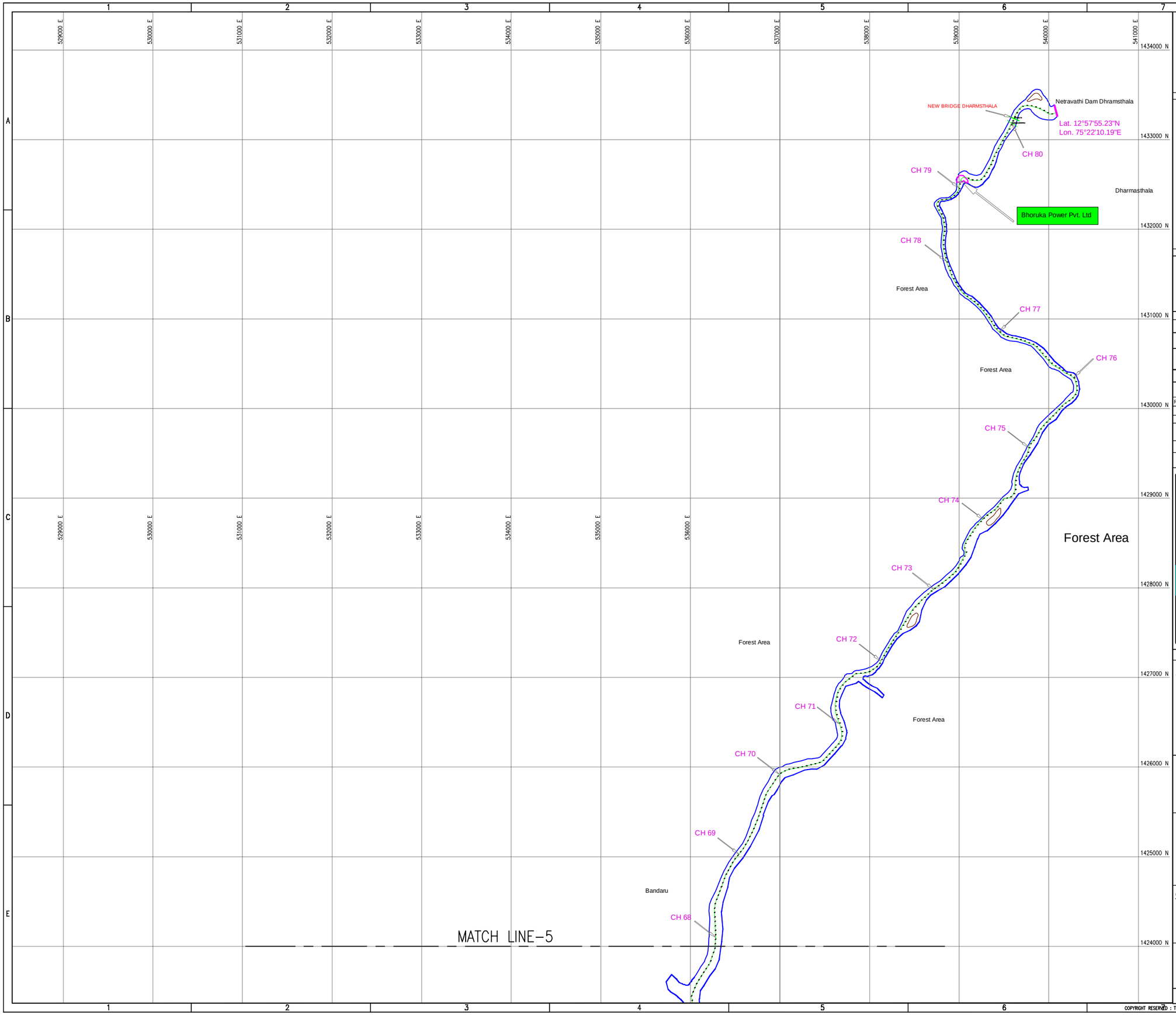
Sheet: 5 of 6



LEGEND:

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	RIVER BOUNDARY
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OVERVIEW PLAN

LAYOUT PLAN

INDIA - WEST COAST

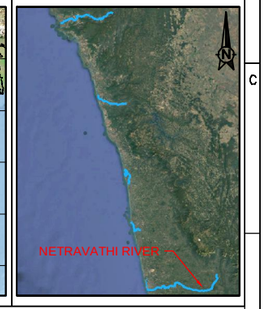

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CHART SHOWING

ANNEXURE 3.1
OVERVIEW CHART OF NETRAVATHI RIVER
BATHYMETRY

SCALE 0 0.40 0.80 1.20 1.60 2.0KM

Sheet: 6 of 6

ANNEXURE 3.2

CHART DATUM NEW MANGALORE PORT

NEW MANGALORE PORT TRUST

OIL SPILL CONTINGENCY PLAN

REVIEWED AND UPDATED IN

SEPTEMBER 2008

CHAPTER 1

1. INTRODUCTION

1.1 Area Description:

New Mangalore Port is located on the West Coast of India midway between Kochi and Mormugao. It is an all weather port and the maritime gateway of Karnataka State.

The National Highway 17 passes just outside the port connecting Cape Comorin to Mumbai.

The Port is served by a Broad Gauge Railway line and is well connected with Southern portion of country through Mangalore, Kerala State and Chennai.

The nearest Airport, Bajpe (Mangalore Airport) is just 18 kms from the Port. There are daily flights to Mumbai, Bangalore and Chennai.

1.2. Location:

Latitude: 12^0 55' N
Longitude: 74^0 48' E

1.3. Meteorological Marine Data:

1.3.1. Wind:

The winds in the monsoon months of June, July and August are predominantly from Southwest and West with a maximum intensity of 5 in the Beaufort Scale (with occasional squall up to force 7). The winds in the remaining months of the year are predominantly from Northwest and maximum intensity during this period is also force 5 in the Beaufort scale.

1.3.2 Waves:

The predominant direction of waves in the vicinity of New Mangalore Port during Monsoon months of June, July and August is West and Southwest whereas during the fair months it is Northwest and North. Analysis of data collected from

ships in and around Mangalore revealed that 0.4% of the waves have a height of 4.9 metres. Maximum height recorded in 1974: 6.50 metres. The wave heights in the non-monsoon months are much less. The dominant wave period during the monsoon is approximately 10 seconds while longer wave periods are experienced during the monsoon.

1.3.3 Cyclones:

The location of the port is such it does not encounter cyclones..

1.3.4 Visibility:

Thirty years observations conducted by the Indian Meteorological Department reveal that poor visibility (visibility less than 4 kms.) is encountered for about 10 days during the South West monsoon period.

1.3.5 Currents:

The current along the coast during the South-West monsoon (from June to September) is in general towards sought. During the North-East monsoon (November to February) the current in general is towards North. During the period of heavy rains in the South-West monsoon there have been observations of reversal of set in the approach channel near the edge of the breakwater with a strong drift. Drift is variable in the approach channel and can be as high as 1.5 knots during the South-West monsoon.

1.3.6 Tides:

The tidal particulars at New Mangalore Port are as follows (with reference to Chart Datum):

Higher High Water Springs	-	+1.68m
Mean Higher High Water	-	+1.48m
Mean Lower High Water	-	+1.26m
Mean Sea Level	-	+0.95m
Mean Lower Low Water	-	+0.26m
Lower Low Water Springs near solstices	-	+0.03m

1.3.7 Climate:

Temperature	-	Max. 34^0 C / Min. 18^0 C
Annual Rainfall	-	About 3450mm
Weather	-	Tropical climate with high humidity

1.4 Important features of the Port:

1.4.1 Port Area:

Water Spread:	-	320 Acres (129 hectares)
Land Area	-	2030 Acres (822 hectares)
Total	-	2350 Acres (951.04 hectares)

1.4.2 Berth Particulars

Sl. No	NAME OF BERTH	TYPE OF BERTH	DRAUGHT (IN MTS.)	LENGTH (IN MTS.)	DWT
1.	BERTH NO.1	GEN.CARGO	7.00	125	4000
2.	BERTH NO.2	GEN.CARGO	10.50	198	30000
3.	BERTH NO.3	GEN.CARGO	10.30	198	30000
4.	BERTH NO.4	GEN.CARGO/LIQUID AMMONIA/ PHOSPHORIC ACID	9.50	198	30000
5.	BERTH NO.5	GEN.CARGO/BULK CEMENT/ EDIBLE OIL	9.50	198	30000
6.	BERTH NO.6	GEN.CARGO	9.50	198	30000
7.	BERTH NO.7	GEN.CARGO	9.50	198	30000
8.	BERTH NO.8	IRON ORE/ GEN.CARGO	13.00	300	60000
9.	BERTH NO.9	POL/LPG	10.50	330	45000
10.	BERTH NO.10	CRUDE OIL/POL	14.00	320	120000
11.	BERTH NO.11	CRUDE & POL	14.00	320	120000
12.	BERTH NO.12	POL & CHEMICALS	12.50	320	50000
13.	BERTH NO.13	Under construction	12.00	275	35000
14.	BERTH NO.14	GEN.CARGO/IRON ORE/COAL	14.00	350	85000

1.4.3. Floating crafts:

- 22.5 T Bollard Pull Tractor Tug (VSP) - 1 No.
- 32 T Bollard Pull Tug Tractor Tug (VSP) - 3 Nos.
- 50 T Bollard Pull Tractor Tug (VSP) - 1 No.
- Pilot Launches - 3 Nos.
- Mooring Launches - 5 Nos.
- Survey Launch - 1 No.
- Buoy Laying Tender cum Skimmer 50 T capacity - 1 No.

ANNEXURE 3.3

BATHYMETRIC SURVEY AS RECEIVED FROM HYDROGRAPHIC SURVEYOR

Annexure 3.3: Bathymetric Survey as Received from Hydrographic Surveyor

Digital Data, Chainage vs Water Depth

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
0.00	74°49 '33.47"	12°50 '44.57"	4.91	3.96
0.02	74°49 '34.02"	12°50 '44.19"	7.53	6.58
0.04	74°49 '34.65"	12°50 '43.96"	7.93	6.98
0.06	74°49 '35.3"	12°50 '43.78"	8.53	7.58
0.08	74°49 '35.94"	12°50 '43.58"	8.88	7.93
0.10	74°49 '36.69"	12°50 '43.38"	9.64	8.69
0.13	74°49 '37.39"	12°50 '43.2"	10.04	9.10
0.15	74°49 '38.1"	12°50 '43.01"	9.76	8.82
0.18	74°49 '39.09"	12°50 '42.74"	10.01	9.07
0.20	74°49 '39.74"	12°50 '42.59"	10.17	9.23
0.23	74°49 '40.55"	12°50 '42.35"	9.89	8.95
0.25	74°49 '41.2"	12°50 '42.18"	9.54	8.60
0.27	74°49 '41.86"	12°50 '42.01"	8.99	8.05
0.29	74°49 '42.5"	12°50 '41.83"	8.29	7.35
0.31	74°49 '43.16"	12°50 '41.68"	7.64	6.70
0.33	74°49 '43.79"	12°50 '41.48"	7.52	6.58
0.36	74°49 '44.88"	12°50 '41.25"	7.37	6.43
0.38	74°49 '45.54"	12°50 '41.07"	6.42	5.49
0.40	74°49 '46.2"	12°50 '40.89"	5.74	4.81
0.42	74°49 '46.85"	12°50 '40.72"	5.49	4.56
0.44	74°49 '47.52"	12°50 '40.6"	5.71	4.78
0.46	74°49 '48.22"	12°50 '40.46"	6.23	5.30
0.49	74°49 '48.93"	12°50 '40.29"	6.99	6.06
0.51	74°49 '49.58"	12°50 '40.11"	7.73	6.80
0.53	74°49 '50.24"	12°50 '39.91"	8.83	7.90
0.55	74°49 '50.99"	12°50 '39.67"	9.33	8.40
0.57	74°49 '51.64"	12°50 '39.5"	8.07	7.14
0.59	74°49 '52.31"	12°50 '39.32"	7.52	6.59
0.61	74°49 '52.97"	12°50 '39.13"	7.03	6.11
0.63	74°49 '53.63"	12°50 '38.92"	6.56	5.64
0.65	74°49 '54.27"	12°50 '38.72"	5.82	4.90
0.69	74°49 '55.4"	12°50 '38.28"	5.32	4.40
0.71	74°49 '56.02"	12°50 '38.02"	4.63	3.71
0.73	74°49 '56.65"	12°50 '37.79"	4.51	3.59
0.75	74°49 '57.29"	12°50 '37.58"	4.44	3.52
0.77	74°49 '57.93"	12°50 '37.36"	4.32	3.40
0.79	74°49 '58.63"	12°50 '37.17"	4.22	3.30
0.81	74°49 '59.25"	12°50 '36.92"	3.83	2.91
0.83	74°49 '59.89"	12°50 '36.71"	3.42	2.50
0.85	74°50 '0.54"	12°50 '36.54"	3.23	2.32
0.88	74°50 '1.51"	12°50 '36.3"	3.16	2.25
0.91	74°50 '2.18"	12°50 '36.12"	2.06	1.15
0.93	74°50 '2.82"	12°50 '35.93"	1.59	0.68
0.95	74°50 '3.49"	12°50 '35.68"	1.65	0.74
0.98	74°50 '4.41"	12°50 '35.4"	1.76	0.85
1.00	74°50 '5.06"	12°50 '35.23"	1.67	0.76
1.02	74°50 '5.72"	12°50 '35.07"	1.62	0.71
1.04	74°50 '6.35"	12°50 '34.84"	1.73	0.82
1.06	74°50 '6.98"	12°50 '34.62"	1.87	0.96
1.08	74°50 '7.62"	12°50 '34.41"	2.13	1.22
1.10	74°50 '8.28"	12°50 '34.26"	2.33	1.43
1.12	74°50 '8.97"	12°50 '34.1"	2.28	1.38
1.16	74°50 '10.2"	12°50 '33.78"	2.24	1.34
1.18	74°50 '10.94"	12°50 '33.6"	2.23	1.33
1.20	74°50 '11.58"	12°50 '33.44"	2.05	1.15
1.22	74°50 '12.31"	12°50 '33.29"	1.98	1.08
1.26	74°50 '13.55"	12°50 '33.08"	1.82	0.92
1.28	74°50 '14.21"	12°50 '32.97"	1.83	0.93
1.30	74°50 '14.95"	12°50 '32.83"	1.94	1.04
1.33	74°50 '15.65"	12°50 '32.69"	2.03	1.13
1.35	74°50 '16.35"	12°50 '32.59"	2.13	1.24
1.37	74°50 '17.02"	12°50 '32.52"	2.24	1.35
1.39	74°50 '17.9"	12°50 '32.43"	2.26	1.37
1.41	74°50 '18.59"	12°50 '32.36"	2.33	1.44
1.44	74°50 '19.26"	12°50 '32.28"	2.51	1.62
1.46	74°50 '19.92"	12°50 '32.23"	2.72	1.83
1.48	74°50 '20.6"	12°50 '32.19"	2.82	1.93

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
1.50	74°50 '21.33"	12°50 '32.18"	2.96	2.07
1.52	74°50 '21.99"	12°50 '32.06"	3.21	2.32
1.55	74°50 '22.88"	12°50 '31.86"	3.29	2.40
1.57	74°50 '23.54"	12°50 '31.67"	3.12	2.23
1.59	74°50 '24.18"	12°50 '31.5"	3.06	2.18
1.61	74°50 '24.85"	12°50 '31.32"	3.11	2.23
1.63	74°50 '25.5"	12°50 '31.17"	3.30	2.42
1.65	74°50 '26.15"	12°50 '31.03"	3.62	2.74
1.67	74°50 '26.8"	12°50 '30.88"	3.81	2.93
1.69	74°50 '27.46"	12°50 '30.75"	4.09	3.21
1.71	74°50 '28.14"	12°50 '30.63"	4.44	3.56
1.73	74°50 '28.8"	12°50 '30.52"	4.61	3.73
1.75	74°50 '29.47"	12°50 '30.41"	4.88	4.00
1.77	74°50 '30.13"	12°50 '30.31"	5.19	4.31
1.80	74°50 '31.01"	12°50 '30.14"	5.28	4.40
1.82	74°50 '31.66"	12°50 '29.94"	5.37	4.50
1.84	74°50 '32.29"	12°50 '29.72"	5.39	4.52
1.86	74°50 '33.11"	12°50 '29.44"	5.28	4.41
1.88	74°50 '33.75"	12°50 '29.24"	5.02	4.15
1.91	74°50 '34.64"	12°50 '28.95"	4.93	4.06
1.93	74°50 '35.3"	12°50 '28.78"	4.66	3.79
1.95	74°50 '35.96"	12°50 '28.62"	4.81	3.94
1.97	74°50 '36.62"	12°50 '28.41"	5.10	4.23
1.99	74°50 '37.29"	12°50 '28.23"	5.24	4.37
2.01	74°50 '37.93"	12°50 '28.06"	4.73	3.86
2.03	74°50 '38.58"	12°50 '27.87"	4.55	3.68
2.06	74°50 '39.26"	12°50 '27.7"	4.38	3.52
2.09	74°50 '40.28"	12°50 '27.46"	4.33	3.47
2.11	74°50 '40.94"	12°50 '27.3"	4.14	3.28
2.14	74°50 '41.8"	12°50 '27.05"	4.17	3.31
2.16	74°50 '42.46"	12°50 '26.86"	3.92	3.06
2.18	74°50 '43.18"	12°50 '26.66"	3.90	3.04
2.21	74°50 '44.11"	12°50 '26.38"	3.84	2.98
2.23	74°50 '44.75"	12°50 '26.19"	3.88	3.02
2.27	74°50 '46.01"	12°50 '25.78"	3.79	2.93
2.29	74°50 '46.66"	12°50 '25.62"	3.63	2.77
2.31	74°50 '47.31"	12°50 '25.45"	3.78	2.93
2.33	74°50 '48.07"	12°50 '25.25"	3.77	2.92
2.36	74°50 '48.94"	12°50 '25.05"	3.94	3.09
2.40	74°50 '50.22"	12°50 '24.83"	3.92	3.07
2.42	74°50 '50.95"	12°50 '24.7"	3.94	3.09
2.46	74°50 '52.15"	12°50 '24.44"	3.96	3.11
2.48	74°50 '52.91"	12°50 '24.27"	3.99	3.14
2.50	74°50 '53.57"	12°50 '24.17"	4.19	3.34
2.52	74°50 '54.26"	12°50 '24.11"	4.20	3.35
2.54	74°50 '54.92"	12°50 '24.05"	4.04	3.19
2.57	74°50 '55.68"	12°50 '23.96"	4.01	3.17
2.59	74°50 '56.36"	12°50 '23.88"	3.93	3.09
2.61	74°50 '57.02"	12°50 '23.74"	3.85	3.01
2.64	74°50 '57.97"	12°50 '23.58"	3.90	3.06
2.66	74°50 '58.64"	12°50 '23.5"	3.72	2.88
2.68	74°50 '59.34"	12°50 '23.38"	3.06	2.22
2.72	74°51 '0.55"	12°50 '23.05"	3.32	2.48
2.74	74°51 '1.19"	12°50 '22.87"	3.23	2.39
2.77	74°51 '2.23"	12°50 '22.58"	3.13	2.29
2.80	74°51 '3.31"	12°50 '22.3"	3.16	2.33
2.82	74°51 '3.97"	12°50 '22.1"	3.22	2.39
2.84	74°51 '4.68"	12°50 '21.9"	3.38	2.55
2.87	74°51 '5.6"	12°50 '21.69"	3.36	2.53
2.89	74°51 '6.23"	12°50 '21.43"	2.76	1.93
2.92	74°51 '7.07"	12°50 '20.94"	2.77	1.94
2.94	74°51 '7.69"	12°50 '20.7"	2.58	1.75
2.96	74°51 '8.33"	12°50 '20.51"	2.36	1.53
2.98	74°51 '8.97"	12°50 '20.29"	2.43	1.60
3.00	74°51 '9.63"	12°50 '20.13"	2.51	1.68
3.03	74°51 '10.44"	12°50 '19.97"	2.24	1.42
3.06	74°51 '11.5"	12°50 '19.8"	2.32	1.50
3.08	74°51 '12.18"	12°50 '19.69"	2.48	1.66
3.10	74°51 '12.86"	12°50 '19.61"	2.65	1.83

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
3.12	74°51 '13.53"	12°50 '19.53"	2.86	2.04
3.14	74°51 '14.21"	12°50 '19.49"	2.98	2.16
3.16	74°51 '14.88"	12°50 '19.46"	3.04	2.22
3.18	74°51 '15.57"	12°50 '19.46"	2.99	2.17
3.21	74°51 '16.25"	12°50 '19.51"	3.07	2.25
3.23	74°51 '16.95"	12°50 '19.56"	3.17	2.35
3.25	74°51 '17.62"	12°50 '19.6"	3.18	2.36
3.27	74°51 '18.31"	12°50 '19.62"	3.25	2.44
3.29	74°51 '18.97"	12°50 '19.63"	3.47	2.66
3.31	74°51 '19.64"	12°50 '19.63"	3.68	2.87
3.33	74°51 '20.3"	12°50 '19.61"	3.86	3.05
3.35	74°51 '20.98"	12°50 '19.59"	3.99	3.18
3.38	74°51 '22.06"	12°50 '19.61"	3.81	3.00
3.40	74°51 '22.73"	12°50 '19.61"	4.30	3.49
3.42	74°51 '23.42"	12°50 '19.66"	3.77	2.96
3.44	74°51 '24.18"	12°50 '19.69"	4.01	3.20
3.46	74°51 '24.85"	12°50 '19.71"	3.82	3.01
3.49	74°51 '25.53"	12°50 '19.67"	3.75	2.94
3.51	74°51 '26.3"	12°50 '19.7"	3.98	3.17
3.53	74°51 '26.96"	12°50 '19.79"	4.35	3.55
3.55	74°51 '27.65"	12°50 '19.89"	4.43	3.63
3.57	74°51 '28.31"	12°50 '20"	4.53	3.73
3.60	74°51 '29.36"	12°50 '20.21"	4.42	3.62
3.62	74°51 '30.02"	12°50 '20.32"	3.90	3.10
3.64	74°51 '30.68"	12°50 '20.44"	3.64	2.84
3.66	74°51 '31.34"	12°50 '20.59"	3.17	2.37
3.68	74°51 '32.03"	12°50 '20.75"	3.02	2.22
3.70	74°51 '32.69"	12°50 '20.92"	2.45	1.65
3.73	74°51 '33.34"	12°50 '21.1"	2.33	1.53
3.75	74°51 '34.06"	12°50 '21.29"	2.42	1.62
3.77	74°51 '34.77"	12°50 '21.46"	2.41	1.62
3.79	74°51 '35.44"	12°50 '21.59"	2.46	1.67
3.83	74°51 '36.57"	12°50 '21.8"	2.40	1.61
3.85	74°51 '37.5"	12°50 '22.02"	2.44	1.65
3.87	74°51 '38.17"	12°50 '22.14"	2.37	1.58
3.89	74°51 '38.83"	12°50 '22.26"	2.41	1.62
3.92	74°51 '39.81"	12°50 '22.46"	2.43	1.64
3.95	74°51 '40.61"	12°50 '22.63"	2.48	1.69
3.97	74°51 '41.26"	12°50 '22.78"	2.70	1.91
4.00	74°51 '42.33"	12°50 '23.09"	2.79	2.01
4.04	74°51 '43.56"	12°50 '23.48"	2.94	2.16
4.06	74°51 '44.2"	12°50 '23.73"	3.39	2.61
4.10	74°51 '45.24"	12°50 '24.06"	3.37	2.59
4.14	74°51 '46.52"	12°50 '24.45"	3.28	2.50
4.16	74°51 '47.17"	12°50 '24.63"	4.63	3.85
4.18	74°51 '47.86"	12°50 '24.8"	3.30	2.52
4.20	74°51 '48.6"	12°50 '25.05"	4.22	3.44
4.22	74°51 '49.24"	12°50 '25.29"	4.48	3.70
4.25	74°51 '50"	12°50 '25.53"	3.64	2.87
4.27	74°51 '50.63"	12°50 '25.75"	4.75	3.98
4.29	74°51 '51.35"	12°50 '26.02"	3.42	2.65
4.31	74°51 '52.01"	12°50 '26.19"	4.93	4.16
4.33	74°51 '52.8"	12°50 '26.35"	4.78	4.01
4.35	74°51 '53.46"	12°50 '26.47"	4.08	3.31
4.38	74°51 '54.12"	12°50 '26.6"	4.84	4.07
4.40	74°51 '54.94"	12°50 '26.83"	3.47	2.70
4.42	74°51 '55.59"	12°50 '27.01"	5.18	4.41
4.45	74°51 '56.43"	12°50 '27.18"	3.71	2.94
4.47	74°51 '57.13"	12°50 '27.27"	4.61	3.84
4.49	74°51 '57.87"	12°50 '27.36"	4.36	3.60
4.51	74°51 '58.53"	12°50 '27.51"	3.42	2.66
4.53	74°51 '59.18"	12°50 '27.63"	4.71	3.95
4.57	74°52 '0.39"	12°50 '27.75"	3.27	2.51
4.59	74°52 '1.06"	12°50 '27.81"	2.72	1.96
4.63	74°52 '2.29"	12°50 '27.98"	3.55	2.79
4.65	74°52 '3.18"	12°50 '28.08"	3.18	2.42
4.68	74°52 '4.04"	12°50 '28.21"	3.65	2.89
4.70	74°52 '4.7"	12°50 '28.33"	3.89	3.13
4.72	74°52 '5.48"	12°50 '28.47"	3.92	3.16

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
4.74	74°52 '6.14"	12°50 '28.6"	3.72	2.97
4.77	74°52 '7.12"	12°50 '28.75"	3.00	2.25
4.80	74°52 '8.14"	12°50 '28.93"	3.20	2.45
4.84	74°52 '9.33"	12°50 '29.18"	4.20	3.45
4.86	74°52 '9.96"	12°50 '29.39"	3.37	2.62
4.88	74°52 '10.61"	12°50 '29.64"	2.73	1.98
4.90	74°52 '11.25"	12°50 '29.86"	2.29	1.54
4.92	74°52 '11.95"	12°50 '30.1"	3.19	2.44
4.95	74°52 '12.62"	12°50 '30.32"	2.84	2.09
4.97	74°52 '13.27"	12°50 '30.49"	2.16	1.42
5.00	74°52 '14.37"	12°50 '30.8"	2.13	1.39
5.03	74°52 '15.14"	12°50 '31.1"	2.26	1.52
5.05	74°52 '15.77"	12°50 '31.34"	2.03	1.29
5.07	74°52 '16.41"	12°50 '31.57"	1.98	1.24
5.09	74°52 '17.1"	12°50 '31.83"	1.94	1.20
5.11	74°52 '17.76"	12°50 '32.07"	1.98	1.24
5.13	74°52 '18.36"	12°50 '32.37"	1.96	1.22
5.16	74°52 '19.35"	12°50 '32.84"	1.92	1.18
5.20	74°52 '20.51"	12°50 '33.29"	1.88	1.14
5.22	74°52 '21.19"	12°50 '33.5"	1.89	1.16
5.25	74°52 '22.07"	12°50 '33.86"	1.92	1.19
5.27	74°52 '22.73"	12°50 '34.23"	1.82	1.09
5.31	74°52 '23.83"	12°50 '34.88"	1.87	1.14
5.35	74°52 '24.93"	12°50 '35.36"	1.95	1.22
5.38	74°52 '25.73"	12°50 '35.68"	1.99	1.26
5.40	74°52 '26.55"	12°50 '36.05"	1.93	1.20
5.43	74°52 '27.26"	12°50 '36.31"	1.97	1.24
5.45	74°52 '27.88"	12°50 '36.54"	2.09	1.37
5.47	74°52 '28.56"	12°50 '36.82"	2.17	1.45
5.50	74°52 '29.6"	12°50 '37.38"	2.26	1.54
5.52	74°52 '30.16"	12°50 '37.73"	2.24	1.52
5.56	74°52 '31.09"	12°50 '38.19"	2.21	1.49
5.58	74°52 '31.72"	12°50 '38.43"	2.01	1.29
5.60	74°52 '32.6"	12°50 '38.74"	2.18	1.46
5.62	74°52 '33.28"	12°50 '38.94"	2.15	1.43
5.65	74°52 '33.95"	12°50 '39.1"	2.32	1.60
5.67	74°52 '34.75"	12°50 '39.31"	2.12	1.40
5.69	74°52 '35.41"	12°50 '39.48"	2.31	1.60
5.72	74°52 '36.44"	12°50 '39.69"	2.07	1.36
5.74	74°52 '37.09"	12°50 '39.89"	2.08	1.37
5.77	74°52 '38.02"	12°50 '40.21"	2.23	1.52
5.81	74°52 '39.1"	12°50 '40.54"	2.10	1.39
5.85	74°52 '40.3"	12°50 '40.96"	1.97	1.26
5.88	74°52 '41.38"	12°50 '41.3"	2.02	1.31
5.91	74°52 '42.47"	12°50 '41.57"	2.13	1.42
5.93	74°52 '43.14"	12°50 '41.75"	2.03	1.32
5.96	74°52 '43.81"	12°50 '41.95"	2.08	1.38
5.98	74°52 '44.51"	12°50 '42.16"	2.15	1.45
6.00	74°52 '45.34"	12°50 '42.42"	2.18	1.48
6.03	74°52 '46.01"	12°50 '42.62"	2.26	1.56
6.05	74°52 '46.65"	12°50 '42.81"	2.30	1.60
6.07	74°52 '47.3"	12°50 '43"	2.53	1.83
6.09	74°52 '48.1"	12°50 '43.27"	2.35	1.65
6.12	74°52 '48.99"	12°50 '43.55"	2.31	1.61
6.14	74°52 '49.64"	12°50 '43.75"	2.38	1.68
6.18	74°52 '50.72"	12°50 '44.15"	2.37	1.68
6.21	74°52 '51.7"	12°50 '44.56"	2.39	1.70
6.23	74°52 '52.39"	12°50 '44.85"	2.37	1.68
6.25	74°52 '53.02"	12°50 '45.09"	2.21	1.52
6.27	74°52 '53.63"	12°50 '45.36"	2.29	1.60
6.30	74°52 '54.61"	12°50 '45.76"	2.27	1.58
6.32	74°52 '55.25"	12°50 '46.07"	2.21	1.52
6.35	74°52 '56.09"	12°50 '46.5"	2.22	1.53
6.37	74°52 '56.72"	12°50 '46.79"	2.33	1.64
6.40	74°52 '57.43"	12°50 '47.09"	2.35	1.66
6.42	74°52 '58.09"	12°50 '47.38"	2.05	1.37
6.45	74°52 '59.18"	12°50 '47.8"	2.11	1.43
6.48	74°52 '59.85"	12°50 '48.08"	2.25	1.57
6.50	74°53 '0.49"	12°50 '48.35"	2.23	1.55

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
6.52	74°53 '1.17"	12°50 '48.61"	2.08	1.40
6.54	74°53 '1.83"	12°50 '48.86"	2.07	1.39
6.57	74°53 '2.84"	12°50 '49.19"	2.04	1.36
6.59	74°53 '3.48"	12°50 '49.39"	2.10	1.42
6.61	74°53 '4.12"	12°50 '49.59"	2.19	1.51
6.63	74°53 '4.76"	12°50 '49.8"	2.28	1.60
6.65	74°53 '5.45"	12°50 '50.01"	2.44	1.76
6.68	74°53 '6.1"	12°50 '50.25"	2.48	1.81
6.71	74°53 '7.15"	12°50 '50.64"	2.56	1.89
6.73	74°53 '7.82"	12°50 '50.81"	2.70	2.03
6.76	74°53 '8.67"	12°50 '51.05"	2.88	2.21
6.79	74°53 '9.85"	12°50 '51.42"	2.94	2.27
6.81	74°53 '10.49"	12°50 '51.64"	3.09	2.42
6.85	74°53 '11.55"	12°50 '52.01"	3.04	2.37
6.87	74°53 '12.17"	12°50 '52.25"	3.21	2.54
6.89	74°53 '12.78"	12°50 '52.53"	3.28	2.61
6.91	74°53 '13.39"	12°50 '52.84"	3.42	2.76
6.94	74°53 '14.23"	12°50 '53.23"	3.54	2.88
6.97	74°53 '15.16"	12°50 '53.63"	3.57	2.91
6.99	74°53 '15.76"	12°50 '53.92"	3.54	2.88
7.01	74°53 '16.36"	12°50 '54.2"	3.69	3.03
7.03	74°53 '16.95"	12°50 '54.5"	3.85	3.19
7.05	74°53 '17.55"	12°50 '54.82"	4.06	3.40
7.07	74°53 '18.16"	12°50 '55.16"	4.22	3.56
7.09	74°53 '18.8"	12°50 '55.52"	4.37	3.71
7.11	74°53 '19.4"	12°50 '55.86"	4.44	3.78
7.13	74°53 '19.99"	12°50 '56.21"	4.55	3.89
7.15	74°53 '20.56"	12°50 '56.55"	4.73	4.08
7.19	74°53 '21.48"	12°50 '57.07"	4.78	4.13
7.21	74°53 '22.05"	12°50 '57.41"	3.78	3.13
7.23	74°53 '22.64"	12°50 '57.72"	3.53	2.88
7.25	74°53 '23.21"	12°50 '58.06"	2.97	2.32
7.27	74°53 '23.77"	12°50 '58.41"	2.84	2.19
7.29	74°53 '24.33"	12°50 '58.77"	2.78	2.13
7.31	74°53 '24.88"	12°50 '59.14"	2.93	2.28
7.33	74°53 '25.52"	12°50 '59.55"	3.01	2.36
7.35	74°53 '26.08"	12°50 '59.91"	2.82	2.17
7.37	74°53 '26.64"	12°51 '0.26"	2.87	2.22
7.39	74°53 '27.16"	12°51 '0.73"	3.04	2.40
7.42	74°53 '27.91"	12°51 '1.33"	3.02	2.38
7.44	74°53 '28.48"	12°51 '1.69"	3.09	2.45
7.46	74°53 '29.06"	12°51 '2.04"	3.39	2.75
7.48	74°53 '29.59"	12°51 '2.45"	3.82	3.18
7.50	74°53 '30.09"	12°51 '2.89"	4.11	3.47
7.52	74°53 '30.61"	12°51 '3.32"	4.31	3.67
7.54	74°53 '31.14"	12°51 '3.74"	4.50	3.86
7.56	74°53 '31.69"	12°51 '4.1"	5.00	4.36
7.60	74°53 '32.58"	12°51 '4.78"	5.01	4.37
7.62	74°53 '33.13"	12°51 '5.17"	4.75	4.11
7.64	74°53 '33.7"	12°51 '5.54"	4.50	3.87
7.66	74°53 '34.35"	12°51 '5.88"	4.46	3.83
7.68	74°53 '34.97"	12°51 '6.14"	4.24	3.61
7.70	74°53 '35.58"	12°51 '6.46"	3.99	3.36
7.72	74°53 '36.23"	12°51 '6.77"	3.66	3.03
7.74	74°53 '36.82"	12°51 '7.11"	3.44	2.81
7.77	74°53 '37.44"	12°51 '7.44"	3.41	2.78
7.79	74°53 '38.03"	12°51 '7.76"	3.52	2.89
7.81	74°53 '38.64"	12°51 '8.05"	3.68	3.05
7.83	74°53 '39.24"	12°51 '8.36"	3.77	3.14
7.85	74°53 '39.83"	12°51 '8.67"	3.95	3.32
7.87	74°53 '40.44"	12°51 '9.01"	4.14	3.52
7.89	74°53 '41.04"	12°51 '9.33"	4.21	3.59
7.91	74°53 '41.62"	12°51 '9.68"	4.39	3.77
7.93	74°53 '42.19"	12°51 '10.04"	4.60	3.98
7.95	74°53 '42.85"	12°51 '10.48"	4.66	4.04
7.97	74°53 '43.4"	12°51 '10.89"	4.55	3.93
8.00	74°53 '44.16"	12°51 '11.47"	4.48	3.86
8.02	74°53 '44.71"	12°51 '11.89"	5.54	4.92
8.06	74°53 '45.66"	12°51 '12.51"	4.77	4.15

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
8.08	74°53 '46.37"	12°51 '12.99"	4.85	4.23
8.10	74°53 '46.91"	12°51 '13.38"	4.97	4.35
8.13	74°53 '47.6"	12°51 '13.91"	5.07	4.46
8.15	74°53 '48.15"	12°51 '14.3"	5.27	4.66
8.19	74°53 '49.16"	12°51 '15.02"	4.68	4.07
8.21	74°53 '49.76"	12°51 '15.47"	4.97	4.36
8.25	74°53 '50.74"	12°51 '16.33"	4.89	4.28
8.28	74°53 '51.62"	12°51 '16.96"	4.68	4.07
8.30	74°53 '52.16"	12°51 '17.34"	4.81	4.20
8.32	74°53 '52.68"	12°51 '17.75"	4.89	4.28
8.35	74°53 '53.24"	12°51 '18.17"	4.96	4.35
8.37	74°53 '53.78"	12°51 '18.56"	5.15	4.55
8.40	74°53 '54.61"	12°51 '19.27"	5.15	4.55
8.42	74°53 '55.15"	12°51 '19.67"	5.06	4.46
8.44	74°53 '55.68"	12°51 '20.07"	5.22	4.62
8.46	74°53 '56.34"	12°51 '20.56"	5.31	4.71
8.49	74°53 '56.91"	12°51 '20.95"	5.41	4.81
8.51	74°53 '57.53"	12°51 '21.44"	5.48	4.88
8.53	74°53 '58.06"	12°51 '21.85"	5.69	5.09
8.56	74°53 '58.75"	12°51 '22.34"	5.55	4.95
8.58	74°53 '59.39"	12°51 '22.6"	5.73	5.13
8.62	74°54 '0.65"	12°51 '22.91"	5.33	4.74
8.64	74°54 '1.32"	12°51 '23.03"	4.79	4.20
8.66	74°54 '1.97"	12°51 '23.15"	4.77	4.18
8.68	74°54 '2.64"	12°51 '23.2"	4.56	3.97
8.70	74°54 '3.3"	12°51 '23.26"	4.26	3.67
8.72	74°54 '3.98"	12°51 '23.3"	3.18	2.59
8.74	74°54 '4.66"	12°51 '23.4"	2.63	2.04
8.76	74°54 '5.32"	12°51 '23.48"	2.42	1.83
8.78	74°54 '5.99"	12°51 '23.55"	2.19	1.60
8.80	74°54 '6.65"	12°51 '23.64"	1.94	1.35
8.82	74°54 '7.31"	12°51 '23.76"	2.03	1.44
8.84	74°54 '7.97"	12°51 '23.85"	2.21	1.63
8.86	74°54 '8.65"	12°51 '23.88"	2.08	1.50
8.88	74°54 '9.31"	12°51 '23.82"	1.82	1.24
8.92	74°54 '10.62"	12°51 '23.92"	1.76	1.18
8.94	74°54 '11.28"	12°51 '23.96"	2.08	1.50
8.97	74°54 '12.28"	12°51 '24.17"	2.32	1.74
8.99	74°54 '12.96"	12°51 '24.32"	2.12	1.54
9.01	74°54 '13.62"	12°51 '24.45"	1.63	1.05
9.03	74°54 '14.29"	12°51 '24.46"	3.54	2.96
9.07	74°54 '15.53"	12°51 '24.29"	2.09	1.51
9.09	74°54 '16.18"	12°51 '24.13"	1.10	0.53
9.11	74°54 '16.85"	12°51 '24.05"	0.90	0.33
9.14	74°54 '17.72"	12°51 '23.96"	0.89	0.32
9.16	74°54 '18.6"	12°51 '23.78"	1.41	0.84
9.18	74°54 '19.23"	12°51 '23.52"	1.08	0.51
9.21	74°54 '19.96"	12°51 '23.24"	1.34	0.77
9.23	74°54 '20.66"	12°51 '23.07"	1.20	0.63
9.25	74°54 '21.31"	12°51 '22.97"	1.28	0.71
9.27	74°54 '21.98"	12°51 '22.96"	1.60	1.03
9.29	74°54 '22.66"	12°51 '23.05"	1.86	1.29
9.31	74°54 '23.32"	12°51 '23.13"	2.13	1.56
9.33	74°54 '23.99"	12°51 '23.18"	2.46	1.90
9.35	74°54 '24.67"	12°51 '23.2"	2.62	2.06
9.39	74°54 '25.97"	12°51 '23.3"	2.55	1.99
9.41	74°54 '26.65"	12°51 '23.34"	2.35	1.79
9.43	74°54 '27.35"	12°51 '23.39"	2.68	2.12
9.45	74°54 '28"	12°51 '23.2"	1.80	1.24
9.48	74°54 '28.83"	12°51 '22.76"	1.73	1.17
9.50	74°54 '29.43"	12°51 '22.46"	1.85	1.29
9.52	74°54 '30.06"	12°51 '22.19"	2.06	1.50
9.54	74°54 '30.7"	12°51 '21.99"	2.35	1.79
9.56	74°54 '31.41"	12°51 '21.9"	2.61	2.05
9.58	74°54 '32.09"	12°51 '21.87"	2.79	2.24
9.61	74°54 '33.07"	12°51 '21.95"	2.93	2.38
9.63	74°54 '33.73"	12°51 '22.1"	3.02	2.47
9.65	74°54 '34.38"	12°51 '22.28"	3.18	2.63
9.68	74°54 '35.1"	12°51 '22.49"	3.43	2.88

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
9.70	74°54 '35.87"	12°51 '22.77"	3.29	2.74
9.72	74°54 '36.49"	12°51 '23.04"	3.05	2.50
9.74	74°54 '37.09"	12°51 '23.32"	2.92	2.37
9.77	74°54 '38.05"	12°51 '23.72"	2.92	2.37
9.79	74°54 '38.68"	12°51 '23.98"	2.61	2.06
9.81	74°54 '39.3"	12°51 '24.23"	2.37	1.83
9.83	74°54 '39.92"	12°51 '24.5"	2.03	1.49
9.85	74°54 '40.55"	12°51 '24.76"	1.82	1.28
9.87	74°54 '41.17"	12°51 '25.02"	1.54	1.00
9.91	74°54 '42.07"	12°51 '25.48"	1.73	1.19
9.94	74°54 '43.16"	12°51 '26.11"	1.55	1.01
9.97	74°54 '44.02"	12°51 '26.69"	1.55	1.01
10.00	74°54 '44.53"	12°51 '27.1"	1.47	0.93
10.03	74°54 '45.31"	12°51 '27.76"	1.43	0.89
10.05	74°54 '45.83"	12°51 '28.17"	1.46	0.93
10.07	74°54 '46.39"	12°51 '28.59"	1.49	0.96
10.09	74°54 '46.96"	12°51 '28.97"	1.64	1.11
10.11	74°54 '47.52"	12°51 '29.37"	1.87	1.34
10.13	74°54 '48.07"	12°51 '29.75"	1.96	1.43
10.15	74°54 '48.61"	12°51 '30.14"	2.20	1.67
10.17	74°54 '49.14"	12°51 '30.54"	2.42	1.89
10.19	74°54 '49.73"	12°51 '30.88"	2.59	2.06
10.22	74°54 '50.41"	12°51 '31.35"	2.64	2.11
10.24	74°54 '50.9"	12°51 '31.82"	2.70	2.17
10.26	74°54 '51.45"	12°51 '32.31"	2.76	2.23
10.28	74°54 '52.02"	12°51 '32.83"	2.61	2.08
10.30	74°54 '52.47"	12°51 '33.31"	2.53	2.01
10.33	74°54 '53.14"	12°51 '34.13"	1.81	1.29
10.36	74°54 '53.6"	12°51 '34.78"	2.42	1.90
10.38	74°54 '54.07"	12°51 '35.47"	2.34	1.82
10.41	74°54 '54.51"	12°51 '36.01"	2.46	1.94
10.43	74°54 '55.09"	12°51 '36.44"	2.55	2.03
10.46	74°54 '55.95"	12°51 '36.9"	2.72	2.20
10.48	74°54 '56.62"	12°51 '37.16"	2.89	2.37
10.52	74°54 '57.86"	12°51 '37.6"	3.30	2.78
10.55	74°54 '58.88"	12°51 '37.85"	3.14	2.63
10.57	74°54 '59.56"	12°51 '38.03"	3.10	2.59
10.60	74°55 '0.3"	12°51 '38.33"	3.43	2.92
10.62	74°55 '0.9"	12°51 '38.62"	4.13	3.62
10.65	74°55 '1.81"	12°51 '39.07"	4.29	3.78
10.67	74°55 '2.43"	12°51 '39.33"	3.82	3.31
10.69	74°55 '3.16"	12°51 '39.57"	4.09	3.58
10.73	74°55 '4.44"	12°51 '39.69"	4.07	3.56
10.75	74°55 '5.11"	12°51 '39.74"	3.55	3.04
10.79	74°55 '6.4"	12°51 '39.78"	3.73	3.23
10.81	74°55 '7.23"	12°51 '39.82"	3.95	3.45
10.84	74°55 '8.12"	12°51 '39.88"	3.70	3.20
10.86	74°55 '8.91"	12°51 '39.91"	3.87	3.37
10.89	74°55 '9.67"	12°51 '39.91"	4.19	3.69
10.92	74°55 '10.86"	12°51 '39.88"	4.14	3.64
10.95	74°55 '11.93"	12°51 '39.86"	4.46	3.96
10.98	74°55 '12.87"	12°51 '39.88"	4.43	3.93
11.01	74°55 '13.65"	12°51 '39.87"	4.71	4.21
11.03	74°55 '14.43"	12°51 '39.84"	4.75	4.26
11.06	74°55 '15.31"	12°51 '39.74"	4.98	4.49
11.09	74°55 '16.32"	12°51 '39.68"	5.16	4.67
11.11	74°55 '16.99"	12°51 '39.68"	5.30	4.81
11.13	74°55 '17.86"	12°51 '39.7"	5.37	4.88
11.16	74°55 '18.78"	12°51 '39.71"	5.20	4.71
11.18	74°55 '19.45"	12°51 '39.71"	4.98	4.49
11.20	74°55 '20.12"	12°51 '39.66"	5.21	4.72
11.23	74°55 '20.99"	12°51 '39.56"	5.29	4.80
11.25	74°55 '21.65"	12°51 '39.48"	4.90	4.41
11.27	74°55 '22.31"	12°51 '39.4"	4.78	4.30
11.30	74°55 '23.29"	12°51 '39.32"	4.94	4.46
11.33	74°55 '24.26"	12°51 '39.24"	5.18	4.70
11.35	74°55 '25.09"	12°51 '39.12"	5.70	5.22
11.38	74°55 '26"	12°51 '39"	5.09	4.61
11.40	74°55 '26.73"	12°51 '38.92"	4.84	4.36

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
11.43	74°55 '27.52"	12°51 '38.84"	5.50	5.02
11.45	74°55 '28.18"	12°51 '38.78"	4.84	4.36
11.48	74°55 '29.15"	12°51 '38.71"	5.85	5.37
11.50	74°55 '29.94"	12°51 '38.66"	5.87	5.40
11.52	74°55 '30.62"	12°51 '38.64"	5.56	5.09
11.54	74°55 '31.32"	12°51 '38.59"	5.40	4.93
11.56	74°55 '32"	12°51 '38.57"	5.69	5.22
11.58	74°55 '32.73"	12°51 '38.56"	5.11	4.64
11.60	74°55 '33.4"	12°51 '38.55"	5.35	4.88
11.63	74°55 '34.32"	12°51 '38.47"	5.41	4.94
11.65	74°55 '34.98"	12°51 '38.37"	5.48	5.01
11.69	74°55 '36.16"	12°51 '37.97"	5.63	5.16
11.71	74°55 '36.78"	12°51 '37.73"	5.42	4.95
11.73	74°55 '37.44"	12°51 '37.58"	5.18	4.71
11.75	74°55 '38.11"	12°51 '37.48"	4.86	4.40
11.77	74°55 '38.77"	12°51 '37.4"	4.37	3.91
11.79	74°55 '39.43"	12°51 '37.3"	4.08	3.62
11.81	74°55 '40.08"	12°51 '37.13"	3.70	3.24
11.83	74°55 '40.73"	12°51 '36.97"	3.22	2.76
11.85	74°55 '41.37"	12°51 '36.79"	2.84	2.38
11.88	74°55 '42.32"	12°51 '36.5"	2.34	1.88
11.92	74°55 '43.48"	12°51 '36.04"	1.83	1.37
11.94	74°55 '44.02"	12°51 '35.66"	1.53	1.07
11.96	74°55 '44.56"	12°51 '35.26"	1.25	0.79
11.98	74°55 '45.26"	12°51 '34.84"	1.35	0.89
12.01	74°55 '45.87"	12°51 '34.45"	1.05	0.60
12.03	74°55 '46.39"	12°51 '34.05"	1.12	0.67
12.05	74°55 '47"	12°51 '33.56"	1.30	0.85
12.08	74°55 '47.72"	12°51 '32.82"	1.37	0.92
12.10	74°55 '48.21"	12°51 '32.35"	1.37	0.92
12.12	74°55 '48.68"	12°51 '31.88"	1.56	1.11
12.16	74°55 '49.65"	12°51 '31.21"	1.69	1.24
12.18	74°55 '50.28"	12°51 '30.92"	1.69	1.24
12.20	74°55 '50.84"	12°51 '30.55"	1.80	1.35
12.23	74°55 '51.81"	12°51 '29.97"	1.82	1.38
12.25	74°55 '52.46"	12°51 '29.65"	1.80	1.36
12.27	74°55 '53.06"	12°51 '29.37"	1.95	1.51
12.30	74°55 '53.69"	12°51 '29.11"	2.19	1.75
12.32	74°55 '54.52"	12°51 '28.73"	2.18	1.74
12.34	74°55 '55.14"	12°51 '28.48"	2.37	1.93
12.36	74°55 '55.79"	12°51 '28.29"	2.54	2.10
12.38	74°55 '56.46"	12°51 '28.18"	2.63	2.19
12.40	74°55 '57.13"	12°51 '28.08"	3.01	2.57
12.43	74°55 '57.83"	12°51 '28.02"	3.28	2.84
12.45	74°55 '58.5"	12°51 '28"	3.51	3.07
12.47	74°55 '59.19"	12°51 '27.99"	3.75	3.32
12.49	74°55 '59.86"	12°51 '27.96"	4.11	3.68
12.51	74°56 '0.55"	12°51 '28.01"	4.28	3.85
12.53	74°56 '1.21"	12°51 '28.12"	4.43	4.00
12.55	74°56 '1.87"	12°51 '28.2"	4.77	4.34
12.57	74°56 '2.71"	12°51 '28.3"	4.12	3.69
12.59	74°56 '3.38"	12°51 '28.39"	3.40	2.97
12.62	74°56 '4.1"	12°51 '28.48"	3.99	3.56
12.64	74°56 '4.81"	12°51 '28.53"	3.53	3.10
12.66	74°56 '5.47"	12°51 '28.6"	4.60	4.17
12.69	74°56 '6.69"	12°51 '28.82"	4.25	3.82
12.72	74°56 '7.36"	12°51 '28.96"	3.34	2.92
12.74	74°56 '8.02"	12°51 '29.07"	2.30	1.88
12.76	74°56 '8.73"	12°51 '29.18"	2.37	1.95
12.78	74°56 '9.39"	12°51 '29.29"	3.23	2.81
12.81	74°56 '10.31"	12°51 '29.44"	4.10	3.68
12.83	74°56 '11.14"	12°51 '29.53"	4.29	3.87
12.85	74°56 '11.81"	12°51 '29.58"	2.80	2.38
12.87	74°56 '12.48"	12°51 '29.64"	1.92	1.50
12.90	74°56 '13.5"	12°51 '29.76"	1.92	1.50
12.93	74°56 '14.57"	12°51 '29.92"	1.99	1.57
12.96	74°56 '15.5"	12°51 '30.12"	1.96	1.55
12.99	74°56 '16.35"	12°51 '30.52"	2.00	1.59
13.02	74°56 '17.02"	12°51 '30.89"	1.90	1.49

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
13.04	74°56 '17.6"	12°51 '31.23"	1.83	1.42
13.06	74°56 '18.17"	12°51 '31.62"	1.68	1.27
13.08	74°56 '18.72"	12°51 '32.05"	1.80	1.39
13.10	74°56 '19.2"	12°51 '32.51"	1.81	1.40
13.12	74°56 '19.64"	12°51 '33.02"	1.91	1.50
13.14	74°56 '20.02"	12°51 '33.57"	2.31	1.90
13.16	74°56 '20.38"	12°51 '34.13"	2.81	2.40
13.18	74°56 '20.74"	12°51 '34.68"	3.79	3.38
13.20	74°56 '21.14"	12°51 '35.28"	4.34	3.94
13.22	74°56 '21.49"	12°51 '35.85"	3.68	3.28
13.24	74°56 '21.85"	12°51 '36.41"	3.20	2.80
13.26	74°56 '22.15"	12°51 '37"	2.72	2.32
13.28	74°56 '22.42"	12°51 '37.6"	2.24	1.84
13.30	74°56 '22.63"	12°51 '38.25"	1.94	1.54
13.32	74°56 '22.81"	12°51 '38.89"	1.76	1.36
13.34	74°56 '22.9"	12°51 '39.54"	1.57	1.17
13.36	74°56 '22.98"	12°51 '40.21"	1.39	0.99
13.38	74°56 '23.08"	12°51 '40.87"	1.61	1.21
13.41	74°56 '23.15"	12°51 '41.55"	1.78	1.38
13.43	74°56 '23.17"	12°51 '42.2"	1.87	1.47
13.45	74°56 '23.21"	12°51 '42.86"	2.12	1.73
13.47	74°56 '23.3"	12°51 '43.5"	2.46	2.07
13.50	74°56 '23.54"	12°51 '44.63"	2.68	2.29
13.52	74°56 '23.8"	12°51 '45.25"	2.56	2.17
13.54	74°56 '23.99"	12°51 '45.88"	2.46	2.07
13.56	74°56 '24.18"	12°51 '46.52"	2.40	2.01
13.59	74°56 '24.51"	12°51 '47.19"	2.25	1.86
13.61	74°56 '24.83"	12°51 '47.76"	2.24	1.85
13.64	74°56 '25.43"	12°51 '48.74"	2.57	2.18
13.66	74°56 '25.78"	12°51 '49.31"	2.80	2.41
13.69	74°56 '26.32"	12°51 '50.13"	2.30	1.92
13.71	74°56 '26.71"	12°51 '50.66"	2.10	1.72
13.74	74°56 '27.23"	12°51 '51.34"	2.02	1.64
13.76	74°56 '27.68"	12°51 '51.93"	2.10	1.72
13.78	74°56 '28.14"	12°51 '52.59"	2.12	1.74
13.81	74°56 '28.53"	12°51 '53.14"	2.29	1.91
13.83	74°56 '28.92"	12°51 '53.68"	2.37	1.99
13.85	74°56 '29.27"	12°51 '54.52"	2.38	2.00
13.88	74°56 '29.49"	12°51 '55.25"	2.43	2.05
13.91	74°56 '29.82"	12°51 '56.12"	2.56	2.18
13.93	74°56 '30.09"	12°51 '56.8"	3.35	2.98
13.95	74°56 '30.38"	12°51 '57.4"	2.61	2.24
13.98	74°56 '30.82"	12°51 '58.19"	2.66	2.29
14.00	74°56 '31.19"	12°51 '58.74"	2.59	2.22
14.02	74°56 '31.58"	12°51 '59.38"	2.73	2.36
14.05	74°56 '32.23"	12°52 '0.25"	2.85	2.48
14.08	74°56 '32.83"	12°52 '0.93"	3.00	2.63
14.10	74°56 '33.35"	12°52 '1.45"	2.99	2.62
14.12	74°56 '33.84"	12°52 '1.9"	2.89	2.52
14.14	74°56 '34.31"	12°52 '2.44"	2.74	2.37
14.16	74°56 '34.75"	12°52 '2.94"	2.52	2.15
14.20	74°56 '35.53"	12°52 '3.76"	2.61	2.25
14.22	74°56 '36.03"	12°52 '4.21"	3.12	2.76
14.24	74°56 '36.54"	12°52 '4.63"	3.23	2.87
14.26	74°56 '37.08"	12°52 '5.02"	3.84	3.48
14.28	74°56 '37.64"	12°52 '5.39"	4.72	4.36
14.30	74°56 '38.18"	12°52 '5.78"	5.29	4.93
14.32	74°56 '38.74"	12°52 '6.15"	6.16	5.80
14.34	74°56 '39.31"	12°52 '6.51"	7.08	6.72
14.36	74°56 '39.84"	12°52 '6.9"	7.11	6.75
14.38	74°56 '40.35"	12°52 '7.32"	6.08	5.72
14.40	74°56 '40.88"	12°52 '7.72"	3.74	3.38
14.42	74°56 '41.39"	12°52 '8.14"	5.03	4.68
14.44	74°56 '41.89"	12°52 '8.59"	3.70	3.35
14.46	74°56 '42.41"	12°52 '9"	5.24	4.89
14.49	74°56 '43.02"	12°52 '9.57"	3.09	2.74
14.52	74°56 '43.83"	12°52 '10.33"	4.25	3.90
14.56	74°56 '44.55"	12°52 '11.3"	2.09	1.74
14.58	74°56 '44.93"	12°52 '11.96"	5.07	4.72

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
14.62	74°56 '45.53"	12°52 '13.02"	5.61	5.26
14.64	74°56 '45.96"	12°52 '13.51"	7.39	7.04
14.67	74°56 '46.85"	12°52 '14.18"	6.61	6.27
14.69	74°56 '47.39"	12°52 '14.57"	5.81	5.47
14.72	74°56 '48.13"	12°52 '15.1"	5.79	5.45
14.74	74°56 '48.69"	12°52 '15.46"	5.49	5.15
14.76	74°56 '49.23"	12°52 '15.84"	3.89	3.55
14.78	74°56 '49.81"	12°52 '16.16"	5.20	4.86
14.81	74°56 '50.65"	12°52 '16.55"	4.98	4.64
14.83	74°56 '51.29"	12°52 '16.74"	4.77	4.43
14.85	74°56 '51.93"	12°52 '16.92"	4.52	4.18
14.87	74°56 '52.59"	12°52 '17.02"	4.38	4.04
14.90	74°56 '53.53"	12°52 '17.25"	4.39	4.06
14.92	74°56 '54.2"	12°52 '17.45"	4.45	4.12
14.96	74°56 '55.46"	12°52 '17.66"	4.35	4.02
14.98	74°56 '56.16"	12°52 '17.7"	4.53	4.20
15.00	74°56 '56.94"	12°52 '17.65"	4.57	4.24
15.02	74°56 '57.67"	12°52 '17.62"	4.62	4.29
15.04	74°56 '58.34"	12°52 '17.63"	4.57	4.24
15.07	74°56 '59.04"	12°52 '17.64"	4.38	4.05
15.09	74°56 '59.71"	12°52 '17.68"	4.26	3.93
15.11	74°57 '0.38"	12°52 '17.66"	4.44	4.11
15.13	74°57 '1.07"	12°52 '17.65"	4.68	4.35
15.15	74°57 '1.84"	12°52 '17.62"	4.89	4.57
15.18	74°57 '2.7"	12°52 '17.53"	5.14	4.82
15.20	74°57 '3.39"	12°52 '17.45"	5.06	4.74
15.22	74°57 '4.27"	12°52 '17.3"	3.95	3.63
15.25	74°57 '5.04"	12°52 '17.07"	4.96	4.64
15.28	74°57 '6.04"	12°52 '16.87"	4.84	4.52
15.31	74°57 '7.11"	12°52 '16.71"	4.60	4.28
15.35	74°57 '8.32"	12°52 '16.52"	4.79	4.47
15.38	74°57 '9.49"	12°52 '16.47"	4.50	4.19
15.40	74°57 '10.18"	12°52 '16.46"	4.41	4.10
15.42	74°57 '10.86"	12°52 '16.42"	4.61	4.30
15.45	74°57 '11.55"	12°52 '16.36"	5.05	4.74
15.47	74°57 '12.51"	12°52 '16.28"	5.18	4.87
15.50	74°57 '13.24"	12°52 '16.17"	5.08	4.77
15.52	74°57 '13.9"	12°52 '16.05"	3.82	3.51
15.55	74°57 '14.86"	12°52 '15.87"	3.73	3.42
15.57	74°57 '15.53"	12°52 '15.87"	4.54	4.23
15.59	74°57 '16.19"	12°52 '15.81"	4.92	4.61
15.61	74°57 '16.9"	12°52 '15.64"	4.36	4.05
15.64	74°57 '17.85"	12°52 '15.34"	4.74	4.44
15.66	74°57 '18.46"	12°52 '15.05"	3.56	3.26
15.68	74°57 '19.07"	12°52 '14.79"	1.86	1.56
15.70	74°57 '19.69"	12°52 '14.54"	1.63	1.33
15.73	74°57 '20.54"	12°52 '14.27"	1.55	1.25
15.76	74°57 '21.56"	12°52 '13.88"	1.51	1.21
15.78	74°57 '22.2"	12°52 '13.61"	1.48	1.18
15.80	74°57 '22.84"	12°52 '13.35"	1.32	1.02
15.82	74°57 '23.44"	12°52 '13.04"	1.08	0.78
15.84	74°57 '24.04"	12°52 '12.71"	0.97	0.67
15.86	74°57 '24.67"	12°52 '12.5"	1.08	0.79
15.90	74°57 '25.79"	12°52 '12.2"	1.24	0.95
15.92	74°57 '26.45"	12°52 '12.02"	1.17	0.88
15.94	74°57 '27.15"	12°52 '11.75"	1.20	0.91
15.96	74°57 '27.79"	12°52 '11.48"	1.29	1.00
15.98	74°57 '28.43"	12°52 '11.13"	1.41	1.12
16.01	74°57 '29.19"	12°52 '10.55"	1.52	1.23
16.03	74°57 '29.7"	12°52 '10.07"	1.59	1.30
16.06	74°57 '30.18"	12°52 '9.53"	1.75	1.46
16.08	74°57 '30.6"	12°52 '8.98"	1.93	1.64
16.10	74°57 '31.03"	12°52 '8.46"	2.03	1.75
16.12	74°57 '31.41"	12°52 '7.92"	2.13	1.85
16.14	74°57 '31.7"	12°52 '7.33"	2.32	2.04
16.16	74°57 '31.95"	12°52 '6.71"	2.41	2.13
16.18	74°57 '32.12"	12°52 '6.06"	2.58	2.30
16.20	74°57 '32.31"	12°52 '5.41"	2.75	2.47
16.22	74°57 '32.51"	12°52 '4.77"	2.90	2.62

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
16.24	74°57 '32.72"	12°52 '4.13"	3.06	2.78
16.26	74°57 '32.95"	12°52 '3.44"	3.17	2.89
16.29	74°57 '33.26"	12°52 '2.6"	3.18	2.90
16.31	74°57 '33.53"	12°52 '2"	3.16	2.88
16.33	74°57 '33.78"	12°52 '1.31"	3.16	2.88
16.35	74°57 '33.99"	12°52 '0.67"	3.20	2.93
16.37	74°57 '34.16"	12°52 '0.04"	3.39	3.12
16.40	74°57 '34.32"	12°51 '59.35"	3.51	3.24
16.43	74°57 '34.51"	12°51 '58.4"	3.57	3.30
16.45	74°57 '34.6"	12°51 '57.75"	3.50	3.23
16.47	74°57 '34.74"	12°51 '57.1"	3.28	3.01
16.49	74°57 '34.82"	12°51 '56.29"	3.09	2.82
16.51	74°57 '34.84"	12°51 '55.61"	3.14	2.87
16.53	74°57 '34.93"	12°51 '54.95"	3.20	2.93
16.55	74°57 '35.04"	12°51 '54.26"	3.32	3.05
16.57	74°57 '35.16"	12°51 '53.62"	3.48	3.21
16.61	74°57 '35.37"	12°51 '52.55"	3.37	3.11
16.63	74°57 '35.51"	12°51 '51.9"	3.16	2.90
16.65	74°57 '35.66"	12°51 '51.2"	2.83	2.57
16.67	74°57 '35.72"	12°51 '50.55"	2.62	2.36
16.71	74°57 '35.86"	12°51 '49.42"	2.41	2.15
16.73	74°57 '35.92"	12°51 '48.46"	2.42	2.16
16.75	74°57 '35.95"	12°51 '47.8"	2.24	1.98
16.78	74°57 '36.05"	12°51 '47.15"	2.01	1.75
16.80	74°57 '36.12"	12°51 '46.49"	1.91	1.65
16.82	74°57 '36.2"	12°51 '45.84"	1.44	1.18
16.84	74°57 '36.25"	12°51 '45.18"	1.57	1.32
16.86	74°57 '36.35"	12°51 '44.47"	1.43	1.18
16.88	74°57 '36.47"	12°51 '43.69"	1.50	1.25
16.90	74°57 '36.61"	12°51 '43.05"	1.35	1.10
16.92	74°57 '36.85"	12°51 '42.43"	0.96	0.71
16.94	74°57 '37.06"	12°51 '41.8"	0.90	0.65
16.96	74°57 '37.25"	12°51 '41.18"	0.92	0.67
16.98	74°57 '37.33"	12°51 '40.5"	1.02	0.77
17.00	74°57 '37.38"	12°51 '39.84"	1.10	0.85
17.03	74°57 '37.43"	12°51 '39.09"	1.20	0.95
17.05	74°57 '37.55"	12°51 '38.34"	1.21	0.96
17.07	74°57 '37.68"	12°51 '37.68"	1.30	1.06
17.09	74°57 '37.85"	12°51 '37.05"	1.34	1.10
17.11	74°57 '38.04"	12°51 '36.43"	1.49	1.25
17.13	74°57 '38.25"	12°51 '35.73"	1.58	1.34
17.17	74°57 '38.74"	12°51 '34.54"	1.47	1.23
17.20	74°57 '39.07"	12°51 '33.78"	1.32	1.08
17.24	74°57 '39.31"	12°51 '32.54"	1.28	1.04
17.26	74°57 '39.38"	12°51 '31.88"	1.39	1.15
17.28	74°57 '39.51"	12°51 '31.12"	1.52	1.28
17.32	74°57 '39.74"	12°51 '30.02"	1.45	1.22
17.34	74°57 '39.91"	12°51 '29.38"	1.52	1.29
17.36	74°57 '40.18"	12°51 '28.68"	1.60	1.37
17.38	74°57 '40.43"	12°51 '28.06"	1.70	1.47
17.40	74°57 '40.66"	12°51 '27.44"	1.82	1.59
17.42	74°57 '40.87"	12°51 '26.82"	2.05	1.82
17.45	74°57 '41.26"	12°51 '25.96"	2.04	1.81
17.47	74°57 '41.58"	12°51 '25.24"	2.00	1.77
17.49	74°57 '41.84"	12°51 '24.6"	2.18	1.95
17.52	74°57 '42.17"	12°51 '23.97"	2.39	2.16
17.55	74°57 '42.82"	12°51 '23.16"	2.57	2.34
17.57	74°57 '43.33"	12°51 '22.71"	2.34	2.12
17.59	74°57 '43.94"	12°51 '22.36"	2.23	2.01
17.61	74°57 '44.53"	12°51 '22.05"	2.34	2.12
17.64	74°57 '45.37"	12°51 '21.69"	2.40	2.18
17.66	74°57 '46"	12°51 '21.44"	2.33	2.11
17.68	74°57 '46.68"	12°51 '21.21"	2.28	2.06
17.70	74°57 '47.31"	12°51 '21.02"	2.30	2.08
17.72	74°57 '48.09"	12°51 '20.79"	2.31	2.09
17.74	74°57 '48.74"	12°51 '20.54"	2.14	1.92
17.77	74°57 '49.39"	12°51 '20.29"	2.02	1.80
17.79	74°57 '50.03"	12°51 '20.08"	1.93	1.71
17.81	74°57 '50.67"	12°51 '19.92"	1.77	1.56

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
17.83	74°57 '51.36"	12°51 '19.84"	1.69	1.48
17.85	74°57 '52.08"	12°51 '19.84"	1.55	1.34
17.87	74°57 '52.76"	12°51 '19.89"	1.67	1.46
17.89	74°57 '53.43"	12°51 '19.96"	1.75	1.54
17.91	74°57 '54.2"	12°51 '20.04"	1.67	1.46
17.94	74°57 '55.03"	12°51 '20.14"	1.76	1.55
17.96	74°57 '55.76"	12°51 '20.24"	1.87	1.66
17.98	74°57 '56.43"	12°51 '20.37"	2.07	1.86
18.00	74°57 '57.08"	12°51 '20.51"	2.22	2.01
18.03	74°57 '58.08"	12°51 '20.85"	2.20	1.99
18.07	74°57 '59.18"	12°51 '21.27"	2.20	2.00
18.09	74°57 '59.79"	12°51 '21.53"	2.02	1.82
18.13	74°58 '1"	12°51 '22.06"	2.06	1.86
18.16	74°58 '1.95"	12°51 '22.54"	2.26	2.06
18.18	74°58 '2.56"	12°51 '22.87"	2.36	2.16
18.20	74°58 '3.16"	12°51 '23.22"	2.52	2.32
18.23	74°58 '3.95"	12°51 '23.69"	2.65	2.45
18.26	74°58 '4.71"	12°51 '24.34"	2.77	2.57
18.28	74°58 '5.15"	12°51 '24.85"	2.56	2.37
18.31	74°58 '5.73"	12°51 '25.44"	2.75	2.56
18.34	74°58 '6.63"	12°51 '26.22"	2.27	2.08
18.38	74°58 '7.49"	12°51 '26.94"	2.26	2.07
18.42	74°58 '8.51"	12°51 '27.71"	2.25	2.06
18.45	74°58 '9.45"	12°51 '28.21"	2.23	2.04
18.47	74°58 '10.08"	12°51 '28.44"	2.38	2.19
18.50	74°58 '11.09"	12°51 '28.83"	2.68	2.49
18.53	74°58 '11.83"	12°51 '29.18"	2.75	2.57
18.56	74°58 '12.81"	12°51 '29.54"	2.61	2.43
18.58	74°58 '13.47"	12°51 '29.65"	2.39	2.21
18.60	74°58 '14.12"	12°51 '29.88"	2.86	2.68
18.62	74°58 '14.69"	12°51 '30.22"	3.06	2.88
18.65	74°58 '15.4"	12°51 '30.75"	2.98	2.80
18.67	74°58 '16.01"	12°51 '31.06"	3.18	3.00
18.69	74°58 '16.58"	12°51 '31.42"	3.86	3.68
18.71	74°58 '17.11"	12°51 '31.82"	4.00	3.82
18.73	74°58 '17.66"	12°51 '32.23"	4.16	3.98
18.75	74°58 '18.2"	12°51 '32.61"	5.30	5.12
18.78	74°58 '19.19"	12°51 '33.31"	4.59	4.42
18.80	74°58 '19.75"	12°51 '33.68"	3.69	3.52
18.82	74°58 '20.27"	12°51 '34.1"	3.12	2.95
18.85	74°58 '20.81"	12°51 '34.54"	2.93	2.76
18.87	74°58 '21.37"	12°51 '35.08"	3.10	2.93
18.89	74°58 '21.84"	12°51 '35.56"	2.87	2.70
18.91	74°58 '22.26"	12°51 '36.08"	3.54	3.37
18.93	74°58 '22.68"	12°51 '36.59"	3.75	3.58
18.96	74°58 '23.26"	12°51 '37.26"	3.66	3.49
18.98	74°58 '23.61"	12°51 '37.82"	4.25	4.08
19.01	74°58 '24.28"	12°51 '38.73"	2.96	2.80
19.05	74°58 '25.07"	12°51 '39.66"	3.25	3.09
19.08	74°58 '25.63"	12°51 '40.28"	2.87	2.71
19.10	74°58 '26.22"	12°51 '40.85"	2.70	2.54
19.12	74°58 '26.75"	12°51 '41.41"	2.74	2.58
19.14	74°58 '27.25"	12°51 '41.85"	2.32	2.16
19.18	74°58 '28.05"	12°51 '42.68"	2.45	2.29
19.21	74°58 '28.64"	12°51 '43.41"	2.28	2.12
19.23	74°58 '29.03"	12°51 '43.93"	2.26	2.10
19.25	74°58 '29.41"	12°51 '44.48"	2.24	2.09
19.27	74°58 '29.76"	12°51 '45.07"	2.38	2.23
19.30	74°58 '30.31"	12°51 '45.96"	2.53	2.38
19.34	74°58 '30.98"	12°51 '46.91"	2.69	2.54
19.37	74°58 '31.67"	12°51 '47.78"	2.91	2.76
19.39	74°58 '32.28"	12°51 '48.33"	3.20	3.05
19.43	74°58 '33.2"	12°51 '49.21"	3.91	3.76
19.47	74°58 '34.13"	12°51 '49.98"	3.13	2.98
19.49	74°58 '34.73"	12°51 '50.37"	3.75	3.61
19.52	74°58 '35.45"	12°51 '50.84"	3.22	3.08
19.54	74°58 '36.04"	12°51 '51.19"	2.36	2.22
19.56	74°58 '36.61"	12°51 '51.54"	2.20	2.06
19.59	74°58 '37.51"	12°51 '52.12"	1.55	1.41

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
19.61	74°58 '38.19"	12°51 '52.37"	2.11	1.97
19.63	74°58 '38.79"	12°51 '52.67"	2.25	2.11
19.66	74°58 '39.46"	12°51 '53.08"	2.33	2.19
19.68	74°58 '40.08"	12°51 '53.36"	2.97	2.83
19.71	74°58 '41.21"	12°51 '53.8"	3.09	2.95
19.74	74°58 '41.88"	12°51 '53.95"	2.70	2.57
19.76	74°58 '42.53"	12°51 '54.06"	2.06	1.93
19.78	74°58 '43.21"	12°51 '54.07"	1.76	1.63
19.80	74°58 '43.88"	12°51 '54.04"	2.00	1.87
19.82	74°58 '44.55"	12°51 '53.95"	2.93	2.80
19.85	74°58 '45.8"	12°51 '53.76"	3.14	3.01
19.87	74°58 '46.47"	12°51 '53.72"	1.77	1.64
19.91	74°58 '47.73"	12°51 '53.74"	1.20	1.07
19.93	74°58 '48.38"	12°51 '53.64"	1.63	1.50
19.95	74°58 '49.06"	12°51 '53.55"	1.66	1.53
19.99	74°58 '50.25"	12°51 '53.03"	1.98	1.86
20.01	74°58 '50.82"	12°51 '52.69"	1.67	1.55
20.03	74°58 '51.4"	12°51 '52.36"	1.36	1.24
20.05	74°58 '52.02"	12°51 '52.02"	1.63	1.51
20.08	74°58 '52.78"	12°51 '51.51"	1.92	1.80
20.12	74°58 '53.77"	12°51 '50.78"	1.28	1.16
20.14	74°58 '54.31"	12°51 '50.37"	1.76	1.64
20.17	74°58 '55.1"	12°51 '49.82"	1.41	1.29
20.19	74°58 '55.75"	12°51 '49.5"	1.03	0.91
20.22	74°58 '56.59"	12°51 '49.1"	1.43	1.32
20.24	74°58 '57.16"	12°51 '48.75"	1.83	1.72
20.26	74°58 '57.88"	12°51 '48.35"	1.79	1.68
20.29	74°58 '58.57"	12°51 '48.05"	1.89	1.78
20.31	74°58 '59.21"	12°51 '47.79"	1.80	1.69
20.34	74°59 '0.08"	12°51 '47.45"	1.77	1.66
20.37	74°59 '1.12"	12°51 '46.96"	1.85	1.74
20.40	74°59 '2.05"	12°51 '46.37"	1.80	1.69
20.43	74°59 '2.68"	12°51 '46.07"	2.11	2.00
20.45	74°59 '3.38"	12°51 '45.78"	2.35	2.24
20.47	74°59 '3.99"	12°51 '45.53"	2.65	2.55
20.49	74°59 '4.79"	12°51 '45.2"	2.08	1.98
20.52	74°59 '5.45"	12°51 '44.86"	2.46	2.36
20.55	74°59 '6.39"	12°51 '44.37"	2.47	2.37
20.57	74°59 '7.01"	12°51 '44.09"	2.54	2.44
20.59	74°59 '7.6"	12°51 '43.79"	2.80	2.70
20.61	74°59 '8.2"	12°51 '43.49"	3.10	3.00
20.63	74°59 '8.87"	12°51 '43.19"	3.02	2.92
20.65	74°59 '9.5"	12°51 '42.94"	2.63	2.53
20.67	74°59 '10.14"	12°51 '42.72"	2.35	2.25
20.69	74°59 '10.76"	12°51 '42.46"	2.34	2.24
20.71	74°59 '11.38"	12°51 '42.16"	2.15	2.06
20.74	74°59 '11.98"	12°51 '41.78"	2.14	2.05
20.76	74°59 '12.59"	12°51 '41.46"	1.88	1.79
20.78	74°59 '13.2"	12°51 '41.16"	1.64	1.55
20.80	74°59 '13.82"	12°51 '40.91"	1.86	1.77
20.84	74°59 '14.99"	12°51 '40.31"	1.88	1.79
20.86	74°59 '15.68"	12°51 '39.94"	2.03	1.94
20.88	74°59 '16.27"	12°51 '39.64"	2.18	2.09
20.92	74°59 '17.29"	12°51 '39.13"	1.60	1.51
20.94	74°59 '17.92"	12°51 '38.89"	1.20	1.11
20.96	74°59 '18.55"	12°51 '38.64"	0.96	0.88
20.98	74°59 '19.19"	12°51 '38.45"	0.76	0.68
21.00	74°59 '19.87"	12°51 '38.27"	0.76	0.68
21.02	74°59 '20.54"	12°51 '38.08"	0.92	0.84
21.04	74°59 '21.2"	12°51 '37.86"	0.84	0.76
21.06	74°59 '21.79"	12°51 '37.55"	0.91	0.83
21.08	74°59 '22.44"	12°51 '37.32"	1.02	0.94
21.10	74°59 '23.12"	12°51 '37.15"	1.19	1.11
21.13	74°59 '24.01"	12°51 '36.98"	1.26	1.18
21.15	74°59 '24.67"	12°51 '36.88"	1.37	1.29
21.18	74°59 '25.83"	12°51 '36.79"	1.51	1.43
21.21	74°59 '26.61"	12°51 '36.66"	1.62	1.55
21.23	74°59 '27.27"	12°51 '36.54"	1.73	1.66
21.25	74°59 '28.03"	12°51 '36.5"	1.72	1.65

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
21.29	74°59 '29.28"	12°51 '36.57"	1.70	1.63
21.32	74°59 '30.34"	12°51 '36.66"	1.67	1.60
21.34	74°59 '31"	12°51 '36.73"	1.59	1.52
21.36	74°59 '31.66"	12°51 '36.84"	1.99	1.92
21.39	74°59 '32.61"	12°51 '37.06"	2.30	2.23
21.41	74°59 '33.25"	12°51 '37.24"	1.89	1.82
21.43	74°59 '33.89"	12°51 '37.5"	1.58	1.52
21.45	74°59 '34.47"	12°51 '37.83"	1.20	1.14
21.48	74°59 '35.35"	12°51 '38.42"	1.19	1.13
21.51	74°59 '36.17"	12°51 '39.01"	1.30	1.24
21.53	74°59 '36.69"	12°51 '39.43"	0.92	0.86
21.56	74°59 '37.19"	12°51 '39.88"	1.31	1.25
21.58	74°59 '37.69"	12°51 '40.33"	1.71	1.65
21.60	74°59 '38.18"	12°51 '40.8"	1.54	1.48
21.63	74°59 '38.89"	12°51 '41.42"	1.48	1.42
21.65	74°59 '39.6"	12°51 '41.94"	1.37	1.31
21.68	74°59 '40.4"	12°51 '42.57"	1.56	1.51
21.70	74°59 '40.92"	12°51 '42.98"	2.10	2.05
21.72	74°59 '41.46"	12°51 '43.36"	2.19	2.14
21.76	74°59 '42.61"	12°51 '43.96"	3.15	3.10
21.79	74°59 '43.5"	12°51 '44.35"	3.89	3.84
21.81	74°59 '44.12"	12°51 '44.61"	3.49	3.44
21.84	74°59 '44.68"	12°51 '45.21"	2.40	2.35
21.86	74°59 '44.93"	12°51 '45.88"	2.25	2.20
21.89	74°59 '45.16"	12°51 '46.83"	3.04	2.99
21.91	74°59 '44.95"	12°51 '47.48"	1.78	1.73
21.92	74°59 '45.05"	12°51 '47.89"	0.93	0.89
21.94	74°59 '45.61"	12°51 '48.03"	1.34	1.30
21.97	74°59 '46.24"	12°51 '48.91"	1.75	1.71
21.99	74°59 '46.49"	12°51 '49.52"	1.42	1.38
22.03	74°59 '46.7"	12°51 '50.7"	1.53	1.49
22.06	74°59 '46.51"	12°51 '51.8"	1.50	1.46
22.08	74°59 '46.63"	12°51 '52.44"	2.21	2.17
22.10	74°59 '46.66"	12°51 '53.09"	1.06	1.02
22.13	74°59 '46.51"	12°51 '53.95"	1.74	1.70
22.15	74°59 '46.39"	12°51 '54.59"	2.11	2.07
22.17	74°59 '46.08"	12°51 '55.27"	1.21	1.18
22.19	74°59 '46.09"	12°51 '55.92"	1.66	1.63
22.22	74°59 '46"	12°51 '56.74"	1.19	1.16
22.25	74°59 '46.05"	12°51 '57.59"	1.39	1.36
22.27	74°59 '46.13"	12°51 '58.24"	2.04	2.01
22.29	74°59 '46.2"	12°51 '59.04"	2.26	2.23
22.32	74°59 '46.35"	12°52 '0.15"	2.96	2.93
22.35	74°59 '46.78"	12°52 '0.89"	2.83	2.80
22.37	74°59 '47.33"	12°52 '1.45"	2.63	2.60
22.40	74°59 '47.89"	12°52 '1.96"	2.41	2.39
22.42	74°59 '48.54"	12°52 '2.52"	1.96	1.94
22.44	74°59 '49.04"	12°52 '2.94"	1.66	1.64
22.46	74°59 '49.56"	12°52 '3.37"	1.64	1.62
22.49	74°59 '50.2"	12°52 '3.88"	1.41	1.39
22.52	74°59 '51.05"	12°52 '4.57"	1.30	1.28
22.54	74°59 '51.51"	12°52 '5.05"	1.11	1.09
22.57	74°59 '52"	12°52 '5.67"	1.01	0.99
22.59	74°59 '52.55"	12°52 '6.31"	0.93	0.91
22.63	74°59 '52.99"	12°52 '7.3"	0.70	0.68
22.65	74°59 '53.17"	12°52 '7.94"	0.75	0.74
22.67	74°59 '53.35"	12°52 '8.57"	0.96	0.95
22.69	74°59 '53.55"	12°52 '9.26"	1.14	1.13
22.71	74°59 '53.7"	12°52 '9.93"	1.36	1.35
22.74	74°59 '53.9"	12°52 '10.93"	1.25	1.24
22.76	74°59 '54.08"	12°52 '11.57"	1.66	1.65
22.78	74°59 '54.34"	12°52 '12.18"	1.94	1.93
22.81	74°59 '54.7"	12°52 '13"	1.59	1.58
22.83	74°59 '54.95"	12°52 '13.63"	1.90	1.89
22.85	74°59 '55.26"	12°52 '14.21"	2.09	2.08
22.87	74°59 '55.56"	12°52 '14.8"	2.49	2.48
22.89	74°59 '55.99"	12°52 '15.31"	2.67	2.67
22.91	74°59 '56.56"	12°52 '15.81"	2.68	2.68
22.93	74°59 '57.09"	12°52 '16.22"	2.64	2.64

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
22.96	74°59 '57.73"	12°52 '16.69"	1.88	1.88
22.98	74°59 '58.28"	12°52 '17.1"	2.22	2.22
23.01	74°59 '59.05"	12°52 '17.59"	1.85	1.85
23.03	74°59 '59.58"	12°52 '17.99"	0.82	0.82
23.06	75°0 '0.57"	12°52 '18.48"	0.90	0.90
23.08	75°0 '1.16"	12°52 '18.78"	0.85	0.85
23.10	75°0 '1.82"	12°52 '18.9"	1.73	1.73
23.13	75°0 '2.43"	12°52 '19.7"	1.15	1.15
23.19	75°0 '4.29"	12°52 '19.75"	0.83	0.83
Thumbe Barrage at Ch 23.50km				
23.95	75°0 '29.41"	12°52 '22.45"	4.99	4.99
23.97	75°0 '30.1"	12°52 '22.36"	4.71	4.71
23.99	75°0 '30.79"	12°52 '22.27"	4.51	4.51
24.01	75°0 '31.49"	12°52 '22.18"	4.48	4.48
24.03	75°0 '32.18"	12°52 '22.09"	4.48	4.48
24.05	75°0 '32.87"	12°52 '22"	4.43	4.43
24.07	75°0 '33.57"	12°52 '21.91"	4.32	4.32
24.10	75°0 '34.26"	12°52 '21.82"	4.18	4.18
24.12	75°0 '34.95"	12°52 '21.73"	4.01	4.01
24.14	75°0 '35.65"	12°52 '21.64"	3.91	3.91
24.16	75°0 '36.34"	12°52 '21.55"	3.76	3.76
24.18	75°0 '37.03"	12°52 '21.46"	3.72	3.72
24.20	75°0 '37.73"	12°52 '21.37"	3.49	3.49
24.22	75°0 '38.42"	12°52 '21.28"	3.68	3.68
24.24	75°0 '39.11"	12°52 '21.19"	3.66	3.66
24.26	75°0 '39.81"	12°52 '21.1"	3.62	3.62
24.29	75°0 '40.5"	12°52 '21.02"	3.20	3.20
24.31	75°0 '41.2"	12°52 '20.95"	3.63	3.63
24.33	75°0 '41.89"	12°52 '20.88"	3.78	3.78
24.35	75°0 '42.59"	12°52 '20.81"	3.80	3.80
24.37	75°0 '43.28"	12°52 '20.74"	3.54	3.54
24.39	75°0 '43.98"	12°52 '20.68"	3.71	3.71
24.41	75°0 '44.68"	12°52 '20.61"	3.71	3.71
24.43	75°0 '45.37"	12°52 '20.54"	3.69	3.69
24.45	75°0 '46.07"	12°52 '20.47"	3.46	3.46
24.47	75°0 '46.76"	12°52 '20.4"	3.59	3.59
24.50	75°0 '47.46"	12°52 '20.33"	3.67	3.67
24.52	75°0 '48.15"	12°52 '20.26"	3.72	3.72
24.54	75°0 '48.84"	12°52 '20.14"	3.62	3.62
24.56	75°0 '49.53"	12°52 '20"	3.61	3.61
24.58	75°0 '50.21"	12°52 '19.86"	3.68	3.68
24.60	75°0 '50.9"	12°52 '19.73"	4.33	4.33
24.62	75°0 '51.58"	12°52 '19.59"	4.31	4.31
24.64	75°0 '52.27"	12°52 '19.45"	3.83	3.83
24.66	75°0 '52.95"	12°52 '19.31"	3.45	3.45
24.69	75°0 '53.64"	12°52 '19.18"	3.76	3.76
24.71	75°0 '54.32"	12°52 '19.04"	3.91	3.91
24.73	75°0 '55.01"	12°52 '18.9"	4.25	4.25
24.75	75°0 '55.69"	12°52 '18.76"	4.35	4.35
24.77	75°0 '56.38"	12°52 '18.63"	4.38	4.38
24.79	75°0 '57.06"	12°52 '18.49"	4.43	4.43
24.81	75°0 '57.75"	12°52 '18.35"	4.53	4.53
24.83	75°0 '58.43"	12°52 '18.21"	4.59	4.59
24.85	75°0 '59.12"	12°52 '18.08"	4.59	4.59
24.88	75°0 '59.8"	12°52 '17.94"	4.50	4.50
24.90	75°1 '0.49"	12°52 '17.8"	4.52	4.52
24.92	75°1 '1.17"	12°52 '17.66"	4.55	4.55
24.94	75°1 '1.86"	12°52 '17.53"	4.70	4.70
24.96	75°1 '2.54"	12°52 '17.39"	4.63	4.63
24.98	75°1 '3.23"	12°52 '17.25"	4.51	4.51
25.00	75°1 '3.92"	12°52 '17.11"	4.43	4.43
25.02	75°1 '4.6"	12°52 '16.98"	4.41	4.41
25.04	75°1 '5.29"	12°52 '16.84"	4.37	4.37
25.07	75°1 '5.97"	12°52 '16.7"	4.36	4.36
25.09	75°1 '6.66"	12°52 '16.56"	4.21	4.21
25.11	75°1 '7.34"	12°52 '16.43"	4.18	4.18
25.13	75°1 '8.02"	12°52 '16.26"	4.36	4.36
25.15	75°1 '8.69"	12°52 '16.06"	4.53	4.53
25.17	75°1 '9.35"	12°52 '15.85"	4.53	4.53

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
25.19	75°1 '10.02"	12°52 '15.64"	3.94	3.94
25.21	75°1 '10.69"	12°52 '15.44"	3.52	3.52
25.23	75°1 '11.35"	12°52 '15.23"	3.78	3.78
25.25	75°1 '12.02"	12°52 '15.02"	3.74	3.74
25.28	75°1 '12.69"	12°52 '14.81"	3.72	3.72
25.30	75°1 '13.35"	12°52 '14.61"	3.86	3.86
25.32	75°1 '14.02"	12°52 '14.4"	3.96	3.96
25.34	75°1 '14.69"	12°52 '14.19"	3.83	3.83
25.36	75°1 '15.35"	12°52 '13.99"	3.72	3.72
25.38	75°1 '16.02"	12°52 '13.78"	3.68	3.68
25.40	75°1 '16.69"	12°52 '13.57"	3.75	3.75
25.42	75°1 '17.35"	12°52 '13.36"	3.88	3.88
25.44	75°1 '18.02"	12°52 '13.16"	4.17	4.17
25.47	75°1 '18.69"	12°52 '12.95"	3.48	3.48
25.49	75°1 '19.35"	12°52 '12.74"	3.30	3.30
25.51	75°1 '20.02"	12°52 '12.54"	3.23	3.23
25.53	75°1 '20.69"	12°52 '12.33"	3.31	3.31
25.55	75°1 '21.35"	12°52 '12.12"	3.02	3.02
25.57	75°1 '22.02"	12°52 '11.91"	2.81	2.81
25.59	75°1 '22.7"	12°52 '11.74"	2.66	2.66
25.61	75°1 '23.31"	12°52 '11.55"	2.66	2.66
25.63	75°1 '23.97"	12°52 '11.32"	2.35	2.35
25.65	75°1 '24.63"	12°52 '11.1"	2.37	2.37
25.67	75°1 '25.3"	12°52 '10.88"	2.38	2.38
25.70	75°1 '25.96"	12°52 '10.65"	2.27	2.27
25.72	75°1 '26.62"	12°52 '10.43"	1.97	1.97
25.74	75°1 '27.28"	12°52 '10.21"	3.00	3.00
25.76	75°1 '27.94"	12°52 '9.98"	2.89	2.89
25.78	75°1 '28.6"	12°52 '9.76"	2.66	2.66
25.80	75°1 '29.26"	12°52 '9.54"	2.35	2.35
25.82	75°1 '29.92"	12°52 '9.31"	2.37	2.37
25.84	75°1 '30.59"	12°52 '9.09"	2.38	2.38
25.86	75°1 '31.25"	12°52 '8.86"	2.27	2.27
25.89	75°1 '31.91"	12°52 '8.64"	1.97	1.97
25.91	75°1 '32.57"	12°52 '8.42"	1.87	1.87
25.93	75°1 '33.23"	12°52 '8.19"	1.93	1.93
25.95	75°1 '33.89"	12°52 '7.97"	2.76	2.76
25.97	75°1 '34.55"	12°52 '7.75"	2.98	2.98
26.00	75°1 '35.38"	12°52 '7.5"	1.90	1.90
26.02	75°1 '36.16"	12°52 '7.27"	1.60	1.60
26.04	75°1 '36.87"	12°52 '7.19"	1.60	1.60
26.06	75°1 '37.58"	12°52 '7.11"	1.80	1.80
26.09	75°1 '38.29"	12°52 '7.03"	1.40	1.40
26.11	75°1 '39.01"	12°52 '6.95"	1.60	1.60
26.13	75°1 '39.72"	12°52 '6.87"	1.50	1.50
26.15	75°1 '40.43"	12°52 '6.79"	1.60	1.60
26.17	75°1 '41.14"	12°52 '6.76"	1.50	1.50
26.19	75°1 '41.86"	12°52 '6.75"	1.20	1.20
26.21	75°1 '42.57"	12°52 '6.75"	1.60	1.60
26.24	75°1 '43.28"	12°52 '6.79"	1.80	1.80
26.26	75°1 '43.96"	12°52 '7.01"	1.40	1.40
26.28	75°1 '44.65"	12°52 '7.22"	1.60	1.60
26.30	75°1 '45.33"	12°52 '7.43"	1.50	1.50
26.32	75°1 '46.01"	12°52 '7.65"	1.90	1.90
26.34	75°1 '46.69"	12°52 '7.86"	1.80	1.80
26.37	75°1 '47.37"	12°52 '8.07"	1.50	1.50
26.39	75°1 '48.02"	12°52 '8.36"	1.60	1.60
26.41	75°1 '48.66"	12°52 '8.69"	1.50	1.50
26.43	75°1 '49.3"	12°52 '9.01"	2.10	2.10
26.45	75°1 '49.93"	12°52 '9.33"	2.10	2.10
26.47	75°1 '50.57"	12°52 '9.65"	1.60	1.60
26.49	75°1 '51.2"	12°52 '9.98"	1.70	1.70
26.52	75°1 '51.83"	12°52 '10.32"	1.50	1.50
26.54	75°1 '52.43"	12°52 '10.7"	1.20	1.20
26.56	75°1 '53.03"	12°52 '11.09"	1.30	1.30
26.58	75°1 '53.63"	12°52 '11.47"	0.90	0.90
26.60	75°1 '54.23"	12°52 '11.85"	2.20	2.20
26.62	75°1 '54.79"	12°52 '12.28"	1.70	1.70
26.65	75°1 '55.36"	12°52 '12.71"	1.50	1.50

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
26.67	75°1 '55.93"	12°52 '13.14"	1.60	1.60
26.69	75°1 '56.53"	12°52 '13.58"	1.00	1.00
26.71	75°1 '57.15"	12°52 '13.89"	2.89	2.89
26.73	75°1 '57.77"	12°52 '14.21"	2.66	2.66
26.75	75°1 '58.39"	12°52 '14.52"	2.35	2.35
26.77	75°1 '59.01"	12°52 '14.84"	2.37	2.37
26.80	75°1 '59.63"	12°52 '15.16"	2.38	2.38
26.82	75°2 '0.26"	12°52 '15.47"	2.27	2.27
26.84	75°2 '0.88"	12°52 '15.79"	1.97	1.97
26.86	75°2 '1.5"	12°52 '16.1"	1.87	1.87
26.88	75°2 '2.12"	12°52 '16.42"	1.93	1.93
26.90	75°2 '2.74"	12°52 '16.74"	2.76	2.76
26.92	75°2 '3.35"	12°52 '16.97"	2.98	2.98
26.94	75°2 '4.03"	12°52 '17.13"	2.75	2.75
26.96	75°2 '4.71"	12°52 '17.28"	2.64	2.64
26.98	75°2 '5.39"	12°52 '17.44"	2.35	2.35
27.00	75°2 '6.07"	12°52 '17.59"	2.38	2.38
27.03	75°2 '6.75"	12°52 '17.75"	2.35	2.35
27.05	75°2 '7.43"	12°52 '17.91"	2.13	2.13
27.07	75°2 '8.11"	12°52 '18.06"	1.99	1.99
27.09	75°2 '8.79"	12°52 '18.22"	1.90	1.90
27.11	75°2 '9.47"	12°52 '18.38"	1.87	1.87
27.13	75°2 '10.16"	12°52 '18.53"	1.90	1.90
27.15	75°2 '10.84"	12°52 '18.69"	1.93	1.93
27.17	75°2 '11.52"	12°52 '18.84"	1.98	1.98
27.19	75°2 '12.17"	12°52 '19.09"	1.98	1.98
27.22	75°2 '12.82"	12°52 '19.34"	2.04	2.04
27.24	75°2 '13.47"	12°52 '19.59"	1.99	1.99
27.26	75°2 '14.13"	12°52 '19.83"	2.17	2.17
27.28	75°2 '14.78"	12°52 '20.08"	2.17	2.17
27.30	75°2 '15.43"	12°52 '20.33"	2.20	2.20
27.32	75°2 '16.08"	12°52 '20.58"	2.24	2.24
27.34	75°2 '16.73"	12°52 '20.83"	2.35	2.35
27.36	75°2 '17.39"	12°52 '21.08"	2.38	2.38
27.38	75°2 '18.04"	12°52 '21.33"	2.50	2.50
27.41	75°2 '18.69"	12°52 '21.57"	1.96	1.96
27.43	75°2 '19.34"	12°52 '21.82"	1.78	1.78
27.45	75°2 '19.99"	12°52 '22.07"	1.70	1.70
27.47	75°2 '20.64"	12°52 '22.32"	1.75	1.75
27.49	75°2 '21.3"	12°52 '22.57"	1.82	1.82
27.51	75°2 '21.95"	12°52 '22.82"	1.84	1.84
27.53	75°2 '22.6"	12°52 '23.06"	1.89	1.89
27.55	75°2 '23.12"	12°52 '23.49"	1.94	1.94
27.57	75°2 '23.54"	12°52 '24.04"	1.94	1.94
27.59	75°2 '23.97"	12°52 '24.58"	1.93	1.93
27.62	75°2 '24.39"	12°52 '25.13"	1.94	1.94
27.64	75°2 '24.82"	12°52 '25.67"	1.90	1.90
27.66	75°2 '25.24"	12°52 '26.21"	1.41	1.41
27.68	75°2 '25.67"	12°52 '26.76"	1.65	1.65
27.70	75°2 '26.09"	12°52 '27.3"	1.65	1.65
27.72	75°2 '26.43"	12°52 '27.9"	1.69	1.69
27.74	75°2 '26.64"	12°52 '28.55"	1.77	1.77
27.76	75°2 '26.86"	12°52 '29.2"	1.74	1.74
27.78	75°2 '27.08"	12°52 '29.85"	1.79	1.79
27.80	75°2 '27.3"	12°52 '30.5"	1.80	1.80
27.84	75°2 '27.28"	12°52 '31.53"	1.70	1.70
27.86	75°2 '27.15"	12°52 '32.2"	1.81	1.81
27.88	75°2 '27.02"	12°52 '32.87"	1.80	1.80
27.90	75°2 '26.88"	12°52 '33.54"	1.79	1.79
27.92	75°2 '26.85"	12°52 '34.23"	1.70	1.70
27.94	75°2 '26.84"	12°52 '34.91"	1.66	1.66
27.96	75°2 '26.84"	12°52 '35.59"	1.70	1.70
27.98	75°2 '26.84"	12°52 '36.28"	1.65	1.65
28.00	75°2 '26.86"	12°52 '36.96"	1.61	1.61
28.03	75°2 '26.88"	12°52 '37.64"	1.63	1.63
28.05	75°2 '26.9"	12°52 '38.33"	1.66	1.66
28.07	75°2 '26.87"	12°52 '39.01"	1.63	1.63
28.09	75°2 '26.79"	12°52 '39.69"	1.69	1.69
28.11	75°2 '26.72"	12°52 '40.37"	1.70	1.70

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
28.13	75°2 '26.64"	12°52 '41.05"	1.74	1.74
28.15	75°2 '26.57"	12°52 '41.73"	1.76	1.76
28.17	75°2 '26.54"	12°52 '42.41"	1.79	1.79
28.19	75°2 '26.62"	12°52 '43.09"	1.76	1.76
28.21	75°2 '26.69"	12°52 '43.77"	1.74	1.74
28.23	75°2 '26.77"	12°52 '44.45"	1.70	1.70
28.26	75°2 '26.84"	12°52 '45.13"	1.62	1.62
28.28	75°2 '26.92"	12°52 '45.81"	1.65	1.65
28.30	75°2 '26.99"	12°52 '46.49"	1.62	1.62
28.32	75°2 '27.05"	12°52 '47.17"	1.72	1.72
28.34	75°2 '27.11"	12°52 '47.85"	1.78	1.78
28.36	75°2 '27.16"	12°52 '48.53"	1.61	1.61
28.38	75°2 '27.22"	12°52 '49.21"	1.49	1.49
28.40	75°2 '27.28"	12°52 '49.89"	1.52	1.52
28.42	75°2 '27.33"	12°52 '50.57"	1.56	1.56
28.44	75°2 '27.39"	12°52 '51.26"	1.63	1.63
28.47	75°2 '27.4"	12°52 '51.94"	1.67	1.67
28.49	75°2 '27.34"	12°52 '52.62"	1.61	1.61
28.51	75°2 '27.29"	12°52 '53.3"	1.66	1.66
28.53	75°2 '27.23"	12°52 '53.98"	1.78	1.78
28.55	75°2 '27.18"	12°52 '54.66"	1.90	1.90
28.57	75°2 '27.12"	12°52 '55.35"	1.94	1.94
28.59	75°2 '27.07"	12°52 '56.03"	2.17	2.17
28.61	75°2 '27.01"	12°52 '56.71"	2.17	2.17
28.63	75°2 '26.96"	12°52 '57.39"	2.20	2.20
28.65	75°2 '26.92"	12°52 '58.07"	2.24	2.24
28.68	75°2 '26.92"	12°52 '58.76"	2.35	2.35
28.70	75°2 '26.92"	12°52 '59.44"	2.38	2.38
28.72	75°2 '26.93"	12°53 '0.12"	2.50	2.50
28.74	75°2 '26.93"	12°53 '0.81"	1.96	1.96
28.76	75°2 '26.93"	12°53 '1.49"	1.78	1.78
28.78	75°2 '26.94"	12°53 '2.17"	1.70	1.70
28.80	75°2 '27.02"	12°53 '2.85"	1.75	1.75
28.82	75°2 '27.09"	12°53 '3.53"	1.82	1.82
28.84	75°2 '27.18"	12°53 '4.21"	1.78	1.78
28.86	75°2 '27.32"	12°53 '4.88"	1.61	1.61
28.89	75°2 '27.46"	12°53 '5.55"	1.49	1.49
28.91	75°2 '27.6"	12°53 '6.22"	1.52	1.52
28.93	75°2 '27.75"	12°53 '6.89"	1.56	1.56
28.95	75°2 '27.89"	12°53 '7.56"	1.63	1.63
28.97	75°2 '28.06"	12°53 '8.22"	1.67	1.67
28.99	75°2 '28.25"	12°53 '8.88"	1.61	1.61
29.01	75°2 '28.45"	12°53 '9.53"	1.66	1.66
29.03	75°2 '28.65"	12°53 '10.19"	1.78	1.78
29.05	75°2 '28.85"	12°53 '10.85"	1.90	1.90
29.07	75°2 '29.16"	12°53 '11.45"	1.94	1.94
29.10	75°2 '29.48"	12°53 '12.06"	2.17	2.17
29.12	75°2 '29.8"	12°53 '12.67"	1.77	1.77
29.14	75°2 '30.11"	12°53 '13.28"	1.07	1.07
29.16	75°2 '30.43"	12°53 '13.89"	1.16	1.16
29.18	75°2 '30.74"	12°53 '14.5"	1.38	1.38
29.20	75°2 '31"	12°53 '15.14"	1.56	1.56
29.22	75°2 '31.26"	12°53 '15.77"	1.65	1.65
29.24	75°2 '31.52"	12°53 '16.41"	1.72	1.72
29.26	75°2 '31.78"	12°53 '17.04"	2.05	2.05
29.29	75°2 '32.04"	12°53 '17.67"	1.78	1.78
29.31	75°2 '32.3"	12°53 '18.31"	1.70	1.70
29.33	75°2 '32.56"	12°53 '18.94"	1.75	1.75
29.35	75°2 '32.89"	12°53 '19.54"	1.82	1.82
29.37	75°2 '33.25"	12°53 '20.13"	1.78	1.78
29.39	75°2 '33.61"	12°53 '20.71"	1.61	1.61
29.41	75°2 '33.97"	12°53 '21.3"	1.49	1.49
29.43	75°2 '34.33"	12°53 '21.88"	1.52	1.52
29.45	75°2 '34.69"	12°53 '22.47"	1.56	1.56
29.47	75°2 '35.05"	12°53 '23.05"	1.63	1.63
29.49	75°2 '35.42"	12°53 '23.64"	1.67	1.67
29.53	75°2 '35.84"	12°53 '24.55"	1.61	1.61
29.55	75°2 '35.98"	12°53 '25.22"	1.80	1.80
29.57	75°2 '36.11"	12°53 '25.89"	1.81	1.81

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
29.59	75°2 '36.25"	12°53 '26.56"	1.80	1.80
29.61	75°2 '36.39"	12°53 '27.24"	1.79	1.79
29.63	75°2 '36.55"	12°53 '27.79"	0.69	0.69
29.66	75°2 '36.87"	12°53 '28.87"	0.63	0.63
29.71	75°2 '37.29"	12°53 '30.25"	0.56	0.56
29.75	75°2 '37.65"	12°53 '31.59"	0.57	0.57
29.78	75°2 '37.96"	12°53 '32.51"	0.53	0.53
29.82	75°2 '38.31"	12°53 '33.65"	0.55	0.55
29.86	75°2 '38.71"	12°53 '35"	0.52	0.52
29.89	75°2 '38.98"	12°53 '35.9"	0.65	0.65
29.92	75°2 '39.27"	12°53 '36.87"	0.85	0.85
29.97	75°2 '39.73"	12°53 '38.44"	0.51	0.51
30.01	75°2 '40.18"	12°53 '39.86"	0.55	0.55
30.06	75°2 '40.61"	12°53 '41.2"	0.62	0.62
30.10	75°2 '41.18"	12°53 '42.36"	0.57	0.57
30.14	75°2 '41.7"	12°53 '43.8"	0.78	0.78
30.19	75°2 '42.45"	12°53 '45.11"	0.72	0.72
30.23	75°2 '42.83"	12°53 '46.2"	0.54	0.54
30.27	75°2 '43.29"	12°53 '47.42"	0.62	0.62
30.32	75°2 '44.55"	12°53 '48.76"	0.65	0.65
30.36	75°2 '45.38"	12°53 '49.58"	0.51	0.51
30.40	75°2 '46.58"	12°53 '50.4"	0.56	0.56
30.46	75°2 '48.13"	12°53 '51.44"	0.53	0.53
30.52	75°2 '49.79"	12°53 '52.4"	0.55	0.55
30.56	75°2 '51.03"	12°53 '53.12"	0.52	0.52
30.59	75°2 '51.9"	12°53 '53.4"	0.51	0.51
30.63	75°2 '53.22"	12°53 '53.65"	0.53	0.53
30.67	75°2 '54.77"	12°53 '53.94"	0.58	0.58
30.73	75°2 '56.59"	12°53 '53.87"	0.55	0.55
30.78	75°2 '58.16"	12°53 '53.81"	0.59	0.59
30.82	75°2 '59.52"	12°53 '53.67"	0.58	0.58
30.86	75°3 '0.88"	12°53 '53.39"	0.58	0.58
30.91	75°3 '2.37"	12°53 '53.08"	0.60	0.60
30.95	75°3 '3.73"	12°53 '52.8"	0.79	0.79
30.99	75°3 '5.21"	12°53 '52.49"	0.76	0.76
31.04	75°3 '6.89"	12°53 '52.54"	0.88	0.88
31.09	75°3 '8.32"	12°53 '52.57"	0.87	0.87
31.14	75°3 '9.92"	12°53 '52.61"	0.86	0.86
31.18	75°3 '11.4"	12°53 '52.65"	0.84	0.84
31.22	75°3 '12.66"	12°53 '52.68"	0.83	0.83
31.25	75°3 '13.65"	12°53 '52.78"	0.79	0.79
31.29	75°3 '15.08"	12°53 '52.99"	0.75	0.75
31.33	75°3 '16.4"	12°53 '53.18"	0.77	0.77
31.38	75°3 '17.86"	12°53 '53.4"	0.73	0.73
31.42	75°3 '19.26"	12°53 '53.6"	0.60	0.60
31.45	75°3 '20.44"	12°53 '53.78"	0.71	0.71
31.49	75°3 '21.61"	12°53 '53.95"	0.70	0.70
31.53	75°3 '22.94"	12°53 '54.04"	0.69	0.69
31.57	75°3 '24.27"	12°53 '54.14"	0.68	0.68
31.61	75°3 '25.6"	12°53 '54.24"	0.66	0.66
31.66	75°3 '27.26"	12°53 '54.36"	0.69	0.69
31.71	75°3 '28.77"	12°53 '54.47"	0.67	0.67
31.74	75°3 '30"	12°53 '54.56"	0.63	0.63
31.78	75°3 '31.16"	12°53 '54.64"	0.58	0.58
31.82	75°3 '32.43"	12°53 '54.79"	0.55	0.55
31.86	75°3 '33.98"	12°53 '55.02"	0.51	0.51
31.91	75°3 '35.43"	12°53 '55.23"	0.54	0.54
31.95	75°3 '36.86"	12°53 '55.43"	0.53	0.53
31.99	75°3 '38.19"	12°53 '55.6"	0.51	0.51
32.03	75°3 '39.41"	12°53 '55.74"	0.59	0.59
32.07	75°3 '40.71"	12°53 '55.89"	0.58	0.58
32.10	75°3 '41.56"	12°53 '55.95"	0.60	0.60
32.15	75°3 '43.3"	12°53 '55.77"	0.69	0.69
32.19	75°3 '44.67"	12°53 '55.63"	0.71	0.71
32.23	75°3 '46.09"	12°53 '55.25"	0.71	0.71
32.29	75°3 '47.93"	12°53 '54.67"	0.76	0.76
32.35	75°3 '49.64"	12°53 '54.04"	0.74	0.74
32.40	75°3 '51.38"	12°53 '53.42"	0.73	0.73
32.45	75°3 '52.78"	12°53 '53.03"	0.76	0.76

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
32.51	75°3 '54.7"	12°53 '52.49"	0.75	0.75
32.56	75°3 '56.56"	12°53 '52.04"	0.79	0.79
32.61	75°3 '58.09"	12°53 '51.68"	0.86	0.86
32.64	75°3 '59.14"	12°53 '51.43"	0.90	0.90
32.69	75°4 '0.71"	12°53 '50.99"	0.84	0.84
32.75	75°4 '2.19"	12°53 '50.07"	0.87	0.87
32.80	75°4 '3.62"	12°53 '49.19"	0.78	0.78
32.85	75°4 '5.15"	12°53 '48.46"	0.89	0.89
32.91	75°4 '6.98"	12°53 '47.57"	0.97	0.97
32.97	75°4 '8.84"	12°53 '46.68"	0.93	0.93
33.05	75°4 '11.03"	12°53 '45.69"	0.92	0.92
33.10	75°4 '12.75"	12°53 '45.04"	0.91	0.91
33.16	75°4 '14.66"	12°53 '44.33"	0.85	0.85
33.21	75°4 '16.3"	12°53 '43.76"	0.87	0.87
33.25	75°4 '17.45"	12°53 '43.37"	0.89	0.89
33.29	75°4 '18.54"	12°53 '42.98"	0.85	0.85
33.32	75°4 '19.64"	12°53 '42.48"	0.83	0.83
33.35	75°4 '20.57"	12°53 '42.06"	0.81	0.81
33.39	75°4 '21.5"	12°53 '41.57"	0.78	0.78
33.45	75°4 '23.13"	12°53 '40.01"	0.79	0.79
33.52	75°4 '24.57"	12°53 '38.61"	0.78	0.78
33.57	75°4 '25.83"	12°53 '37.38"	0.73	0.73
33.62	75°4 '27.12"	12°53 '36.12"	0.71	0.71
33.67	75°4 '28.15"	12°53 '35.14"	0.68	0.68
33.72	75°4 '29.51"	12°53 '33.84"	0.69	0.69
33.79	75°4 '31.09"	12°53 '32.34"	0.73	0.73
33.84	75°4 '32.24"	12°53 '31.27"	0.70	0.70
33.90	75°4 '33.66"	12°53 '29.97"	0.69	0.69
33.95	75°4 '35.13"	12°53 '28.83"	0.66	0.66
34.01	75°4 '36.6"	12°53 '27.81"	0.67	0.67
34.06	75°4 '38.1"	12°53 '26.76"	0.65	0.65
34.12	75°4 '39.34"	12°53 '25.22"	0.61	0.61
34.16	75°4 '40.11"	12°53 '24.2"	0.63	0.63
34.22	75°4 '41.18"	12°53 '22.77"	0.62	0.62
34.26	75°4 '42.11"	12°53 '21.55"	0.58	0.58
34.32	75°4 '43.26"	12°53 '20.02"	0.59	0.59
34.37	75°4 '44.22"	12°53 '18.74"	0.54	0.54
34.42	75°4 '45.14"	12°53 '17.51"	0.53	0.53
34.46	75°4 '45.6"	12°53 '16.36"	0.57	0.57
34.50	75°4 '46.14"	12°53 '15.03"	0.67	0.67
34.54	75°4 '46.59"	12°53 '13.89"	0.56	0.56
34.57	75°4 '47.02"	12°53 '12.79"	0.56	0.56
34.60	75°4 '47.39"	12°53 '11.89"	0.65	0.65
34.64	75°4 '47.78"	12°53 '10.9"	0.78	0.78
34.66	75°4 '48.38"	12°53 '10.22"	0.51	0.51
34.69	75°4 '48.88"	12°53 '9.65"	0.72	0.72
34.72	75°4 '49.54"	12°53 '8.91"	0.49	0.49
34.75	75°4 '50.26"	12°53 '8.09"	0.57	0.57
34.78	75°4 '50.94"	12°53 '7.32"	0.49	0.49
34.81	75°4 '51.51"	12°53 '6.68"	0.54	0.54
34.84	75°4 '52.34"	12°53 '6.13"	0.57	0.57
34.86	75°4 '53.02"	12°53 '5.67"	0.56	0.56
34.89	75°4 '53.8"	12°53 '5.15"	0.59	0.59
34.92	75°4 '54.54"	12°53 '4.66"	0.64	0.64
34.94	75°4 '55.23"	12°53 '4.2"	0.61	0.61
34.97	75°4 '55.94"	12°53 '3.72"	0.67	0.67
34.99	75°4 '56.59"	12°53 '3.29"	0.65	0.65
35.01	75°4 '57.18"	12°53 '2.89"	0.68	0.68
35.04	75°4 '57.78"	12°53 '2.49"	0.79	0.79
35.06	75°4 '58.54"	12°53 '1.99"	0.85	0.85
35.09	75°4 '59.27"	12°53 '1.5"	0.82	0.82
35.11	75°4 '59.85"	12°53 '1.11"	0.83	0.83
35.13	75°5 '0.49"	12°53 '0.7"	0.81	0.81
35.15	75°5 '1.04"	12°53 '0.36"	0.77	0.77
35.18	75°5 '1.77"	12°52 '59.9"	0.78	0.78
35.20	75°5 '2.42"	12°52 '59.49"	0.79	0.79
35.23	75°5 '3.05"	12°52 '59.1"	0.75	0.75
35.24	75°5 '3.57"	12°52 '58.78"	0.74	0.74
35.26	75°5 '4.12"	12°52 '58.43"	0.72	0.72

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
35.29	75°5 '4.91"	12°52 '57.93"	0.61	0.61
35.32	75°5 '5.74"	12°52 '57.42"	0.63	0.63
35.36	75°5 '6.67"	12°52 '56.83"	0.68	0.68
35.38	75°5 '7.33"	12°52 '56.56"	0.67	0.67
35.40	75°5 '8.04"	12°52 '56.3"	0.64	0.64
35.43	75°5 '8.83"	12°52 '56.02"	0.62	0.62
35.45	75°5 '9.65"	12°52 '55.72"	0.63	0.63
35.47	75°5 '10.36"	12°52 '55.47"	0.59	0.59
35.50	75°5 '11.15"	12°52 '55.19"	0.57	0.57
35.52	75°5 '11.92"	12°52 '54.91"	0.53	0.53
35.55	75°5 '12.58"	12°52 '54.67"	0.56	0.56
35.57	75°5 '13.2"	12°52 '54.44"	0.54	0.54
35.59	75°5 '13.89"	12°52 '54.2"	0.52	0.52
35.62	75°5 '14.87"	12°52 '53.86"	0.53	0.53
35.64	75°5 '15.66"	12°52 '53.56"	0.50	0.50
35.66	75°5 '16.22"	12°52 '53.37"	0.51	0.51
35.68	75°5 '16.92"	12°52 '53.12"	0.62	0.62
35.71	75°5 '17.58"	12°52 '52.89"	0.78	0.78
35.73	75°5 '18.28"	12°52 '52.67"	0.72	0.72
35.75	75°5 '19.08"	12°52 '52.42"	0.56	0.56
35.78	75°5 '19.82"	12°52 '52.2"	0.68	0.68
35.80	75°5 '20.45"	12°52 '52"	0.57	0.57
35.83	75°5 '21.49"	12°52 '51.7"	0.54	0.54
35.86	75°5 '22.41"	12°52 '51.42"	0.57	0.57
35.88	75°5 '23.09"	12°52 '51.17"	0.55	0.55
35.90	75°5 '23.8"	12°52 '50.95"	0.56	0.56
35.92	75°5 '24.46"	12°52 '50.75"	0.78	0.78
AMR Barrage at Ch 36.00km				
36.53	75°5 '44.16"	12°52 '46.22"	14.43	14.43
36.55	75°5 '44.85"	12°52 '46.12"	13.84	13.84
36.58	75°5 '45.54"	12°52 '46.03"	14.42	14.42
36.60	75°5 '46.23"	12°52 '45.94"	14.08	14.08
36.62	75°5 '46.92"	12°52 '45.84"	14.38	14.38
36.64	75°5 '47.59"	12°52 '45.68"	13.81	13.81
36.66	75°5 '48.25"	12°52 '45.44"	10.27	10.27
36.68	75°5 '48.9"	12°52 '45.21"	12.13	12.13
36.70	75°5 '49.56"	12°52 '44.97"	11.01	11.01
36.72	75°5 '50.21"	12°52 '44.74"	10.09	10.09
36.74	75°5 '50.86"	12°52 '44.5"	9.56	9.56
36.76	75°5 '51.52"	12°52 '44.26"	9.86	9.86
36.79	75°5 '52.17"	12°52 '44.03"	10.03	10.03
36.81	75°5 '52.83"	12°52 '43.79"	10.06	10.06
36.83	75°5 '53.48"	12°52 '43.56"	9.81	9.81
36.85	75°5 '54.14"	12°52 '43.32"	9.78	9.78
36.87	75°5 '54.79"	12°52 '43.09"	9.79	9.79
36.89	75°5 '55.45"	12°52 '42.86"	9.90	9.90
36.91	75°5 '56.11"	12°52 '42.63"	10.02	10.02
36.93	75°5 '56.76"	12°52 '42.4"	10.04	10.04
36.95	75°5 '57.42"	12°52 '42.17"	10.09	10.09
36.97	75°5 '58.08"	12°52 '41.94"	9.86	9.86
37.00	75°5 '58.73"	12°52 '41.71"	9.84	9.84
37.02	75°5 '59.39"	12°52 '41.48"	9.73	9.73
37.04	75°6 '0.05"	12°52 '41.25"	9.79	9.79
37.06	75°6 '0.7"	12°52 '41.02"	9.86	9.86
37.08	75°6 '1.36"	12°52 '40.79"	9.72	9.72
37.10	75°6 '2.01"	12°52 '40.56"	9.78	9.78
37.12	75°6 '2.67"	12°52 '40.33"	9.63	9.63
37.14	75°6 '3.33"	12°52 '40.1"	9.34	9.34
37.16	75°6 '3.98"	12°52 '39.87"	8.31	8.31
37.18	75°6 '4.64"	12°52 '39.64"	8.27	8.27
37.21	75°6 '5.3"	12°52 '39.4"	8.14	8.14
37.23	75°6 '5.95"	12°52 '39.17"	7.90	7.90
37.25	75°6 '6.61"	12°52 '38.94"	7.71	7.71
37.27	75°6 '7.27"	12°52 '38.71"	9.16	9.16
37.29	75°6 '7.92"	12°52 '38.48"	9.36	9.36
37.31	75°6 '8.58"	12°52 '38.25"	9.12	9.12
37.33	75°6 '9.24"	12°52 '38.05"	8.86	8.86
37.35	75°6 '9.93"	12°52 '37.92"	6.92	6.92
37.37	75°6 '10.61"	12°52 '37.79"	7.32	7.32

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
37.39	75°6 '11.3"	12°52 '37.67"	6.73	6.73
37.42	75°6 '11.98"	12°52 '37.54"	7.13	7.13
37.44	75°6 '12.67"	12°52 '37.41"	6.97	6.97
37.46	75°6 '13.35"	12°52 '37.28"	6.56	6.56
37.48	75°6 '14.04"	12°52 '37.15"	9.86	9.86
37.50	75°6 '14.72"	12°52 '37.03"	9.81	9.81
37.52	75°6 '15.41"	12°52 '36.9"	9.78	9.78
37.54	75°6 '16.09"	12°52 '36.77"	9.79	9.79
37.56	75°6 '16.78"	12°52 '36.64"	9.16	9.16
37.58	75°6 '17.46"	12°52 '36.51"	9.36	9.36
37.60	75°6 '18.15"	12°52 '36.39"	9.12	9.12
37.63	75°6 '18.83"	12°52 '36.26"	8.86	8.86
37.65	75°6 '19.52"	12°52 '36.13"	9.86	9.86
37.67	75°6 '20.2"	12°52 '36"	9.84	9.84
37.69	75°6 '20.89"	12°52 '35.87"	9.73	9.73
37.71	75°6 '21.57"	12°52 '35.75"	9.79	9.79
37.73	75°6 '22.26"	12°52 '35.62"	9.86	9.86
37.75	75°6 '22.94"	12°52 '35.49"	8.31	8.31
37.77	75°6 '23.61"	12°52 '35.31"	8.27	8.27
37.79	75°6 '24.27"	12°52 '35.09"	8.14	8.14
37.81	75°6 '24.94"	12°52 '34.88"	7.90	7.90
37.84	75°6 '25.6"	12°52 '34.67"	7.71	7.71
37.86	75°6 '26.23"	12°52 '34.4"	9.16	9.16
37.88	75°6 '26.7"	12°52 '33.9"	9.36	9.36
37.90	75°6 '27.18"	12°52 '33.4"	9.12	9.12
37.92	75°6 '27.66"	12°52 '32.9"	8.86	8.86
37.94	75°6 '28.13"	12°52 '32.4"	6.92	6.92
37.96	75°6 '28.61"	12°52 '31.9"	7.32	7.32
37.98	75°6 '29.08"	12°52 '31.4"	6.73	6.73
38.00	75°6 '29.44"	12°52 '30.83"	7.13	7.13
38.02	75°6 '29.73"	12°52 '30.21"	6.97	6.97
38.04	75°6 '30.03"	12°52 '29.58"	9.86	9.86
38.07	75°6 '30.32"	12°52 '28.96"	9.84	9.84
38.09	75°6 '30.61"	12°52 '28.34"	9.73	9.73
38.11	75°6 '30.9"	12°52 '27.72"	9.79	9.79
38.13	75°6 '31.19"	12°52 '27.1"	9.86	9.86
38.15	75°6 '31.49"	12°52 '26.48"	9.72	9.72
38.17	75°6 '31.78"	12°52 '25.86"	9.78	9.78
38.19	75°6 '32.07"	12°52 '25.24"	9.63	9.63
38.21	75°6 '32.34"	12°52 '24.61"	9.34	9.34
38.23	75°6 '32.5"	12°52 '23.94"	9.50	9.50
38.26	75°6 '32.65"	12°52 '23.27"	9.63	9.63
38.28	75°6 '32.81"	12°52 '22.61"	9.34	9.34
38.30	75°6 '32.97"	12°52 '21.94"	8.31	8.31
38.32	75°6 '33.13"	12°52 '21.28"	8.27	8.27
38.34	75°6 '33.28"	12°52 '20.61"	8.14	8.14
38.36	75°6 '33.44"	12°52 '19.94"	7.90	7.90
38.38	75°6 '33.6"	12°52 '19.28"	7.71	7.71
38.40	75°6 '33.76"	12°52 '18.61"	9.16	9.16
38.42	75°6 '34.02"	12°52 '17.98"	9.36	9.36
38.44	75°6 '34.32"	12°52 '17.36"	9.12	9.12
38.47	75°6 '34.62"	12°52 '16.74"	8.86	8.86
38.49	75°6 '34.91"	12°52 '16.13"	8.80	8.80
38.51	75°6 '35.21"	12°52 '15.51"	8.96	8.96
38.53	75°6 '35.51"	12°52 '14.89"	8.21	8.21
38.55	75°6 '35.81"	12°52 '14.27"	8.64	8.64
38.57	75°6 '36.11"	12°52 '13.65"	8.70	8.70
38.59	75°6 '36.41"	12°52 '13.04"	8.42	8.42
38.61	75°6 '36.71"	12°52 '12.42"	8.26	8.26
38.63	75°6 '37.01"	12°52 '11.8"	8.45	8.45
38.65	75°6 '37.48"	12°52 '11.31"	8.58	8.58
38.67	75°6 '38.02"	12°52 '10.88"	8.21	8.21
38.70	75°6 '38.56"	12°52 '10.45"	8.28	8.28
38.72	75°6 '39.1"	12°52 '10.02"	8.10	8.10
38.74	75°6 '39.64"	12°52 '9.59"	3.22	3.22
38.76	75°6 '40.18"	12°52 '9.15"	2.61	2.61
38.78	75°6 '40.72"	12°52 '8.72"	2.18	2.18
38.80	75°6 '41.26"	12°52 '8.29"	2.12	2.12
38.82	75°6 '41.8"	12°52 '7.86"	2.63	2.63

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
38.84	75°6 '42.34"	12°52 '7.43"	3.21	3.21
38.86	75°6 '42.88"	12°52 '6.99"	3.57	3.57
38.88	75°6 '43.42"	12°52 '6.56"	4.01	4.01
38.91	75°6 '43.96"	12°52 '6.13"	4.23	4.23
38.93	75°6 '44.5"	12°52 '5.7"	4.93	4.93
38.95	75°6 '45.04"	12°52 '5.26"	5.18	5.18
38.97	75°6 '45.57"	12°52 '4.82"	6.09	6.09
38.99	75°6 '46.11"	12°52 '4.38"	6.55	6.55
39.01	75°6 '46.64"	12°52 '3.94"	6.96	6.96
39.03	75°6 '47.18"	12°52 '3.5"	7.06	7.06
39.05	75°6 '47.71"	12°52 '3.06"	6.99	6.99
39.07	75°6 '48.25"	12°52 '2.62"	7.46	7.46
39.09	75°6 '48.78"	12°52 '2.18"	7.96	7.96
39.12	75°6 '49.32"	12°52 '1.74"	8.50	8.50
39.14	75°6 '49.85"	12°52 '1.31"	8.84	8.84
39.16	75°6 '50.38"	12°52 '0.87"	9.15	9.15
39.18	75°6 '50.92"	12°52 '0.43"	9.04	9.04
39.20	75°6 '51.45"	12°51 '59.99"	8.91	8.91
39.22	75°6 '51.99"	12°51 '59.55"	8.80	8.80
39.24	75°6 '52.59"	12°51 '59.21"	8.79	8.79
39.26	75°6 '53.22"	12°51 '58.93"	8.83	8.83
39.28	75°6 '53.86"	12°51 '58.64"	8.39	8.39
39.30	75°6 '54.49"	12°51 '58.35"	7.84	7.84
39.33	75°6 '55.12"	12°51 '58.07"	8.16	8.16
39.35	75°6 '55.76"	12°51 '57.78"	8.23	8.23
39.37	75°6 '56.39"	12°51 '57.5"	8.42	8.42
39.39	75°6 '57.02"	12°51 '57.21"	8.46	8.46
39.41	75°6 '57.65"	12°51 '56.92"	8.71	8.71
39.43	75°6 '58.29"	12°51 '56.64"	8.59	8.59
39.45	75°6 '58.92"	12°51 '56.35"	8.91	8.91
39.47	75°6 '59.55"	12°51 '56.06"	7.46	7.46
39.49	75°7 '0.19"	12°51 '55.78"	8.07	8.07
39.52	75°7 '0.82"	12°51 '55.49"	7.89	7.89
39.54	75°7 '1.45"	12°51 '55.21"	7.86	7.86
39.56	75°7 '2.1"	12°51 '54.96"	7.83	7.83
39.58	75°7 '2.79"	12°51 '54.85"	7.65	7.65
39.60	75°7 '3.48"	12°51 '54.75"	7.81	7.81
39.62	75°7 '4.17"	12°51 '54.64"	7.78	7.78
39.64	75°7 '4.85"	12°51 '54.53"	8.16	8.16
39.66	75°7 '5.54"	12°51 '54.42"	8.23	8.23
39.68	75°7 '6.23"	12°51 '54.31"	8.42	8.42
39.70	75°7 '6.92"	12°51 '54.21"	8.46	8.46
39.73	75°7 '7.61"	12°51 '54.1"	8.71	8.71
39.75	75°7 '8.3"	12°51 '53.99"	8.59	8.59
39.77	75°7 '8.98"	12°51 '53.88"	8.91	8.91
39.79	75°7 '9.67"	12°51 '53.77"	8.80	8.80
39.81	75°7 '10.36"	12°51 '53.67"	8.96	8.96
39.83	75°7 '11.05"	12°51 '53.6"	8.21	8.21
39.85	75°7 '11.75"	12°51 '53.59"	8.64	8.64
39.87	75°7 '12.45"	12°51 '53.58"	8.70	8.70
39.89	75°7 '13.15"	12°51 '53.56"	8.42	8.42
39.91	75°7 '13.84"	12°51 '53.55"	8.26	8.26
39.94	75°7 '14.54"	12°51 '53.54"	8.45	8.45
39.96	75°7 '15.24"	12°51 '53.53"	8.58	8.58
39.98	75°7 '15.93"	12°51 '53.51"	8.21	8.21
40.00	75°7 '16.63"	12°51 '53.5"	8.28	8.28
40.02	75°7 '17.33"	12°51 '53.49"	8.10	8.10
40.04	75°7 '18.02"	12°51 '53.47"	7.92	7.92
40.06	75°7 '18.72"	12°51 '53.46"	7.46	7.46
40.08	75°7 '19.42"	12°51 '53.45"	8.07	8.07
40.10	75°7 '20.12"	12°51 '53.43"	7.89	7.89
40.12	75°7 '20.81"	12°51 '53.42"	7.86	7.86
40.15	75°7 '21.51"	12°51 '53.41"	7.83	7.83
40.17	75°7 '22.21"	12°51 '53.39"	7.65	7.65
40.19	75°7 '22.9"	12°51 '53.38"	7.81	7.81
40.21	75°7 '23.6"	12°51 '53.37"	7.78	7.78
40.23	75°7 '24.3"	12°51 '53.34"	7.72	7.72
40.25	75°7 '24.96"	12°51 '53.14"	7.57	7.57
40.27	75°7 '25.63"	12°51 '52.94"	7.68	7.68

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
40.29	75°7 '26.3"	12°51 '52.74"	7.19	7.19
40.31	75°7 '26.96"	12°51 '52.54"	7.59	7.59
40.33	75°7 '27.63"	12°51 '52.34"	7.67	7.67
40.36	75°7 '28.29"	12°51 '52.14"	7.69	7.69
40.38	75°7 '28.96"	12°51 '51.94"	7.93	7.93
40.40	75°7 '29.63"	12°51 '51.74"	8.14	8.14
40.42	75°7 '30.29"	12°51 '51.54"	8.39	8.39
40.44	75°7 '30.96"	12°51 '51.34"	9.04	9.04
40.46	75°7 '31.63"	12°51 '51.14"	8.39	8.39
40.48	75°7 '32.29"	12°51 '50.93"	8.33	8.33
40.50	75°7 '32.96"	12°51 '50.73"	8.37	8.37
40.52	75°7 '33.63"	12°51 '50.53"	4.99	4.99
40.54	75°7 '34.29"	12°51 '50.33"	5.28	5.28
40.57	75°7 '34.96"	12°51 '50.13"	5.61	5.61
40.59	75°7 '35.63"	12°51 '49.93"	5.71	5.71
40.61	75°7 '36.29"	12°51 '49.73"	5.39	5.39
40.63	75°7 '36.96"	12°51 '49.53"	9.04	9.04
40.65	75°7 '37.52"	12°51 '49.13"	8.39	8.39
40.67	75°7 '38.09"	12°51 '48.73"	9.35	9.35
40.69	75°7 '38.66"	12°51 '48.33"	8.29	8.29
40.71	75°7 '39.22"	12°51 '47.93"	7.41	7.41
40.73	75°7 '39.79"	12°51 '47.53"	7.27	7.27
40.75	75°7 '40.35"	12°51 '47.13"	7.50	7.50
40.78	75°7 '40.92"	12°51 '46.73"	6.98	6.98
40.80	75°7 '41.48"	12°51 '46.33"	7.76	7.76
40.82	75°7 '42.05"	12°51 '45.93"	7.32	7.32
40.84	75°7 '42.61"	12°51 '45.53"	7.29	7.29
40.86	75°7 '43.18"	12°51 '45.13"	10.76	10.76
40.88	75°7 '43.74"	12°51 '44.73"	9.35	9.35
40.90	75°7 '44.31"	12°51 '44.33"	6.77	6.77
40.92	75°7 '44.88"	12°51 '43.93"	6.30	6.30
40.94	75°7 '45.44"	12°51 '43.53"	6.02	6.02
40.96	75°7 '46.01"	12°51 '43.13"	6.08	6.08
40.99	75°7 '46.4"	12°51 '42.57"	6.90	6.90
41.01	75°7 '46.76"	12°51 '41.99"	5.99	5.99
41.03	75°7 '47.13"	12°51 '41.4"	5.74	5.74
41.05	75°7 '47.49"	12°51 '40.82"	5.95	5.95
41.07	75°7 '47.86"	12°51 '40.24"	5.84	5.84
41.09	75°7 '48.23"	12°51 '39.66"	5.30	5.30
41.11	75°7 '48.59"	12°51 '39.08"	5.35	5.35
41.13	75°7 '48.96"	12°51 '38.49"	5.95	5.95
41.15	75°7 '49.33"	12°51 '37.91"	6.18	6.18
41.17	75°7 '49.69"	12°51 '37.33"	5.48	5.48
41.20	75°7 '50.06"	12°51 '36.75"	5.32	5.32
41.22	75°7 '50.44"	12°51 '36.18"	5.18	5.18
41.24	75°7 '50.88"	12°51 '35.65"	4.79	4.79
41.26	75°7 '51.32"	12°51 '35.12"	3.93	3.93
41.28	75°7 '51.77"	12°51 '34.59"	2.57	2.57
41.30	75°7 '52.21"	12°51 '34.06"	2.50	2.50
41.32	75°7 '52.65"	12°51 '33.53"	2.52	2.52
41.34	75°7 '53.09"	12°51 '33"	2.44	2.44
41.36	75°7 '53.54"	12°51 '32.47"	2.28	2.28
41.38	75°7 '53.98"	12°51 '31.95"	2.14	2.14
41.41	75°7 '54.42"	12°51 '31.42"	2.74	2.74
41.43	75°7 '54.86"	12°51 '30.89"	2.37	2.37
41.45	75°7 '55.31"	12°51 '30.36"	2.44	2.44
41.47	75°7 '55.75"	12°51 '29.83"	3.51	3.51
41.49	75°7 '56.19"	12°51 '29.3"	4.02	4.02
41.51	75°7 '56.63"	12°51 '28.77"	4.61	4.61
41.53	75°7 '57.08"	12°51 '28.25"	4.99	4.99
41.55	75°7 '57.54"	12°51 '27.74"	5.28	5.28
41.57	75°7 '58.05"	12°51 '27.27"	5.61	5.61
41.59	75°7 '58.57"	12°51 '26.81"	5.71	5.71
41.62	75°7 '59.08"	12°51 '26.35"	5.39	5.39
41.64	75°7 '59.59"	12°51 '25.88"	5.92	5.92
41.66	75°8 '0.1"	12°51 '25.42"	5.45	5.45
41.68	75°8 '0.62"	12°51 '24.96"	5.54	5.54
41.70	75°8 '1.13"	12°51 '24.49"	5.28	5.28
41.72	75°8 '1.64"	12°51 '24.03"	5.88	5.88

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
41.74	75°8 '2.16"	12°51 '23.57"	6.14	6.14
41.76	75°8 '2.67"	12°51 '23.1"	11.23	11.23
41.78	75°8 '3.18"	12°51 '22.64"	10.29	10.29
41.80	75°8 '3.69"	12°51 '22.18"	8.16	8.16
41.83	75°8 '4.21"	12°51 '21.71"	7.13	7.13
41.85	75°8 '4.72"	12°51 '21.25"	7.22	7.22
41.87	75°8 '5.23"	12°51 '20.79"	7.26	7.26
41.89	75°8 '5.75"	12°51 '20.32"	7.39	7.39
41.91	75°8 '6.31"	12°51 '19.93"	7.46	7.46
41.93	75°8 '6.9"	12°51 '19.57"	7.51	7.51
41.95	75°8 '7.5"	12°51 '19.21"	7.50	7.50
41.97	75°8 '8.09"	12°51 '18.85"	7.45	7.45
41.99	75°8 '8.69"	12°51 '18.5"	7.13	7.13
42.01	75°8 '9.28"	12°51 '18.14"	7.22	7.22
42.04	75°8 '9.88"	12°51 '17.78"	7.26	7.26
42.06	75°8 '10.47"	12°51 '17.43"	7.39	7.39
42.08	75°8 '11.07"	12°51 '17.07"	13.85	13.85
42.10	75°8 '11.7"	12°51 '16.79"	11.23	11.23
42.12	75°8 '12.34"	12°51 '16.51"	10.29	10.29
42.14	75°8 '12.98"	12°51 '16.23"	8.16	8.16
42.16	75°8 '13.61"	12°51 '15.96"	7.13	7.13
42.18	75°8 '14.25"	12°51 '15.68"	7.22	7.22
42.20	75°8 '14.89"	12°51 '15.41"	7.26	7.26
42.23	75°8 '15.53"	12°51 '15.13"	7.39	7.39
42.25	75°8 '16.17"	12°51 '14.86"	7.46	7.46
42.27	75°8 '16.82"	12°51 '14.64"	7.51	7.51
42.29	75°8 '17.5"	12°51 '14.49"	7.50	7.50
42.31	75°8 '18.19"	12°51 '14.35"	7.45	7.45
42.33	75°8 '18.87"	12°51 '14.21"	7.19	7.19
42.35	75°8 '19.55"	12°51 '14.07"	7.12	7.12
42.37	75°8 '20.23"	12°51 '13.93"	7.47	7.47
42.39	75°8 '20.91"	12°51 '13.78"	7.50	7.50
42.41	75°8 '21.6"	12°51 '13.64"	7.53	7.53
42.44	75°8 '22.28"	12°51 '13.5"	7.54	7.54
42.46	75°8 '22.96"	12°51 '13.36"	7.60	7.60
42.48	75°8 '23.64"	12°51 '13.22"	7.34	7.34
42.50	75°8 '24.32"	12°51 '13.07"	7.84	7.84
42.52	75°8 '25.01"	12°51 '12.93"	7.98	7.98
42.54	75°8 '25.7"	12°51 '12.97"	7.77	7.77
42.56	75°8 '26.4"	12°51 '13"	7.91	7.91
42.58	75°8 '27.09"	12°51 '13.04"	6.09	6.09
42.60	75°8 '27.79"	12°51 '13.07"	5.93	5.93
42.62	75°8 '28.49"	12°51 '13.11"	5.40	5.40
42.65	75°8 '29.18"	12°51 '13.14"	4.79	4.79
42.67	75°8 '29.88"	12°51 '13.18"	5.28	5.28
42.69	75°8 '30.58"	12°51 '13.21"	5.30	5.30
42.71	75°8 '31.27"	12°51 '13.25"	5.16	5.16
42.73	75°8 '31.97"	12°51 '13.29"	5.25	5.25
42.75	75°8 '32.66"	12°51 '13.32"	5.31	5.31
42.77	75°8 '33.36"	12°51 '13.36"	4.65	4.65
42.79	75°8 '34.06"	12°51 '13.39"	4.88	4.88
42.81	75°8 '34.75"	12°51 '13.43"	5.27	5.27
42.83	75°8 '35.45"	12°51 '13.49"	5.20	5.20
42.86	75°8 '36.14"	12°51 '13.57"	5.16	5.16
42.88	75°8 '36.83"	12°51 '13.65"	4.93	4.93
42.90	75°8 '37.52"	12°51 '13.73"	4.38	4.38
42.92	75°8 '38.22"	12°51 '13.81"	4.32	4.32
42.94	75°8 '38.91"	12°51 '13.88"	4.38	4.38
42.96	75°8 '39.6"	12°51 '13.96"	4.31	4.31
42.98	75°8 '40.29"	12°51 '14.04"	4.12	4.12
43.00	75°8 '40.99"	12°51 '14.12"	4.05	4.05
43.02	75°8 '41.68"	12°51 '14.2"	3.94	3.94
43.04	75°8 '42.37"	12°51 '14.28"	3.72	3.72
43.07	75°8 '43.06"	12°51 '14.36"	3.48	3.48
43.09	75°8 '43.76"	12°51 '14.44"	3.30	3.30
43.11	75°8 '44.45"	12°51 '14.51"	3.23	3.23
43.13	75°8 '45.14"	12°51 '14.59"	3.31	3.31
43.15	75°8 '45.83"	12°51 '14.67"	3.02	3.02
43.17	75°8 '46.53"	12°51 '14.75"	2.81	2.81

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
43.19	75°8 '47.22"	12°51 '14.83"	2.66	2.66
43.21	75°8 '47.91"	12°51 '14.91"	2.47	2.47
43.23	75°8 '48.6"	12°51 '14.99"	2.23	2.23
43.25	75°8 '49.3"	12°51 '15.07"	2.30	2.30
43.28	75°8 '49.99"	12°51 '15.14"	2.33	2.33
43.30	75°8 '50.68"	12°51 '15.22"	2.29	2.29
43.32	75°8 '51.37"	12°51 '15.3"	2.42	2.42
43.34	75°8 '52.07"	12°51 '15.38"	2.75	2.75
43.36	75°8 '52.76"	12°51 '15.46"	2.99	2.99
43.38	75°8 '53.45"	12°51 '15.54"	3.45	3.45
43.40	75°8 '54.14"	12°51 '15.62"	3.87	3.87
43.42	75°8 '54.84"	12°51 '15.69"	4.30	4.30
43.44	75°8 '55.53"	12°51 '15.77"	4.32	4.32
43.46	75°8 '56.22"	12°51 '15.85"	4.38	4.38
43.49	75°8 '56.91"	12°51 '15.93"	4.31	4.31
43.51	75°8 '57.61"	12°51 '16.01"	4.12	4.12
43.53	75°8 '58.3"	12°51 '16.09"	4.05	4.05
43.55	75°8 '58.99"	12°51 '16.17"	3.94	3.94
43.57	75°8 '59.68"	12°51 '16.25"	3.72	3.72
43.59	75°9 '0.38"	12°51 '16.32"	3.48	3.48
43.61	75°9 '1.07"	12°51 '16.4"	3.30	3.30
43.63	75°9 '1.76"	12°51 '16.48"	3.23	3.23
43.65	75°9 '2.45"	12°51 '16.56"	3.31	3.31
43.67	75°9 '3.15"	12°51 '16.64"	3.02	3.02
43.70	75°9 '3.84"	12°51 '16.72"	2.81	2.81
43.72	75°9 '4.53"	12°51 '16.8"	2.66	2.66
43.74	75°9 '5.23"	12°51 '16.82"	2.66	2.66
43.76	75°9 '5.92"	12°51 '16.81"	2.35	2.35
43.78	75°9 '6.62"	12°51 '16.79"	2.37	2.37
43.80	75°9 '7.32"	12°51 '16.77"	2.38	2.38
43.82	75°9 '8.01"	12°51 '16.75"	2.27	2.27
43.84	75°9 '8.71"	12°51 '16.74"	1.97	1.97
43.86	75°9 '9.41"	12°51 '16.72"	1.87	1.87
43.88	75°9 '10.11"	12°51 '16.7"	1.93	1.93
43.91	75°9 '10.8"	12°51 '16.69"	1.66	1.66
43.93	75°9 '11.5"	12°51 '16.67"	0.80	0.80
43.95	75°9 '12.2"	12°51 '16.65"	0.70	0.70
43.97	75°9 '12.89"	12°51 '16.63"	1.20	1.20
43.99	75°9 '13.59"	12°51 '16.61"	0.90	0.90
44.06	75°9 '15.92"	12°51 '16.31"	0.80	0.80
44.11	75°9 '17.56"	12°51 '16.1"	0.70	0.70
44.16	75°9 '19.2"	12°51 '15.88"	0.50	0.50
44.21	75°9 '20.83"	12°51 '15.62"	0.60	0.60
44.26	75°9 '22.47"	12°51 '15.36"	0.50	0.50
44.31	75°9 '24.1"	12°51 '15.09"	0.90	0.90
44.36	75°9 '25.73"	12°51 '14.82"	0.80	0.80
44.41	75°9 '27.36"	12°51 '14.55"	0.80	0.80
44.46	75°9 '28.99"	12°51 '14.28"	0.50	0.50
44.51	75°9 '30.62"	12°51 '14.01"	0.60	0.60
44.56	75°9 '32.23"	12°51 '13.62"	0.80	0.80
44.61	75°9 '33.83"	12°51 '13.21"	0.50	0.50
44.66	75°9 '35.43"	12°51 '12.81"	0.80	0.80
44.71	75°9 '37.03"	12°51 '12.4"	0.40	0.40
44.76	75°9 '38.64"	12°51 '12"	0.60	0.60
44.81	75°9 '40.24"	12°51 '11.6"	0.50	0.50
44.86	75°9 '41.84"	12°51 '11.19"	0.50	0.50
44.91	75°9 '43.44"	12°51 '10.79"	0.90	0.90
44.96	75°9 '45.04"	12°51 '10.39"	0.70	0.70
45.01	75°9 '46.64"	12°51 '9.98"	0.80	0.80
45.06	75°9 '48.21"	12°51 '9.45"	0.50	0.50
45.11	75°9 '49.78"	12°51 '8.93"	0.70	0.70
45.16	75°9 '51.34"	12°51 '8.41"	0.60	0.60
45.21	75°9 '52.91"	12°51 '7.88"	0.80	0.80
45.26	75°9 '54.48"	12°51 '7.36"	0.70	0.70
45.31	75°9 '56.04"	12°51 '6.84"	0.50	0.50
45.36	75°9 '57.61"	12°51 '6.32"	0.60	0.60
45.41	75°9 '59.17"	12°51 '5.79"	0.50	0.50
45.46	75°10 '0.74"	12°51 '5.27"	0.90	0.90
45.51	75°10 '2.31"	12°51 '4.75"	0.80	0.80

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
45.56	75°10 '3.88"	12°51 '4.24"	0.80	0.80
45.61	75°10 '5.52"	12°51 '4.06"	0.50	0.50
45.66	75°10 '7.16"	12°51 '3.87"	0.80	0.80
45.71	75°10 '8.81"	12°51 '3.69"	0.80	0.80
45.76	75°10 '10.45"	12°51 '3.51"	0.70	0.70
45.81	75°10 '12.09"	12°51 '3.32"	0.60	0.60
45.86	75°10 '13.74"	12°51 '3.14"	0.40	0.40
45.91	75°10 '15.38"	12°51 '2.95"	0.60	0.60
45.96	75°10 '17.02"	12°51 '2.77"	0.80	0.80
46.01	75°10 '18.66"	12°51 '2.55"	0.50	0.50
46.06	75°10 '20.3"	12°51 '2.32"	0.80	0.80
46.10	75°10 '21.94"	12°51 '2.1"	0.40	0.40
46.15	75°10 '23.58"	12°51 '1.88"	0.60	0.60
46.20	75°10 '25.22"	12°51 '1.65"	0.50	0.50
46.25	75°10 '26.86"	12°51 '1.43"	0.50	0.50
46.30	75°10 '28.49"	12°51 '1.21"	0.90	0.90
46.35	75°10 '30.13"	12°51 '0.97"	0.70	0.70
46.40	75°10 '31.75"	12°51 '0.64"	0.80	0.80
46.45	75°10 '33.37"	12°51 '0.31"	0.50	0.50
46.50	75°10 '34.99"	12°50 '59.98"	0.70	0.70
46.55	75°10 '36.61"	12°50 '59.65"	0.60	0.60
46.60	75°10 '38.23"	12°50 '59.32"	0.80	0.80
46.65	75°10 '39.85"	12°50 '58.99"	0.70	0.70
46.70	75°10 '41.47"	12°50 '58.66"	0.50	0.50
46.75	75°10 '43.09"	12°50 '58.33"	0.60	0.60
46.80	75°10 '44.71"	12°50 '58"	0.50	0.50
46.85	75°10 '46.29"	12°50 '57.56"	0.90	0.90
46.90	75°10 '47.83"	12°50 '56.96"	0.80	0.80
46.95	75°10 '49.37"	12°50 '56.36"	0.80	0.80
47.00	75°10 '50.91"	12°50 '55.76"	0.50	0.50
47.05	75°10 '52.45"	12°50 '55.17"	0.80	0.80
47.10	75°10 '53.98"	12°50 '54.57"	0.80	0.80
47.15	75°10 '55.21"	12°50 '53.48"	0.70	0.70
47.20	75°10 '56.43"	12°50 '52.39"	0.60	0.60
47.25	75°10 '57.66"	12°50 '51.3"	0.40	0.40
47.30	75°10 '58.83"	12°50 '50.16"	0.60	0.60
47.35	75°10 '59.79"	12°50 '48.84"	0.80	0.80
47.40	75°11 '0.76"	12°50 '47.52"	0.50	0.50
47.45	75°11 '1.94"	12°50 '46.4"	0.80	0.80
47.50	75°11 '3.18"	12°50 '45.32"	0.40	0.40
47.55	75°11 '4.42"	12°50 '44.24"	0.60	0.60
47.60	75°11 '5.66"	12°50 '43.17"	0.50	0.50
47.65	75°11 '6.89"	12°50 '42.09"	0.50	0.50
47.70	75°11 '8.46"	12°50 '41.62"	0.90	0.90
47.75	75°11 '10.06"	12°50 '41.21"	0.70	0.70
47.80	75°11 '11.66"	12°50 '40.8"	0.80	0.80
47.85	75°11 '13.26"	12°50 '40.39"	0.50	0.50
47.90	75°11 '14.81"	12°50 '39.83"	0.70	0.70
47.95	75°11 '16.34"	12°50 '39.21"	0.60	0.60
48.00	75°11 '17.87"	12°50 '38.58"	0.80	0.80
48.05	75°11 '19.39"	12°50 '37.96"	0.70	0.70
48.10	75°11 '20.92"	12°50 '37.34"	0.50	0.50
48.15	75°11 '22.48"	12°50 '36.79"	0.60	0.60
48.20	75°11 '24.04"	12°50 '36.26"	0.50	0.50
48.25	75°11 '25.6"	12°50 '35.73"	0.90	0.90
48.30	75°11 '27.17"	12°50 '35.2"	0.80	0.80
48.35	75°11 '28.75"	12°50 '34.72"	0.80	0.80
48.40	75°11 '30.33"	12°50 '34.24"	0.50	0.50
48.45	75°11 '31.93"	12°50 '33.84"	0.60	0.60
48.50	75°11 '33.57"	12°50 '33.66"	0.70	0.70
48.55	75°11 '35.16"	12°50 '33.92"	0.50	0.50
48.60	75°11 '36.36"	12°50 '35.04"	0.80	0.80
48.65	75°11 '37.57"	12°50 '36.15"	0.70	0.70
48.70	75°11 '38.77"	12°50 '37.26"	0.60	0.60
48.74	75°11 '39.75"	12°50 '38.57"	0.70	0.70
48.84	75°11 '41.65"	12°50 '41.22"	0.70	0.70
48.89	75°11 '42.6"	12°50 '42.55"	0.60	0.60
48.94	75°11 '43.22"	12°50 '44.01"	0.70	0.70
48.99	75°11 '43.42"	12°50 '45.62"	0.60	0.60

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
49.04	75°11 '43.62"	12°50 '47.23"	0.80	0.80
49.09	75°11 '44.03"	12°50 '48.79"	0.50	0.50
49.14	75°11 '44.6"	12°50 '50.31"	0.70	0.70
49.19	75°11 '45.19"	12°50 '51.82"	0.80	0.80
49.24	75°11 '46.71"	12°50 '52.46"	0.80	0.80
49.29	75°11 '48.25"	12°50 '53"	0.70	0.70
49.34	75°11 '49.87"	12°50 '52.67"	0.60	0.60
49.39	75°11 '51.49"	12°50 '52.35"	0.40	0.40
49.44	75°11 '53.12"	12°50 '52.29"	0.60	0.60
49.49	75°11 '54.77"	12°50 '52.41"	0.80	0.80
49.54	75°11 '56.42"	12°50 '52.54"	0.50	0.50
49.59	75°11 '58.06"	12°50 '52.59"	0.80	0.80
49.64	75°11 '59.64"	12°50 '52.1"	0.40	0.40
49.69	75°12 '1.22"	12°50 '51.62"	0.60	0.60
49.74	75°12 '2.8"	12°50 '51.13"	0.50	0.50
49.79	75°12 '4.39"	12°50 '50.71"	0.50	0.50
49.84	75°12 '6"	12°50 '50.34"	0.90	0.90
49.89	75°12 '7.62"	12°50 '49.97"	0.70	0.70
49.94	75°12 '9.23"	12°50 '49.6"	0.80	0.80
49.99	75°12 '10.81"	12°50 '49.14"	0.50	0.50
50.04	75°12 '12.36"	12°50 '48.57"	0.70	0.70
50.09	75°12 '13.91"	12°50 '48"	0.60	0.60
50.14	75°12 '15.46"	12°50 '47.44"	0.80	0.80
50.19	75°12 '17.01"	12°50 '46.87"	0.50	0.50
50.24	75°12 '18.56"	12°50 '46.3"	0.90	0.90
50.29	75°12 '20.11"	12°50 '45.73"	0.80	0.80
50.34	75°12 '21.69"	12°50 '45.26"	0.60	0.60
50.39	75°12 '23.27"	12°50 '44.79"	0.60	0.60
50.44	75°12 '24.85"	12°50 '44.32"	0.50	0.50
50.49	75°12 '26.44"	12°50 '43.85"	0.60	0.60
50.54	75°12 '28.03"	12°50 '43.4"	0.80	0.80
50.59	75°12 '29.62"	12°50 '42.96"	0.70	0.70
50.64	75°12 '31.21"	12°50 '42.52"	0.70	0.70
50.69	75°12 '32.81"	12°50 '42.08"	0.60	0.60
50.74	75°12 '34.4"	12°50 '41.64"	0.50	0.50
50.79	75°12 '35.99"	12°50 '41.21"	0.50	0.50
50.84	75°12 '37.58"	12°50 '40.77"	0.80	0.80
50.88	75°12 '39.18"	12°50 '40.33"	0.80	0.80
50.93	75°12 '40.75"	12°50 '39.84"	0.50	0.50
50.98	75°12 '42.32"	12°50 '39.31"	0.80	0.80
51.03	75°12 '43.88"	12°50 '38.78"	0.80	0.80
51.08	75°12 '45.44"	12°50 '38.24"	0.70	0.70
51.13	75°12 '47"	12°50 '37.71"	0.60	0.60
51.18	75°12 '48.57"	12°50 '37.18"	0.60	0.60
51.23	75°12 '50.13"	12°50 '36.64"	1.20	1.20
51.28	75°12 '51.72"	12°50 '36.22"	0.50	0.50
51.33	75°12 '53.33"	12°50 '35.84"	0.80	0.80
51.38	75°12 '54.94"	12°50 '35.45"	0.70	0.70
51.43	75°12 '56.55"	12°50 '35.07"	0.80	0.80
51.48	75°12 '58.15"	12°50 '34.68"	0.50	0.50
51.53	75°12 '59.65"	12°50 '34.01"	0.70	0.70
51.58	75°13 '1.13"	12°50 '33.27"	0.60	0.60
51.63	75°13 '2.6"	12°50 '32.54"	0.80	0.80
51.68	75°13 '4.08"	12°50 '31.81"	0.70	0.70
51.73	75°13 '5.58"	12°50 '31.14"	0.70	0.70
51.78	75°13 '7.15"	12°50 '30.64"	0.80	0.80
51.83	75°13 '8.73"	12°50 '30.13"	0.50	0.50
51.88	75°13 '9.88"	12°50 '29.08"	0.70	0.70
51.93	75°13 '10.81"	12°50 '27.73"	0.60	0.60
51.98	75°13 '11.74"	12°50 '26.39"	0.80	0.80
52.03	75°13 '12.69"	12°50 '25.07"	0.70	0.70
52.08	75°13 '13.78"	12°50 '23.85"	0.80	0.80
52.13	75°13 '14.87"	12°50 '22.63"	1.30	1.30
52.18	75°13 '16.3"	12°50 '21.91"	0.50	0.50
52.23	75°13 '17.87"	12°50 '21.42"	0.80	0.80
52.28	75°13 '19.45"	12°50 '20.93"	0.80	0.80
52.33	75°13 '21.03"	12°50 '20.44"	1.30	1.30
52.38	75°13 '22.61"	12°50 '19.96"	1.50	1.50
52.43	75°13 '24.2"	12°50 '19.51"	1.60	1.60

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
52.48	75°13 '25.79"	12°50 '19.07"	1.10	1.10
52.53	75°13 '27.38"	12°50 '18.63"	0.50	0.50
52.58	75°13 '28.97"	12°50 '18.18"	0.70	0.70
52.63	75°13 '30.43"	12°50 '17.41"	0.60	0.60
52.68	75°13 '31.88"	12°50 '16.63"	0.80	0.80
52.73	75°13 '33.33"	12°50 '15.85"	0.70	0.70
52.77	75°13 '34.87"	12°50 '15.43"	0.50	0.50
52.82	75°13 '36.52"	12°50 '15.44"	0.80	0.80
52.87	75°13 '38.18"	12°50 '15.46"	0.80	0.80
52.92	75°13 '39.82"	12°50 '15.62"	0.50	0.50
52.97	75°13 '41.46"	12°50 '15.84"	0.80	0.80
53.02	75°13 '43.1"	12°50 '16.07"	0.80	0.80
53.07	75°13 '44.71"	12°50 '15.92"	0.70	0.70
53.12	75°13 '46.31"	12°50 '15.51"	0.60	0.60
53.17	75°13 '47.79"	12°50 '14.78"	0.40	0.40
53.22	75°13 '49.34"	12°50 '14.78"	0.70	0.70
53.27	75°13 '50.94"	12°50 '15.18"	0.80	0.80
53.32	75°13 '52.54"	12°50 '15.59"	0.50	0.50
53.37	75°13 '53.81"	12°50 '16.63"	0.70	0.70
53.42	75°13 '55.07"	12°50 '17.69"	0.60	0.60
53.47	75°13 '55.89"	12°50 '19.06"	0.80	0.80
53.52	75°13 '56.6"	12°50 '20.53"	0.70	0.70
53.56	75°13 '58.17"	12°50 '20.89"	0.80	0.80
53.61	75°13 '59.8"	12°50 '21.16"	1.30	1.30
53.66	75°14 '1.43"	12°50 '21.44"	0.50	0.50
53.71	75°14 '3.07"	12°50 '21.6"	0.80	0.80
53.76	75°14 '4.72"	12°50 '21.7"	0.80	0.80
53.81	75°14 '6.37"	12°50 '21.81"	0.70	0.70
53.86	75°14 '8.02"	12°50 '21.92"	0.60	0.60
53.91	75°14 '9.67"	12°50 '22.03"	0.70	0.70
53.96	75°14 '11.32"	12°50 '22.14"	0.80	0.80
54.01	75°14 '12.98"	12°50 '22.25"	0.50	0.50
54.06	75°14 '14.63"	12°50 '22.36"	0.70	0.70
54.11	75°14 '16.27"	12°50 '22.49"	0.80	0.80
54.16	75°14 '17.92"	12°50 '22.63"	0.50	0.50
54.21	75°14 '19.57"	12°50 '22.76"	0.70	0.70
54.26	75°14 '21.21"	12°50 '22.96"	0.60	0.60
54.31	75°14 '22.86"	12°50 '23.15"	0.80	0.80
54.36	75°14 '24.5"	12°50 '23.35"	0.70	0.70
54.41	75°14 '26.14"	12°50 '23.55"	0.80	0.80
54.46	75°14 '27.79"	12°50 '23.62"	1.30	1.30
54.51	75°14 '29.44"	12°50 '23.56"	0.50	0.50
54.56	75°14 '31.09"	12°50 '23.5"	0.80	0.80
54.61	75°14 '32.75"	12°50 '23.44"	0.80	0.80
54.66	75°14 '34.35"	12°50 '23.69"	0.70	0.70
54.71	75°14 '35.91"	12°50 '24.23"	0.60	0.60
54.76	75°14 '37.47"	12°50 '24.78"	0.70	0.70
54.81	75°14 '39.03"	12°50 '25.32"	0.80	0.80
54.86	75°14 '40.59"	12°50 '25.86"	0.50	0.50
54.91	75°14 '42.13"	12°50 '26.43"	0.50	0.50
54.96	75°14 '43.63"	12°50 '27.13"	0.80	0.80
55.01	75°14 '45.12"	12°50 '27.83"	0.80	0.80
55.06	75°14 '46.61"	12°50 '28.52"	0.70	0.70
55.11	75°14 '48.14"	12°50 '29.12"	0.60	0.60
55.16	75°14 '49.76"	12°50 '29.46"	1.20	1.20
55.21	75°14 '51.38"	12°50 '29.8"	0.50	0.50
55.26	75°14 '52.99"	12°50 '30.18"	0.80	0.80
55.31	75°14 '54.59"	12°50 '30.57"	0.70	0.70
55.36	75°14 '56.2"	12°50 '30.96"	0.80	0.80
55.41	75°14 '57.85"	12°50 '30.99"	0.50	0.50
55.46	75°14 '59.5"	12°50 '30.99"	0.70	0.70
55.51	75°15 '1.16"	12°50 '31"	0.60	0.60
55.56	75°15 '2.81"	12°50 '30.85"	0.80	0.80
55.61	75°15 '4.45"	12°50 '30.7"	0.70	0.70
55.66	75°15 '6.04"	12°50 '30.36"	0.70	0.70
55.71	75°15 '7.44"	12°50 '29.5"	0.80	0.80
55.76	75°15 '8.49"	12°50 '28.26"	0.50	0.50
55.81	75°15 '9.48"	12°50 '26.96"	0.70	0.70
55.86	75°15 '10.76"	12°50 '25.96"	0.50	0.50

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
55.90	75°15 '12.2"	12°50 '25.19"	0.60	0.60
55.95	75°15 '13.75"	12°50 '24.63"	0.50	0.50
56.00	75°15 '15.31"	12°50 '24.11"	0.90	0.90
56.05	75°15 '16.96"	12°50 '24.22"	0.80	0.80
56.10	75°15 '18.61"	12°50 '24.25"	0.80	0.80
56.15	75°15 '20.26"	12°50 '24.08"	0.50	0.50
56.20	75°15 '21.91"	12°50 '24.12"	0.80	0.80
56.25	75°15 '23.48"	12°50 '23.68"	0.80	0.80
56.30	75°15 '25.01"	12°50 '23.09"	0.70	0.70
56.35	75°15 '26.22"	12°50 '21.97"	0.80	0.80
56.40	75°15 '27.42"	12°50 '20.86"	0.80	0.80
56.45	75°15 '28.42"	12°50 '19.57"	0.50	0.50
56.50	75°15 '29.38"	12°50 '18.25"	0.80	0.80
56.55	75°15 '30.68"	12°50 '17.25"	0.80	0.80
56.60	75°15 '32"	12°50 '16.27"	0.70	0.70
56.65	75°15 '33.33"	12°50 '15.31"	0.60	0.60
56.70	75°15 '34.67"	12°50 '14.36"	0.40	0.40
56.75	75°15 '36.02"	12°50 '13.42"	0.60	0.60
56.80	75°15 '37.48"	12°50 '12.67"	0.80	0.80
56.85	75°15 '38.95"	12°50 '11.91"	0.50	0.50
56.90	75°15 '40.54"	12°50 '11.86"	0.60	0.60
56.95	75°15 '42.18"	12°50 '12.07"	0.70	0.70
57.00	75°15 '43.82"	12°50 '12.25"	0.80	0.80
57.05	75°15 '45.47"	12°50 '12.43"	0.80	0.80
57.10	75°15 '47.12"	12°50 '12.39"	0.70	0.70
57.15	75°15 '48.77"	12°50 '12.31"	0.80	0.80
57.20	75°15 '50.42"	12°50 '12.24"	1.30	1.30
57.25	75°15 '52.06"	12°50 '12.37"	0.50	0.50
57.30	75°15 '53.7"	12°50 '12.63"	0.80	0.80
57.35	75°15 '55.28"	12°50 '13.02"	0.80	0.80
57.40	75°15 '56.76"	12°50 '13.76"	0.70	0.70
57.45	75°15 '58.14"	12°50 '14.63"	0.60	0.60
57.50	75°15 '59.41"	12°50 '15.67"	1.20	1.20
57.55	75°16 '0.52"	12°50 '16.87"	0.50	0.50
57.60	75°16 '1.63"	12°50 '18.08"	0.80	0.80
57.65	75°16 '2.74"	12°50 '19.28"	0.60	0.60
57.70	75°16 '3.78"	12°50 '20.54"	0.70	0.70
57.74	75°16 '4.81"	12°50 '21.81"	0.80	0.80
57.79	75°16 '5.83"	12°50 '23.09"	0.80	0.80
57.84	75°16 '6.71"	12°50 '24.47"	0.70	0.70
57.89	75°16 '7.58"	12°50 '25.84"	0.80	0.80
57.94	75°16 '8.53"	12°50 '27.17"	1.30	1.30
57.99	75°16 '9.67"	12°50 '28.34"	0.50	0.50
58.04	75°16 '10.83"	12°50 '29.49"	0.80	0.80
58.09	75°16 '12.07"	12°50 '30.57"	0.80	0.80
58.14	75°16 '13.48"	12°50 '31.37"	0.70	0.70
58.19	75°16 '15.02"	12°50 '31.96"	0.60	0.60
58.24	75°16 '16.56"	12°50 '32.55"	1.20	1.20
58.29	75°16 '18.16"	12°50 '32.98"	0.50	0.50
58.34	75°16 '19.76"	12°50 '33.4"	0.80	0.80
58.39	75°16 '21.39"	12°50 '33.55"	0.70	0.70
58.44	75°16 '23.04"	12°50 '33.51"	0.80	0.80
58.49	75°16 '24.7"	12°50 '33.5"	0.50	0.50
58.54	75°16 '26.35"	12°50 '33.5"	0.70	0.70
58.59	75°16 '28"	12°50 '33.5"	0.60	0.60
58.64	75°16 '29.66"	12°50 '33.51"	0.80	0.80
58.69	75°16 '31.31"	12°50 '33.51"	0.70	0.70
58.74	75°16 '32.97"	12°50 '33.51"	0.70	0.70
58.79	75°16 '34.62"	12°50 '33.51"	0.80	0.80
58.84	75°16 '36.27"	12°50 '33.52"	0.50	0.50
58.89	75°16 '37.93"	12°50 '33.52"	0.70	0.70
58.94	75°16 '39.58"	12°50 '33.52"	0.60	0.60
58.99	75°16 '41.24"	12°50 '33.59"	0.80	0.80
59.04	75°16 '42.89"	12°50 '33.67"	0.70	0.70
59.09	75°16 '44.54"	12°50 '33.75"	0.80	0.80
59.14	75°16 '46.19"	12°50 '33.77"	1.30	1.30
59.19	75°16 '47.84"	12°50 '33.69"	0.50	0.50
59.24	75°16 '49.5"	12°50 '33.61"	0.80	0.80
59.29	75°16 '51.15"	12°50 '33.53"	0.80	0.80

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
59.34	75°16 '52.74"	12°50 '33.91"	1.30	1.30
59.39	75°16 '54.31"	12°50 '34.42"	1.50	1.50
59.44	75°16 '55.89"	12°50 '34.87"	1.60	1.60
59.49	75°16 '57.53"	12°50 '35.08"	1.10	1.10
59.54	75°16 '59.17"	12°50 '34.85"	0.50	0.50
59.59	75°17 '0.56"	12°50 '34"	0.70	0.70
59.64	75°17 '1.94"	12°50 '33.1"	0.60	0.60
59.69	75°17 '3.32"	12°50 '32.2"	0.80	0.80
59.74	75°17 '4.65"	12°50 '31.24"	0.70	0.70
59.79	75°17 '6.15"	12°50 '30.59"	0.50	0.50
59.84	75°17 '7.68"	12°50 '29.96"	0.80	0.80
59.89	75°17 '9.16"	12°50 '29.25"	0.80	0.80
59.94	75°17 '10.6"	12°50 '28.44"	0.50	0.50
59.99	75°17 '12.01"	12°50 '27.6"	0.80	0.80
60.03	75°17 '13.6"	12°50 '27.22"	0.80	0.80
60.08	75°17 '15.23"	12°50 '26.96"	0.70	0.70
60.13	75°17 '16.88"	12°50 '26.84"	0.60	0.60
60.18	75°17 '18.53"	12°50 '26.76"	0.40	0.40
60.23	75°17 '20.17"	12°50 '27.01"	0.60	0.60
60.28	75°17 '21.79"	12°50 '27.3"	0.80	0.80
60.33	75°17 '23.34"	12°50 '27.86"	0.50	0.50
60.38	75°17 '24.55"	12°50 '28.94"	0.80	0.80
60.43	75°17 '25.53"	12°50 '30.25"	0.40	0.40
60.48	75°17 '26.49"	12°50 '31.57"	0.60	0.60
60.53	75°17 '27.45"	12°50 '32.89"	0.40	0.40
60.58	75°17 '28.5"	12°50 '34.15"	0.60	0.60
60.63	75°17 '29.6"	12°50 '35.36"	1.20	1.20
60.68	75°17 '30.76"	12°50 '36.51"	0.50	0.50
60.73	75°17 '32.08"	12°50 '37.48"	0.80	0.80
60.78	75°17 '33.41"	12°50 '38.45"	0.80	0.80
60.83	75°17 '34.76"	12°50 '39.38"	0.70	0.70
60.88	75°17 '36.14"	12°50 '40.27"	0.60	0.60
60.93	75°17 '37.56"	12°50 '41.11"	0.70	0.70
60.98	75°17 '39.04"	12°50 '41.84"	0.80	0.80
61.03	75°17 '40.52"	12°50 '42.56"	0.50	0.50
61.08	75°17 '42.02"	12°50 '43.23"	0.70	0.70
61.13	75°17 '43.58"	12°50 '43.78"	0.60	0.60
61.18	75°17 '45.14"	12°50 '44.33"	0.80	0.80
61.23	75°17 '46.71"	12°50 '44.83"	0.70	0.70
61.28	75°17 '48.28"	12°50 '45.32"	0.70	0.70
61.33	75°17 '49.8"	12°50 '45.94"	0.80	0.80
61.38	75°17 '51.19"	12°50 '46.83"	0.50	0.50
61.43	75°17 '52.57"	12°50 '47.72"	0.70	0.70
61.48	75°17 '53.95"	12°50 '48.61"	0.60	0.60
61.53	75°17 '55.33"	12°50 '49.5"	0.80	0.80
61.58	75°17 '56.82"	12°50 '50.2"	0.70	0.70
61.63	75°17 '58.33"	12°50 '50.87"	0.80	0.80
61.68	75°17 '59.84"	12°50 '51.53"	1.30	1.30
61.73	75°18 '1.35"	12°50 '52.19"	0.50	0.50
61.78	75°18 '2.86"	12°50 '52.85"	0.80	0.80
61.83	75°18 '4.38"	12°50 '53.51"	0.80	0.80
61.88	75°18 '5.83"	12°50 '54.29"	0.70	0.70
61.93	75°18 '7.29"	12°50 '55.05"	0.60	0.60
61.98	75°18 '8.87"	12°50 '55.51"	0.70	0.70
62.03	75°18 '10.46"	12°50 '55.97"	0.80	0.80
62.08	75°18 '11.85"	12°50 '56.81"	0.50	0.50
62.13	75°18 '13.29"	12°50 '57.52"	0.60	0.60
62.18	75°18 '14.93"	12°50 '57.68"	0.80	0.80
62.22	75°18 '16.59"	12°50 '57.66"	0.70	0.70
62.27	75°18 '18.24"	12°50 '57.61"	0.70	0.70
62.32	75°18 '19.89"	12°50 '57.58"	0.60	0.60
62.37	75°18 '21.55"	12°50 '57.57"	0.50	0.50
62.42	75°18 '23.2"	12°50 '57.56"	0.60	0.60
62.47	75°18 '24.86"	12°50 '57.55"	0.80	0.80
62.52	75°18 '26.51"	12°50 '57.54"	0.60	0.60
62.57	75°18 '28.11"	12°50 '57.89"	0.70	0.70
62.62	75°18 '29.7"	12°50 '58.34"	0.50	0.50
62.67	75°18 '31.27"	12°50 '58.87"	0.60	0.60
62.72	75°18 '32.83"	12°50 '59.39"	0.70	0.70

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
62.77	75°18 '34.4"	12°50 '59.91"	0.90	0.90
62.82	75°18 '36.02"	12°51 '0.15"	0.50	0.50
62.87	75°18 '37.67"	12°51 '0.22"	0.50	0.50
62.92	75°18 '39.32"	12°51 '0.36"	0.60	0.60
62.97	75°18 '40.95"	12°51 '0.63"	0.70	0.70
63.02	75°18 '42.34"	12°51 '1.32"	0.60	0.60
63.07	75°18 '43.42"	12°51 '2.55"	0.40	0.40
63.12	75°18 '44.51"	12°51 '3.77"	0.60	0.60
63.17	75°18 '45.45"	12°51 '5.1"	0.80	0.80
63.22	75°18 '46.36"	12°51 '6.46"	0.50	0.50
63.27	75°18 '47.76"	12°51 '7.21"	0.80	0.80
63.32	75°18 '49.31"	12°51 '7.79"	0.40	0.40
63.37	75°18 '50.83"	12°51 '8.41"	0.80	0.80
63.42	75°18 '52.22"	12°51 '9.29"	0.50	0.50
63.47	75°18 '53.61"	12°51 '10.17"	0.80	0.80
63.52	75°18 '55"	12°51 '11.06"	0.80	0.80
63.57	75°18 '56.39"	12°51 '11.94"	0.70	0.70
63.62	75°18 '57.9"	12°51 '12.57"	0.60	0.60
63.66	75°18 '59.45"	12°51 '13.14"	0.70	0.70
63.71	75°19 '1"	12°51 '13.71"	0.80	0.80
63.76	75°19 '2.51"	12°51 '14.35"	0.80	0.80
63.81	75°19 '3.87"	12°51 '15.28"	0.70	0.70
63.86	75°19 '5.22"	12°51 '16.21"	0.80	0.80
63.91	75°19 '6.58"	12°51 '17.14"	1.30	1.30
63.96	75°19 '7.94"	12°51 '18.07"	0.50	0.50
64.01	75°19 '9.36"	12°51 '18.82"	0.80	0.80
64.06	75°19 '11.01"	12°51 '18.99"	0.80	0.80
64.11	75°19 '12.65"	12°51 '19.17"	0.70	0.70
64.16	75°19 '14.29"	12°51 '19.37"	0.60	0.60
64.21	75°19 '15.91"	12°51 '19.45"	1.20	1.20
64.26	75°19 '17.41"	12°51 '18.75"	0.50	0.50
64.31	75°19 '18.9"	12°51 '18.05"	0.80	0.80
64.36	75°19 '20.43"	12°51 '17.45"	0.80	0.80
64.41	75°19 '22.03"	12°51 '17.03"	0.70	0.70
64.46	75°19 '23.62"	12°51 '16.61"	0.60	0.60
64.51	75°19 '25.24"	12°51 '16.26"	0.70	0.70
64.56	75°19 '26.79"	12°51 '16.36"	0.80	0.80
Sagar Dam at Ch 64.60km				
64.61	75°19 '28.05"	12°51 '17.41"	0.50	0.50
64.66	75°19 '29.31"	12°51 '18.45"	0.70	0.70
64.71	75°19 '30.38"	12°51 '19.69"	0.60	0.60
64.76	75°19 '31.48"	12°51 '20.89"	0.80	0.80
64.81	75°19 '32.76"	12°51 '21.91"	0.70	0.70
64.85	75°19 '33.68"	12°51 '23.24"	0.70	0.70
64.90	75°19 '34.48"	12°51 '24.66"	0.80	0.80
64.95	75°19 '35.24"	12°51 '26.1"	0.50	0.50
65.00	75°19 '35.97"	12°51 '27.55"	0.70	0.70
65.05	75°19 '36.7"	12°51 '29.01"	0.60	0.60
65.10	75°19 '37.36"	12°51 '30.5"	0.80	0.80
65.15	75°19 '37.89"	12°51 '32.03"	0.70	0.70
65.20	75°19 '38.42"	12°51 '33.57"	0.80	0.80
65.25	75°19 '38.95"	12°51 '35.11"	1.30	1.30
65.30	75°19 '39.38"	12°51 '36.67"	0.50	0.50
65.35	75°19 '39.68"	12°51 '38.27"	0.80	0.80
65.40	75°19 '39.98"	12°51 '39.86"	0.80	0.80
65.45	75°19 '40.34"	12°51 '41.45"	0.70	0.70
65.50	75°19 '40.75"	12°51 '43.02"	0.60	0.60
65.55	75°19 '41.15"	12°51 '44.59"	0.40	0.40
65.60	75°19 '41.56"	12°51 '46.17"	0.60	0.60
65.65	75°19 '41.97"	12°51 '47.74"	0.80	0.80
65.70	75°19 '42.48"	12°51 '49.28"	0.50	0.50
65.75	75°19 '43.24"	12°51 '50.72"	0.80	0.80
65.80	75°19 '44.01"	12°51 '52.15"	0.40	0.40
65.85	75°19 '44.77"	12°51 '53.59"	1.50	1.50
65.90	75°19 '45.54"	12°51 '55.03"	0.70	0.70
65.95	75°19 '46.3"	12°51 '56.47"	0.60	0.60
66.00	75°19 '47.43"	12°51 '57.65"	0.80	0.80
66.05	75°19 '48.6"	12°51 '58.8"	0.70	0.70
66.10	75°19 '49.77"	12°51 '59.95"	0.50	0.50

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
66.15	75°19 '50.93"	12°52 '1.1"	0.60	0.60
66.20	75°19 '52.1"	12°52 '2.25"	0.50	0.50
66.25	75°19 '53.11"	12°52 '3.52"	0.90	0.90
66.30	75°19 '53.89"	12°52 '4.94"	0.80	0.80
66.35	75°19 '54.68"	12°52 '6.37"	0.80	0.80
66.40	75°19 '55.39"	12°52 '7.83"	0.50	0.50
66.45	75°19 '55.84"	12°52 '9.39"	0.80	0.80
66.50	75°19 '56.28"	12°52 '10.96"	0.80	0.80
66.55	75°19 '56.55"	12°52 '12.56"	0.70	0.70
66.60	75°19 '56.82"	12°52 '14.16"	0.80	0.80
66.65	75°19 '57.09"	12°52 '15.76"	0.80	0.80
66.70	75°19 '57.22"	12°52 '17.37"	0.50	0.50
66.75	75°19 '57.25"	12°52 '19"	0.80	0.80
66.80	75°19 '57.29"	12°52 '20.62"	0.80	0.80
66.85	75°19 '57.04"	12°52 '22.21"	0.70	0.70
66.90	75°19 '56.65"	12°52 '23.79"	0.60	0.60
66.95	75°19 '56.26"	12°52 '25.37"	0.40	0.40
67.00	75°19 '55.86"	12°52 '26.94"	0.60	0.60
67.05	75°19 '55.59"	12°52 '28.54"	0.80	0.80
67.10	75°19 '55.33"	12°52 '30.15"	0.50	0.50
67.15	75°19 '55.07"	12°52 '31.75"	0.80	0.80
67.20	75°19 '54.81"	12°52 '33.35"	0.40	0.40
67.25	75°19 '55.42"	12°52 '34.85"	0.80	0.80
67.30	75°19 '56.06"	12°52 '36.35"	0.50	0.50
67.35	75°19 '56.7"	12°52 '37.84"	0.80	0.80
67.40	75°19 '57.55"	12°52 '39.24"	0.80	0.80
67.45	75°19 '58.45"	12°52 '40.6"	0.70	0.70
67.50	75°19 '59.35"	12°52 '41.96"	0.60	0.60
67.54	75°20 '0.25"	12°52 '43.32"	0.70	0.70
67.59	75°20 '1.15"	12°52 '44.68"	0.80	0.80
67.64	75°20 '1.93"	12°52 '46.1"	0.50	0.50
67.69	75°20 '2.47"	12°52 '47.63"	0.70	0.70
67.74	75°20 '3"	12°52 '49.17"	0.60	0.60
67.79	75°20 '3.54"	12°52 '50.71"	0.80	0.80
67.84	75°20 '3.67"	12°52 '52.32"	0.70	0.70
67.89	75°20 '3.76"	12°52 '53.94"	0.50	0.50
67.94	75°20 '3.8"	12°52 '55.56"	0.80	0.80
67.99	75°20 '3.73"	12°52 '57.18"	0.80	0.80
68.04	75°20 '3.66"	12°52 '58.8"	0.50	0.50
68.09	75°20 '3.6"	12°53 '0.43"	0.80	0.80
68.14	75°20 '3.53"	12°53 '2.05"	0.80	0.80
68.19	75°20 '3.46"	12°53 '3.67"	0.70	0.70
68.24	75°20 '3.47"	12°53 '5.29"	0.60	0.60
68.29	75°20 '3.68"	12°53 '6.9"	0.40	0.40
68.34	75°20 '4.19"	12°53 '8.43"	0.60	0.60
68.39	75°20 '4.79"	12°53 '9.95"	0.80	0.80
68.44	75°20 '5.39"	12°53 '11.46"	0.50	0.50
68.49	75°20 '5.96"	12°53 '12.98"	0.80	0.80
68.54	75°20 '6.53"	12°53 '14.51"	0.40	0.40
68.59	75°20 '7.09"	12°53 '16.03"	0.60	0.60
68.64	75°20 '7.71"	12°53 '17.54"	0.40	0.40
68.69	75°20 '8.51"	12°53 '18.95"	0.50	0.50
68.74	75°20 '9.32"	12°53 '20.37"	0.80	0.80
68.79	75°20 '10.12"	12°53 '21.79"	0.80	0.80
68.84	75°20 '11.02"	12°53 '23.15"	0.50	0.50
68.89	75°20 '12.05"	12°53 '24.42"	0.80	0.80
68.94	75°20 '13.08"	12°53 '25.69"	0.80	0.80
68.99	75°20 '14.1"	12°53 '26.97"	0.70	0.70
69.04	75°20 '14.96"	12°53 '28.35"	0.80	0.80
69.09	75°20 '15.8"	12°53 '29.75"	0.50	0.50
69.14	75°20 '16.53"	12°53 '31.2"	0.70	0.70
69.19	75°20 '17.27"	12°53 '32.66"	0.60	0.60
69.24	75°20 '17.98"	12°53 '34.13"	0.80	0.80
69.29	75°20 '18.61"	12°53 '35.63"	0.70	0.70
69.34	75°20 '19.24"	12°53 '37.13"	0.80	0.80
69.39	75°20 '19.8"	12°53 '38.65"	1.30	1.30
69.44	75°20 '20.35"	12°53 '40.19"	0.50	0.50
69.49	75°20 '20.88"	12°53 '41.72"	0.80	0.80
69.54	75°20 '21.4"	12°53 '43.26"	0.80	0.80

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
69.59	75°20 '21.93"	12°53 '44.8"	1.30	1.30
69.64	75°20 '22.45"	12°53 '46.34"	1.50	1.50
69.69	75°20 '23.19"	12°53 '47.78"	1.60	1.60
69.74	75°20 '24.12"	12°53 '49.12"	1.10	1.10
69.79	75°20 '25.05"	12°53 '50.46"	0.50	0.50
69.84	75°20 '25.99"	12°53 '51.8"	0.70	0.70
69.89	75°20 '26.92"	12°53 '53.14"	0.60	0.60
69.94	75°20 '28.07"	12°53 '54.28"	0.80	0.80
69.99	75°20 '29.43"	12°53 '55.19"	0.70	0.70
70.04	75°20 '30.96"	12°53 '55.81"	0.50	0.50
70.09	75°20 '32.58"	12°53 '56.13"	0.80	0.80
70.13	75°20 '34.2"	12°53 '56.42"	0.80	0.80
70.18	75°20 '35.83"	12°53 '56.72"	0.50	0.50
70.23	75°20 '37.44"	12°53 '57.08"	0.80	0.80
70.28	75°20 '39.05"	12°53 '57.45"	0.80	0.80
70.33	75°20 '40.67"	12°53 '57.82"	0.60	0.60
70.38	75°20 '42.27"	12°53 '58.22"	0.70	0.70
70.43	75°20 '43.67"	12°53 '58.98"	0.80	0.80
70.48	75°20 '44.82"	12°54 '0.14"	0.60	0.60
70.53	75°20 '45.94"	12°54 '1.33"	0.50	0.50
70.58	75°20 '47.05"	12°54 '2.54"	0.60	0.60
70.63	75°20 '48.16"	12°54 '3.74"	0.80	0.80
70.68	75°20 '49.27"	12°54 '4.94"	0.60	0.60
70.73	75°20 '50.18"	12°54 '6.29"	0.80	0.80
70.78	75°20 '50.66"	12°54 '7.83"	0.70	0.70
70.83	75°20 '50.63"	12°54 '9.45"	0.60	0.60
70.88	75°20 '50.32"	12°54 '11.03"	0.60	0.60
70.93	75°20 '49.78"	12°54 '12.56"	0.80	0.80
70.98	75°20 '49.2"	12°54 '14.07"	1.30	1.30
71.03	75°20 '48.66"	12°54 '15.61"	1.50	1.50
71.08	75°20 '48.31"	12°54 '17.17"	1.60	1.60
71.13	75°20 '48.29"	12°54 '18.8"	1.10	1.10
71.18	75°20 '48.48"	12°54 '20.4"	0.50	0.50
71.23	75°20 '48.77"	12°54 '22"	0.50	0.50
71.28	75°20 '49.13"	12°54 '23.58"	0.70	0.70
71.33	75°20 '49.89"	12°54 '25.02"	0.60	0.60
71.38	75°20 '50.8"	12°54 '26.36"	0.80	0.80
71.43	75°20 '51.95"	12°54 '27.53"	0.70	0.70
71.48	75°20 '53.22"	12°54 '28.56"	0.50	0.50
71.53	75°20 '54.54"	12°54 '29.55"	0.80	0.80
71.58	75°20 '55.86"	12°54 '30.52"	0.80	0.80
71.63	75°20 '57.51"	12°54 '30.64"	0.50	0.50
71.68	75°20 '59.15"	12°54 '30.81"	0.80	0.80
71.73	75°21 '0.75"	12°54 '31.24"	0.80	0.80
71.78	75°21 '2.16"	12°54 '32.08"	0.70	0.70
71.82	75°21 '3.51"	12°54 '33"	0.80	0.80
71.87	75°21 '4.59"	12°54 '34.23"	0.50	0.50
71.92	75°21 '5.43"	12°54 '35.62"	0.70	0.70
71.97	75°21 '6.24"	12°54 '37.04"	0.80	0.80
72.02	75°21 '7.03"	12°54 '38.47"	1.30	1.30
72.07	75°21 '7.83"	12°54 '39.89"	1.50	1.50
72.12	75°21 '8.74"	12°54 '41.24"	1.60	1.60
72.17	75°21 '9.66"	12°54 '42.59"	1.10	1.10
72.22	75°21 '10.58"	12°54 '43.94"	0.50	0.50
72.27	75°21 '11.5"	12°54 '45.29"	0.70	0.70
72.32	75°21 '12.41"	12°54 '46.65"	0.60	0.60
72.37	75°21 '13.28"	12°54 '48.03"	0.80	0.80
72.42	75°21 '14.15"	12°54 '49.41"	0.70	0.70
72.47	75°21 '15.02"	12°54 '50.79"	0.50	0.50
72.52	75°21 '15.9"	12°54 '52.16"	0.80	0.80
72.57	75°21 '16.78"	12°54 '53.54"	0.80	0.80
72.62	75°21 '17.86"	12°54 '54.76"	0.50	0.50
72.67	75°21 '19.02"	12°54 '55.91"	0.80	0.80
72.72	75°21 '20.18"	12°54 '57.06"	0.80	0.80
72.77	75°21 '21.35"	12°54 '58.22"	0.70	0.70
72.82	75°21 '22.55"	12°54 '59.33"	0.80	0.80
72.87	75°21 '23.76"	12°55 '0.44"	0.50	0.50
72.92	75°21 '25.09"	12°55 '1.41"	0.70	0.70
72.97	75°21 '26.41"	12°55 '2.38"	0.60	0.60

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
73.02	75°21 '27.74"	12°55 '3.35"	0.80	0.80
73.07	75°21 '29.08"	12°55 '4.3"	0.70	0.70
73.12	75°21 '30.39"	12°55 '5.29"	0.80	0.80
73.17	75°21 '31.62"	12°55 '6.38"	1.30	1.30
73.22	75°21 '32.78"	12°55 '7.52"	0.50	0.50
73.27	75°21 '33.68"	12°55 '8.88"	0.80	0.80
73.32	75°21 '34.58"	12°55 '10.25"	0.80	0.80
73.37	75°21 '35.33"	12°55 '11.7"	1.30	1.30
73.42	75°21 '36.07"	12°55 '13.15"	1.50	1.50
73.47	75°21 '36.65"	12°55 '14.61"	1.60	1.60
73.52	75°21 '36.15"	12°55 '16.15"	1.10	1.10
73.57	75°21 '36.52"	12°55 '17.73"	0.50	0.50
73.62	75°21 '37.21"	12°55 '19.18"	0.70	0.70
73.67	75°21 '38.13"	12°55 '20.53"	0.60	0.60
73.72	75°21 '39.05"	12°55 '21.88"	0.80	0.80
73.77	75°21 '39.97"	12°55 '23.23"	0.70	0.70
73.82	75°21 '41.02"	12°55 '24.48"	0.50	0.50
73.87	75°21 '42.1"	12°55 '25.71"	0.80	0.80
73.92	75°21 '43.24"	12°55 '26.88"	0.80	0.80
73.97	75°21 '44.48"	12°55 '27.95"	0.50	0.50
74.02	75°21 '45.8"	12°55 '28.93"	0.80	0.80
74.07	75°21 '47.15"	12°55 '29.87"	1.30	1.30
74.11	75°21 '48.31"	12°55 '31.01"	1.50	1.50
74.16	75°21 '49.35"	12°55 '32.27"	1.60	1.60
74.21	75°21 '50.38"	12°55 '33.53"	1.10	1.10
74.26	75°21 '51.77"	12°55 '34.21"	0.50	0.50
74.31	75°21 '53.33"	12°55 '34.65"	0.70	0.70
74.36	75°21 '54.43"	12°55 '35.81"	0.60	0.60
74.41	75°21 '54.99"	12°55 '37.31"	0.80	0.80
74.46	75°21 '55"	12°55 '38.93"	0.70	0.70
74.51	75°21 '55.11"	12°55 '40.55"	0.50	0.50
74.56	75°21 '55.38"	12°55 '42.15"	0.80	0.80
74.61	75°21 '55.88"	12°55 '43.69"	0.80	0.80
74.66	75°21 '56.53"	12°55 '45.18"	0.50	0.50
74.71	75°21 '57.22"	12°55 '46.65"	0.80	0.80
74.76	75°21 '58.13"	12°55 '48.01"	0.80	0.80
74.81	75°21 '59.03"	12°55 '49.37"	0.70	0.70
74.86	75°21 '59.67"	12°55 '50.85"	0.80	0.80
74.91	75°22 '0.14"	12°55 '52.4"	0.50	0.50
74.95	75°22 '0.66"	12°55 '53.93"	0.70	0.70
75.00	75°22 '1.76"	12°55 '55.15"	0.60	0.60
75.05	75°22 '2.75"	12°55 '56.43"	0.80	0.80
75.10	75°22 '3.58"	12°55 '57.84"	0.70	0.70
75.15	75°22 '4.41"	12°55 '59.25"	0.80	0.80
75.20	75°22 '5.44"	12°56 '0.51"	1.30	1.30
75.25	75°22 '6.52"	12°56 '1.74"	0.50	0.50
75.30	75°22 '7.72"	12°56 '2.86"	0.80	0.80
75.35	75°22 '8.92"	12°56 '3.97"	0.80	0.80
75.40	75°22 '10.07"	12°56 '5.14"	1.30	1.30
75.45	75°22 '11.18"	12°56 '6.35"	1.50	1.50
75.50	75°22 '12.29"	12°56 '7.55"	1.60	1.60
75.55	75°22 '13.54"	12°56 '8.6"	1.10	1.10
75.60	75°22 '14.88"	12°56 '9.55"	0.50	0.50
75.65	75°22 '16.21"	12°56 '10.52"	0.70	0.70
75.70	75°22 '17.24"	12°56 '11.77"	0.60	0.60
75.75	75°22 '17.85"	12°56 '13.23"	0.80	0.80
75.80	75°22 '17.85"	12°56 '14.86"	0.70	0.70
75.85	75°22 '17.47"	12°56 '16.43"	0.50	0.50
75.90	75°22 '16.76"	12°56 '17.82"	0.80	0.80
75.95	75°22 '15.47"	12°56 '18.83"	0.80	0.80
76.00	75°22 '13.98"	12°56 '19.54"	0.50	0.50
76.05	75°22 '12.66"	12°56 '20.5"	0.70	0.70
76.10	75°22 '11.31"	12°56 '21.42"	0.80	0.80
76.15	75°22 '9.86"	12°56 '22.21"	1.30	1.30
76.20	75°22 '8.53"	12°56 '23.14"	0.50	0.50
76.25	75°22 '7.39"	12°56 '24.32"	0.80	0.80
76.29	75°22 '6.25"	12°56 '25.49"	0.80	0.80
76.34	75°22 '5.16"	12°56 '26.72"	0.70	0.70
76.39	75°22 '4.08"	12°56 '27.94"	0.60	0.60

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
76.44	75°22 '2.97"	12°56 '29.14"	0.40	0.40
76.49	75°22 '1.62"	12°56 '30.03"	0.60	0.60
76.54	75°22 '0.08"	12°56 '30.61"	0.80	0.80
76.59	75°21 '58.54"	12°56 '31.21"	0.50	0.50
76.64	75°21 '56.98"	12°56 '31.74"	0.80	0.80
76.69	75°21 '55.38"	12°56 '32.14"	0.40	0.40
76.74	75°21 '53.76"	12°56 '32.5"	1.50	1.50
76.79	75°21 '52.15"	12°56 '32.86"	0.70	0.70
76.84	75°21 '50.66"	12°56 '33.47"	0.60	0.60
76.89	75°21 '49.38"	12°56 '34.51"	0.80	0.80
76.94	75°21 '48.2"	12°56 '35.64"	0.70	0.70
76.99	75°21 '47.19"	12°56 '36.91"	0.50	0.50
77.04	75°21 '46.3"	12°56 '38.28"	0.60	0.60
77.09	75°21 '45.41"	12°56 '39.65"	0.50	0.50
77.14	75°21 '44.41"	12°56 '40.94"	0.90	0.90
77.19	75°21 '43.39"	12°56 '42.22"	0.80	0.80
77.24	75°21 '42.24"	12°56 '43.39"	0.80	0.80
77.29	75°21 '41.1"	12°56 '44.56"	0.50	0.50
77.34	75°21 '39.84"	12°56 '45.61"	0.80	0.80
77.39	75°21 '38.5"	12°56 '46.56"	1.50	1.50
77.44	75°21 '37.17"	12°56 '47.53"	1.60	1.60
77.49	75°21 '35.91"	12°56 '48.56"	1.10	1.10
77.54	75°21 '34.83"	12°56 '49.8"	0.50	0.50
77.59	75°21 '33.87"	12°56 '51.11"	0.70	0.70
77.64	75°21 '33.04"	12°56 '52.51"	0.60	0.60
77.69	75°21 '32.2"	12°56 '53.91"	0.80	0.80
77.74	75°21 '31.47"	12°56 '55.36"	0.70	0.70
77.79	75°21 '30.92"	12°56 '56.89"	0.50	0.50
77.84	75°21 '30.37"	12°56 '58.42"	0.80	0.80
77.89	75°21 '29.81"	12°56 '59.95"	0.80	0.80
77.94	75°21 '29.35"	12°57 '1.51"	0.50	0.50
77.99	75°21 '28.95"	12°57 '3.08"	0.80	0.80
78.04	75°21 '28.61"	12°57 '4.67"	0.80	0.80
78.09	75°21 '28.42"	12°57 '6.28"	0.70	0.70
78.14	75°21 '28.48"	12°57 '7.89"	0.80	0.80
78.19	75°21 '28.65"	12°57 '9.51"	0.70	0.70
78.24	75°21 '28.85"	12°57 '11.12"	0.80	0.80
78.28	75°21 '28.93"	12°57 '12.73"	0.50	0.50
78.33	75°21 '28.71"	12°57 '14.34"	0.70	0.70
78.38	75°21 '28.38"	12°57 '15.93"	0.60	0.60
78.43	75°21 '27.73"	12°57 '17.39"	0.80	0.80
78.48	75°21 '26.87"	12°57 '18.77"	0.70	0.70
78.53	75°21 '26.27"	12°57 '20.28"	0.80	0.80
78.58	75°21 '26.47"	12°57 '21.75"	1.30	1.30
78.63	75°21 '27.83"	12°57 '22.59"	0.50	0.50
78.68	75°21 '29.47"	12°57 '22.77"	0.80	0.80
78.73	75°21 '31.06"	12°57 '23.19"	0.80	0.80
78.78	75°21 '32.43"	12°57 '24.08"	1.30	1.30
78.82	75°21 '33.61"	12°57 '25.19"	1.50	1.50
78.87	75°21 '34.3"	12°57 '26.63"	1.60	1.60
78.92	75°21 '34.6"	12°57 '28.23"	1.10	1.10
79.04	75°21 '37.73"	12°57 '30.35"	0.50	0.50
79.09	75°21 '39.21"	12°57 '29.75"	0.80	0.80
Bhoruka Anicut at Ch 79.11km				
79.14	75°21 '40.85"	12°57 '29.66"	0.70	0.70
79.18	75°21 '42.42"	12°57 '29.92"	0.50	0.50
79.23	75°21 '43.58"	12°57 '31.08"	0.80	0.80
79.28	75°21 '44.46"	12°57 '32.45"	0.80	0.80
79.33	75°21 '45.27"	12°57 '33.86"	0.50	0.50
79.38	75°21 '46.08"	12°57 '35.27"	0.80	0.80
79.43	75°21 '46.73"	12°57 '36.77"	0.80	0.80
79.48	75°21 '47.33"	12°57 '38.28"	0.70	0.70
79.53	75°21 '48.04"	12°57 '39.74"	0.80	0.80
79.58	75°21 '48.85"	12°57 '41.16"	0.50	0.50
79.63	75°21 '49.66"	12°57 '42.57"	0.70	0.70
79.68	75°21 '50.47"	12°57 '43.99"	0.60	0.60
79.73	75°21 '51.28"	12°57 '45.4"	0.80	0.80
79.78	75°21 '52.09"	12°57 '46.82"	0.70	0.70
79.83	75°21 '52.9"	12°57 '48.23"	0.80	0.80

Chainage(KM)	Easting	Northing	Depth(M)	Reduced Depth w.r.t CD/MDDL/MWL (M)
79.88	75°21 '53.61"	12°57 '49.7"	0.40	0.40
79.93	75°21 '54.29"	12°57 '51.18"	0.50	0.50
79.98	75°21 '54.96"	12°57 '52.66"	0.80	0.80
80.03	75°21 '55.73"	12°57 '54.09"	0.80	0.80
80.08	75°21 '56.68"	12°57 '55.42"	1.30	1.30
80.13	75°21 '57.88"	12°57 '56.46"	1.50	1.50
80.18	75°21 '59.48"	12°57 '56.75"	1.60	1.60
80.23	75°22 '1.13"	12°57 '56.67"	1.10	1.10
80.28	75°22 '2.72"	12°57 '56.23"	0.50	0.50
80.33	75°22 '4.26"	12°57 '55.65"	0.70	0.70
80.38	75°22 '5.75"	12°57 '54.94"	0.60	0.60
80.43	75°22 '7.19"	12°57 '54.15"	0.80	0.80
80.48	75°22 '10.3"	12°57 '54.22"	0.70	0.70
Netravathi Dam at Ch 80.70km				

Note: The Observed depth has been worked out after duly applying the tidal correction, wherever applicable.

ANNEXURE 3.4

PHOTOS CAPTURED BY SURVEY TEAM DURING RECONNAISSANCE SURVEY

Annexure 3.4: Photos Captured by Survey Team during Reconnaissance Survey

Photo 1: Arabian Sea Mouth near Mangalore

Photo 2: Arabian Sea Mouth near Mangalore

Photo 3: Railway Bridge at Ch 3.43km

Photo 4: Railway Bridge at Ch 3.44km

Photo 5: Bridge on Mumbai Highway at Ch 3.82km

Photo 6: Transmission Line at Ch 7.76km

Photo 7: River Bank at Ch 10.00km

Photo 8: Transmission Line at Ch 12.51km

Photo 9: Stone at Ch 17.00km

Photo 10: Rocky Area at Ch 20.00km

Photo 11: Karnataka Urban Water Supply & Drainage Board (Thumbe Barrage) at Ch 23.50km

Photo 12: Karnataka Urban Water Supply & Drainage Board,(Thumbe barrage) at Ch 23.50km

Photo 13: Thumbe Barrage at Ch 23.50km

Photo 14: Maximum Flood Level of 39 Ft. Dated 26/07/1974 Mark near Thumbe Barrage at Ch 23.50km

Photo 15: Maximum Flood Level of 38.5 Ft. Dated 04/07/1974 Mark near Thumbe Barrage at Ch 23.50km

Photo 16: Railway Bridge at Ch 27.05km

Photo 17: Bridge on Mysore Highway at Ch 28.00km

Photo 18: Transmission Line at Ch 28.50km

Photo 19: AMR Power Pvt. Ltd DAM at Ch 36.00km

Photo 20: River at Ch 45.00km

Photo 21: River at Ch 52.00km

Photo 22: River at Ch 54.00km

Photo 23: Bridge at Ch 62.30km

Photo 24: Foot over Bridge at Ch 62.45km

Photo 25: River at Ch 64.40km

Photo 26: Sagar Power Pvt. Ltd Dam at Ch 64.60km

Photo 27: Transmission Line at Ch 64.75km

Photo 28: LT Line at Ch 74.50km

Photo 29: Bhoruka Power Pvt. Ltd at Ch 79.11km

Photo 30: Rocky area at Ch 79.50km

Photo 31: Old Bridge, Dhramsthala at Ch 80.00km

Photo 32: New Bridge, Dhramsthala at Ch 80.14km

Photo 33: River at Ch 80.50km

Photo 34: Netravathi Dam Dhramsthala Ending Point at Ch 80.70km

ANNEXURE 3.5

BANTAWAL GAUGE AND DISCHARGE DATA

Gauge-Discharge Data: Bantwal (WN000G9)

Period: 2000 Data Type : Absolute Gauge (HZS)

January				February				March				April				May				June			
Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed
1/1/2000	1.585	3	C	2/1/2000	2.93	2.55	D	3/1/2000	2.85	2.3	O	4/1/2000	2.5	1.528	O	5/1/2000	2.85	2.45	D	6/1/2000	0.9	13.055	O
1/2/2000	1.94	1.2	C	2/2/2000	2.93	2.55	D	3/2/2000	2.87	2.3	O	4/2/2000	2.49	1.5	C	5/2/2000	2.84	2.45	D	6/2/2000	0.95	16.676	O
1/3/2000	1.94	1.2	C	2/3/2000	2.925	2.55	D	3/3/2000	2.87	2.3	O	4/3/2000	2.48	1.517	O	5/3/2000	2.84	2.45	D	6/3/2000	1.2	52.23	O
1/4/2000	2.61	1.5	C	2/4/2000	2.925	2.55	D	3/4/2000	2.87	2.3	O	4/4/2000	2.45	1.488	O	5/4/2000	2.83	2.563	O	6/4/2000	1.35	84.3	C
1/5/2000	2.97	2.7	C	2/5/2000	2.925	2.55	D	3/5/2000	2.87	2.3	C	4/5/2000	2.43	1.5	C	5/5/2000	2.82	2.514	O	6/5/2000	2.31	368.4	O
1/6/2000	2.98	2.7	C	2/6/2000	2.925	2.5	C	3/6/2000	2.86	2.3	O	4/6/2000	2.42	1.455	O	5/6/2000	2.82	2.431	O	6/6/2000	1.84	195.3	D
1/7/2000	2.97	2.7	C	2/7/2000	2.925	2.5	D	3/7/2000	2.86	2.3	O	4/7/2000	2.38	1.426	O	5/7/2000	2.82	2.4	C	6/7/2000	3.42	718.8	O
1/8/2000	2.97	2.7	C	2/8/2000	2.92	2.5	D	3/8/2000	2.85	2.3	O	4/8/2000	2.37	4.917	C	5/8/2000	2.83	2.583	O	6/8/2000	3.39	677.2	O
1/9/2000	2.97	2.7	C	2/9/2000	2.92	2.5	D	3/9/2000	2.84	2.3	O	4/9/2000	2.36	1.46	C	5/9/2000	2.82	2.514	O	6/9/2000	2.68	485.2	O
1/10/2000	2.97	2.7	D	2/10/2000	2.92	2.5	D	3/10/2000	2.84	2.3	O	4/10/2000	2.35	1.45	O	5/10/2000	2.82	2.4	D	6/10/2000	3.35	684.5	O
1/11/2000	2.97	2.7	D	2/11/2000	2.915	2.5	D	3/11/2000	2.84	2.3	O	4/11/2000	2.32	1.42	O	5/11/2000	2.84	2.4	C	6/11/2000	3.25	641.7	C
1/12/2000	2.97	2.7	D	2/12/2000	2.915	2.5	C	3/12/2000	2.84	2.3	C	4/12/2000	2.29	1.472	O	5/12/2000	2.84	2.4	C	6/12/2000	3.22	617.1	O
1/13/2000	3.03	2.8	C	2/13/2000	2.91	2.5	C	3/13/2000	2.835	2.3	O	4/13/2000	2.27	1.532	O	5/13/2000	2.84	2.4	C	6/13/2000	3.64	785.1	O
1/14/2000	3.05	2.8	C	2/14/2000	2.91	2.5	D	3/14/2000	2.835	2.3	O	4/14/2000	2.24	1.3	C	5/14/2000	2.83	2.4	C	6/14/2000	3.15	592.7	O
1/15/2000	3.05	2.8	C	2/15/2000	2.91	2.5	D	3/15/2000	2.83	2.3	O	4/15/2000	2.22	1.478	O	5/15/2000	2.85	2.4	D	6/15/2000	2.97	540.7	C
1/16/2000	3.05	2.8	C	2/16/2000	2.91	2.5	D	3/16/2000	2.83	2.3	O	4/16/2000	2.21	1.3	C	5/16/2000	2.86	2.4	D	6/16/2000	2.62	432.7	O
1/17/2000	3.04	2.8	C	2/17/2000	2.91	2.5	D	3/17/2000	2.825	2.3	C	4/17/2000	2.2	1.475	O	5/17/2000	2.88	2.45	D	6/17/2000	2.64	446.9	O
1/18/2000	3.03	2.8	C	2/18/2000	2.91	2.5	D	3/18/2000	2.82	2.964	O	4/18/2000	1.96	1.419	O	5/18/2000	2.87	2.45	C	6/18/2000	3.11	590.6	C
1/19/2000	2.995	2.7	C	2/19/2000	2.91	2.5	D	3/19/2000	2.82	2.95	C	4/19/2000	1.92	1.331	O	5/19/2000	2.48	2.2	D	6/19/2000	3.73	892.7	O
1/20/2000	2.99	2.7	D	2/20/2000	2.905	2.45	C	3/20/2000	2.78	2.751	O	4/20/2000	1.91	1.263	O	5/20/2000	2.2	2.1	D	6/20/2000	5.195	1455	O
1/21/2000	2.97	2.7	D	2/21/2000	2.905	2.45	D	3/21/2000	2.78	2.72	O	4/21/2000	1.88	1	C	5/21/2000	1.9	3	C	6/21/2000	4.935	1348	O
1/22/2000	2.97	2.7	D	2/22/2000	2.905	2.45	D	3/22/2000	2.785	2.834	O	4/22/2000	1.86	1.103	O	5/22/2000	1.75	3.801	O	6/22/2000	3.855	879.9	O
1/23/2000	2.97	2.7	C	2/23/2000	2.905	2.45	D	3/23/2000	2.77	2.726	O	4/23/2000	1.93	1.2	C	5/23/2000	1.55	3.366	O	6/23/2000	3.62	774.5	O
1/24/2000	2.96	2.65	D	2/24/2000	2.885	2.4	D	3/24/2000	2.76	2.66	O	4/24/2000	2.19	1.295	O	5/24/2000	1.42	4.5	O	6/24/2000	2.96	525	O
1/25/2000	2.955	2.65	D	2/25/2000	2.875	2.4	D	3/25/2000	2.75	2.598	O	4/25/2000	2.46	2.2	D	5/25/2000	1.345	7.452	O	6/25/2000	2.61	419.2	C
1/26/2000	2.955	2.65	C	2/26/2000	2.875	2.4	D	3/26/2000	2.74	2.4	C	4/26/2000	2.96	2.5	D	5/26/2000	1.01	20.255	O	6/26/2000	2.56	428.5	O
1/27/2000	2.95	2.6	D	2/27/2000	2.85	2.4	C	3/27/2000	2.7	1.976	O	4/27/2000	2.93	2.5	D	5/27/2000	1.1	46.33	O	6/27/2000	2.96	489.1	O
1/28/2000	2.94	2.6	D	2/28/2000	2.77	2.3	D	3/28/2000	2.67	1.914	O	4/28/2000	2.9	2.5	D	5/28/2000	1.3	56	C	6/28/2000	3.11	555.4	O
1/29/2000	2.94	2.6	D	2/29/2000	2.74	2.3	D	3/29/2000	2.65	1.854	O	4/29/2000	2.88	2.45	D	5/29/2000	1.16	51.535	O	6/29/2000	3.455	680.8	O
1/30/2000	2.94	2.6	C					3/30/2000	2.63	1.814	O	4/30/2000	2.85	2.45	C	5/30/2000	1.07	41.015	O	6/30/2000	3.54	711.2	O
1/31/2000	2.94	2.6	D					3/31/2000	2.57	1.594	O					5/31/2000	1.05	38.688	O				

July				August				September				October				November				December			
Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed
7/1/2000	3.605	756.7	O	8/1/2000	2.14	299.3	O	9/1/2000	3.98	929.2	C	10/1/2000	3.22	630.7	C	11/1/2000	1.71	150.6	O	12/1/2000	1.15	53.095	O
7/2/2000	3.53	748	C	8/2/2000	2.1	276.7	O	9/2/2000	3.63	742.9	O	10/2/2000	4	937.5	C	11/2/2000	1.805	165.8	O	12/2/2000	1.28	73.349	O
7/3/2000	3.01	519.2	O	8/3/2000	2.04	247.7	O	9/3/2000	3.73	827	C	10/3/2000	2.8	480.6	O	11/3/2000	1.77	164.1	O	12/3/2000	1.25	70.05	C
7/4/2000	3.09	556.9	O	8/4/2000	2.06	251.5	O	9/4/2000	4	898.9	O	10/4/2000	2.48	430.6	O	11/4/2000	1.695	146.3	O	12/4/2000	1.16	59.563	O
7/5/2000	3.545	727.5	O	8/5/2000	2.2	301.4	O	9/5/2000	4.12	943.6	O	10/5/2000	2.37	381.2	O	11/5/2000	1.68	155.9	C	12/5/2000	1.12	55.204	O
7/6/2000	3.69	804.4	O	8/6/2000	3.12	594.2	C	9/6/2000	3.4	758	O	10/6/2000	2.27	345	O	11/6/2000	1.645	139.5	O	12/6/2000	1.07	51.06	O
7/7/2000	3.53	716	O	8/7/2000	2.29	352.1	O	9/7/2000	3.32	713.1	O	10/7/2000	3.08	579.8	C	11/7/2000	1.575	131.3	O	12/7/2000	1.05	49.136	O
7/8/2000	5.015	1386	O	8/8/2000	2.69	440.4	O	9/8/2000	3.165	628.6	O	10/8/2000	2.61	419.2	C	11/8/2000	1.64	138.6	O	12/8/2000	1.02	45.568	O
7/9/2000	4.76	1271	C	8/9/2000	3.365	689.1	O	9/9/2000	2.865	527.1	O	10/9/2000	4.33	1037	O	11/9/2000	1.625	135	O	12/9/2000	1	42.698	O
7/10/2000	5.605	1622	O	8/10/2000	3.27	634.6	O	9/10/2000	2.8	482.1	C	10/10/2000	2.565	374.6	O	11/10/2000	1.58	129.7	O	12/10/2000	0.99	39.71	C
7/11/2000	5.53	1593	O	8/11/2000	3.315	656.3	O	9/11/2000	2.815	504.2	O	10/11/2000	2.6	409.7	O	11/11/2000	1.5	115.1	C	12/11/2000	0.98	40.87	O
7/12/2000	6.97	2472	O	8/12/2000	3.235	604.7	O	9/12/2000	2.685	469.744	O	10/12/2000	2.295	317.2	O	11/12/2000	1.42	98.32	C	12/12/2000	0.955	37.468	O
7/13/2000	6.47	2041	O	8/13/2000	3.05	569	C	9/13/2000	2.85	522.5	O	10/13/2000	2.275	313.7	O	11/13/2000	1.38	84.07	O	12/13/2000	0.95	36.974	O
7/14/2000	6.39	2070	O	8/14/2000	2.705	453.6	O	9/14/2000	2.555	429.777	O	10/14/2000	2.845	476.2	O	11/14/2000	1.35	83.392	O	12/14/2000	0.94	36.351	O
7/15/2000	5.63	1684	O	8/15/2000	2.41	356.1	C	9/15/2000	3.31	703.2	O	10/15/2000	2.59	412.7	C	11/15/2000	1.33	80.389	O	12/15/2000	0.92	34.321	O
7/16/2000	4.38	1100	C	8/16/2000	3.685	768.7	O	9/16/2000	2.845	511.4	O	10/16/2000	2.33	315.9	O	11/16/2000	1.3	76.99	O	12/16/2000	0.92	33.729	O
7/17/2000	4.045	943.4	O	8/17/2000	2.675	441.1	O	9/17/2000	2.41	356.1	C	10/17/2000	2.185	273.8	O	11/17/2000	1.27	72.074	O	12/17/2000	0.9	31.42	C
7/18/2000	4.055	935.4	O	8/18/2000	3.335	658.6	O	9/18/2000	2.345	382.8	O	10/18/2000	2.08	243.7	O	11/18/2000	1.25	68.733	O	12/18/2000	0.89	30.713	O
7/19/2000	3.835	801.8	O	8/19/2000	3.24	614.4	O	9/19/2000	2.39	403.4	O	10/19/2000	2.315	314.7	O	11/19/2000	1.23	61.92	C	12/19/2000	0.88	30.137	O
7/20/2000	3.645	732.5	O	8/20/2000	3.23	634.3	C	9/20/2000	2.36	393.7	O	10/20/2000	2.09	249.8	O	11/20/2000	1.23	64.83	O	12/20/2000	0.84	22.766	O
7/21/2000	3.375	630.1	O	8/21/2000	3.84	861.2	O	9/21/2000	3.375	729.1	O	10/21/2000	2.385	353.2	O	11/21/2000	1.34	80.534	O	12/21/2000	0.84	22.823	O
7/22/2000	3.08	536.6	O	8/22/2000	5	1389	O	9/22/2000	3.2	637.1	O	10/22/2000	2.12	270.5	C	11/22/2000	1.32	78.239	O	12/22/2000	0.83	21.881	O
7/23/2000	2.98	544.2	C	8/23/2000	5.79	1760	O	9/23/2000	3.43	759.2	O	10/23/2000	2.64	460.3	O	11/23/2000	1.29	74.812	O	12/23/2000	0.815	20.683	O
7/24/2000	2.69	431.2	O	8/24/2000	6.25	2020	O	9/24/2000	2.45	368.4	C	10/24/2000	2.09	250.2	O	11/24/2000	1.25	68.216	O	12/24/2000	0.8	23.49	C
7/25/2000	2.57	431.7	O	8/25/2000	7.2	2669	O	9/25/2000	2.45	432.1	O	10/25/2000	2.065	239.6	O	11/25/2000	1.23	65.184	O	12/25/2000	0.79	22.77	C
7/26/2000	2.485	410.2	O	8/26/2000	7	2431	O	9/26/2000	3.325	681.5	O	10/26/2000	1.97	229.2	C	11/26/2000	1.22	60.16	C	12/26/2000	0.79	18.9	O
7/27/2000	2.44	394.7	O	8/27/2000	5.9	1827	C	9/27/2000	2.83	489.8	O	10/27/2000	1.975	207.7	O	11/27/2000	1.23	63.653	O	12/27/2000	0.78	18.22	O
7/28/2000	2.49	414.3	O	8/28/2000	5.065	1409	O	9/28/2000	3.65	754	O	10/28/2000	1.975	205.8	O	11/28/2000	1.2	58.073	O	12/28/2000	0.77	21.36	C
7/29/2000	2.52	421.9	O	8/29/2000	5.035	1378	O	9/29/2000	2.42	410.517	O	10/29/2000	1.87	203	C	11/29/2000	1.18	55.802	O	12/29/2000	0.76	16.934	O
7/30/2000	2.48	377.8	C	8/30/2000	4.585	1140	O	9/30/2000	2.42	411.088	O	10/30/2000	1.98	204.1	O	11/30/2000	1.16	53.901	O	12/30/2000	0.74	15.946	O
7/31/2000	2.265	339.2	O	8/31/2000	4.1	918.6	O					10/31/2000	1.91	186.1	O					12/31/2000	0.74	19.35	C

Gauge-Discharge Data: Bantwal (WN000G9)
Period: 2001 Data Type : Absolute Gauge (HZS)

January				February				March				April				May				June			
Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed
1/1/2001	0.76	23.176	O	2/1/2001	2.91	0	D	3/1/2001	2.87	0	D	4/1/2001	2.25	0	D	5/1/2001	2.865	0	D	6/1/2001	0.795	28.547	O
1/2/2001	0.755	22.941	O	2/2/2001	2.91	0	D	3/2/2001	2.86	0	D	4/2/2001	2.18	0	D	5/2/2001	2.85	0	D	6/2/2001	0.775	26.201	O
1/3/2001	0.75	22.262	O	2/3/2001	2.9	0	D	3/3/2001	2.87	0	D	4/3/2001	2.1	0	D	5/3/2001	2.84	0	D	6/3/2001	0.76	17.66	C
1/4/2001	0.75	21.921	O	2/4/2001	2.9	0	D	3/4/2001	2.86	0	D	4/4/2001	2.08	0	D	5/4/2001	2.84	0	D	6/4/2001	0.74	23.071	O
1/5/2001	0.745	21.422	O	2/5/2001	2.93	0	D	3/5/2001	2.86	0	D	4/5/2001	2	0	D	5/5/2001	2.84	0	D	6/5/2001	0.615	6.927	C
1/6/2001	0.735	20.933	O	2/6/2001	2.92	0	D	3/6/2001	2.85	0	D	4/6/2001	1.96	0	D	5/6/2001	2.83	0	D	6/6/2001	1.12	49.407	O
1/7/2001	0.725	18.39	C	2/7/2001	2.92	0	D	3/7/2001	2.84	0	D	4/7/2001	1.94	0	D	5/7/2001	2.83	0	D	6/7/2001	1.26	63.526	O
1/8/2001	0.72	19.964	O	2/8/2001	2.91	0	D	3/8/2001	2.83	0	D	4/8/2001	1.89	0	D	5/8/2001	2.83	0	D	6/8/2001	1.31	71.624	O
1/9/2001	0.7	17.241	O	2/9/2001	2.9	0	D	3/9/2001	2.83	0	D	4/9/2001	1.84	0	D	5/9/2001	2.83	0	D	6/9/2001	1.725	140.8	O
1/10/2001	0.7	17.227	O	2/10/2001	2.9	0	D	3/10/2001	2.83	0	D	4/10/2001	1.785	0	D	5/10/2001	2.83	0	D	6/10/2001	1.55	133.3	C
1/11/2001	0.69	16.702	O	2/11/2001	2.89	0	D	3/11/2001	2.82	0	D	4/11/2001	1.765	0	D	5/11/2001	2.85	0	D	6/11/2001	1.825	159.743	O
1/12/2001	0.69	16.571	O	2/12/2001	2.89	0	D	3/12/2001	2.82	0	D	4/12/2001	1.815	0	D	5/12/2001	2.85	0	D	6/12/2001	3.26	603.048	O
1/13/2001	0.69	16.509	O	2/13/2001	2.885	0	D	3/13/2001	2.82	0	D	4/13/2001	1.895	0	D	5/13/2001	2.85	0	D	6/13/2001	2.95	529.321	O
1/14/2001	0.68	15.66	C	2/14/2001	2.88	0	D	3/14/2001	2.81	0	D	4/14/2001	2.22	0	D	5/14/2001	2.83	0	D	6/14/2001	3.58	743.959	O
1/15/2001	0.68	16.12	O	2/15/2001	2.88	0	D	3/15/2001	2.8	0	D	4/15/2001	2.89	0	D	5/15/2001	2.33	0	D	6/15/2001	5.04	1404.11	O
1/16/2001	0.67	15.687	O	2/16/2001	2.86	0	D	3/16/2001	2.77	0	D	4/16/2001	3.01	0	D	5/16/2001	2.3	0	D	6/16/2001	3.98	908.989	O
1/17/2001	0.66	15.152	O	2/17/2001	2.8	0	D	3/17/2001	2.7	0	D	4/17/2001	2.95	0	D	5/17/2001	2.3	0	D	6/17/2001	3.35	662.5	C
1/18/2001	0.66	15.011	O	2/18/2001	2.76	0	D	3/18/2001	2.7	0	D	4/18/2001	2.94	0	D	5/18/2001	1.81	0	D	6/18/2001	2.885	516.414	O
1/19/2001	0.95	0	O	2/19/2001	2.73	0	D	3/19/2001	2.68	0	D	4/19/2001	2.91	0	D	5/19/2001	1.76	0	D	6/19/2001	2.835	511.005	O
1/20/2001	1.26	0	O	2/20/2001	2.84	0	D	3/20/2001	2.67	0	D	4/20/2001	2.91	0	D	5/20/2001	1.75	0	D	6/20/2001	3.115	600.731	O
1/21/2001	1.79	0	O	2/21/2001	2.88	0	D	3/21/2001	2.66	0	D	4/21/2001	2.92	0	D	5/21/2001	1.78	0	D	6/21/2001	3.31	671.179	O
1/22/2001	2	0	O	2/22/2001	2.89	0	D	3/22/2001	2.64	0	D	4/22/2001	2.91	0	D	5/22/2001	1.29	0	D	6/22/2001	3.395	707.772	O
1/23/2001	2.3	0	O	2/23/2001	2.88	0	D	3/23/2001	2.62	0	D	4/23/2001	2.92	0	D	5/23/2001	0.98	0	D	6/23/2001	2.98	555.954	O
1/24/2001	2.65	0	O	2/24/2001	2.88	0	D	3/24/2001	2.58	0	D	4/24/2001	2.91	0	D	5/24/2001	0.85	0	D	6/24/2001	2.98	527.8	O
1/25/2001	2.85	0	O	2/25/2001	2.89	0	D	3/25/2001	2.5	0	D	4/25/2001	2.91	0	D	5/25/2001	0.75	0	D	6/25/2001	2.965	550.869	O
1/26/2001	2.9	0	O	2/26/2001	2.89	0	D	3/26/2001	2.43	0	D	4/26/2001	2.91	0	D	5/26/2001	0.73	0	D	6/26/2001	2.735	474.707	O
1/27/2001	2.93	0	O	2/27/2001	2.89	0	D	3/27/2001	2.4	0	D	4/27/2001	2.9	0	D	5/27/2001	0.8	0	D	6/27/2001	2.59	429.395	O
1/28/2001	2.95	0	O	2/28/2001	2.87	0	D	3/28/2001	2.34	0	D	4/28/2001	2.89	0	D	5/28/2001	0.73	0	D	6/28/2001	3.775	848.01	O
1/29/2001	2.94	0	O					3/29/2001	2.32	0	D	4/29/2001	2.89	0	D	5/29/2001	0.73	0	D	6/29/2001	3.055	598.551	O
1/30/2001	2.93	0	O					3/30/2001	2.3	0	D	4/30/2001	2.89	0	D	5/30/2001	0.85	0	D	6/30/2001	2.945	558.957	O
1/31/2001	2.91	0	O					3/31/2001	2.27	0	D					5/31/2001	0.9	0	D				

July				August				September				October				November				December			
Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed
7/1/2001	2.59	399.7	C	8/1/2001	3.65	774.293	O	9/1/2001	3.075	572.434	O	10/1/2001	2.715	459.48	O	11/1/2001	1.605	153.8	O	12/1/2001	1.27	78.405	O
7/2/2001	2.67	459.205	O	8/2/2001	3.415	663.95	O	9/2/2001	2.88	493.6	C	10/2/2001	2.65	418.4	C	11/2/2001	1.59	151.367	O	12/2/2001	1.25	74.34	C
7/3/2001	2.935	551.369	O	8/3/2001	4.5	1193.269	O	9/3/2001	2.675	451.462	O	10/3/2001	2.55	413.713	O	11/3/2001	1.54	131.3	C	12/3/2001	1.16	62.997	O
7/4/2001	4.43	1191.594	O	8/4/2001	4.28	1104.311	O	9/4/2001	2.52	413.72	O	10/4/2001	2.17	271.9	O	11/4/2001	1.53	129.3	C	12/4/2001	1.14	60.669	O
7/5/2001	5.06	1424.124	O	8/5/2001	4.93	1369	O	9/5/2001	2.415	345.454	O	10/5/2001	2.085	236.1	O	11/5/2001	1.625	158.5	O	12/5/2001	1.12	57.163	O
7/6/2001	5.635	1753.41	O	8/6/2001	4.265	1091.402	O	9/6/2001	2.33	319.019	O	10/6/2001	2.095	241	O	11/6/2001	1.61	155.1	O	12/6/2001	1.11	54.635	O
7/7/2001	4.64	1238.222	O	8/7/2001	4.4	1139.077	O	9/7/2001	2.255	302.293	O	10/7/2001	2.84	480.2	C	11/7/2001	2.29	295.3	O	12/7/2001	1.1	54.034	O
7/8/2001	7.11	2658	C	8/8/2001	3.965	939.696	O	9/8/2001	2.19	276.638	O	10/8/2001	2.88	487.195	O	11/8/2001	2.18	269.9	O	12/8/2001	1.09	50.986	O
7/9/2001	6.26	2037.261	O	8/9/2001	3.905	911.8	O	9/9/2001	2.06	249.5	C	10/9/2001	2.855	491.754	O	11/9/2001	1.79	163	O	12/9/2001	1.07	51.9	C
7/10/2001	5.725	1761.558	O	8/10/2001	3.73	816.782	O	9/10/2001	2.175	270.472	O	10/10/2001	2.345	324	O	11/10/2001	1.615	151	O	12/10/2001	1.04	48.568	O
7/11/2001	6.575	2248.504	O	8/11/2001	3.985	958.366	O	9/11/2001	1.945	219.606	O	10/11/2001	2.185	275.644	O	11/11/2001	1.53	129.3	C	12/11/2001	1.02	46.786	O
7/12/2001	5.055	1406.958	O	8/12/2001	3.54	736.4	C	9/12/2001	1.89	198.026	O	10/12/2001	2.235	289.664	O	11/12/2001	1.467	118.2	O	12/12/2001	1.01	46.126	O
7/13/2001	4.2	1082.945	O	8/13/2001	3.32	674.421	O	9/13/2001	1.925	209.667	O	10/13/2001	2.1	245.079	O	11/13/2001	1.45	106.9	O	12/13/2001	0.99	44.198	O
7/14/2001	4.17	1056.731	O	8/14/2001	3.785	873.655	O	9/14/2001	1.89	199.364	O	10/14/2001	2.01	236.8	C	11/14/2001	1.43	110.3	C	12/14/2001	0.985	43.275	O
7/15/2001	3.595	758.3	C	8/15/2001	3.76	825.8	C	9/15/2001	1.855	188.749	O	10/15/2001	2.465	355.433	O	11/15/2001	1.41	96.57	O	12/15/2001	0.975	41.87	C
7/16/2001	3.69	830.803	O	8/16/2001	3.975	952.965	O	9/16/2001	1.91	212.3	C	10/16/2001	2.705	437.239	O	11/16/2001	2.23	261.2	O	12/16/2001	0.97	41.37	C
7/17/2001	4.025	977.471	O	8/17/2001	4.08	998.267	O	9/17/2001	2.155	262.912	O	10/17/2001	2.08	233.488	O	11/17/2001	2.725	422.222	O	12/17/2001	1.08	53.03	C
7/18/2001	3.88	916.868	O	8/18/2001	4.55	1257.513	O	9/18/2001	1.995	227.008	O	10/18/2001	2.065	228.447	O	11/18/2001	1.82	191.1	C	12/18/2001	1.52	0	O
7/19/2001	3.615	760.31	O	8/19/2001	5.4	1618	C	9/19/2001	1.99	224.213	O	10/19/2001	1.935	204.617	O	11/19/2001	1.555	124	O	12/19/2001	2.2	0	O
7/20/2001	3.28	643.911	O	8/20/2001	4.45	1175.818	O	9/20/2001	1.81	182.779	O	10/20/2001	1.945	199.799	O	11/20/2001	1.475	113.1	O	12/20/2001	2.24	0	O
7/21/2001	3.295	661.948	O	8/21/2001	4.25	1057.896	O	9/21/2001	2.015	228.458	O	10/21/2001	2.01	236.8	C	11/21/2001	1.47	111.6	O	12/21/2001	3	0	O
7/22/2001	3.06	555.9	C	8/22/2001	4.19	1013	C	9/22/2001	2.575	426.881	O	10/22/2001	1.885	194.278	O	11/22/2001	1.41	100	O	12/22/2001	3.02	0	O
7/23/2001	2.91	531.536	O	8/23/2001	4.56	1217.699	O	9/23/2001	2.6	402.8	C	10/23/2001	1.825	164.15	O	11/23/2001	1.505	118.6	O	12/23/2001	3.02	0	O
7/24/2001	3.18	614.353	O	8/24/2001	4.27	1049.447	O	9/24/2001	2.73	458.566	O	10/24/2001	1.78	155.041	O	11/24/2001	1.41	101.1	O	12/24/2001	3.02	0	O
7/25/2001	3.76	887.8	O	8/25/2001	4.47	1182.307	O	9/25/2001	2.305	318.399	O	10/25/2001	1.8	186.6	C	11/25/2001	1.39	103.1	C	12/25/2001	3.02	0	O
7/26/2001	3.2	635.912	O	8/26/2001	3.93	897.8	C	9/26/2001	3.65	777.687	O	10/26/2001	1.79	184.3	C	11/26/2001	1.38	94.55	O	12/26/2001	3.02	0	O
7/27/2001	3.545	734.08	O	8/27/2001	3.93	911.592	O	9/27/2001	2.79	478.719	O	10/27/2001	2.09	237.658	O	11/27/2001	1.37	92.349	O	12/27/2001	3.01	0	O
7/28/2001	3.425	638.462	O	8/28/2001	3.525	730.755	O	9/28/2001	2.445	357.409	O	10/28/2001	2.08	254.6	C	11/28/2001	1.36	92.02	O	12/28/2001	3.01	0	O
7/29/2001	3.56	744.3	C	8/29/2001	3.4	686.41	O	9/29/2001	2.605	436.077	O	10/29/2001	2.02	225.02	O	11/29/2001	1.33	84.51	O	12/29/2001	3	0	O
7/30/2001	4.02	973.75	O	8/30/2001	3.385	678.865	O	9/30/2001	2.88	493.6	C	10/30/2001	1.715	171.453	O	11/30/2001	1.31	89.18	C	12/30/2001	3	0	O
7/31/2001	3.87	898.589	O	8/31/2001	3.29	654.182	O					10/31/2001	1.605	152.015	O					12/31/2001	3	0	O

Gauge-Discharge Data: Bantwal (WN000G9)
Period: 2002 Data Type : Absolute Gauge (HZS)

January				February				March				April				May				June			
Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed
1/1/2002	3	0	O	2/1/2002	2.93	0	O	3/1/2002	2.88	0	O	4/1/2002	2.1	0	O	5/1/2002	2.38	0	O	6/1/2002	0.655	16.827	O
1/2/2002	3	0	O	2/2/2002	2.93	0	O	3/2/2002	2.88	0	O	4/2/2002	2.06	0	O	5/2/2002	2.34	0	O	6/2/2002	0.8	26.01	C
1/3/2002	3	0	O	2/3/2002	2.93	0	O	3/3/2002	2.87	0	O	4/3/2002	2.05	0	O	5/3/2002	2.3	0	O	6/3/2002	0.875	32.757	O
1/4/2002	3	0	O	2/4/2002	2.93	0	O	3/4/2002	2.86	0	O	4/4/2002	2.01	0	O	5/4/2002	2.23	0	O	6/4/2002	1.19	60.789	O
1/5/2002	3	0	O	2/5/2002	2.93	0	O	3/5/2002	2.85	0	O	4/5/2002	2	0	O	5/5/2002	2.18	0	O	6/5/2002	1.23	64.497	O
1/6/2002	3	0	O	2/6/2002	2.93	0	O	3/6/2002	2.76	0	O	4/6/2002	2	0	O	5/6/2002	2.15	0	O	6/6/2002	0.975	43.191	O
1/7/2002	2.98	0	O	2/7/2002	2.93	0	O	3/7/2002	2.76	0	O	4/7/2002	1.89	0	O	5/7/2002	2.12	0	O	6/7/2002	0.865	31.418	O
1/8/2002	2.97	0	O	2/8/2002	3.06	0	O	3/8/2002	2.76	0	O	4/8/2002	1.8	0	O	5/8/2002	2.25	0	O	6/8/2002	0.76	22.907	O
1/9/2002	2.96	0	O	2/9/2002	3.04	0	O	3/9/2002	2.83	0	O	4/9/2002	1.78	0	O	5/9/2002	2.21	0	O	6/9/2002	0.695	17.48	C
1/10/2002	2.96	0	O	2/10/2002	3.02	0	O	3/10/2002	2.83	0	O	4/10/2002	1.7	0	O	5/10/2002	2.17	0	O	6/10/2002	1.075	52.006	O
1/11/2002	2.96	0	O	2/11/2002	3.04	0	O	3/11/2002	2.83	0	O	4/11/2002	1.67	0	O	5/11/2002	2.2	0	O	6/11/2002	1.265	69.928	O
1/12/2002	2.96	0	O	2/12/2002	3.02	0	O	3/12/2002	2.83	0	O	4/12/2002	1.63	0	O	5/12/2002	2.17	0	O	6/12/2002	1.14	58.199	O
1/13/2002	2.96	0	O	2/13/2002	3.01	0	O	3/13/2002	2.83	0	O	4/13/2002	1.62	0	O	5/13/2002	2.14	0	O	6/13/2002	1.035	48.391	O
1/14/2002	2.95	0	O	2/14/2002	3	0	O	3/14/2002	2.83	0	O	4/14/2002	1.7	0	O	5/14/2002	2.13	0	O	6/14/2002	1.195	63.163	O
1/15/2002	2.95	0	O	2/15/2002	2.99	0	O	3/15/2002	2.83	0	O	4/15/2002	1.84	0	O	5/15/2002	2.18	0	O	6/15/2002	2.395	322.296	O
1/16/2002	2.95	0	O	2/16/2002	2.97	0	O	3/16/2002	2.83	0	O	4/16/2002	2	0	O	5/16/2002	2.3	0	O	6/16/2002	2.45	336.8	C
1/17/2002	2.95	0	O	2/17/2002	2.945	0	O	3/17/2002	2.825	0	O	4/17/2002	2.08	0	O	5/17/2002	2.4	0	O	6/17/2002	2.115	245.106	O
1/18/2002	2.95	0	O	2/18/2002	2.93	0	O	3/18/2002	2.82	0	O	4/18/2002	2.2	0	O	5/18/2002	2.43	0	O	6/18/2002	1.945	196.904	O
1/19/2002	2.95	0	O	2/19/2002	2.925	0	O	3/19/2002	2.72	0	O	4/19/2002	2.3	0	O	5/19/2002	2.47	0	O	6/19/2002	2.23	271.456	O
1/20/2002	2.95	0	O	2/20/2002	2.925	0	O	3/20/2002	2.72	0	O	4/20/2002	2.36	0	O	5/20/2002	2.7	0	O	6/20/2002	2.195	256.984	O
1/21/2002	2.945	0	O	2/21/2002	2.92	0	O	3/21/2002	2.6	0	O	4/21/2002	2.5	0	O	5/21/2002	2.2	0	O	6/21/2002	2.38	318.198	O
1/22/2002	2.94	0	O	2/22/2002	2.915	0	O	3/22/2002	2.55	0	O	4/22/2002	2.45	0	O	5/22/2002	1.95	0	O	6/22/2002	2.535	349.127	O
1/23/2002	2.94	0	O	2/23/2002	2.91	0	O	3/23/2002	2.54	0	O	4/23/2002	2.39	0	O	5/23/2002	1.67	0	O	6/23/2002	2.83	450.9	C
1/24/2002	2.94	0	O	2/24/2002	2.91	0	O	3/24/2002	2.53	0	O	4/24/2002	2.36	0	O	5/24/2002	1.48	0	O	6/24/2002	2.86	459.569	O
1/25/2002	2.94	0	O	2/25/2002	2.9	0	O	3/25/2002	2.52	0	O	4/25/2002	2.33	0	O	5/25/2002	1	0	O	6/25/2002	3.755	728.238	O
1/26/2002	2.94	0	O	2/26/2002	2.89	0	O	3/26/2002	2.5	0	O	4/26/2002	2.5	0	O	5/26/2002	0.98	0	O	6/26/2002	3.13	555.243	O
1/27/2002	2.94	0	O	2/27/2002	2.89	0	O	3/27/2002	2.4	0	O	4/27/2002	2.54	0	O	5/27/2002	0.94	0	O	6/27/2002	2.69	434.168	O
1/28/2002	2.935	0	O	2/28/2002	2.89	0	O	3/28/2002	2.37	0	O	4/28/2002	2.52	0	O	5/28/2002	0.62	14.579	O	6/28/2002	2.44	324.428	O
1/29/2002	2.935	0	O					3/29/2002	2.3	0	O	4/29/2002	2.47	0	O	5/29/2002	0.64	15.673	O	6/29/2002	2.34	292.981	O
1/30/2002	2.93	0	O					3/30/2002	2.27	0	O	4/30/2002	2.43	0	O	5/30/2002	0.62	14.59	O	6/30/2002	2.055	234.3	C
1/31/2002	2.93	0	O					3/31/2002	2.17	0	O					5/31/2002	0.91	38.162	O				

July				August				September				October				November				December			
Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed
7/1/2002	1.915	189.224	O	8/1/2002	2.975	497.611	O	9/1/2002	2.25	282.8	C	10/1/2002	1.87	213.865	O	11/1/2002	1.875	198.783	O	12/1/2002	1.08	55.96	C
7/2/2002	2.02	202.637	O	8/2/2002	3.145	547.747	O	9/2/2002	2.18	246.41	O	10/2/2002	1.69	154.7	C	11/2/2002	1.895	202.388	O	12/2/2002	1.055	55.689	O
7/3/2002	2.375	293.372	O	8/3/2002	3.135	543.048	O	9/3/2002	2.265	277.779	O	10/3/2002	1.605	150.522	O	11/3/2002	2.68	404.1	C	12/3/2002	1.035	56.993	O
7/4/2002	2.405	299.365	O	8/4/2002	3.28	605.1	C	9/4/2002	2.545	362.833	O	10/4/2002	1.685	173.289	O	11/4/2002	1.86	189.9	C	12/4/2002	1.025	56.79	O
7/5/2002	2.43	306.183	O	8/5/2002	3.485	693.564	O	9/5/2002	2.215	259.814	O	10/5/2002	1.66	166.945	O	11/5/2002	1.715	163.415	O	12/5/2002	1.135	54.87	O
7/6/2002	2.385	294.102	O	8/6/2002	4.56	1165.888	O	9/6/2002	2.415	324.623	O	10/6/2002	1.525	123.7	C	11/6/2002	1.66	151.572	O	12/6/2002	1.12	52	C
7/7/2002	2.2	270	C	8/7/2002	4.025	921.222	O	9/7/2002	3.66	786.528	O	10/7/2002	1.495	137.101	O	11/7/2002	1.63	148.144	O	12/7/2002	1.1	51.75	O
7/8/2002	1.93	196.739	O	8/8/2002	3.59	767.819	O	9/8/2002	3.32	619.8	C	10/8/2002	1.595	147.631	O	11/8/2002	1.64	145.785	O	12/8/2002	1.85	0	O
7/9/2002	1.795	157.821	O	8/9/2002	4.51	1148.951	O	9/9/2002	3.12	548	C	10/9/2002	2.575	375.17	O	11/9/2002	1.58	137.243	O	12/9/2002	1.85	0	O
7/10/2002	1.945	201.974	O	8/10/2002	4.315	1024.012	O	9/10/2002	3.73	779.5	C	10/10/2002	3.11	558.489	O	11/10/2002	1.53	124.6	C	12/10/2002	2.11	0	O
7/11/2002	2.36	288.887	O	8/11/2002	5.07	1413	C	9/11/2002	2.82	464.689	O	10/11/2002	2.11	242.413	O	11/11/2002	1.5	125.996	O	12/11/2002	2.72	0	O
7/12/2002	4.345	1021.771	O	8/12/2002	4.79	1277.346	O	9/12/2002	2.62	391.314	O	10/12/2002	2.66	382.849	O	11/12/2002	1.48	125.069	O	12/12/2002	3.02	0	O
7/13/2002	5.5	1535.816	O	8/13/2002	5.155	1424.323	O	9/13/2002	2.505	342.376	O	10/13/2002	4.87	1308	C	11/13/2002	1.46	122.565	O	12/13/2002	3.02	0	O
7/14/2002	4.25	1005	C	8/14/2002	4.72	1234.917	O	9/14/2002	2.3	286.168	O	10/14/2002	5.4	1595	C	11/14/2002	1.43	117.375	O	12/14/2002	3.02	0	O
7/15/2002	3.545	707.52	O	8/15/2002	3.98	884.9	C	9/15/2002	2.2	270	C	10/15/2002	3.32	619.8	C	11/15/2002	1.4	110.214	O	12/15/2002	3.02	0	O
7/16/2002	3.28	582.368	O	8/16/2002	4.69	1228.287	O	9/16/2002	3.1	547.658	O	10/16/2002	2.8	441.4	C	11/16/2002	1.38	105.617	O	12/16/2002	3.02	0	O
7/17/2002	3.835	809.243	O	8/17/2002	6.655	2431.823	O	9/17/2002	2.665	403.469	O	10/17/2002	2.69	407.1	C	11/17/2002	1.35	94.2	C	12/17/2002	3	0	O
7/18/2002	3.255	570.137	O	8/18/2002	5.64	1733	C	9/18/2002	2.21	273.259	O	10/18/2002	2.39	320.1	C	11/18/2002	1.32	96.215	O	12/18/2002	3	0	O
7/19/2002	2.885	464.919	O	8/19/2002	4.635	1183.859	O	9/19/2002	2.065	261.512	O	10/19/2002	2.33	303.9	C	11/19/2002	1.28	83.43	C	12/19/2002	3	0	O
7/20/2002	2.69	418.698	O	8/20/2002	4.185	994.034	O	9/20/2002	1.985	233.235	O	10/20/2002	2.53	359.6	C	11/20/2002	1.27	73.332	O	12/20/2002	3	0	O
7/21/2002	2.6	380	C	8/21/2002	4.335	1074.811	O	9/21/2002	1.92	208.034	O	10/21/2002	2.655	407.499	O	11/21/2002	1.26	71.134	O	12/21/2002	3	0	O
7/22/2002	2.525	341.547	O	8/22/2002	3.995	885.361	O	9/22/2002	1.88	194.3	C	10/22/2002	2.16	286.522	O	11/22/2002	1.395	75.285	O	12/22/2002	3	0	O
7/23/2002	2.7	417.047	O	8/23/2002	3.695	811.087	O	9/23/2002	1.825	212.041	O	10/23/2002	2.005	208.033	O	11/23/2002	1.29	74.549	O	12/23/2002	2.99	0	O
7/24/2002	2.535	347.908	O	8/24/2002	3.495	754.776	O	9/24/2002	1.765	196.353	O	10/24/2002	1.925	202.525	O	11/24/2002	1.23	76.1	C	12/24/2002	2.99	0	O
7/25/2002	2.26	285.899	O	8/25/2002	3.43	661.1	C	9/25/2002	1.74	190.293	O	10/25/2002	1.855	186.978	O	11/25/2002	1.22	74.69	O	12/25/2002	2.99	0	O
7/26/2002	2.61	371.331	O	8/26/2002	3.205	612.947	O	9/26/2002	1.71	158.7	C	10/26/2002	1.805	183.622	O	11/26/2002	1.185	71.696	O	12/26/2002	2.98	0	O
7/27/2002	2.23	261.773	O	8/27/2002	2.845	479.776	O	9/27/2002	1.67	167.999	O	10/27/2002	2.07	237.9	C	11/27/2002	1.16	71.09	O	12/27/2002	2.98	0	O
7/28/2002	4	893.6	C	8/28/2002	2.65	403.181	O	9/28/2002	1.64	161.774	O	10/28/2002	2.085	242	O	11/28/2002	1.14	61.674	O	12/28/2002	2.98	0	O
7/29/2002	3.345	561.847	O	8/29/2002	2.51	362.571	O	9/29/2002	1.625	142.1	C	10/29/2002	1.815	184.482	O	11/29/2002	1.12	64.261	O	12/29/2002	2.98	0	O
7/30/2002	2.855	462.225	O	8/30/2002	2.4	320.689	O	9/30/2002	1.64	159.71	O	10/30/2002	2.465	356.89	O	11/30/2002	1.1	57.104	O	12/30/2002	2.97	0	O
7/31/2002	2.885	469.092	O	8/31/2002	2.34	294.52	O					10/31/2002	2.355	292.555	O					12/31/2002	2.97	0	O

Gauge-Discharge Data: Bantwal (WN000G9)
Period: 200 Data Type : Absolute Gauge (HZS)

January				February				March				April				May				June			
Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed
1/1/2003	2.97	0	O	2/1/2003	2.9	0	O	3/1/2003	2.84	0	O	4/1/2003	1.89	0	O	5/1/2003	1.68	0	O	6/1/2003	0.295	2.391	C
1/2/2003	2.97	0	O	2/2/2003	2.9	0	O	3/2/2003	2.84	0	O	4/2/2003	1.89	0	O	5/2/2003	1.67	0	O	6/2/2003	0.19	0.254	O
1/3/2003	2.96	0	O	2/3/2003	2.9	0	O	3/3/2003	2.83	0	O	4/3/2003	1.88	0	O	5/3/2003	1.69	0	O	6/3/2003	0.15	0.013	D
1/4/2003	2.96	0	O	2/4/2003	2.9	0	O	3/4/2003	2.82	0	O	4/4/2003	1.88	0	O	5/4/2003	1.72	0	O	6/4/2003	0.15	0.014	O
1/5/2003	2.96	0	O	2/5/2003	2.9	0	O	3/5/2003	2.82	0	O	4/5/2003	1.88	0	O	5/5/2003	1.82	0	O	6/5/2003	0.15	0.017	O
1/6/2003	2.96	0	O	2/6/2003	2.89	0	O	3/6/2003	2.82	0	O	4/6/2003	1.85	0	O	5/6/2003	1.87	0	O	6/6/2003	0.12	0	O
1/7/2003	2.955	0	O	2/7/2003	2.89	0	O	3/7/2003	2.82	0	O	4/7/2003	1.84	0	O	5/7/2003	1.88	0	O	6/7/2003	0.145	0	O
1/8/2003	2.955	0	O	2/8/2003	2.89	0	O	3/8/2003	2.81	0	O	4/8/2003	1.83	0	O	5/8/2003	2	0	O	6/8/2003	0.14	0	O
1/9/2003	2.95	0	O	2/9/2003	2.89	0	O	3/9/2003	2.8	0	O	4/9/2003	1.73	0	O	5/9/2003	2.07	0	O	6/9/2003	0.13	0	O
1/10/2003	2.945	0	O	2/10/2003	2.89	0	O	3/10/2003	2.78	0	O	4/10/2003	1.68	0	O	5/10/2003	2.12	0	O	6/10/2003	0.135	0	O
1/11/2003	2.94	0	O	2/11/2003	2.885	0	O	3/11/2003	2.77	0	O	4/11/2003	1.61	0	O	5/11/2003	2.11	0	O	6/11/2003	0.16	0.05	C
1/12/2003	2.94	0	O	2/12/2003	2.885	0	O	3/12/2003	2.77	0	O	4/12/2003	1.54	0	O	5/12/2003	2.11	0	O	6/12/2003	0.15	0.013	C
1/13/2003	2.94	0	O	2/13/2003	2.8	0	O	3/13/2003	2.68	0	O	4/13/2003	1.51	0	O	5/13/2003	2.11	0	O	6/13/2003	0.17	0.107	C
1/14/2003	2.935	0	O	2/14/2003	2.71	0	O	3/14/2003	2.63	0	O	4/14/2003	1.47	0	O	5/14/2003	1.77	0	O	6/14/2003	0.19	0.281	C
1/15/2003	2.935	0	O	2/15/2003	2.67	0	O	3/15/2003	2.59	0	O	4/15/2003	1.42	0	O	5/15/2003	1.74	0	O	6/15/2003	0.36	4.365	C
1/16/2003	2.935	0	O	2/16/2003	2.8	0	O	3/16/2003	2.53	0	O	4/16/2003	1.41	0	O	5/16/2003	1.76	0	O	6/16/2003	0.46	9.41	D
1/17/2003	2.935	0	O	2/17/2003	2.85	0	O	3/17/2003	2.49	0	O	4/17/2003	1.42	0	O	5/17/2003	1.75	0	O	6/17/2003	0.79	37.152	O
1/18/2003	2.93	0	O	2/18/2003	2.87	0	O	3/18/2003	2.42	0	O	4/18/2003	1.41	0	O	5/18/2003	1.72	0	O	6/18/2003	0.83	39.126	O
1/19/2003	2.925	0	O	2/19/2003	2.9	0	O	3/19/2003	2.36	0	O	4/19/2003	1.4	0	O	5/19/2003	1.66	0	O	6/19/2003	1.105	69.627	O
1/20/2003	2.915	0	O	2/20/2003	2.89	0	O	3/20/2003	2.27	0	O	4/20/2003	1.36	0	O	5/20/2003	1.66	0	O	6/20/2003	3.01	579.06	O
1/21/2003	2.915	0	O	2/21/2003	2.89	0	O	3/21/2003	2.22	0	O	4/21/2003	1.35	0	O	5/21/2003	1.27	0	O	6/21/2003	3.365	735.488	O
1/22/2003	2.915	0	O	2/22/2003	2.88	0	O	3/22/2003	2.16	0	O	4/22/2003	1.35	0	O	5/22/2003	1.23	0	O	6/22/2003	4.55	1337	C
1/23/2003	2.915	0	O	2/23/2003	2.87	0	O	3/23/2003	2.05	0	O	4/23/2003	1.29	0	O	5/23/2003	1.27	0	O	6/23/2003	4.465	1095.09	O
1/24/2003	2.915	0	O	2/24/2003	2.87	0	O	3/24/2003	2	0	O	4/24/2003	1.25	0	O	5/24/2003	1.19	0	O	6/24/2003	4.915	1312.276	O
1/25/2003	2.91	0	O	2/25/2003	2.86	0	O	3/25/2003	1.94	0	O	4/25/2003	1.25	0	O	5/25/2003	1	0	O	6/25/2003	2.805	475.033	O
1/26/2003	2.91	0	O	2/26/2003	2.85	0	O	3/26/2003	1.95	0	O	4/26/2003	1.23	0	O	5/26/2003	0.86	0	O	6/26/2003	2.415	335.641	O
1/27/2003	2.91	0	O	2/27/2003	2.85	0	O	3/27/2003	1.97	0	O	4/27/2003	1.23	0	O	5/27/2003	0.77	0	O	6/27/2003	2.3	298.359	O
1/28/2003	2.91	0	O	2/28/2003	2.84	0	O	3/28/2003	1.97	0	O	4/28/2003	1.23	0	O	5/28/2003	0.68	0	O	6/28/2003	2.47	371.182	O
1/29/2003	2.91	0	O					3/29/2003	1.97	0	O	4/29/2003	1.46	0	O	5/29/2003	0.59	0	O	6/29/2003	2.56	430.3	C
1/30/2003	2.9	0	O					3/30/2003	1.95	0	O	4/30/2003	1.6	0	O	5/30/2003	0.5	0	O	6/30/2003	2.18	274.692	O
1/31/2003	2.9	0	O					3/31/2003	1.94	0	O					5/31/2003	0.41	0	O				

July				August				September				October				November				December			
Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed
7/1/2003	2.46	358.328	O	8/1/2003	3.19	700.68	O	9/1/2003	3.22	687.291	O	10/1/2003	1.655	210.554	O	11/1/2003	1.405	126.548	O	12/1/2003	1.4	0	O
7/2/2003	2.335	345.97	O	8/2/2003	4.165	1059.285	O	9/2/2003	3.885	949.947	O	10/2/2003	1.7	187.7	C	11/2/2003	1.37	119.8	C	12/2/2003	1.36	0	O
7/3/2003	2.235	283.938	O	8/3/2003	3.11	633.6	C	9/3/2003	3.45	811.99	O	10/3/2003	2.55	427	C	11/3/2003	1.335	116.907	O	12/3/2003	1.38	0	O
7/4/2003	2.055	249.954	O	8/4/2003	3.02	640.013	O	9/4/2003	3.245	744.149	O	10/4/2003	2.73	489.2	C	11/4/2003	1.41	118.742	O	12/4/2003	1.345	0	O
7/5/2003	2.705	454.673	O	8/5/2003	2.77	514.616	O	9/5/2003	3.05	604.318	O	10/5/2003	2.37	368.7	C	11/5/2003	1.31	88.873	O	12/5/2003	1.69	0	O
7/6/2003	4.45	1280	C	8/6/2003	3.07	668.375	O	9/6/2003	3.14	657.742	O	10/6/2003	2.445	387.549	O	11/6/2003	1.27	102.1	C	12/6/2003	1.69	0	O
7/7/2003	3.445	672.487	O	8/7/2003	3.095	668.364	O	9/7/2003	3.09	625.6	C	10/7/2003	2.79	474.918	O	11/7/2003	1.27	102.1	D	12/7/2003	1.89	0	O
7/8/2003	3.1	565.042	O	8/8/2003	4.465	1328.192	O	9/8/2003	3.06	607.238	O	10/8/2003	2.345	415.652	O	11/8/2003	1.265	101.2	C	12/8/2003	1.86	0	O
7/9/2003	2.895	478.9	O	8/9/2003	3.97	1047.409	O	9/9/2003	2.86	555.198	O	10/9/2003	2.15	310.143	O	11/9/2003	1.3	107.3	C	12/9/2003	2.32	0	O
7/10/2003	2.54	374.703	O	8/10/2003	3.64	864.1	C	9/10/2003	2.93	595.289	O	10/10/2003	2	259.965	O	11/10/2003	1.28	77.385	O	12/10/2003	2.39	0	O
7/11/2003	2.84	457.496	O	8/11/2003	3.19	721.847	O	9/11/2003	2.65	461.1	C	10/11/2003	1.85	252.449	O	11/11/2003	1.225	84.052	O	12/11/2003	2.45	0	O
7/12/2003	2.625	427.442	O	8/12/2003	2.975	618.78	O	9/12/2003	2.47	357.716	O	10/12/2003	1.76	201.6	C	11/12/2003	1.18	73.805	O	12/12/2003	3	0	O
7/13/2003	2.91	555.4	C	8/13/2003	2.8	541.33	O	9/13/2003	2.38	333.438	O	10/13/2003	1.74	235.908	O	11/13/2003	1.15	68.061	O	12/13/2003	3	0	O
7/14/2003	3.15	605.152	O	8/14/2003	3.24	788.654	O	9/14/2003	2.53	420.3	C	10/14/2003	1.71	220.017	O	11/14/2003	1.13	62.112	O	12/14/2003	3	0	O
7/15/2003	4.92	1323.257	O	8/15/2003	3.6	845.5	C	9/15/2003	2.41	357.042	O	10/15/2003	1.69	235.209	O	11/15/2003	1.11	62.36	O	12/15/2003	2.995	0	O
7/16/2003	4.565	1314.138	O	8/16/2003	3.72	960.828	O	9/16/2003	2.635	469.62	O	10/16/2003	1.79	275.312	O	11/16/2003	1.12	77.99	C	12/16/2003	2.995	0	O
7/17/2003	4.82	1459.868	O	8/17/2003	3.38	746.8	C	9/17/2003	2.46	408.378	O	10/17/2003	2.93	583.097	O	11/17/2003	1.095	61.549	O	12/17/2003	2.985	0	O
7/18/2003	3.9	1013.565	O	8/18/2003	3.16	726.473	O	9/18/2003	2.275	354.445	O	10/18/2003	1.79	268.152	O	11/18/2003	1.075	59.622	O	12/18/2003	2.985	0	O
7/19/2003	3.88	958.92	O	8/19/2003	2.89	595.805	O	9/19/2003	2.27	349.208	O	10/19/2003	1.73	194.6	C	11/19/2003	1.06	58.842	O	12/19/2003	2.98	0	O
7/20/2003	3.6	845.5	C	8/20/2003	2.75	530.144	O	9/20/2003	2.105	277.073	O	10/20/2003	1.785	275.719	O	11/20/2003	1.04	58.084	O	12/20/2003	2.99	0	O
7/21/2003	2.94	599.022	O	8/21/2003	6.13	2715.262	O	9/21/2003	2.03	269.8	C	10/21/2003	1.865	301.129	O	11/21/2003	1.01	54.231	O	12/21/2003	2.98	0	O
7/22/2003	2.895	584.082	O	8/22/2003	5.665	2095.968	O	9/22/2003	1.95	248.902	O	10/22/2003	1.95	315.357	O	11/22/2003	0.99	52.204	O	12/22/2003	2.98	0	O
7/23/2003	3.34	749.388	O	8/23/2003	6.02	2174.51	O	9/23/2003	1.9	257.732	O	10/23/2003	2.16	344.519	O	11/23/2003	0.985	58.94	C	12/23/2003	2.99	0	O
7/24/2003	4.06	1079.997	O	8/24/2003	5.39	1859	C	9/24/2003	1.88	294.579	O	10/24/2003	2.21	320.3	C	11/24/2003	0.975	47.392	O	12/24/2003	2.98	0	O
7/25/2003	3.845	975.097	O	8/25/2003	4.625	1386.174	O	9/25/2003	1.9	290.005	O	10/25/2003	1.76	250.965	O	11/25/2003	0.955	44.79	O	12/25/2003	2.98	0	O
7/26/2003	4.12	1149.025	O	8/26/2003	4.8	1416.977	O	9/26/2003	1.87	286.801	O	10/26/2003	1.66	178.7	C	11/26/2003	0.94	53.15	C	12/26/2003	2.995	0	O
7/27/2003	4.24	1165	C	8/27/2003	4.5	1273.293	O	9/27/2003	1.815	222.562	O	10/27/2003	1.595	181.062	O	11/27/2003	0.93	41.613	O	12/27/2003	3	0	O
7/28/2003	4.67	1442.023	O	8/28/2003	4.15	1073.868	O	9/28/2003	1.77	204	C	10/28/2003	1.545	162.613	O	11/28/2003	0.95	47.488	O	12/28/2003	2.97	0	O
7/29/2003	5.1	1627.416	O	8/29/2003	3.55	835.819	O	9/29/2003	1.72	235.781	O	10/29/2003	1.52	156.167	O	11/29/2003	1.05	67.8	D	12/29/2003	2.97	0	O
7/30/2003	4.07	1097.102	O	8/30/2003	3.355	774.937	O	9/30/2003	1.69	230.296	O	10/30/2003	1.49	149.186	O	11/30/2003	1.05	67.8	C	12/30/2003	2.98	0	O
7/31/2003	3.62	900.725	O	8/31/2003	3.46	782	C					10/31/2003	1.445	136.95	O					12/31/2003	2.97	0	O

Gauge-Discharge Data: Bantwal (WN000G9)
Period: 2004 Data Type : Absolute Gauge (HZS)

January				February				March				April				May				June			
Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed
1/1/2004	2.97	0	O	2/1/2004	2.85	0	O	3/1/2004	2.72	0	O	4/1/2004	1.24	0	O	5/1/2004	1.12	0	O	6/1/2004	1.07	64.496	O
1/2/2004	2.97	0	O	2/2/2004	2.79	0	O	3/2/2004	2.68	0	O	4/2/2004	1.15	0	O	5/2/2004	1.07	0	O	6/2/2004	1.46	118.6	C
1/3/2004	2.95	0	O	2/3/2004	2.72	0	O	3/3/2004	2.65	0	O	4/3/2004	1.08	0	O	5/3/2004	1.09	0	O	6/3/2004	2.525	481.483	O
1/4/2004	2.95	0	O	2/4/2004	2.9	0	O	3/4/2004	2.61	0	O	4/4/2004	1.06	0	O	5/4/2004	1.22	0	O	6/4/2004	1.545	130.899	O
1/5/2004	2.95	0	O	2/5/2004	2.9	0	O	3/5/2004	2.56	0	O	4/5/2004	1.1	0	O	5/5/2004	1.4	0	O	6/5/2004	1.255	82.596	O
1/6/2004	2.95	0	O	2/6/2004	2.9	0	O	3/6/2004	2.53	0	O	4/6/2004	1.35	0	O	5/6/2004	1.65	0	O	6/6/2004	1.92	242.5	C
1/7/2004	2.95	0	O	2/7/2004	2.9	0	O	3/7/2004	2.5	0	O	4/7/2004	1.64	0	O	5/7/2004	1.84	0	O	6/7/2004	1.64	146.838	O
1/8/2004	2.95	0	O	2/8/2004	2.9	0	O	3/8/2004	2.44	0	O	4/8/2004	1.81	0	O	5/8/2004	2.04	0	O	6/8/2004	2.44	423.408	O
1/9/2004	2.95	0	O	2/9/2004	2.9	0	O	3/9/2004	2.41	0	O	4/9/2004	1.93	0	O	5/9/2004	2.38	0	O	6/9/2004	2.665	556.241	O
1/10/2004	2.94	0	O	2/10/2004	2.89	0	O	3/10/2004	2.37	0	O	4/10/2004	2.015	0	O	5/10/2004	2.7	0	O	6/10/2004	3.18	793.216	O
1/11/2004	2.94	0	O	2/11/2004	2.88	0	O	3/11/2004	2.33	0	O	4/11/2004	2.06	0	O	5/11/2004	2.95	0	O	6/11/2004	4.04	1118.605	O
1/12/2004	2.94	0	O	2/12/2004	2.88	0	O	3/12/2004	2.29	0	O	4/12/2004	2.07	0	O	5/12/2004	2.99	0	O	6/12/2004	3.24	777.287	O
1/13/2004	2.94	0	O	2/13/2004	2.88	0	O	3/13/2004	2.25	0	O	4/13/2004	2.06	0	O	5/13/2004	2.94	0	O	6/13/2004	3.16	699.9	C
1/14/2004	2.93	0	O	2/14/2004	2.88	0	O	3/14/2004	2.2	0	O	4/14/2004	2.06	0	O	5/14/2004	2.92	0	O	6/14/2004	3.91	1076.221	O
1/15/2004	2.93	0	O	2/15/2004	2.87	0	O	3/15/2004	2.19	0	O	4/15/2004	2.06	0	O	5/15/2004	2.91	0	O	6/15/2004	4.275	1259.944	O
1/16/2004	2.93	0	O	2/16/2004	2.87	0	O	3/16/2004	2.14	0	O	4/16/2004	2.05	0	O	5/16/2004	2.94	0	O	6/16/2004	3.985	1117.977	O
1/17/2004	2.93	0	O	2/17/2004	2.86	0	O	3/17/2004	2.105	0	O	4/17/2004	2.04	0	O	5/17/2004	2.99	0	O	6/17/2004	3.55	901.496	O
1/18/2004	2.925	0	O	2/18/2004	2.86	0	O	3/18/2004	2.08	0	O	4/18/2004	2.04	0	O	5/18/2004	2.44	0	O	6/18/2004	3.21	748.312	O
1/19/2004	2.925	0	O	2/19/2004	2.85	0	O	3/19/2004	2.04	0	O	4/19/2004	1.97	0	O	5/19/2004	2.08	0	O	6/19/2004	3.64	960.026	O
1/20/2004	2.925	0	O	2/20/2004	2.85	0	O	3/20/2004	1.99	0	O	4/20/2004	1.91	0	O	5/20/2004	2.52	0	O	6/20/2004	2.9	591.2	C
1/21/2004	2.925	0	O	2/21/2004	2.86	0	O	3/21/2004	1.97	0	O	4/21/2004	1.86	0	O	5/21/2004	1.95	0	O	6/21/2004	2.485	455.806	O
1/22/2004	2.93	0	O	2/22/2004	2.84	0	O	3/22/2004	1.89	0	O	4/22/2004	1.8	0	O	5/22/2004	1.63	0	O	6/22/2004	2.235	342.087	O
1/23/2004	2.92	0	O	2/23/2004	2.84	0	O	3/23/2004	1.84	0	O	4/23/2004	1.73	0	O	5/23/2004	1.85	0	O	6/23/2004	2.01	260.982	O
1/24/2004	2.915	0	O	2/24/2004	2.82	0	O	3/24/2004	1.79	0	O	4/24/2004	1.645	0	O	5/24/2004	1.56	0	O	6/24/2004	1.865	218.412	O
1/25/2004	2.915	0	O	2/25/2004	2.82	0	O	3/25/2004	1.73	0	O	4/25/2004	1.565	0	O	5/25/2004	1.31	0	O	6/25/2004	1.875	216.686	O
1/26/2004	2.91	0	O	2/26/2004	2.8	0	O	3/26/2004	1.67	0	O	4/26/2004	1.49	0	O	5/26/2004	1.22	0	O	6/26/2004	2.285	353.703	O
1/27/2004	2.92	0	O	2/27/2004	2.79	0	O	3/27/2004	1.64	0	O	4/27/2004	1.425	0	O	5/27/2004	1.56	0	O	6/27/2004	2.03	276.3	C
1/28/2004	2.92	0	O	2/28/2004	2.77	0	O	3/28/2004	1.58	0	O	4/28/2004	1.345	0	O	5/28/2004	1.23	0	O	6/28/2004	2.47	425.6	C
1/29/2004	2.92	0	O	2/29/2004	2.76	0	O	3/29/2004	1.48	0	O	4/29/2004	1.27	0	O	5/29/2004	1.15	0	O	6/29/2004	3.02	640.6	C
1/30/2004	2.92	0	O					3/30/2004	1.41	0	O	4/30/2004	1.18	0	O	5/30/2004	0.95	0	O	6/30/2004	2.72	573.431	O
1/31/2004	2.91	0	O					3/31/2004	1.34	0	O					5/31/2004	1.05	63.511	O				

July				August				September				October				November				December			
Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed
7/1/2004	2.785	592.114	O	8/1/2004	4.04	1111	C	9/1/2004	2.36	364.939	O	10/1/2004	1.68	162.536	O	11/1/2004	1.84	230.514	O	12/1/2004	1.8	0	O
7/2/2004	2.44	404.257	O	8/2/2004	3.725	966.934	O	9/2/2004	2.285	347.528	O	10/2/2004	1.65	166.2	C	11/2/2004	1.42	101.964	O	12/2/2004	1.5	0	O
7/3/2004	3.39	801.1	C	8/3/2004	4.83	1500.602	O	9/3/2004	2.2	322.9	O	10/3/2004	2.88	583.1	C	11/3/2004	1.73	191.416	O	12/3/2004	1.77	0	O
7/4/2004	5.25	1773	C	8/4/2004	7.835	3566.649	O	9/4/2004	2.13	295.797	O	10/4/2004	2.86	575	C	11/4/2004	1.37	85.253	O	12/4/2004	1.77	0	O
7/5/2004	4.22	1218.973	O	8/5/2004	7.625	3258.366	O	9/5/2004	2.08	292.2	C	10/5/2004	2.62	469.182	O	11/5/2004	1.27	95.44	C	12/5/2004	1.76	0	O
7/6/2004	3.42	857.066	O	8/6/2004	5.845	2021.423	O	9/6/2004	2.485	427.2	O	10/6/2004	2.065	248.627	O	11/6/2004	1.23	88.8	C	12/6/2004	1.745	0	O
7/7/2004	2.77	558.656	O	8/7/2004	5.63	1917.478	O	9/7/2004	2.4	400.4	C	10/7/2004	1.86	227.058	O	11/7/2004	1.41	107	C	12/7/2004	1.73	0	O
7/8/2004	2.53	455.921	O	8/8/2004	5.7	2044	C	9/8/2004	2.07	259.803	O	10/8/2004	1.78	201.7	C	11/8/2004	1.34	91.49	C	12/8/2004	1.91	0	O
7/9/2004	2.625	499.237	O	8/9/2004	4.475	1306.94	O	9/9/2004	2.17	325.178	O	10/9/2004	1.7	179.6	C	11/9/2004	1.305	84.04	C	12/9/2004	2.06	0	O
7/10/2004	2.88	634.557	O	8/10/2004	3.89	1015.286	O	9/10/2004	2.29	361.37	O	10/10/2004	1.64	163.6	C	11/10/2004	1.62	153.377	O	12/10/2004	2.24	0	O
7/11/2004	2.83	563	C	8/11/2004	3.575	866.303	O	9/11/2004	2.22	337.085	O	10/11/2004	1.59	150.6	C	11/11/2004	1.53	135.5	C	12/11/2004	2.7	0	O
7/12/2004	2.535	479.06	O	8/12/2004	3.5	851.1	C	9/12/2004	2.36	386.3	C	10/12/2004	1.55	140.5	C	11/12/2004	1.425	98.391	O	12/12/2004	3.02	0	O
7/13/2004	2.41	424.561	O	8/13/2004	5.025	1610.526	O	9/13/2004	2.24	342.734	O	10/13/2004	1.58	124.192	O	11/13/2004	1.28	100.848	O	12/13/2004	3.02	0	O
7/14/2004	2.555	483.391	O	8/14/2004	6.3	2426	C	9/14/2004	2.44	411.861	O	10/14/2004	2.54	467.749	O	11/14/2004	1.22	87.15	C	12/14/2004	3.02	0	O
7/15/2004	2.87	625.889	O	8/15/2004	4.81	1520	C	9/15/2004	2.175	301.868	O	10/15/2004	1.755	178.59	O	11/15/2004	1.17	79.2	C	12/15/2004	3	0	O
7/16/2004	4.005	1101.113	O	8/16/2004	4.77	1434.161	O	9/16/2004	2.035	236.173	O	10/16/2004	1.697	186.034	O	11/16/2004	1.13	76.806	O	12/16/2004	3	0	O
7/17/2004	3.62	973.597	O	8/17/2004	5.065	1606.535	O	9/17/2004	1.95	251.6	C	10/17/2004	1.85	221.8	C	11/17/2004	1.05	61.51	D	12/17/2004	2.99	0	O
7/18/2004	3.045	651	C	8/18/2004	4.22	1159.189	O	9/18/2004	2.03	276.3	C	10/18/2004	1.705	187.864	O	11/18/2004	1.03	58.76	D	12/18/2004	2.99	0	O
7/19/2004	2.595	490.023	O	8/19/2004	4.49	1306.33	O	9/19/2004	1.92	242.5	C	10/19/2004	1.635	153.032	O	11/19/2004	1.02	57.41	D	12/19/2004	2.98	0	O
7/20/2004	2.415	414.258	O	8/20/2004	4.92	1545.415	O	9/20/2004	1.86	206.639	O	10/20/2004	1.755	205.009	O	11/20/2004	0.99	53.43	D	12/20/2004	2.98	0	O
7/21/2004	2.93	641.632	O	8/21/2004	4.03	1077.98	O	9/21/2004	1.8	202.606	O	10/21/2004	1.72	185.746	O	11/21/2004	0.99	53.43	C	12/21/2004	2.98	0	O
7/22/2004	2.8	565.052	O	8/22/2004	3.71	949.4	C	9/22/2004	1.77	186.39	O	10/22/2004	1.72	185	C	11/22/2004	0.985	52.78	D	12/22/2004	2.98	0	O
7/23/2004	2.61	477.5	C	8/23/2004	3.885	1007.963	O	9/23/2004	1.78	193.66	O	10/23/2004	1.59	144.476	O	11/23/2004	0.96	49.58	D	12/23/2004	2.97	0	O
7/24/2004	3.135	725.415	O	8/24/2004	3.565	870.219	O	9/24/2004	1.72	193.983	O	10/24/2004	1.46	118.6	C	11/24/2004	1.01	55.48	O	12/24/2004	2.97	0	O
7/25/2004	5.41	1868	C	8/25/2004	3.4	809.572	O	9/25/2004	1.68	164.724	O	10/25/2004	1.41	91.139	O	11/25/2004	1	53.753	O	12/25/2004	2.96	0	O
7/26/2004	4.73	1539.951	O	8/26/2004	3.15	702.24	O	9/26/2004	1.98	260.8	C	10/26/2004	1.37	84.284	O	11/26/2004	0.99	53.43	C	12/26/2004	2.96	0	O
7/27/2004	4.475	1400.431	O	8/27/2004	3.18	716.47	O	9/27/2004	2.18	296.308	O	10/27/2004	1.33	75.173	O	11/27/2004	0.97	49.385	O	12/27/2004	2.96	0	O
7/28/2004	4.26	1242.545	O	8/28/2004	2.93	603.4	C	9/28/2004	2.54	449.377	O	10/28/2004	1.3	100.6	D	11/28/2004	0.95	48.32	C	12/28/2004	2.97	0	O
7/29/2004	4.185	1211.157	O	8/29/2004	2.7	511.9	C	9/29/2004	2.32	360.493	O	10/29/2004	1.28	99.634	O	11/29/2004	0.93	45.78	O	12/29/2004	2.96	0	O
7/30/2004	4.28	1245.51	O	8/30/2004	2.57	444.957	O	9/30/2004	1.8	197.619	O	10/30/2004	1.29	101.608	O	11/30/2004	0.92	46.208	O	12/30/2004	2.97	0	O
7/31/2004	4.845	1515.355	O	8/31/2004	2.46	399.076	O					10/31/2004	1.31	85.09	C					12/31/2004	2.96	0	O

Gauge-Discharge Data: Bantwal (WN000G9)
Period: 2005 Data Type : Absolute Gauge (HZS)

January				February				March				April				May				June			
Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed
1/1/2005	2.95	0	O	2/1/2005	2.89	0	O	3/1/2005	2.86	0	O	4/1/2005	1.64	0	O	5/1/2005	2.88	0	O	6/1/2005	1.61	0	O
1/2/2005	2.95	0	O	2/2/2005	2.87	0	O	3/2/2005	2.84	0	O	4/2/2005	1.53	0	O	5/2/2005	2.84	0	O	6/2/2005	1.91	0	O
1/3/2005	2.96	0	O	2/3/2005	2.87	0	O	3/3/2005	2.84	0	O	4/3/2005	1.43	0	O	5/3/2005	2.83	0	O	6/3/2005	1.33	0	O
1/4/2005	2.96	0	O	2/4/2005	2.87	0	O	3/4/2005	2.79	0	O	4/4/2005	1.35	0	O	5/4/2005	2.87	0	O	6/4/2005	0.79	0	O
1/5/2005	2.96	0	O	2/5/2005	2.86	0	O	3/5/2005	2.76	0	O	4/5/2005	1.27	0	O	5/5/2005	2.85	0	O	6/5/2005	0.75	0	O
1/6/2005	2.95	0	O	2/6/2005	2.85	0	O	3/6/2005	2.72	0	O	4/6/2005	1.255	0	O	5/6/2005	2.85	0	O	6/6/2005	0.76	0	O
1/7/2005	2.955	0	O	2/7/2005	2.89	0	O	3/7/2005	2.72	0	O	4/7/2005	1.23	0	O	5/7/2005	2.83	0	O	6/7/2005	0.3	0	O
1/8/2005	2.955	0	O	2/8/2005	2.89	0	O	3/8/2005	2.71	0	O	4/8/2005	1.17	0	O	5/8/2005	2.8	0	O	6/8/2005	0.29	0	O
1/9/2005	2.95	0	O	2/9/2005	2.89	0	O	3/9/2005	2.7	0	O	4/9/2005	1.16	0	O	5/9/2005	2.76	0	O	6/9/2005	0.3	0	O
1/10/2005	2.95	0	O	2/10/2005	2.88	0	O	3/10/2005	2.7	0	O	4/10/2005	1.12	0	O	5/10/2005	2.73	0	O	6/10/2005	0.3	0	O
1/11/2005	2.94	0	O	2/11/2005	2.87	0	O	3/11/2005	2.69	0	O	4/11/2005	1.31	0	O	5/11/2005	2.69	0	O	6/11/2005	0.77	33.16	C
1/12/2005	2.94	0	O	2/12/2005	2.86	0	O	3/12/2005	2.7	0	O	4/12/2005	1.32	0	O	5/12/2005	2.65	0	O	6/12/2005	0.54	11.76	C
1/13/2005	2.94	0	O	2/13/2005	2.87	0	O	3/13/2005	2.69	0	O	4/13/2005	1.73	0	O	5/13/2005	2.6	0	O	6/13/2005	0.68	21.406	O
1/14/2005	2.935	0	O	2/14/2005	2.87	0	O	3/14/2005	2.46	0	O	4/14/2005	1.92	0	O	5/14/2005	2.57	0	O	6/14/2005	0.77	31.345	O
1/15/2005	2.935	0	O	2/15/2005	2.88	0	O	3/15/2005	2.44	0	O	4/15/2005	2.02	0	O	5/15/2005	2.53	0	O	6/15/2005	0.64	21.331	O
1/16/2005	2.93	0	O	2/16/2005	2.86	0	O	3/16/2005	2.43	0	O	4/16/2005	2.11	0	O	5/16/2005	2.49	0	O	6/16/2005	0.74	30.589	O
1/17/2005	2.93	0	O	2/17/2005	2.86	0	O	3/17/2005	2.42	0	O	4/17/2005	2.15	0	O	5/17/2005	2.43	0	O	6/17/2005	0.71	26.212	O
1/18/2005	2.93	0	O	2/18/2005	2.86	0	O	3/18/2005	2.41	0	O	4/18/2005	2.18	0	O	5/18/2005	2.39	0	O	6/18/2005	0.78	31.603	O
1/19/2005	2.93	0	O	2/19/2005	2.85	0	O	3/19/2005	2.39	0	O	4/19/2005	2.19	0	O	5/19/2005	2.34	0	O	6/19/2005	1.62	185.1	C
1/20/2005	2.93	0	O	2/20/2005	2.85	0	O	3/20/2005	2.31	0	O	4/20/2005	2.27	0	O	5/20/2005	2.28	0	O	6/20/2005	3.75	988.597	O
1/21/2005	2.93	0	O	2/21/2005	2.83	0	O	3/21/2005	2.18	0	O	4/21/2005	2.34	0	O	5/21/2005	2.22	0	O	6/21/2005	4.19	1052.175	O
1/22/2005	2.93	0	O	2/22/2005	2.82	0	O	3/22/2005	2.15	0	O	4/22/2005	2.35	0	O	5/22/2005	2.15	0	O	6/22/2005	3.87	1031.609	O
1/23/2005	2.93	0	O	2/23/2005	2.82	0	O	3/23/2005	2.1	0	O	4/23/2005	2.34	0	O	5/23/2005	2.09	0	O	6/23/2005	3.175	751.373	O
1/24/2005	2.93	0	O	2/24/2005	2.83	0	O	3/24/2005	2.04	0	O	4/24/2005	2.34	0	O	5/24/2005	2.03	0	O	6/24/2005	3.09	712.061	O
1/25/2005	2.92	0	O	2/25/2005	2.83	0	O	3/25/2005	1.99	0	O	4/25/2005	2.33	0	O	5/25/2005	1.97	0	O	6/25/2005	3.77	964.673	O
1/26/2005	2.92	0	O	2/26/2005	2.84	0	O	3/26/2005	1.94	0	O	4/26/2005	2.32	0	O	5/26/2005	1.92	0	O	6/26/2005	3	637.6	C
1/27/2005	2.92	0	O	2/27/2005	2.85	0	O	3/27/2005	1.9	0	O	4/27/2005	2.49	0	O	5/27/2005	1.86	0	O	6/27/2005	3.02	623.97	O
1/28/2005	2.91	0	O	2/28/2005	2.86	0	O	3/28/2005	1.85	0	O	4/28/2005	2.54	0	O	5/28/2005	1.78	0	O	6/28/2005	2.72	454.959	O
1/29/2005	2.91	0	O					3/29/2005	1.77	0	O	4/29/2005	2.61	0	O	5/29/2005	1.71	0	O	6/29/2005	3.31	838.165	O
1/30/2005	2.9	0	O					3/30/2005	1.72	0	O	4/30/2005	2.72	0	O	5/30/2005	1.65	0	O	6/30/2005	3.57	984.02	O
1/31/2005	2.89	0	O					3/31/2005	1.68	0	O					5/31/2005	1.6	0	O				

July				August				September				October				November				December			
Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed
7/1/2005	5.26	1853.925	O	8/1/2005	7.64	3475.435	O	9/1/2005	3.015	691.143	O	10/1/2005	2.13	328.755	O	11/1/2005	1.82	235.8	C	12/1/2005	1.53	0	O
7/2/2005	5.12	1715.836	O	8/2/2005	8.2	4197	C	9/2/2005	3.05	678.177	O	10/2/2005	2.05	300.5	C	11/2/2005	2.03	257.884	O	12/2/2005	1.52	0	O
7/3/2005	4.56	1416	C	8/3/2005	7.3	3309.636	O	9/3/2005	3.125	724.682	O	10/3/2005	2.01	324.734	O	11/3/2005	1.88	252	C	12/3/2005	1.525	0	O
7/4/2005	3.98	1124.843	O	8/4/2005	7.44	3442.656	O	9/4/2005	3.43	825.2	C	10/4/2005	1.935	302.586	O	11/4/2005	2.24	359.1	C	12/4/2005	1.56	0	O
7/5/2005	4.055	1165.595	O	8/5/2005	5.86	2075.05	O	9/5/2005	3.66	957.71	O	10/5/2005	1.87	270.518	O	11/5/2005	1.89	254.7	C	12/5/2005	1.64	0	O
7/6/2005	4.76	1440.413	O	8/6/2005	5.12	1625.876	O	9/6/2005	3.01	664.017	O	10/6/2005	1.85	264.378	O	11/6/2005	1.79	227.8	C	12/6/2005	1.6	0	O
7/7/2005	3.95	1080	C	8/7/2005	4.58	1427	C	9/7/2005	2.99	633.5	C	10/7/2005	1.93	305.991	O	11/7/2005	1.75	224.48	O	12/7/2005	1.505	0	O
7/8/2005	3.31	770.8	C	8/8/2005	4.25	1188.396	O	9/8/2005	2.77	557.963	O	10/8/2005	1.9	295.199	O	11/8/2005	1.69	203.327	O	12/8/2005	1.47	0	O
7/9/2005	3.26	784.415	O	8/9/2005	4.25	1159.346	O	9/9/2005	3.3	800.955	O	10/9/2005	2.49	443	C	11/9/2005	1.645	180.708	O	12/9/2005	1.45	0	O
7/10/2005	3.08	670.9	C	8/10/2005	4.63	1317.781	O	9/10/2005	3.48	863.845	O	10/10/2005	1.95	271.5	C	11/10/2005	1.59	157.54	O	12/10/2005	1.43	0	O
7/11/2005	4.1	1169.619	O	8/11/2005	4.26	1161.788	O	9/11/2005	3.54	876.6	C	10/11/2005	2.225	354.3	C	11/11/2005	1.58	175.443	O	12/11/2005	1.42	0	O
7/12/2005	3.76	964.624	O	8/12/2005	4.29	1183.167	O	9/12/2005	3.96	1175.522	O	10/12/2005	2.33	388.4	C	11/12/2005	1.55	169.528	O	12/12/2005	1.41	0	O
7/13/2005	3.51	926.412	O	8/13/2005	3.875	994.98	O	9/13/2005	4.4	1324	C	10/13/2005	3.24	739.819	O	11/13/2005	1.585	176.8	C	12/13/2005	1.4	0	O
7/14/2005	3.67	992.479	O	8/14/2005	3.96	1085	C	9/14/2005	4.16	1191	C	10/14/2005	3.015	615.91	O	11/14/2005	1.53	149.605	O	12/14/2005	1.395	0	O
7/15/2005	3.315	798.095	O	8/15/2005	4.47	1364	C	9/15/2005	4.04	1127	C	10/15/2005	2.83	602.995	O	11/15/2005	1.48	152.9	C	12/15/2005	1.38	0	O
7/16/2005	3.01	616.188	O	8/16/2005	6.67	2845.623	O	9/16/2005	4.08	1148	C	10/16/2005	2.27	368.8	C	11/16/2005	1.45	133.152	O	12/16/2005	1.37	0	O
7/17/2005	5.08	1733	C	8/17/2005	5.78	1987.956	O	9/17/2005	3.265	781.389	O	10/17/2005	2.08	351.464	O	11/17/2005	1.43	126.606	O	12/17/2005	1.46	0	O
7/18/2005	4.23	1229	C	8/18/2005	5.26	1717.991	O	9/18/2005	3	637.6	C	10/18/2005	2.94	662.264	O	11/18/2005	1.4	122.151	O	12/18/2005	1.89	0	O
7/19/2005	3.64	924.4	C	8/19/2005	4.15	1123.569	O	9/19/2005	2.745	560.105	O	10/19/2005	2.47	467.742	O	11/19/2005	1.38	135.46	O	12/19/2005	2.13	0	O
7/20/2005	4.22	1142.486	O	8/20/2005	4.21	1137.816	O	9/20/2005	3.09	709.201	O	10/20/2005	2.45	458.836	O	11/20/2005	1.35	125.4	C	12/20/2005	2.14	0	O
7/21/2005	3.39	823.647	O	8/21/2005	3.47	843.8	C	9/21/2005	3.52	929.611	O	10/21/2005	2.4	439.944	O	11/21/2005	1.33	105.012	O	12/21/2005	2.39	0	O
7/22/2005	3.73	1038.562	O	8/22/2005	3.63	952.987	O	9/22/2005	2.955	695.601	O	10/22/2005	2.06	339.64	O	11/22/2005	1.31	101.947	O	12/22/2005	3.01	0	O
7/23/2005	4.64	1360.279	O	8/23/2005	3.125	697.723	O	9/23/2005	2.725	577.806	O	10/23/2005	3.26	748.6	C	11/23/2005	1.31	101.992	O	12/23/2005	3.01	0	O
7/24/2005	6.11	2442	C	8/24/2005	2.945	630.051	O	9/24/2005	2.59	513.591	O	10/24/2005	2.46	478.668	O	11/24/2005	1.3	100.987	O	12/24/2005	3.02	0	O
7/25/2005	6.08	2148.455	O	8/25/2005	2.815	594.87	O	9/25/2005	2.46	432.6	C	10/25/2005	2.18	377.377	O	11/25/2005	1.295	109.8	O	12/25/2005	3.01	0	O
7/26/2005	6.74	2798.295	O	8/26/2005	2.88	588.896	O	9/26/2005	2.36	444.318	O	10/26/2005	2.01	297.375	O	11/26/2005	1.26	109.3	O	12/26/2005	3	0	O
7/27/2005	5.92	2022.233	O	8/27/2005	2.65	501.979	O	9/27/2005	2.3	380.235	O	10/27/2005	1.98	284.462	O	11/27/2005	1.26	107.7	C	12/27/2005	3	0	O
7/28/2005	6.77	3160.845	O	8/28/2005	4.725	1513	C	9/28/2005	2.74	659.658	O	10/28/2005	2.03	302.441	O	11/28/2005	1.26	107.7	C	12/28/2005	3	0	O
7/29/2005	6.08	2313.455	O	8/29/2005	3.03	689.606	O	9/29/2005	2.25	344.883	O	10/29/2005	1.94	270.026	O	11/29/2005	1.25	105.9	C	12/29/2005	3	0	O
7/30/2005	5.755	2090.799	O	8/30/2005	2.95	614.677	O	9/30/2005	2.22	333.07	O	10/30/2005	1.89	254.7	C	11/30/2005	1.4	135.7	O	12/30/2005	2.99	0	O
7/31/2005	6.26	2555	C	8/31/2005	3.01	671.096	O					10/31/2005	1.92	226.132	O					12/31/2005	2.98	0	O

Gauge-Discharge Data: Bantwal (WN000G9)
Period: 2006 Data Type : Absolute Gauge (HZS)

January				February				March				April				May				June			
Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed
1/1/2006	2.98	0	O	2/1/2006	2.93	0	O	3/1/2006	2.89	0	O	4/1/2006	2.78	0	O	5/1/2006	0.73	0	O	6/1/2006	2.87	655.858	O
1/2/2006	2.98	0	O	2/2/2006	2.94	0	O	3/2/2006	2.9	0	O	4/2/2006	2.76	0	O	5/2/2006	0.66	0	O	6/2/2006	2.67	570.06	O
1/3/2006	2.98	0	O	2/3/2006	2.935	0	O	3/3/2006	2.92	0	O	4/3/2006	2.69	0	O	5/3/2006	0.61	0	O	6/3/2006	2.74	614.646	O
1/4/2006	2.98	0	O	2/4/2006	2.935	0	O	3/4/2006	2.93	0	O	4/4/2006	2.65	0	O	5/4/2006	0.89	0	O	6/4/2006	2.52	534.9	C
1/5/2006	2.99	0	O	2/5/2006	2.93	0	O	3/5/2006	2.92	0	O	4/5/2006	2.6	0	O	5/5/2006	1	0	O	6/5/2006	2.345	422.286	O
1/6/2006	2.99	0	O	2/6/2006	2.935	0	O	3/6/2006	2.94	0	O	4/6/2006	2.57	0	O	5/6/2006	1.04	0	O	6/6/2006	2.37	455.006	O
1/7/2006	2.99	0	O	2/7/2006	2.925	0	O	3/7/2006	2.93	0	O	4/7/2006	2.54	0	O	5/7/2006	1.05	0	O	6/7/2006	1.99	323.356	O
1/8/2006	2.99	0	O	2/8/2006	2.91	0	O	3/8/2006	2.96	0	O	4/8/2006	2.48	0	O	5/8/2006	1.02	0	O	6/8/2006	2.03	349.74	O
1/9/2006	2.99	0	O	2/9/2006	2.9	0	O	3/9/2006	2.98	0	O	4/9/2006	2.44	0	O	5/9/2006	1.01	0	O	6/9/2006	1.68	261.886	O
1/10/2006	2.98	0	O	2/10/2006	2.89	0	O	3/10/2006	3	0	O	4/10/2006	2.415	0	O	5/10/2006	1.01	0	O	6/10/2006	1.49	225.182	O
1/11/2006	2.98	0	O	2/11/2006	2.88	0	O	3/11/2006	2.995	0	O	4/11/2006	2.31	0	O	5/11/2006	1	0	O	6/11/2006	1.49	188.9	C
1/12/2006	2.97	0	O	2/12/2006	2.875	0	O	3/12/2006	2.98	0	O	4/12/2006	2.255	0	O	5/12/2006	1	0	O	6/12/2006	1.49	219.482	O
1/13/2006	2.97	0	O	2/13/2006	2.88	0	O	3/13/2006	2.985	0	O	4/13/2006	2.2	0	O	5/13/2006	1	0	O	6/13/2006	1.34	106.59	O
1/14/2006	2.97	0	O	2/14/2006	2.89	0	O	3/14/2006	2.99	0	O	4/14/2006	2.12	0	O	5/14/2006	0.99	0	O	6/14/2006	1.22	91.057	O
1/15/2006	2.97	0	O	2/15/2006	2.875	0	O	3/15/2006	2.985	0	O	4/15/2006	2.08	0	O	5/15/2006	0.99	0	O	6/15/2006	1.17	108.3	D
1/16/2006	2.97	0	O	2/16/2006	2.855	0	O	3/16/2006	2.96	0	O	4/16/2006	2.01	0	O	5/16/2006	0.99	1.65	O	6/16/2006	1.13	99.36	D
1/17/2006	2.97	0	O	2/17/2006	2.76	0	O	3/17/2006	2.94	0	O	4/17/2006	1.94	0	O	5/17/2006	1.01	1.728	O	6/17/2006	2.74	671.442	O
1/18/2006	2.97	0	O	2/18/2006	2.65	0	O	3/18/2006	2.925	0	O	4/18/2006	1.88	0	O	5/18/2006	1.02	2.383	D	6/18/2006	1.7	249.5	C
1/19/2006	2.965	0	O	2/19/2006	2.6	0	O	3/19/2006	2.91	0	O	4/19/2006	1.8	0	O	5/19/2006	1	1.832	D	6/19/2006	1.79	305.397	O
1/20/2006	2.965	0	O	2/20/2006	2.58	0	O	3/20/2006	2.9	0	O	4/20/2006	1.725	0	O	5/20/2006	0.97	1.308	O	6/20/2006	1.84	315.181	O
1/21/2006	2.96	0	O	2/21/2006	2.84	0	O	3/21/2006	2.92	0	O	4/21/2006	1.64	0	O	5/21/2006	0.95	1.396	C	6/21/2006	1.66	273.714	O
1/22/2006	2.96	0	O	2/22/2006	2.85	0	O	3/22/2006	2.925	0	O	4/22/2006	1.55	0	O	5/22/2006	0.925	1.303	C	6/22/2006	1.84	315.89	O
1/23/2006	2.96	0	O	2/23/2006	2.88	0	O	3/23/2006	2.93	0	O	4/23/2006	1.49	0	O	5/23/2006	0.88	0.972	O	6/23/2006	1.67	266.174	O
1/24/2006	2.95	0	O	2/24/2006	2.86	0	O	3/24/2006	2.92	0	O	4/24/2006	1.35	0	O	5/24/2006	0.87	1.183	O	6/24/2006	2.95	738.093	O
1/25/2006	2.95	0	O	2/25/2006	2.86	0	O	3/25/2006	2.92	0	O	4/25/2006	1.3	0	O	5/25/2006	0.85	1.137	O	6/25/2006	3.58	993.5	C
1/26/2006	2.945	0	O	2/26/2006	2.85	0	O	3/26/2006	2.92	0	O	4/26/2006	1.22	0	O	5/26/2006	0.9	1.212	D	6/26/2006	4.53	1303.038	O
1/27/2006	2.95	0	O	2/27/2006	2.85	0	O	3/27/2006	2.915	0	O	4/27/2006	1.11	0	O	5/27/2006	1.06	3.717	D	6/27/2006	4.09	1232.021	O
1/28/2006	2.94	0	O	2/28/2006	2.88	0	O	3/28/2006	2.89	0	O	4/28/2006	1	0	O	5/28/2006	1.61	55.59	C	6/28/2006	4	1143.166	O
1/29/2006	2.94	0	O					3/29/2006	2.89	0	O	4/29/2006	0.9	0	O	5/29/2006	2.4	248.9	C	6/29/2006	5.32	1938.314	O
1/30/2006	2.94	0	O					3/30/2006	2.85	0	O	4/30/2006	0.81	0	O	5/30/2006	4.31	1282.513	O	6/30/2006	8	3303.773	O
1/31/2006	2.935	0	O					3/31/2006	2.815	0	O					5/31/2006	3.48	811.282	O				

July				August				September				October				November				December			
Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed
7/1/2006	5.355	1828.645	O	8/1/2006	3.96	1163	C	9/1/2006	2.56	550.7	C	10/1/2006	3.1	777.2	C	11/1/2006	1.8	280.3	C	12/1/2006	1.28	116.4	C
7/2/2006	5.52	1951	C	8/2/2006	3.66	1028	C	9/2/2006	2.47	515.5	C	10/2/2006	2.92	698.8	C	11/2/2006	1.9	312.3	C	12/2/2006	1.25	102.2	C
7/3/2006	6.84	3026.396	O	8/3/2006	3.52	967.7	C	9/3/2006	2.37	477.4	C	10/3/2006	2.73	610.127	O	11/3/2006	2.18	407.8	C	12/3/2006	1.23	93.25	C
7/4/2006	5.66	1970.801	O	8/4/2006	4.26	1303	C	9/4/2006	2.31	470.799	O	10/4/2006	2.59	562.5	C	11/4/2006	1.74	261.7	C	12/4/2006	1.19	78.15	O
7/5/2006	4.995	1595.299	O	8/5/2006	4.98	1662	C	9/5/2006	2.2	415	C	10/5/2006	2.96	716	C	11/5/2006	1.89	309	C	12/5/2006	1.18	72.79	C
7/6/2006	4.39	1365	C	8/6/2006	4.72	1528	C	9/6/2006	2.15	397.2	C	10/6/2006	2.565	552.6	C	11/6/2006	2.34	459.956	O	12/6/2006	1.195	78.893	O
7/7/2006	4.42	1380	C	8/7/2006	4.36	1303.317	O	9/7/2006	2.16	400.7	C	10/7/2006	2.66	590.6	C	11/7/2006	2.65	586.6	C	12/7/2006	1.17	69.02	C
7/8/2006	4.33	1336	C	8/8/2006	3.54	976.3	C	9/8/2006	2.14	393.6	C	10/8/2006	2.66	590.6	C	11/8/2006	2.06	365.8	C	12/8/2006	1.16	65.35	C
7/9/2006	4.58	1458	C	8/9/2006	3.56	984.9	C	9/9/2006	2.4	488.8	C	10/9/2006	2.82	656.4	C	11/9/2006	1.73	258.6	C	12/9/2006	1.14	58.34	C
7/10/2006	4.08	1220.641	O	8/10/2006	4.07	1213	C	9/10/2006	2.55	546.7	C	10/10/2006	2.51	531	C	11/10/2006	1.71	252.5	C	12/10/2006	1.19	76.67	C
7/11/2006	4.34	1341	C	8/11/2006	5.52	1951	C	9/11/2006	2.24	440.888	O	10/11/2006	2.97	720.3	C	11/11/2006	1.63	228.7	C	12/11/2006	1.17	68.766	O
7/12/2006	4.53	1434	C	8/12/2006	7.42	3093	C	9/12/2006	2.46	511.7	C	10/12/2006	2.68	598.7	C	11/12/2006	1.58	214.2	C	12/12/2006	1.16	65.35	C
7/13/2006	4.73	1533	C	8/13/2006	6.45	2486	C	9/13/2006	2.69	602.8	C	10/13/2006	2.345	463.801	O	11/13/2006	1.53	221.619	O	12/13/2006	1.55	0	O
7/14/2006	5.495	1937	C	8/14/2006	6.73	2725.258	O	9/14/2006	3.98	1172	C	10/14/2006	2.38	481.2	C	11/14/2006	1.51	194.4	C	12/14/2006	1.97	0	O
7/15/2006	5.68	2040	C	8/15/2006	5.97	2204	C	9/15/2006	3.75	1068	C	10/15/2006	2.72	615	C	11/15/2006	1.47	183.4	C	12/15/2006	2.09	0	O
7/16/2006	5.09	1719	C	8/16/2006	5.66	2028	C	9/16/2006	3.6	1002	C	10/16/2006	2.49	538.932	O	11/16/2006	1.49	188.9	C	12/16/2006	2.09	0	O
7/17/2006	4.74	1677.312	O	8/17/2006	6.91	2768	C	9/17/2006	4.38	1360	C	10/17/2006	2.74	609.57	O	11/17/2006	1.47	183.4	C	12/17/2006	2.01	0	O
7/18/2006	5.3	1919.286	O	8/18/2006	6.44	2480	C	9/18/2006	3.81	1106.598	O	10/18/2006	2.12	386.6	C	11/18/2006	1.41	167.4	C	12/18/2006	2.01	0	O
7/19/2006	5.95	2193	C	8/19/2006	6.02	2270.376	O	9/19/2006	3.14	795	C	10/19/2006	1.945	327	C	11/19/2006	1.48	186.2	C	12/19/2006	2.01	0	O
7/20/2006	6.9	2762	C	8/20/2006	4.53	1434	C	9/20/2006	3.5	959.1	C	10/20/2006	2	345.4	C	11/20/2006	1.44	210.671	O	12/20/2006	2.01	0	O
7/21/2006	5.88	2153	C	8/21/2006	4.21	1248.976	O	9/21/2006	3.26	849.2	C	10/21/2006	2.26	436.7	C	11/21/2006	1.43	172.7	C	12/21/2006	2.01	0	O
7/22/2006	5.27	1815	C	8/22/2006	3.56	984.9	C	9/22/2006	3.49	954.9	C	10/22/2006	1.96	332	C	11/22/2006	1.42	202.201	O	12/22/2006	2	0	O
7/23/2006	4.37	1356	C	8/23/2006	3.34	886.1	C	9/23/2006	2.83	660.6	C	10/23/2006	1.86	319.748	O	11/23/2006	1.38	159.5	C	12/23/2006	2	0	O
7/24/2006	3.87	1066.703	O	8/24/2006	2.98	724.6	C	9/24/2006	2.79	643.9	C	10/24/2006	1.8	280.3	C	11/24/2006	2.06	365.8	C	12/24/2006	2	0	O
7/25/2006	3.44	932.8	C	8/25/2006	2.85	669	C	9/25/2006	3.07	822.065	O	10/25/2006	1.75	264.7	C	11/25/2006	1.78	274	C	12/25/2006	2.28	0	O
7/26/2006	3.99	1176	C	8/26/2006	2.69	602.8	C	9/26/2006	2.77	635.6	C	10/26/2006	1.75	264.7	C	11/26/2006	1.47	183.4	C	12/26/2006	2.4	0	O
7/27/2006	5.13	1740	C	8/27/2006	2.62	574.5	C	9/27/2006	2.9	690.2	C	10/27/2006	1.97	335.3	C	11/27/2006	1.38	187.216	O	12/27/2006	2.66	0	O
7/28/2006	6.01	2227	C	8/28/2006	2.5	499.114	O	9/28/2006	2.51	531	C	10/28/2006	1.75	264.7	C	11/28/2006	1.35	151.8	C	12/28/2006	2.66	0	O
7/29/2006	4.74	1539	C	8/29/2006	2.7	606.8	C	9/29/2006	2.35	469.9	C	10/29/2006	1.78	274	C	11/29/2006	1.46	180.7	C	12/29/2006	3.02	0	O
7/30/2006	4.08	1218	C	8/30/2006	2.64	582.5	C	9/30/2006	2.64	582.5	C	10/30/2006	2.21	435.068	O	11/30/2006	1.34	149.3	C	12/30/2006	3.02	0	O
7/31/2006	3.94	1147.13	O	8/31/2006	2.96	716	C					10/31/2006	2.08	372.7	C					12/31/2006	2.98	0	O

Gauge-Discharge Data: Bantwal (WN000G9)
Period: 2007 Data Type : Absolute Gauge (HZS)

January				February				March				April				May				June			
Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed
1/1/2007	2.96	0	O	2/1/2007	2.96	0	O	3/1/2007	2.95	0	O	4/1/2007	2.48	0	O	5/1/2007	2.95	0	O	6/1/2007	0.52	8.452	C
1/2/2007	2.96	0	O	2/2/2007	2.96	0	O	3/2/2007	2.95	0	O	4/2/2007	2.44	0	O	5/2/2007	2.9	0	O	6/2/2007	0.52	8.452	C
1/3/2007	2.96	0	O	2/3/2007	2.95	0	O	3/3/2007	2.95	0	O	4/3/2007	2.4	0	O	5/3/2007	2.96	0	O	6/3/2007	0.5	6.578	C
1/4/2007	3.01	0	O	2/4/2007	2.95	0	O	3/4/2007	2.95	0	O	4/4/2007	2.35	0	O	5/4/2007	2.89	0	O	6/4/2007	0.5	7.664	O
1/5/2007	3.01	0	O	2/5/2007	2.96	0	O	3/5/2007	2.95	0	O	4/5/2007	2.31	0	O	5/5/2007	2.88	0	O	6/5/2007	0.46	3.338	C
1/6/2007	3.01	0	O	2/6/2007	2.98	0	O	3/6/2007	2.95	0	O	4/6/2007	2.26	0	O	5/6/2007	2.86	0	O	6/6/2007	0.49	5.701	C
1/7/2007	3.01	0	O	2/7/2007	2.99	0	O	3/7/2007	2.95	0	O	4/7/2007	2.2	0	O	5/7/2007	2.88	0	O	6/7/2007	0.46	3.338	C
1/8/2007	3	0	O	2/8/2007	2.985	0	O	3/8/2007	2.96	0	O	4/8/2007	2.13	0	O	5/8/2007	2.96	0	O	6/8/2007	0.5	6.578	C
1/9/2007	3	0	O	2/9/2007	2.98	0	O	3/9/2007	2.99	0	O	4/9/2007	2.05	0	O	5/9/2007	3	0	O	6/9/2007	0.52	8.452	C
1/10/2007	3	0	O	2/10/2007	2.97	0	O	3/10/2007	2.97	0	O	4/10/2007	1.96	0	O	5/10/2007	2.77	0	O	6/10/2007	0.76	40.62	C
1/11/2007	3	0	O	2/11/2007	2.97	0	O	3/11/2007	2.99	0	O	4/11/2007	1.92	0	O	5/11/2007	2.43	0	O	6/11/2007	0.62	15.526	O
1/12/2007	3	0	O	2/12/2007	2.97	0	O	3/12/2007	2.99	0	O	4/12/2007	1.87	0	O	5/12/2007	2.4	0	O	6/12/2007	0.64	22.55	C
1/13/2007	2.99	0	O	2/13/2007	2.96	0	O	3/13/2007	2.97	0	O	4/13/2007	1.78	0	O	5/13/2007	2.38	0	O	6/13/2007	0.68	28.18	C
1/14/2007	2.99	0	O	2/14/2007	2.96	0	O	3/14/2007	2.97	0	O	4/14/2007	1.64	0	O	5/14/2007	2.37	0	O	6/14/2007	0.65	23.92	C
1/15/2007	2.98	0	O	2/15/2007	2.96	0	O	3/15/2007	2.97	0	O	4/15/2007	1.63	0	O	5/15/2007	2.36	0	O	6/15/2007	0.86	58.17	C
1/16/2007	2.98	0	O	2/16/2007	2.96	0	O	3/16/2007	2.94	0	O	4/16/2007	1.59	0	O	5/16/2007	2.36	0	O	6/16/2007	1.22	136.6	D
1/17/2007	2.97	0	O	2/17/2007	2.96	0	O	3/17/2007	2.93	0	O	4/17/2007	1.43	0	O	5/17/2007	2.36	0	O	6/17/2007	1.46	200	C
1/18/2007	2.97	0	O	2/18/2007	3	0	O	3/18/2007	2.95	0	O	4/18/2007	1.34	0	O	5/18/2007	2.35	0	O	6/18/2007	1.36	172.6	C
1/19/2007	2.96	0	O	2/19/2007	3	0	O	3/19/2007	2.96	0	O	4/19/2007	1.29	0	O	5/19/2007	2.35	0	O	6/19/2007	1.86	262.926	O
1/20/2007	2.96	0	O	2/20/2007	3	0	O	3/20/2007	2.96	0	O	4/20/2007	1.34	0	O	5/20/2007	2.34	0	O	6/20/2007	2.09	377.157	O
1/21/2007	2.97	0	O	2/21/2007	2.98	0	O	3/21/2007	2.92	0	O	4/21/2007	1.37	0	O	5/21/2007	2.32	0	O	6/21/2007	2.01	372.7	C
1/22/2007	2.97	0	O	2/22/2007	2.92	0	O	3/22/2007	2.87	0	O	4/22/2007	1.42	0	O	5/22/2007	2.3	0	O	6/22/2007	1.97	358.9	C
1/23/2007	2.97	0	O	2/23/2007	2.98	0	O	3/23/2007	2.82	0	O	4/23/2007	1.73	0	O	5/23/2007	2.28	0	O	6/23/2007	7.47	3382.546	O
1/24/2007	2.97	0	O	2/24/2007	2.98	0	O	3/24/2007	2.79	0	O	4/24/2007	2.02	0	O	5/24/2007	1.81	0	O	6/24/2007	5.6	2151	C
1/25/2007	2.96	0	O	2/25/2007	2.97	0	O	3/25/2007	2.74	0	O	4/25/2007	2.39	0	O	5/25/2007	1.78	0	O	6/25/2007	3.75	1146.832	O
1/26/2007	2.95	0	O	2/26/2007	2.98	0	O	3/26/2007	2.69	0	O	4/26/2007	2.83	0	O	5/26/2007	1.84	0	O	6/26/2007	3.04	780	C
1/27/2007	2.95	0	O	2/27/2007	2.97	0	O	3/27/2007	2.65	0	O	4/27/2007	2.97	0	O	5/27/2007	0.99	0	O	6/27/2007	2.8	679.996	O
1/28/2007	2.95	0	O	2/28/2007	2.95	0	O	3/28/2007	2.62	0	O	4/28/2007	2.96	0	O	5/28/2007	0.885	4.54	O	6/28/2007	2.87	706.1	C
1/29/2007	2.95	0	O					3/29/2007	2.59	0	O	4/29/2007	2.92	0	O	5/29/2007	0.62	0	O	6/29/2007	4.44	1575.11	O
1/30/2007	2.95	0	O					3/30/2007	2.55	0	O	4/30/2007	2.94	0	O	5/30/2007	0.56	0	O	6/30/2007	5.1	1849	C
1/31/2007	2.95	0	O					3/31/2007	2.52	0	O					5/31/2007	0.53	0	O				

July				August				September				October				November				December			
Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed
7/1/2007	6.26	2424.087	O	8/1/2007	3.73	1104	C	9/1/2007	3.69	1084	C	10/1/2007	2.58	560.293	O	11/1/2007	1.79	299.3	C	12/1/2007	3.085	59.667	O
7/2/2007	5.72	2226	C	8/2/2007	3.24	824.332	O	9/2/2007	3.78	1129	C	10/2/2007	2.69	630.6	C	11/2/2007	1.73	280.3	C	12/2/2007	3.085	61.41	C
7/3/2007	5.47	2071	C	8/3/2007	3.9	1189	C	9/3/2007	4.77	1694.094	O	10/3/2007	2.48	546.2	C	11/3/2007	1.8	302.6	C	12/3/2007	3.065	57.013	O
7/4/2007	5.56	2127	C	8/4/2007	3.97	1225	C	9/4/2007	4.38	1442	C	10/4/2007	2.4	515.1	C	11/4/2007	1.67	261.7	C	12/4/2007	3.065	53.21	C
7/5/2007	4.99	1785	C	8/5/2007	5.5	2090	C	9/5/2007	4.15	1319	C	10/5/2007	2.26	462.2	C	11/5/2007	1.75	278.681	O	12/5/2007	3.065	53.21	C
7/6/2007	4.63	1702.976	O	8/6/2007	6.79	3020.982	O	9/6/2007	4.94	1756	C	10/6/2007	2.19	436.5	C	11/6/2007	1.63	249.5	C	12/6/2007	3.055	49.52	C
7/7/2007	6.16	2508	C	8/7/2007	8.22	3989.687	O	9/7/2007	4.64	1585	C	10/7/2007	2.28	469.7	C	11/7/2007	2.29	473.4	C	12/7/2007	3.045	46.08	C
7/8/2007	6.05	2436	C	8/8/2007	6.42	2679	C	9/8/2007	4.03	1256	C	10/8/2007	2.07	406.941	O	11/8/2007	2.05	386.5	C	12/8/2007	3.04	43.186	O
7/9/2007	7.03	3096	C	8/9/2007	6.86	2978	C	9/9/2007	4.03	1256	C	10/9/2007	2.02	376.1	C	11/9/2007	1.7	270.9	C	12/9/2007	3.04	44.45	C
7/10/2007	5.43	2079.121	O	8/10/2007	7.13	3166	C	9/10/2007	4.61	1686.983	O	10/10/2007	1.95	352.1	C	11/10/2007	1.62	246.5	C	12/10/2007	3.025	32.923	O
7/11/2007	6.09	2462	C	8/11/2007	6.6	2800	C	9/11/2007	3.14	824.6	C	10/11/2007	2.28	469.7	C	11/11/2007	1.55	225.7	C	12/11/2007	3.015	37.08	C
7/12/2007	5.04	1814	C	8/12/2007	6.12	2482	C	9/12/2007	3.31	902.3	C	10/12/2007	2.01	372.7	C	11/12/2007	1.47	205.296	O	12/12/2007	3.015	37.08	C
7/13/2007	5.37	2011	C	8/13/2007	4.58	1566.195	O	9/13/2007	3.29	893	C	10/13/2007	2.05	386.5	C	11/13/2007	1.45	197.2	C	12/13/2007	3.015	37.08	C
7/14/2007	5.19	1902	C	8/14/2007	3.93	1205	C	9/14/2007	2.83	689.1	C	10/14/2007	1.82	309	C	11/14/2007	1.4	183.4	C	12/14/2007	3.01	35.76	C
7/15/2007	5.05	1820	C	8/15/2007	3.48	982.2	C	9/15/2007	3.84	1159	C	10/15/2007	1.755	315.986	O	11/15/2007	1.38	177.9	C	12/15/2007	3.03	41.35	C
7/16/2007	5.11	1855	C	8/16/2007	3.26	879.2	C	9/16/2007	2.81	680.6	C	10/16/2007	1.72	277.2	C	11/16/2007	1.35	169.9	C	12/16/2007	3.03	41.35	C
7/17/2007	6.625	2552.481	O	8/17/2007	2.98	753.6	C	9/17/2007	3.47	1015.439	O	10/17/2007	1.74	283.4	C	11/17/2007	1.35	189.652	O	12/17/2007	3.025	39.88	D
7/18/2007	6.81	2944	C	8/18/2007	2.83	689.1	C	9/18/2007	4.88	1721	C	10/18/2007	2.27	465.9	C	11/18/2007	1.4	183.4	C	12/18/2007	3.035	0	O
7/19/2007	6.5	2733	C	8/19/2007	2.66	618.3	C	9/19/2007	3.13	820.1	C	10/19/2007	1.82	309	C	11/19/2007	1.37	181.266	O	12/19/2007	3.025	0	O
7/20/2007	4.45	1480	C	8/20/2007	2.77	742.523	O	9/20/2007	3.07	793.3	C	10/20/2007	2.34	492.2	C	11/20/2007	1.65	255.6	C	12/20/2007	3.025	0	O
7/21/2007	4.94	1756	C	8/21/2007	3.17	838.1	C	9/21/2007	2.84	693.3	C	10/21/2007	3.24	870	C	11/21/2007	2	369.2	C	12/21/2007	3.025	0	O
7/22/2007	3.73	1104	C	8/22/2007	4.08	1282	C	9/22/2007	3.04	780	C	10/22/2007	2.98	760.753	O	11/22/2007	2.26	462.2	C	12/22/2007	3.035	0	O
7/23/2007	3.35	916.241	O	8/23/2007	3.2	851.7	C	9/23/2007	2.96	744.9	C	10/23/2007	2.61	598	C	11/23/2007	2.48	546.2	D	12/23/2007	3.035	0	O
7/24/2007	3.19	847.2	C	8/24/2007	3.18	842.6	C	9/24/2007	3.07	823.136	O	10/24/2007	2.61	580.369	O	11/24/2007	2.46	538.4	D	12/24/2007	3.02	0	O
7/25/2007	2.95	740.6	C	8/25/2007	3.105	808.9	C	9/25/2007	5.24	1932	C	10/25/2007	2.25	458.5	C	11/25/2007	2.88	710.4	C	12/25/2007	3.02	0	O
7/26/2007	3.01	766.8	C	8/26/2007	2.94	736.2	C	9/26/2007	4.33	1415	C	10/26/2007	2.13	414.8	C	11/26/2007	3.12	815.6	D	12/26/2007	3.02	0	O
7/27/2007	2.89	714.7	C	8/27/2007	3.06	808.563	O	9/27/2007	3.29	893	C	10/27/2007	1.98	362.3	C	11/27/2007	3.14	824.6	D	12/27/2007	3.005	0	O
7/28/2007	3.05	784.4	C	8/28/2007	3.12	815.6	C	9/28/2007	2.92	727.6	C	10/28/2007	2.67	622.4	C	11/28/2007	3.12	815.6	D	12/28/2007	3	0	O
7/29/2007	3.17	838.1	C	8/29/2007	3.09	802.2	C	9/29/2007	2.81	680.6	C	10/29/2007	2.24	454.8	C	11/29/2007	3.13	820.1	C	12/29/2007	3	0	O
7/30/2007	3.23	865.4	C	8/30/2007	3	762.4	C	9/30/2007	2.96	744.9	C	10/30/2007	2.07	408.572	O	11/30/2007	3.09	802.2	D	12/30/2007	3	0	O
7/31/2007	3.14	824.6	C	8/31/2007	3.23	865.4	C					10/31/2007	1.84	315.5	C					12/31/2007	3	0	O

Gauge-Discharge Data: Bantwal (WN000G9)
Period: 2008 Data Type : Absolute Gauge (HZS)

January				February				March				April				May				June			
Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed
1/1/2008	3	0	O	2/1/2008	2.91	0	O	3/1/2008	2.92	0	O	4/1/2008	2.97	0	O	5/1/2008	2.92	0	O	6/1/2008	1.42	156.9	C
1/2/2008	3	0	O	2/2/2008	2.91	0	O	3/2/2008	2.88	0	O	4/2/2008	2.96	0	O	5/2/2008	2.91	0	O	6/2/2008	1.46	168.3	C
1/3/2008	2.995	0	O	2/3/2008	2.91	0	O	3/3/2008	2.75	0	O	4/3/2008	2.96	0	O	5/3/2008	2.905	0	O	6/3/2008	1.52	186	C
1/4/2008	2.99	0	O	2/4/2008	2.905	0	O	3/4/2008	2.64	0	O	4/4/2008	2.95	0	O	5/4/2008	2.9	0	O	6/4/2008	1.235	107.5	C
1/5/2008	2.98	0	O	2/5/2008	2.905	0	O	3/5/2008	2.58	0	O	4/5/2008	2.94	0	O	5/5/2008	2.89	0	O	6/5/2008	1.058	67.91	D
1/6/2008	2.99	0	O	2/6/2008	2.9	0	O	3/6/2008	2.66	0	O	4/6/2008	2.93	0	O	5/6/2008	2.89	0	O	6/6/2008	0.99	53.47	D
1/7/2008	2.965	0	O	2/7/2008	2.9	0	O	3/7/2008	2.78	0	O	4/7/2008	2.925	0	O	5/7/2008	2.88	0	O	6/7/2008	1.02	56.46	D
1/8/2008	2.95	0	O	2/8/2008	2.9	0	O	3/8/2008	2.84	0	O	4/8/2008	2.92	0	O	5/8/2008	2.87	0	O	6/8/2008	1.24	108.7	C
1/9/2008	2.95	0	O	2/9/2008	2.9	0	O	3/9/2008	2.86	0	O	4/9/2008	2.92	0	O	5/9/2008	2.87	0	O	6/9/2008	1.54	192.1	C
1/10/2008	2.95	0	O	2/10/2008	2.91	0	O	3/10/2008	2.86	0	O	4/10/2008	2.92	0	O	5/10/2008	2.87	0	O	6/10/2008	1.78	303.94	O
1/11/2008	2.95	0	O	2/11/2008	2.92	0	O	3/11/2008	2.85	0	O	4/11/2008	2.915	0	O	5/11/2008	2.865	0	O	6/11/2008	1.832	306.167	O
1/12/2008	2.95	0	O	2/12/2008	2.925	0	O	3/12/2008	2.845	0	O	4/12/2008	2.91	0	O	5/12/2008	2.865	0	O	6/12/2008	2.575	580.88	O
1/13/2008	2.945	0	O	2/13/2008	2.925	0	O	3/13/2008	2.845	0	O	4/13/2008	2.91	0	O	5/13/2008	2.86	0	O	6/13/2008	2.495	531.554	O
1/14/2008	0.593	0	O	2/14/2008	2.925	0	O	3/14/2008	2.845	0	O	4/14/2008	2.905	0	O	5/14/2008	2.86	0	O	6/14/2008	2.11	372.869	O
1/15/2008	2.955	0	O	2/15/2008	2.92	0	O	3/15/2008	2.87	0	O	4/15/2008	2.89	0	O	5/15/2008	2.86	0	O	6/15/2008	2.47	534.7	C
1/16/2008	2.95	0	O	2/16/2008	2.97	0	O	3/16/2008	2.96	0	O	4/16/2008	2.88	0	O	5/16/2008	2.88	0	O	6/16/2008	2.36	488.5	C
1/17/2008	2.94	0	O	2/17/2008	3.02	0	O	3/17/2008	3	0	O	4/17/2008	2.87	0	O	5/17/2008	2.875	0	O	6/17/2008	3.04	795.5	C
1/18/2008	0.579	0	O	2/18/2008	3	0	O	3/18/2008	3.05	0	O	4/18/2008	2.87	0	O	5/18/2008	2.87	0	O	6/18/2008	2.75	658.5	C
1/19/2008	2.93	0	O	2/19/2008	2.95	0	O	3/19/2008	3.03	0	O	4/19/2008	2.875	0	O	5/19/2008	2.87	0	O	6/19/2008	2.72	644.9	C
1/20/2008	2.93	0	O	2/20/2008	2.945	0	O	3/20/2008	3	0	O	4/20/2008	2.875	0	O	5/20/2008	2.87	0	O	6/20/2008	2.71	640.3	C
1/21/2008	0.567	0	O	2/21/2008	2.93	0	O	3/21/2008	3.07	0	O	4/21/2008	2.89	0	O	5/21/2008	2.87	0	O	6/21/2008	2.54	564.9	C
1/22/2008	2.93	0	O	2/22/2008	2.93	0	O	3/22/2008	3.07	0	O	4/22/2008	2.915	0	O	5/22/2008	2.865	0	O	6/22/2008	2.51	551.9	C
1/23/2008	2.93	0	O	2/23/2008	2.945	0	O	3/23/2008	3.17	0	O	4/23/2008	2.91	0	O	5/23/2008	2.85	0	O	6/23/2008	2.155	406.753	O
1/24/2008	2.93	0	O	2/24/2008	2.945	0	O	3/24/2008	3.22	144.993	O	4/24/2008	2.905	0	O	5/24/2008	2.85	0	O	6/24/2008	2.11	398.718	O
1/25/2008	0.562	0	O	2/25/2008	2.945	0	O	3/25/2008	2.765	5.682	C	4/25/2008	2.905	0	O	5/25/2008	2.85	0	O	6/25/2008	2.03	337.523	O
1/26/2008	2.925	0	O	2/26/2008	2.94	0	O	3/26/2008	2.675	2.805	D	4/26/2008	2.905	0	O	5/26/2008	2.95	0	O	6/26/2008	2.47	543.842	O
1/27/2008	2.925	0	O	2/27/2008	2.93	0	O	3/27/2008	2.6	1.537	D	4/27/2008	2.915	0	O	5/27/2008	2.45	0	O	6/27/2008	2.82	733.845	O
1/28/2008	2.92	0	O	2/28/2008	2.925	0	O	3/28/2008	2.555	0	O	4/28/2008	2.925	0	O	5/28/2008	2.05	0	O	6/28/2008	4.28	1470	C
1/29/2008	0.539	0	O	2/29/2008	2.925	0	O	3/29/2008	2.54	0	O	4/29/2008	2.935	0	O	5/29/2008	1.835	0	O	6/29/2008	3.96	1283	C
1/30/2008	2.92	0	O					3/30/2008	2.995	0	O	4/30/2008	2.925	0	O	5/30/2008	1.41	0	O	6/30/2008	4.79	1788.426	O
1/31/2008	2.92	0	O					3/31/2008	2.98	0	O					5/31/2008	1.41	0	O				

July				August				September				October				November				December			
Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed
7/1/2008	3.67	1115.93	O	8/1/2008	5.432	2262.142	O	9/1/2008	2.975	921.659	O	10/1/2008	1.7	242.6	C	11/1/2008	1.56	178.527	O	12/1/2008	3.045	44.36	C
7/2/2008	4.19	1417	C	8/2/2008	4.83	1811	C	9/2/2008	3.365	958.9	C	10/2/2008	1.67	232.8	C	11/2/2008	1.54	192.1	C	12/2/2008	2.95	38.134	O
7/3/2008	3.1	824.9	C	8/3/2008	4.255	1455	C	9/3/2008	2.95	752.1	C	10/3/2008	1.635	221.6	C	11/3/2008	1.5	160.431	O	12/3/2008	2.92	33.48	C
7/4/2008	2.6	653.294	O	8/4/2008	4.43	1561	C	9/4/2008	2.36	535.47	O	10/4/2008	1.66	229.293	O	11/4/2008	1.48	174.2	C	12/4/2008	2.915	32.81	C
7/5/2008	2.47	534.7	C	8/5/2008	3.78	1226.877	O	9/5/2008	2.26	453.756	O	10/5/2008	1.64	223.2	C	11/5/2008	1.46	0	O	12/5/2008	2.885	30.855	O
7/6/2008	2.37	492.6	C	8/6/2008	3.98	1318.415	O	9/6/2008	2.145	401.587	O	10/6/2008	1.63	210.042	O	11/6/2008	1.44	0	O	12/6/2008	2.885	28.44	D
7/7/2008	2.85	704.8	C	8/7/2008	3.815	1208.175	O	9/7/2008	2.14	400.3	C	10/7/2008	1.535	190.6	C	11/7/2008	1.43	0	O	12/7/2008	2.87	26.02	C
7/8/2008	2.955	754.5	C	8/8/2008	3.842	1201.165	O	9/8/2008	2.31	484.178	O	10/8/2008	1.715	240.446	O	11/8/2008	1.41	0	O	12/8/2008	2.835	19.74	C
7/9/2008	3.07	810.2	C	8/9/2008	4.543	1663.479	O	9/9/2008	4.825	1808	C	10/9/2008	1.57	201.2	C	11/9/2008	1.4	0	O	12/9/2008	2.825	17.78	C
7/10/2008	2.905	730.7	C	8/10/2008	6.245	2790	C	9/10/2008	4.75	1760	C	10/10/2008	2.315	470	C	11/10/2008	1.38	0	O	12/10/2008	2.815	15.76	C
7/11/2008	2.505	549.7	C	8/11/2008	7.35	3646	C	9/11/2008	3.915	1258	C	10/11/2008	1.617	205.339	O	11/11/2008	1.36	0	O	12/11/2008	2.81	14.788	O
7/12/2008	2.495	545.4	C	8/12/2008	7.37	3533.346	O	9/12/2008	3.22	884.8	C	10/12/2008	1.8	276.1	C	11/12/2008	1.89	0	O	12/12/2008	2.805	14.046	O
7/13/2008	2.56	573.6	C	8/13/2008	9.6	5610	C	9/13/2008	3.26	905	C	10/13/2008	1.84	292.242	O	11/13/2008	1.835	0	O	12/13/2008	2.795	0	O
7/14/2008	2.275	453.7	C	8/14/2008	7.45	3519.09	O	9/14/2008	3.33	940.8	C	10/14/2008	1.62	216.8	C	11/14/2008	2.31	0	O	12/14/2008	2.785	0	O
7/15/2008	2.09	381.1	C	8/15/2008	5.905	2542	C	9/15/2008	3.41	982.4	C	10/15/2008	1.535	179.198	O	11/15/2008	2.3	0	O	12/15/2008	2.77	0	O
7/16/2008	3.39	971.9	C	8/16/2008	4.778	1694.467	O	9/16/2008	3.05	800.4	C	10/16/2008	1.555	188.185	O	11/16/2008	2.295	0	O	12/16/2008	2.74	0	O
7/17/2008	2.26	447.7	C	8/17/2008	4.285	1473	C	9/17/2008	2.775	686.813	O	10/17/2008	2.26	447.7	C	11/17/2008	2.275	0	O	12/17/2008	2.73	0	O
7/18/2008	2.13	396.4	C	8/18/2008	3.86	1211.026	O	9/18/2008	2.55	575.281	O	10/18/2008	1.658	216.014	O	11/18/2008	2.29	0	O	12/18/2008	2.715	0	O
7/19/2008	2.057	364.131	O	8/19/2008	3.43	982.601	O	9/19/2008	2.47	530.173	O	10/19/2008	1.9	311	C	11/19/2008	2.29	0	O	12/19/2008	2.99	0	O
7/20/2008	2.09	381.1	C	8/20/2008	3.27	851.066	O	9/20/2008	3.015	834.698	O	10/20/2008	2.255	417.482	O	11/20/2008	2.28	0	O	12/20/2008	2.99	0	O
7/21/2008	3.32	979.915	O	8/21/2008	3.09	820	C	9/21/2008	2.495	545.4	C	10/21/2008	1.815	262.899	O	11/21/2008	2.25	0	O	12/21/2008	2.99	0	O
7/22/2008	2.53	584.464	O	8/22/2008	2.87	714.2	C	9/22/2008	2.335	507.633	O	10/22/2008	1.915	308.002	O	11/22/2008	2.23	0	O	12/22/2008	2.99	0	O
7/23/2008	3.145	912.968	O	8/23/2008	2.72	696.137	O	9/23/2008	2.21	432.499	O	10/23/2008	1.73	252.5	C	11/23/2008	2.23	0	O	12/23/2008	2.99	0	O
7/24/2008	2.8	700.18	O	8/24/2008	2.61	595.6	C	9/24/2008	2.2	416.297	O	10/24/2008	2.57	578	C	11/24/2008	2.235	0	O	12/24/2008	2.99	0	O
7/25/2008	3.425	1024.093	O	8/25/2008	2.505	597.302	O	9/25/2008	2.04	334.641	O	10/25/2008	2.193	391.496	O	11/25/2008	2.23	0	O	12/25/2008	2.98	0	O
7/26/2008	3.89	1256.004	O	8/26/2008	2.395	550.333	O	9/26/2008	2.105	386.489	O	10/26/2008	2.47	534.7	C	11/26/2008	2.79	10.38	D	12/26/2008	2.975	0	O
7/27/2008	5.395	2185	C	8/27/2008	2.405	537.608	O	9/27/2008	1.915	310.759	O	10/27/2008	2.175	413.9	C	11/27/2008	3	41.72	C	12/27/2008	2.975	0	O
7/28/2008	7.97	3752.088	O	8/28/2008	2.33	476.1	C	9/28/2008	1.85	293.4	C	10/28/2008	1.99	343.6	C	11/28/2008	3	43.306	O	12/28/2008	2.97	0	O
7/29/2008	6.55	2652.876	O	8/29/2008	2.225	471.339	O	9/29/2008	1.79	276.856	O	10/29/2008	1.79	257.053	O	11/29/2008	3.04	42.499	O	12/29/2008	2.97	0	O
7/30/2008	6.782	2851.999	O	8/30/2008	2.435	576.153	O	9/30/2008	1.755	260.8	C	10/30/2008	1.62	216.8	C	11/30/2008	3.03	43.64	C	12/30/2008	2.97	0	O
7/31/2008	6.565	3030	C	8/31/2008	2.65	613.3	C					10/31/2008	1.59	188.549	O					12/31/2008	2.965	0	O

Gauge-Discharge Data: Bantwal (WN000G9)
Period: 2009 Data Type : Absolute Gauge (HZS)

January				February				March				April				May				June			
Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed
1/1/2009	2.96	0	O	2/1/2009	2.905	0	O	3/1/2009	2.875	0	O	4/1/2009	2.945	0	O	5/1/2009	2.885	0	O	6/1/2009	1.045	11.026	O
1/2/2009	2.96	0	O	2/2/2009	2.905	0	O	3/2/2009	2.875	0	O	4/2/2009	2.935	0	O	5/2/2009	2.88	0	O	6/2/2009	1.17	47.98	C
1/3/2009	2.955	0	O	2/3/2009	2.9	0	O	3/3/2009	2.875	0	O	4/3/2009	2.915	0	O	5/3/2009	2.88	0	O	6/3/2009	1.03	8.658	C
1/4/2009	2.955	0	O	2/4/2009	2.9	0	O	3/4/2009	2.875	0	O	4/4/2009	2.91	0	O	5/4/2009	2.88	0	O	6/4/2009	1.27	100.4	C
1/5/2009	2.955	0	O	2/5/2009	2.9	0	O	3/5/2009	2.87	0	O	4/5/2009	2.905	0	O	5/5/2009	2.87	0	O	6/5/2009	1.08	18.815	O
1/6/2009	2.95	0	O	2/6/2009	2.9	0	O	3/6/2009	2.8	0	O	4/6/2009	2.905	0	O	5/6/2009	2.87	0	O	6/6/2009	1.355	175.7	C
1/7/2009	2.95	0	O	2/7/2009	2.9	0	O	3/7/2009	2.8	0	O	4/7/2009	2.905	0	O	5/7/2009	2.865	0	O	6/7/2009	2.16	425.4	C
1/8/2009	2.95	0	O	2/8/2009	2.9	0	O	3/8/2009	2.8	0	O	4/8/2009	2.92	0	O	5/8/2009	2.855	0	O	6/8/2009	1.92	343.4	C
1/9/2009	2.945	0	O	2/9/2009	2.9	0	O	3/9/2009	2.8	0	O	4/9/2009	2.92	0	O	5/9/2009	2.85	0	O	6/9/2009	1.48	199.54	O
1/10/2009	2.945	0	O	2/10/2009	2.9	0	O	3/10/2009	2.71	0	O	4/10/2009	2.92	0	O	5/10/2009	2.87	0	O	6/10/2009	1.24	146.4	C
1/11/2009	2.945	0	O	2/11/2009	2.9	0	O	3/11/2009	2.71	0	O	4/11/2009	2.925	0	O	5/11/2009	2.87	0	O	6/11/2009	1	91.51	C
1/12/2009	2.945	0	O	2/12/2009	2.87	0	O	3/12/2009	2.65	0	O	4/12/2009	2.81	0	O	5/12/2009	2.87	0	O	6/12/2009	0.73	41.24	C
1/13/2009	2.94	0	O	2/13/2009	2.83	0	O	3/13/2009	2.65	0	O	4/13/2009	2.805	0	O	5/13/2009	2.87	0	O	6/13/2009	0.64	27.71	C
1/14/2009	2.935	0	O	2/14/2009	2.82	0	O	3/14/2009	2.6	0	O	4/14/2009	2.79	0	O	5/14/2009	2.87	0	O	6/14/2009	0.51	11.72	C
1/15/2009	2.925	0	O	2/15/2009	2.81	0	O	3/15/2009	2.54	0	O	4/15/2009	2.75	0	O	5/15/2009	2.87	0	O	6/15/2009	0.68	38.247	O
1/16/2009	2.925	0	O	2/16/2009	2.805	0	O	3/16/2009	2.47	0	O	4/16/2009	2.74	0	O	5/16/2009	2.86	0	O	6/16/2009	0.66	30.56	C
1/17/2009	2.925	0	O	2/17/2009	2.75	0	O	3/17/2009	2.45	0	O	4/17/2009	2.745	0	O	5/17/2009	2.855	0	O	6/17/2009	0.85	61.92	C
1/18/2009	2.92	0	O	2/18/2009	2.705	0	O	3/18/2009	2.74	0	O	4/18/2009	2.685	0	O	5/18/2009	2.86	0	O	6/18/2009	0.775	48.206	O
1/19/2009	2.92	0	O	2/19/2009	2.67	0	O	3/19/2009	2.95	0	O	4/19/2009	2.65	0	O	5/19/2009	2.82	0	O	6/19/2009	0.86	63.77	C
1/20/2009	2.915	0	O	2/20/2009	2.72	0	O	3/20/2009	2.96	0	O	4/20/2009	2.6	0	O	5/20/2009	2.945	0	O	6/20/2009	1.175	155.493	O
1/21/2009	2.91	0	O	2/21/2009	2.74	0	O	3/21/2009	2.96	0	O	4/21/2009	2.585	0	O	5/21/2009	2.6	0	O	6/21/2009	0.96	83.24	C
1/22/2009	2.91	0	O	2/22/2009	2.795	0	O	3/22/2009	2.95	0	O	4/22/2009	2.53	0	O	5/22/2009	2.68	0	O	6/22/2009	0.905	72.31	C
1/23/2009	2.91	0	O	2/23/2009	2.845	0	O	3/23/2009	2.95	0	O	4/23/2009	2.56	0	O	5/23/2009	2.655	0	O	6/23/2009	0.945	80.21	C
1/24/2009	2.905	0	O	2/24/2009	2.87	0	O	3/24/2009	2.925	0	O	4/24/2009	2.615	0	O	5/24/2009	2.485	0	O	6/24/2009	0.91	63.279	O
1/25/2009	2.905	0	O	2/25/2009	2.88	0	O	3/25/2009	2.92	0	O	4/25/2009	2.66	0	O	5/25/2009	2.005	0	O	6/25/2009	1.445	199.8	C
1/26/2009	2.905	0	O	2/26/2009	2.88	0	O	3/26/2009	2.93	0	O	4/26/2009	2.63	0	O	5/26/2009	1.39	0	O	6/26/2009	1.51	217.9	C
1/27/2009	2.905	0	O	2/27/2009	2.895	0	O	3/27/2009	2.955	0	O	4/27/2009	2.65	0	O	5/27/2009	1.36	0	O	6/27/2009	1.78	282.289	O
1/28/2009	2.905	0	O	2/28/2009	2.875	0	O	3/28/2009	2.945	0	O	4/28/2009	2.75	0	O	5/28/2009	1.4	0	O	6/28/2009	1.495	213.6	C
1/29/2009	2.905	0	O					3/29/2009	2.95	0	O	4/29/2009	2.855	0	O	5/29/2009	1.14	0	O	6/29/2009	1.295	170.27	O
1/30/2009	2.905	0	O					3/30/2009	2.945	0	O	4/30/2009	2.9	0	O	5/30/2009	1.075	0	O	6/30/2009	1.18	131.9	C
1/31/2009	2.905	0	O					3/31/2009	2.945	0	O					5/31/2009	1.05	0	O				

July				August				September				October				November				December			
Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed / Computed
7/1/2009	1.345	164.311	O	8/1/2009	5.245	1867.816	O	9/1/2009	4.01	1284.004	O	10/1/2009	2.355	496.4	C	11/1/2009	1.51	217.9	C	12/1/2009	2.385	71.13	D
7/2/2009	2.77	659.2	C	8/2/2009	4.44	1456	C	9/2/2009	3.905	1178	C	10/2/2009	5.35	1973	C	11/2/2009	1.265	152.6	C	12/2/2009	2.385	71.13	D
7/3/2009	3.7	1169.642	O	8/3/2009	3.9	1176	C	9/3/2009	3.54	1000	C	10/3/2009	5.41	2010.827	O	11/3/2009	1.245	164.515	O	12/3/2009	2.42	77.72	O
7/4/2009	4.695	1637.635	O	8/4/2009	3.545	1010.032	O	9/4/2009	4.595	1540	C	10/4/2009	4.5	1488	C	11/4/2009	1.375	180.9	C	12/4/2009	2.425	82.393	O
7/5/2009	5.24	1907	C	8/5/2009	3.805	1128	C	9/5/2009	5.635	2145	C	10/5/2009	3.715	1084	C	11/5/2009	1.085	114.405	O	12/5/2009	2.425	79.35	O
7/6/2009	5.76	2299.675	O	8/6/2009	3.63	1043	C	9/6/2009	5.815	2256	C	10/6/2009	3.355	874.525	O	11/6/2009	1.285	170.302	O	12/6/2009	2.495	92.99	O
7/7/2009	5.95	2341	C	8/7/2009	3.365	900.477	O	9/7/2009	4.885	1702	C	10/7/2009	2.975	745.2	C	11/7/2009	1.22	153.127	O	12/7/2009	2.38	68.486	O
7/8/2009	5.205	1887	C	8/8/2009	3.265	873	C	9/8/2009	4.125	1323.062	O	10/8/2009	2.785	717.916	O	11/8/2009	1.1	113.3	C	12/8/2009	2.42	77.72	O
7/9/2009	5.41	1953.295	O	8/9/2009	3.52	990.8	C	9/9/2009	3.45	1007.063	O	10/9/2009	2.505	553.4	C	11/9/2009	1.185	136.018	O	12/9/2009	2.35	57.082	O
7/10/2009	4.795	1682.127	O	8/10/2009	3.115	827.186	O	9/10/2009	3.1	799.4	C	10/10/2009	2.355	534.946	O	11/10/2009	1.515	219.3	C	12/10/2009	2.35	64.89	C
7/11/2009	4.23	1345	C	8/11/2009	3.13	812.6	C	9/11/2009	2.845	702.665	O	10/11/2009	2.24	454.1	C	11/11/2009	1.32	172.693	O	12/11/2009	2.375	69.32	C
7/12/2009	5.06	1802	C	8/12/2009	3.24	861.7	C	9/12/2009	2.665	616.5	C	10/12/2009	2.105	406.1	C	11/12/2009	1.625	216.276	O	12/12/2009	2.37	68.42	C
7/13/2009	4.528	1501.058	O	8/13/2009	3.15	821.5	C	9/13/2009	2.6	590.6	C	10/13/2009	2.725	640.8	C	11/13/2009	1.325	163.738	O	12/13/2009	2.435	80.64	C
7/14/2009	5.12	1837	C	8/14/2009	2.83	684	C	9/14/2009	3.125	770.146	O	10/14/2009	1.875	328.7	C	11/14/2009	1.25	151.826	O	12/14/2009	2.21	43.22	D
7/15/2009	6.93	2812.266	O	8/15/2009	2.91	717.6	C	9/15/2009	2.725	640.8	C	10/15/2009	2.395	539.691	O	11/15/2009	1.275	155.1	C	12/15/2009	2.175	38.59	O
7/16/2009	8.42	4217.927	O	8/16/2009	2.57	578	C	9/16/2009	2.69	626.6	C	10/16/2009	2.315	502.246	O	11/16/2009	1.965	338.408	O	12/16/2009	2.125	35.81	O
7/17/2009	7.39	3309	C	8/17/2009	2.565	579.89	O	9/17/2009	2.61	594.6	C	10/17/2009	1.72	279.7	C	11/17/2009	1.375	177.187	O	12/17/2009	2.135	37.05	O
7/18/2009	8.26	3947	C	8/18/2009	2.92	721.8	C	9/18/2009	2.475	541.8	C	10/18/2009	2.005	371.8	C	11/18/2009	1.285	149.547	O	12/18/2009	2.145	33.388	O
7/19/2009	6.705	2835	C	8/19/2009	2.895	711.2	C	9/19/2009	4.31	1387	C	10/19/2009	1.715	259.026	O	11/19/2009	1.44	145.783	O	12/19/2009	2.305	27.831	O
7/20/2009	5.75	2216	C	8/20/2009	2.65	590.36	O	9/20/2009	3.695	1075	C	10/20/2009	1.63	241.409	O	11/20/2009	1.77	140.311	O	12/20/2009	2.425	0	O
7/21/2009	4.53	1505	C	8/21/2009	2.8	671.6	C	9/21/2009	3.1	799.4	C	10/21/2009	1.61	232.03	O	11/21/2009	1.78	139.76	O	12/21/2009	1.99	0	O
7/22/2009	4.84	1598.151	O	8/22/2009	2.72	704.683	O	9/22/2009	4.015	1223.941	O	10/22/2009	1.68	257.667	O	11/22/2009	2.07	0	O	12/22/2009	1.96	0	O
7/23/2009	4.59	1436.756	O	8/23/2009	2.505	553.4	C	9/23/2009	3.43	948.6	C	10/23/2009	1.62	242.653	O	11/23/2009	2.47	0	O	12/23/2009	1.28	0	O
7/24/2009	4.1	1277	C	8/24/2009	2.54	543.368	O	9/24/2009	2.95	734.6	C	10/24/2009	1.655	245.071	O	11/24/2009	2.415	0	O	12/24/2009	1.94	0	O
7/25/2009	3.46	962.6	C	8/25/2009	3.55	1040.489	O	9/25/2009	2.845	690.3	C	10/25/2009	1.545	227.8	C	11/25/2009	2.725	0	O	12/25/2009	1.94	0	O
7/26/2009	3.08	790.7	C	8/26/2009	3.8	1160.9	O	9/26/2009	3.12	775.046	O	10/26/2009	1.525	188.482	O	11/26/2009	2.72	0	O	12/26/2009	1.93	0	O
7/27/2009	2.895	748.26	O	8/27/2009	3.35	939.927	O	9/27/2009	3	756	C	10/27/2009	1.455	172.34	O	11/27/2009	2.675	0	O	12/27/2009	2.21	0	O
7/28/2009	3.315	928.764	O	8/28/2009	2.92	771.543	O	9/28/2009	2.88	704.9	C	10/28/2009	1.55	229.2	C	11/28/2009	2.64	0	O	12/28/2009	2.6	0	O
7/29/2009	5.65	2154	C	8/29/2009	2.87	716.869	O	9/29/2009	3.265	814.631	O	10/29/2009	1.515	219.3	C	11/29/2009	2.47	0	O	12/29/2009	2.61	0	O
7/30/2009	4.755	1408.268	O	8/30/2009	2.8	671.6	C	9/30/2009	2.435	585.081	O	10/30/2009	1.42	164.752	O	11/30/2009	2.465	96.344	O	12/30/2009	2.72	0	O
7/31/2009	4.2	1329	C	8/31/2009	3.42	944	C					10/31/2009	1.45	173.509	O					12/31/2009	2.72	0	O

Gauge-Discharge Data: Bantwal (WN000G9)
Period: 201(Data Type : Absolute Gauge (HZS)

January				February				March				April				May				June			
Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed
1/1/2010	2.68	0	O	2/1/2010	1.945	0	O	3/1/2010	2.88	0	O	4/1/2010	2.84	0	O	5/1/2010	2.885	0	O	6/1/2010	1.385	0	O
1/2/2010	2.48	0	O	2/2/2010	1.87	0	O	3/2/2010	2.91	0	O	4/2/2010	2.81	0	O	5/2/2010	2.885	0	O	6/2/2010	1.345	0	O
1/3/2010	2.45	0	O	2/3/2010	1.91	0	O	3/3/2010	2.86	0	O	4/3/2010	2.83	0	O	5/3/2010	2.88	0	O	6/3/2010	1.34	0	O
1/4/2010	1.98	0	O	2/4/2010	1.935	0	O	3/4/2010	2.89	0	O	4/4/2010	2.71	0	O	5/4/2010	2.86	0	O	6/4/2010	1.325	0	O
1/5/2010	2.08	0	O	2/5/2010	1.9	0	O	3/5/2010	2.87	0	O	4/5/2010	2.47	0	O	5/5/2010	2.83	0	O	6/5/2010	1.355	0	O
1/6/2010	2.35	0	O	2/6/2010	2.465	0	O	3/6/2010	2.865	0	O	4/6/2010	2.32	0	O	5/6/2010	2.86	0	O	6/6/2010	1.42	0	O
1/7/2010	2.04	0	O	2/7/2010	2.28	0	O	3/7/2010	2.86	0	O	4/7/2010	2.32	0	O	5/7/2010	2.84	0	O	6/7/2010	1.425	0	O
1/8/2010	1.98	0	O	2/8/2010	2.335	0	O	3/8/2010	2.89	0	O	4/8/2010	2.31	0	O	5/8/2010	2.87	0	O	6/8/2010	1	88.81	D
1/9/2010	2.01	0	O	2/9/2010	2.91	0	O	3/9/2010	2.875	0	O	4/9/2010	2.36	0	O	5/9/2010	2.89	0	O	6/9/2010	1.1	110.3	D
1/10/2010	2.04	0	O	2/10/2010	2.915	0	O	3/10/2010	2.84	0	O	4/10/2010	2.345	0	O	5/10/2010	2.87	0	O	6/10/2010	0.69	33.294	O
1/11/2010	1.985	0	O	2/11/2010	2.91	0	O	3/11/2010	2.835	0	O	4/11/2010	2.325	0	O	5/11/2010	2.89	0	O	6/11/2010	0.62	25.926	O
1/12/2010	1.99	0	O	2/12/2010	2.905	0	O	3/12/2010	2.83	0	O	4/12/2010	2.285	0	O	5/12/2010	2.88	0	O	6/12/2010	0.705	39.287	O
1/13/2010	1.98	0	O	2/13/2010	2.905	0	O	3/13/2010	2.83	0	O	4/13/2010	2.27	0	O	5/13/2010	2.84	0	O	6/13/2010	0.645	27.38	C
1/14/2010	2.195	0	O	2/14/2010	2.925	0	O	3/14/2010	2.86	0	O	4/14/2010	2.26	0	O	5/14/2010	2.81	0	O	6/14/2010	1.072	97.698	O
1/15/2010	1.955	0	O	2/15/2010	2.925	0	O	3/15/2010	2.84	0	O	4/15/2010	2.275	0	O	5/15/2010	2.78	0	O	6/15/2010	2.18	406.182	O
1/16/2010	2.455	0	O	2/16/2010	2.92	0	O	3/16/2010	2.835	0	O	4/16/2010	2.3	0	O	5/16/2010	2.79	0	O	6/16/2010	1.96	354.329	O
1/17/2010	1.97	0	O	2/17/2010	2.93	0	O	3/17/2010	2.785	0	O	4/17/2010	2.25	0	O	5/17/2010	2.775	0	O	6/17/2010	2.6	619.205	O
1/18/2010	1.965	0	O	2/18/2010	2.905	0	O	3/18/2010	2.78	0	O	4/18/2010	2.28	0	O	5/18/2010	2.775	0	O	6/18/2010	2.88	749.665	O
1/19/2010	2.37	0	O	2/19/2010	2.9	0	O	3/19/2010	2.31	0	O	4/19/2010	2.255	0	O	5/19/2010	2.88	0	O	6/19/2010	2.285	477.674	O
1/20/2010	2.455	0	O	2/20/2010	2.93	0	O	3/20/2010	2.28	0	O	4/20/2010	2.29	0	O	5/20/2010	2.87	0	O	6/20/2010	2.28	469.7	C
1/21/2010	1.955	0	O	2/21/2010	2.9	0	O	3/21/2010	2.29	0	O	4/21/2010	2.385	0	O	5/21/2010	2.865	0	O	6/21/2010	1.775	303.17	O
1/22/2010	2.065	0	O	2/22/2010	2.89	0	O	3/22/2010	2.975	0	O	4/22/2010	2.56	0	O	5/22/2010	2.91	0	O	6/22/2010	1.53	220.3	C
1/23/2010	1.97	0	O	2/23/2010	2.92	0	O	3/23/2010	2.96	0	O	4/23/2010	2.77	0	O	5/23/2010	2.885	0	O	6/23/2010	1.985	363.7	C
1/24/2010	1.93	0	O	2/24/2010	2.89	0	O	3/24/2010	2.94	0	O	4/24/2010	2.86	0	O	5/24/2010	2.87	0	O	6/24/2010	2.03	379.3	C
1/25/2010	1.96	0	O	2/25/2010	2.91	0	O	3/25/2010	2.98	0	O	4/25/2010	2.86	0	O	5/25/2010	2.93	0	O	6/25/2010	1.98	362	C
1/26/2010	2.06	0	O	2/26/2010	2.86	0	O	3/26/2010	2.99	0	O	4/26/2010	2.855	0	O	5/26/2010	2.92	0	O	6/26/2010	3.44	972.6	C
1/27/2010	1.91	0	O	2/27/2010	2.89	0	O	3/27/2010	3	0	O	4/27/2010	2.84	0	O	5/27/2010	2.56	0	O	6/27/2010	3.18	848.8	C
1/28/2010	2.155	0	O	2/28/2010	2.92	0	O	3/28/2010	2.99	0	O	4/28/2010	2.88	0	O	5/28/2010	1.905	0	O	6/28/2010	2.45	531.549	O
1/29/2010	1.99	0	O					3/29/2010	2.97	0	O	4/29/2010	2.89	0	O	5/29/2010	1.875	0	O	6/29/2010	2.32	479.496	O
1/30/2010	2.015	0	O					3/30/2010	2.96	0	O	4/30/2010	2.895	0	O	5/30/2010	1.83	0	O	6/30/2010	2.43	527.341	O
1/31/2010	2.06	0	O					3/31/2010	2.86	0	O					5/31/2010	1.92	0	O				

July				August				September				October				November				December			
Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed
7/1/2010	1.95	355.414	O	8/1/2010	5.54	2174	C	9/1/2010	4.15	1354.074	O	10/1/2010	1.825	300.177	O	11/1/2010	1.92	359.143	O	12/1/2010	1.4	176.7	C
7/2/2010	2.075	423.203	O	8/2/2010	4.32	1464.927	O	9/2/2010	3.405	933.224	O	10/2/2010	2.805	681.2	C	11/2/2010	3.14	826.088	O	12/2/2010	1.97	295.3	C
7/3/2010	2.225	464.684	O	8/3/2010	3.81	1194.049	O	9/3/2010	3.385	924.813	O	10/3/2010	2.6	595.3	C	11/3/2010	2.49	554.658	O	12/3/2010	1.37	168.006	O
7/4/2010	3.03	780.2	C	8/4/2010	5.07	1878.929	O	9/4/2010	3.45	959.851	O	10/4/2010	3.265	920.626	O	11/4/2010	1.985	344.867	O	12/4/2010	1.28	151.635	O
7/5/2010	3.08	802.8	C	8/5/2010	4.51	1503.611	O	9/5/2010	3.345	926.7	C	10/5/2010	2.88	697.073	O	11/5/2010	2.08	396.8	C	12/5/2010	1.32	161.7	C
7/6/2010	3.045	761.191	O	8/6/2010	3.84	1174	C	9/6/2010	3.15	834.424	O	10/6/2010	2.98	757.8	C	11/6/2010	3.21	855.39	O	12/6/2010	1.07	125.634	O
7/7/2010	3.18	834.491	O	8/7/2010	4.06	1170.003	O	9/7/2010	4.13	1378.813	O	10/7/2010	2.85	690.71	O	11/7/2010	2.85	700.6	C	12/7/2010	1.05	115.811	O
7/8/2010	3.1	802.531	O	8/8/2010	4.23	1384	C	9/8/2010	4.86	1772.406	O	10/8/2010	2.635	617.903	O	11/8/2010	1.685	252.22	O	12/8/2010	1.23	145.863	O
7/9/2010	2.83	688.355	O	8/9/2010	3.645	1056.634	O	9/9/2010	4.265	1403.09	O	10/9/2010	2.34	485.512	O	11/9/2010	2.21	458.936	O	12/9/2010	1.3	161.305	O
7/10/2010	2.43	486.572	O	8/10/2010	3.27	869.55	O	9/10/2010	3.83	1220.684	O	10/10/2010	2.45	535.1	C	11/10/2010	1.83	324.106	O	12/10/2010	1.06	112.105	O
7/11/2010	2.11	407.5	C	8/11/2010	2.995	756.7	O	9/11/2010	4.97	1815	C	10/11/2010	1.93	341.049	O	11/11/2010	2.745	646.871	O	12/11/2010	1.13	128.931	O
7/12/2010	1.855	309.319	O	8/12/2010	2.95	730.005	O	9/12/2010	3.51	1007	C	10/12/2010	2.03	363.447	O	11/12/2010	3.475	989.7	C	12/12/2010	1.17	134.9	C
7/13/2010	1.865	314.335	O	8/13/2010	2.885	693.021	O	9/13/2010	3.23	874.075	O	10/13/2010	1.94	342.427	O	11/13/2010	1.97	363.415	O	12/13/2010	0.91	96.347	O
7/14/2010	1.65	263.772	O	8/14/2010	2.98	744.634	O	9/14/2010	3.095	803.681	O	10/14/2010	1.985	346.835	O	11/14/2010	2.72	645.1	C	12/14/2010	0.95	99.054	O
7/15/2010	1.92	341.7	C	8/15/2010	2.65	615.9	C	9/15/2010	3.545	1060.854	O	10/15/2010	2.35	496.3	C	11/15/2010	2.37	504	C	12/15/2010	0.955	100.557	O
7/16/2010	2.47	509.531	O	8/16/2010	4.08	1274.805	O	9/16/2010	3.545	1024	C	10/16/2010	1.88	328.4	C	11/16/2010	3.09	807.4	C	12/16/2010	1.05	114.6	C
7/17/2010	2.545	555.882	O	8/17/2010	3.765	1102.91	O	9/17/2010	3.265	877.625	O	10/17/2010	2.48	547	C	11/17/2010	2.475	545	C	12/17/2010	1.06	116.2	C
7/18/2010	2.63	607.6	C	8/18/2010	3.825	1134.389	O	9/18/2010	2.78	689.092	O	10/18/2010	2.135	406.948	O	11/18/2010	3.17	926.8	O	12/18/2010	1.045	110.184	O
7/19/2010	2.56	584.392	O	8/19/2010	3.31	893.366	O	9/19/2010	2.59	591.2	C	10/19/2010	2.065	374.934	O	11/19/2010	2.155	406.634	O	12/19/2010	1.16	133.1	C
7/20/2010	3.64	1082.059	O	8/20/2010	3.48	976.361	O	9/20/2010	2.425	537.23	O	10/20/2010	1.74	270.069	O	11/20/2010	2.33	470.495	O	12/20/2010	1.075	118.7	C
7/21/2010	4.1	1413.306	O	8/21/2010	3.6	1041.228	O	9/21/2010	2.075	357.113	O	10/21/2010	1.9	335	C	11/21/2010	1.81	305.6	C	12/21/2010	0.91	87.343	O
7/22/2010	4.485	1521.94	O	8/22/2010	4.445	1505	C	9/22/2010	2.32	475.535	O	10/22/2010	2.65	657.981	O	11/22/2010	1.78	312.722	O	12/22/2010	0.9	84.941	O
7/23/2010	3.505	1100.755	O	8/23/2010	3.425	965.3	C	9/23/2010	2.195	441.127	O	10/23/2010	2.935	735.013	O	11/23/2010	2.13	422.692	O	12/23/2010	1.105	0	O
7/24/2010	3.4	1001.953	O	8/24/2010	3.52	1012	C	9/24/2010	3.58	1042	C	10/24/2010	2.795	676.9	C	11/24/2010	1.875	327.606	O	12/24/2010	1.51	0	O
7/25/2010	3.93	1222	C	8/25/2010	4.87	1754	C	9/25/2010	2.48	547	C	10/25/2010	2.145	399.679	O	11/25/2010	1.87	325.1	C	12/25/2010	1.24	0	O
7/26/2010	4.275	1422.556	O	8/26/2010	4.165	1348	C	9/26/2010	2.28	469.7	C	10/26/2010	2.01	356.803	O	11/26/2010	1.685	290.832	O	12/26/2010	1.725	0	O
7/27/2010	4.14	1358.715	O	8/27/2010	3.995	1249.367	O	9/27/2010	3.145	833.062	O	10/27/2010	2.82	718.889	O	11/27/2010	1.55	229.058	O	12/27/2010	1.725	0	O
7/28/2010	4.74	1734.757	O	8/28/2010	4.155	1399.008	O	9/28/2010	2.8	679.1	C	10/28/2010	2.83	701.948	O	11/28/2010	1.78	296	C	12/28/2010	1.815	0.004	C
7/29/2010	5.96	2653.918	O	8/29/2010	4.2	1368	C	9/29/2010	2.48	547	C	10/29/2010	2.06	369.557	O	11/29/2010	1.345	174.526	O	12/29/2010	1.78	0	O
7/30/2010	7.93	3775.343	O	8/30/2010	3.79	1160.611	O	9/30/2010	2.245	451.88	O	10/30/2010	1.83	323.06	O	11/30/2010	1.49	203.176	O	12/30/2010	2.275	1.831	C
7/31/2010	6.345	2849.061	O	8/31/2010	6.05	2422.186	O					10/31/2010	2.48	547	C					12/31/2010	2.945	8.482	D

Gauge-Discharge Data: Bantwal (WN000G9)
Period: 2011Data Type : Absolute Gauge (HZS)

January				February				March				April				May				June			
Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed
1/1/2011	2.85	0	O	2/1/2011	2.97	0	O	3/1/2011	2.91	8.035	D	4/1/2011	2.53	3.871	C	5/1/2011	2.9	7.909	C	6/1/2011	1.87	8.024	O
1/2/2011	2.91	0	O	2/2/2011	2.91	0	O	3/2/2011	3.01	9.338	C	4/2/2011	2.59	4.443	C	5/2/2011	2.89	7.008	O	6/2/2011	1.865	9.056	O
1/3/2011	2.965	0	O	2/3/2011	2.96	0	O	3/3/2011	2.96	8.676	C	4/3/2011	2.72	5.793	C	5/3/2011	2.89	7.785	C	6/3/2011	1.93	24.5	D
1/4/2011	2.935	0	O	2/4/2011	2.96	0	O	3/4/2011	2.93	8.855	O	4/4/2011	2.78	6.467	C	5/4/2011	2.96	8.686	C	6/4/2011	1.865	10.289	O
1/5/2011	2.88	0	O	2/5/2011	2.945	0	O	3/5/2011	2.92	8.162	C	4/5/2011	2.74	6.014	D	5/5/2011	2.925	8.225	C	6/5/2011	2.07	74.38	C
1/6/2011	2.935	0	O	2/6/2011	2.96	0	O	3/6/2011	2.945	8.482	C	4/6/2011	2.64	4.944	C	5/6/2011	2.93	8.289	C	6/6/2011	2.27	225.359	O
1/7/2011	2.89	0	O	2/7/2011	2.94	0	O	3/7/2011	2.89	7.951	O	4/7/2011	2.53	3.871	C	5/7/2011	2.925	8.225	C	6/7/2011	2.395	254.295	O
1/8/2011	2.965	0	O	2/8/2011	2.95	0	O	3/8/2011	2.88	7.661	C	4/8/2011	2.435	3.036	C	5/8/2011	2.91	8.035	C	6/8/2011	2.72	454.939	O
1/9/2011	2.93	0	O	2/9/2011	2.94	0	O	3/9/2011	2.88	7.661	C	4/9/2011	2.3	2.002	C	5/9/2011	2.925	8.225	C	6/9/2011	2.48	294.656	O
1/10/2011	2.775	0	O	2/10/2011	2.915	0	O	3/10/2011	2.89	7.785	C	4/10/2011	2.22	1.478	C	5/10/2011	2.88	7.833	O	6/10/2011	2.345	233.841	O
1/11/2011	3.03	0	O	2/11/2011	2.935	0	O	3/11/2011	2.88	7.661	C	4/11/2011	2.155	1.29	O	5/11/2011	2.83	7.053	C	6/11/2011	2.355	255.427	O
1/12/2011	2.96	0	O	2/12/2011	2.945	0	O	3/12/2011	2.88	7.661	C	4/12/2011	2.075	0.72	O	5/12/2011	2.85	7.294	C	6/12/2011	2.74	632	C
1/13/2011	2.72	0	O	2/13/2011	2.935	0	O	3/13/2011	2.89	7.785	C	4/13/2011	2.07	0.684	C	5/13/2011	2.85	7.294	C	6/13/2011	3.375	850.352	O
1/14/2011	2.76	0	O	2/14/2011	2.92	0	O	3/14/2011	2.88	6.518	O	4/14/2011	2.27	1.798	C	5/14/2011	2.95	8.546	C	6/14/2011	2.96	663.368	O
1/15/2011	2.72	0	O	2/15/2011	2.935	0	O	3/15/2011	2.89	7.785	C	4/15/2011	2.51	3.689	C	5/15/2011	2.91	8.035	C	6/15/2011	3.665	1015.846	O
1/16/2011	2.83	0	O	2/16/2011	2.93	0	O	3/16/2011	2.88	7.761	C	4/16/2011	2.72	5.793	C	5/16/2011	2.91	8.798	O	6/16/2011	2.77	595.841	O
1/17/2011	3.01	0	O	2/17/2011	2.905	0	O	3/17/2011	2.89	7.785	C	4/17/2011	2.77	6.353	C	5/17/2011	2.9	7.909	C	6/17/2011	2.4	460.238	O
1/18/2011	3	0	O	2/18/2011	2.905	0	O	3/18/2011	2.89	7.785	C	4/18/2011	2.835	7.113	D	5/18/2011	2.98	8.939	C	6/18/2011	3.01	688.904	O
1/19/2011	3.005	0	O	2/19/2011	2.9	0	O	3/19/2011	2.82	6.934	C	4/19/2011	2.86	7.415	C	5/19/2011	2.99	9.071	C	6/19/2011	2.92	705.7	C
1/20/2011	3.005	0	O	2/20/2011	2.9	0	O	3/20/2011	2.8	6.699	C	4/20/2011	2.86	7.415	C	5/20/2011	3	9.204	C	6/20/2011	2.37	439.634	O
1/21/2011	3.005	0	O	2/21/2011	2.895	0	O	3/21/2011	2.8	6.934	D	4/21/2011	2.92	8.162	C	5/21/2011	2.98	8.939	C	6/21/2011	2.13	359.525	O
1/22/2011	2.99	0	O	2/22/2011	2.895	0	O	3/22/2011	2.8	6.699	C	4/22/2011	2.935	8.353	C	5/22/2011	2.92	8.162	C	6/22/2011	1.805	263.124	O
1/23/2011	3	0	O	2/23/2011	2.895	0	O	3/23/2011	2.78	6.467	C	4/23/2011	2.97	8.807	C	5/23/2011	2.93	9.831	O	6/23/2011	2.68	573.919	O
1/24/2011	3.005	0	O	2/24/2011	2.89	0	O	3/24/2011	2.76	6.239	C	4/24/2011	2.98	8.939	C	5/24/2011	2.915	8.098	C	6/24/2011	2.93	696.974	O
1/25/2011	3	0	O	2/25/2011	2.9	0	O	3/25/2011	2.72	5.793	C	4/25/2011	2.92	8.162	D	5/25/2011	2.92	8.162	C	6/25/2011	3.045	735.08	O
1/26/2011	2.98	0	O	2/26/2011	2.9	0	O	3/26/2011	2.7	5.576	C	4/26/2011	2.86	7.415	C	5/26/2011	2.31	2.072	C	6/26/2011	3.85	1133	C
1/27/2011	2.975	0	O	2/27/2011	2.88	0	O	3/27/2011	2.65	5.047	C	4/27/2011	2.93	8.289	C	5/27/2011	1.81	0.002	C	6/27/2011	3.915	1185.665	O
1/28/2011	2.98	0	O	2/28/2011	2.98	0	O	3/28/2011	2.6	4.541	D	4/28/2011	2.935	8.353	C	5/28/2011	1.82	0.007	C	6/28/2011	4.66	1673.951	O
1/29/2011	2.98	0	O					3/29/2011	2.57	4.249	C	4/29/2011	2.915	8.098	C	5/29/2011	1.83	0.015	C	6/29/2011	3.745	1097.722	O
1/30/2011	3	0	O					3/30/2011	2.49	3.509	C	4/30/2011	2.905	7.972	C	5/30/2011	1.81	0.002	D	6/30/2011	3.06	750.248	O
1/31/2011	3	0	O					3/31/2011	2.42	2.913	C					5/31/2011	1.87	0.065	C				

July				August				September				October				November				December			
Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed
7/1/2011	2.865	679.663	O	8/1/2011	3.31	825.088	O	9/1/2011	4.6	1529	C	10/1/2011	1.83	290.999	O	11/1/2011	1.61	256.581	O	12/1/2011	1.515	125.746	O
7/2/2011	3.56	1006.829	O	8/2/2011	3.875	1153.657	O	9/2/2011	5.385	1982.867	O	10/2/2011	1.675	262	C	11/2/2011	1.655	266.71	O	12/2/2011	1.875	99.013	O
7/3/2011	2.89	693.2	C	8/3/2011	4.92	1735.166	O	9/3/2011	5.38	1975.566	O	10/3/2011	1.685	268.448	O	11/3/2011	3.09	819.452	O	12/3/2011	1.86	101.9	C
7/4/2011	2.73	627.207	O	8/4/2011	5.24	1899.076	O	9/4/2011	5.11	1822	C	10/4/2011	1.69	273.265	O	11/4/2011	2.82	687.451	O	12/4/2011	1.8	91.194	O
7/5/2011	3.005	735.294	O	8/5/2011	4.95	1675.764	O	9/5/2011	4.375	1499.677	O	10/5/2011	1.66	238.236	O	11/5/2011	2.07	398.543	O	12/5/2011	1.79	72.69	C
7/6/2011	3.03	754.19	O	8/6/2011	6.02	2367.585	O	9/6/2011	4.01	1237.938	O	10/6/2011	1.6	240.6	C	11/6/2011	2.11	398.7	C	12/6/2011	1.75	57.98	C
7/7/2011	3.47	957.454	O	8/7/2011	5.71	2192	C	9/7/2011	3.69	1054	C	10/7/2011	1.53	216.668	O	11/7/2011	2.78	648.1	C	12/7/2011	1.84	93.14	C
7/8/2011	2.79	652.646	O	8/8/2011	5.435	2003.114	O	9/8/2011	3.885	1150	C	10/8/2011	1.52	211.609	O	11/8/2011	2.6	576.7	C	12/8/2011	1.79	72.69	C
7/9/2011	2.9	722.792	O	8/9/2011	4.59	1523.859	O	9/9/2011	3.77	1122.085	O	10/9/2011	1.63	249.1	C	11/9/2011	1.65	254.8	C	12/9/2011	1.75	57.98	C
7/10/2011	2.37	490.1	C	8/10/2011	4.235	1351.836	O	9/10/2011	3.52	985.828	O	10/10/2011	2.12	399.2	O	11/10/2011	1.47	208.035	O	12/10/2011	1.7	41.71	C
7/11/2011	2.56	553.381	O	8/11/2011	4.155	1300.933	O	9/11/2011	3.59	1006	C	10/11/2011	2.42	492.919	O	11/11/2011	1.76	298.811	O	12/11/2011	1.79	72.69	C
7/12/2011	2.53	537.622	O	8/12/2011	5.21	1858.879	O	9/12/2011	3.6	1056.044	O	10/12/2011	1.755	296.947	O	11/12/2011	1.48	199.877	O	12/12/2011	1.59	14.473	O
7/13/2011	2.89	721.853	O	8/13/2011	4.275	1375.423	O	9/13/2011	3.325	904.619	O	10/13/2011	2.005	372.39	O	11/13/2011	1.43	194.7	C	12/13/2011	1.86	99.533	O
7/14/2011	2.875	698.397	O	8/14/2011	3.99	1203	C	9/14/2011	4.07	1301.463	O	10/14/2011	2.11	399.373	O	11/14/2011	1.46	196.985	O	12/14/2011	1.66	55.094	O
7/15/2011	4.79	1644.358	O	8/15/2011	3.545	984.4	C	9/15/2011	3.515	1011.191	O	10/15/2011	2.31	473.797	O	11/15/2011	1.47	198.18	O	12/15/2011	1.75	55.773	O
7/16/2011	4.675	1593.259	O	8/16/2011	3.53	969.642	O	9/16/2011	4.045	1295.499	O	10/16/2011	1.84	311.3	C	11/16/2011	1.34	173.545	O	12/16/2011	2.18	39.613	O
7/17/2011	6.49	2709	C	8/17/2011	3.245	811.449	O	9/17/2011	3.38	933.122	O	10/17/2011	1.91	322.895	O	11/17/2011	1.34	176.047	O	12/17/2011	2.14	36.313	O
7/18/2011	5.955	2350	C	8/18/2011	3.1	759.694	O	9/18/2011	3	739.5	C	10/18/2011	1.69	275.65	O	11/18/2011	1.27	153.4	O	12/18/2011	2.7	35	C
7/19/2011	6.06	2419	C	8/19/2011	3.31	847.599	O	9/19/2011	3.28	903.913	O	10/19/2011	2.36	481.339	O	11/19/2011	1.24	141.75	O	12/19/2011	2.68	34.394	O
7/20/2011	4.885	1690	C	8/20/2011	3.395	880.608	O	9/20/2011	3.23	891.946	O	10/20/2011	1.29	154.374	O	11/20/2011	1.25	150.2	C	12/20/2011	2.67	33.475	O
7/21/2011	5.315	1946	C	8/21/2011	3.87	1143	C	9/21/2011	2.705	617.001	O	10/21/2011	1.61	233.942	O	11/21/2011	1.1	126.004	O	12/21/2011	3.04	25.645	O
7/22/2011	4.27	1392.057	O	8/22/2011	3.24	827.6	O	9/22/2011	2.675	653.946	O	10/22/2011	1.85	316.36	O	11/22/2011	1.105	128.035	O	12/22/2011	3.035	25.311	O
7/23/2011	4.8	1586.506	O	8/23/2011	3.365	900.7	C	9/23/2011	2.405	520.06	O	10/23/2011	1.48	207.8	C	11/23/2011	1.1	127.87	O	12/23/2011	3.04	22.8	D
7/24/2011	5.24	1900	C	8/24/2011	3.05	760.8	C	9/24/2011	2.31	468.082	O	10/24/2011	2.32	438.388	O	11/24/2011	1.13	133.574	O	12/24/2011	3.02	18.376	O
7/25/2011	4.865	1625.146	O	8/25/2011	2.88	689.1	C	9/25/2011	2.22	436.5	C	10/25/2011	2.49	520.081	O	11/25/2011	1.075	123.102	O	12/25/2011	3.02	19.01	C
7/26/2011	4.55	1456.74	O	8/26/2011	3.24	816.068	O	9/26/2011	2.11	404.443	O	10/26/2011	2.58	569	C	11/26/2011	1.095	127.042	O	12/26/2011	3.02	16.456	O
7/27/2011	3.81	1112.292	O	8/27/2011	2.79	640.004	O	9/27/2011	2	373.585	O	10/27/2011	1.94	351.925	O	11/27/2011	1.14	125.1	C	12/27/2011	3.01	14.566	O
7/28/2011	3.325	840.591	O	8/28/2011	3.425	928.3	C	9/28/2011	1.985	359.897	O	10/28/2011	2.57	578.763	O	11/28/2011	1.11	122.158	O	12/28/2011	2.98	13.748	O
7/29/2011	3.32	852.624	O	8/29/2011	3.13	780.195	O	9/29/2011	1.86	320.223	O	10/29/2011	1.765	299.926	O	11/29/2011	1.095	110.224	O	12/29/2011	2.98	13.514	O
7/30/2011	3.71	1065.298	O	8/30/2011	3.72	1150.116	O	9/30/2011	1.88	313.719	O	10/30/2011	1.61	243.4	C	11/30/2011	1.22	105.487	O	12/30/2011	2.98	13.08	O
7/31/2011	3.36	898.4	C	8/31/2011	4.965	1737	C					10/31/2011	1.52	226.575	O					12/31/2011	2.99	11.421	O

Gauge-Discharge Data: Bantwal (WN000G9)
Period: 2012 Data Type : Absolute Gauge (HZS)

January				February				March				April				May				June			
Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed
1/1/2012	2.99	24.18	C	2/1/2012	2.76	0.088	D	3/1/2012	2.82	2.794	O	4/1/2012	2	6.533	C	5/1/2012	2.94	7.229	D	6/1/2012	1.15	107.1	D
1/2/2012	2.99	25.46	O	2/2/2012	2.89	7.26	D	3/2/2012	2.83	2.593	O	4/2/2012	1.99	6.379	D	5/2/2012	2.99	7.954	O	6/2/2012	1.14	105.1	D
1/3/2012	3	24.54	O	2/3/2012	2.96	17.87	D	3/3/2012	2.82	2.753	O	4/3/2012	1.96	1.736	D	5/3/2012	2.9	5.934	O	6/3/2012	1.04	85.9	C
1/4/2012	3.005	26.69	O	2/4/2012	2.84	2.833	D	3/4/2012	2.83	2.78	C	4/4/2012	1.89	1.47	C	5/4/2012	2.89	5.267	O	6/4/2012	0.755	40.22	D
1/5/2012	3	26.49	O	2/5/2012	2.82	1.7	C	3/5/2012	2.8	2.511	O	4/5/2012	1.87	1.398	C	5/5/2012	2.93	8.549	O	6/5/2012	0.73	36.89	D
1/6/2012	2.99	24.18	C	2/6/2012	2.835	2.716	O	3/6/2012	2.8	2.46	O	4/6/2012	1.85	1.327	C	5/6/2012	3.01	7.738	C	6/6/2012	0.68	30.57	D
1/7/2012	2.98	21.95	C	2/7/2012	2.93	12.64	D	3/7/2012	2.8	2.618	C	4/7/2012	1.84	1.292	D	5/7/2012	3.01	10.29	O	6/7/2012	0.67	29.37	D
1/8/2012	2.97	19.85	C	2/8/2012	2.99	24.944	O	3/8/2012	2.82	2.725	C	4/8/2012	1.79	1.124	C	5/8/2012	2.91	6.06	O	6/8/2012	0.77	42.27	D
1/9/2012	2.97	21.15	O	2/9/2012	2.99	24.18	C	3/9/2012	2.79	2.565	C	4/9/2012	1.72	0.905	D	5/9/2012	2.87	6.735	D	6/9/2012	0.81	47.95	D
1/10/2012	2.96	17.87	C	2/10/2012	2.9	9.176	O	3/10/2012	2.73	2.26	C	4/10/2012	1.68	0.789	D	5/10/2012	2.83	6.459	D	6/10/2012	0.47	9.613	C
1/11/2012	2.96	22.41	O	2/11/2012	2.9	7.29	O	3/11/2012	2.74	2.31	C	4/11/2012	1.62	0.628	D	5/11/2012	2.82	6.391	D	6/11/2012	0.345	2.123	D
1/12/2012	2.96	19.19	O	2/12/2012	2.89	7.26	C	3/12/2012	2.78	2.385	O	4/12/2012	1.58	0.452	O	5/12/2012	2.81	6.323	D	6/12/2012	0.46	8.861	D
1/13/2012	2.96	17.91	O	2/13/2012	2.91	7.058	O	3/13/2012	2.74	2.31	D	4/13/2012	1.52	0.395	D	5/13/2012	2.88	6.804	C	6/13/2012	0.35	2.336	D
1/14/2012	2.97	19.85	C	2/14/2012	2.9	8.444	C	3/14/2012	2.7	2.115	D	4/14/2012	1.5	0.354	C	5/14/2012	2.92	7.318	O	6/14/2012	0.78	43.66	D
1/15/2012	2.85	3.529	C	2/15/2012	2.9	8.444	C	3/15/2012	2.67	1.975	D	4/15/2012	1.62	0.628	C	5/15/2012	2.92	6.877	O	6/15/2012	0.3	0.602	D
1/16/2012	2.87	5.199	D	2/16/2012	2.89	7.26	C	3/16/2012	2.52	1.348	C	4/16/2012	1.78	1.091	D	5/16/2012	2.92	6.638	O	6/16/2012	0.35	2.336	D
1/17/2012	3	24.31	O	2/17/2012	2.88	6.179	C	3/17/2012	2.5	1.272	C	4/17/2012	1.9	1.507	D	5/17/2012	2.92	7.112	O	6/17/2012	1.48	181.2	C
1/18/2012	2.9	8.444	D	2/18/2012	2.88	6.179	C	3/18/2012	2.43	1.028	C	4/18/2012	1.97	2.002	O	5/18/2012	2.92	7.086	C	6/18/2012	2.25	390.73	O
1/19/2012	2.99	22.29	O	2/19/2012	2.88	6.179	C	3/19/2012	2.33	0.724	C	4/19/2012	2.045	2.083	D	5/19/2012	2.92	7.086	C	6/19/2012	2.78	595.204	O
1/20/2012	2.99	21.94	O	2/20/2012	2.88	6.179	C	3/20/2012	2.22	0.452	C	4/20/2012	2.09	2.277	D	5/20/2012	2.4	3.81	C	6/20/2012	2.33	408.013	O
1/21/2012	2.99	23.11	O	2/21/2012	2.88	6.187	O	3/21/2012	2.11	0.246	O	4/21/2012	2.15	2.282	O	5/21/2012	2.39	3.755	D	6/21/2012	2.4	413.195	O
1/22/2012	2.9	8.44	C	2/22/2012	2.87	3.002	D	3/22/2012	2.03	0.134	D	4/22/2012	2.19	2.735	C	5/22/2012	2.36	3.594	D	6/22/2012	1.95	280.68	O
1/23/2012	2.97	22.4	O	2/23/2012	2.85	2.89	C	3/23/2012	1.87	4.698	C	4/23/2012	2.17	2.878	O	5/23/2012	2.24	2.978	D	6/23/2012	1.58	201.079	O
1/24/2012	2.91	9.734	D	2/24/2012	2.87	3.084	O	3/24/2012	1.76	3.419	D	4/24/2012	2.32	3.383	C	5/24/2012	2.15	2.548	D	6/24/2012	1.48	181.2	C
1/25/2012	2.97	24.56	O	2/25/2012	2.87	3.239	O	3/25/2012	1.68	2.638	C	4/25/2012	2.53	4.548	D	5/25/2012	2.095	2.299	D	6/25/2012	2.09	349.192	O
1/26/2012	2.86	4.317	C	2/26/2012	2.87	3.002	C	3/26/2012	1.62	2.13	D	4/26/2012	2.92	7.086	D	5/26/2012	2.44	4.031	D	6/26/2012	1.81	270.087	O
1/27/2012	2.74	0.002	C	2/27/2012	2.85	2.89	C	3/27/2012	1.53	1.437	O	4/27/2012	2.82	6.391	D	5/27/2012	1.9	1.507	C	6/27/2012	1.75	251.701	O
1/28/2012	2.95	16.01	C	2/28/2012	2.85	2.89	C	3/28/2012	1.48	1.361	O	4/28/2012	2.82	6.391	D	5/28/2012	1.83	1.36	O	6/28/2012	1.72	243.776	O
1/29/2012	2.94	14.27	C	2/29/2012	2.83	3.068	O	3/29/2012	1.57	1.486	O	4/29/2012	2.78	6.121	C	5/29/2012	1.32	0.076	D	6/29/2012	2.4	444.269	O
1/30/2012	2.98	21.04	O					3/30/2012	1.79	3.989	O	4/30/2012	2.75	5.922	D	5/30/2012	1.29	0.047	D	6/30/2012	2.48	478.796	O
1/31/2012	2.96	17.87	O					3/31/2012	1.97	6.077	D					5/31/2012	1.2	0.001	C				

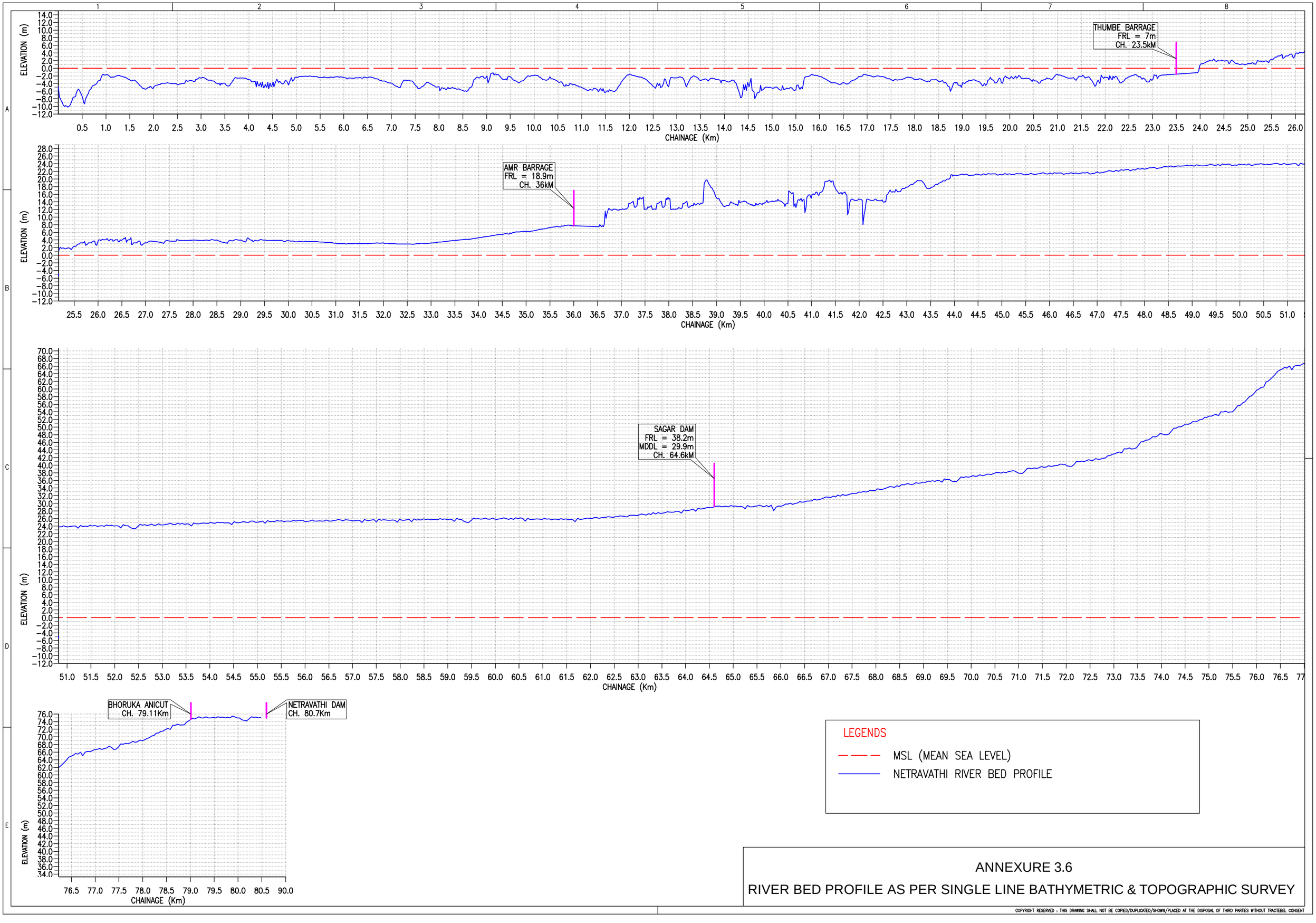
July				August				September				October				November				December			
Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed /Computed
7/1/2012	2.15	376.2	C	8/1/2012	2.965	653.943	O	9/1/2012	4.84	1709.172	O	10/1/2012	2.41	435.853	O	11/1/2012	1.14	121.8	O	12/1/2012	1.67	0	D
7/2/2012	2.84	634.396	O	8/2/2012	2.72	563.535	O	9/2/2012	5.13	1825	C	10/2/2012	1.86	284.9	C	11/2/2012	1.82	245.9	O	12/2/2012	1.64	0	O
7/3/2012	3.71	1112.378	O	8/3/2012	2.76	575.757	O	9/3/2012	5.43	2131.126	O	10/3/2012	2.46	455.992	O	11/3/2012	1.91	290	O	12/3/2012	2.57	1.767	D
7/4/2012	3.63	1062.761	O	8/4/2012	3.45	955.555	O	9/4/2012	5.15	1899.727	O	10/4/2012	1.92	271.527	O	11/4/2012	1.55	198.9	C	12/4/2012	3.03	6.684	D
7/5/2012	3.21	777.873	O	8/5/2012	4.35	1364	C	9/5/2012	5.41	2070.473	O	10/5/2012	1.81	240.821	O	11/5/2012	1.285	139.6	O	12/5/2012	3.04	6.844	D
7/6/2012	2.475	472.136	O	8/6/2012	5.5	2010.082	O	9/6/2012	4.25	1452.968	O	10/6/2012	1.59	205.822	O	11/6/2012	1.31	145.5	O	12/6/2012	2.99	6.067	D
7/7/2012	2.16	370.666	O	8/7/2012	8.245	3928.476	O	9/7/2012	4.15	1331.818	O	10/7/2012	1.65	225.3	C	11/7/2012	1.315	147.7	O	12/7/2012	3.03	6.684	D
7/8/2012	2.22	399.7	C	8/8/2012	5.71	2273.595	O	9/8/2012	3.78	1132.386	O	10/8/2012	1.57	202.045	O	11/8/2012	1.21	128.4	O	12/8/2012	3.06	7.174	D
7/9/2012	2.33	432.407	O	8/9/2012	5.41	2058.786	O	9/9/2012	3.76	1052	C	10/9/2012	1.55	197.116	O	11/9/2012	1.2	126	O	12/9/2012	3.055	0	O
7/10/2012	2.65	546.993	O	8/10/2012	5.8	2268.984	O	9/10/2012	3.565	1024.781	O	10/10/2012	1.805	241.078	O	11/10/2012	1.24	134.5	O	12/10/2012	3.05	0	O
7/11/2012	2.475	494.063	O	8/11/2012	6.43	2817.109	O	9/11/2012	3.145	713.205	O	10/11/2012	1.56	198.48	O	11/11/2012	1.22	121.5	C	12/11/2012	3.01	0	O
7/12/2012	2.47	482.895	O	8/12/2012	5.72	2209	C	9/12/2012	3.47	980.493	O	10/12/2012	1.59	211.188	O	11/12/2012	1.21	119.4	C	12/12/2012	2.99	0	O
7/13/2012	2.095	355.132	O	8/13/2012	4.56	1614.186	O	9/13/2012	3.71	1110.995	O	10/13/2012	1.55	195.527	O	11/13/2012	1.24	133.7	O	12/13/2012	3	0	O
7/14/2012	1.97	318.3	C	8/14/2012	3.85	1195.503	O	9/14/2012	3.07	684.861	O	10/14/2012	1.44	171.4	C	11/14/2012	1.15	118.3	O	12/14/2012	2.98	0	O
7/15/2012	1.96	315.2	C	8/15/2012	3.36	859	C	9/15/2012	3.175	737.086	O	10/15/2012	1.95	282.51	O	11/15/2012	1.1	109.1	O	12/15/2012	2.98	0	O
7/16/2012	2.09	350.051	O	8/16/2012	3.59	1054.018	O	9/16/2012	2.95	677.9	C	10/16/2012	1.61	211.411	O	11/16/2012	1.085	107.6	O	12/16/2012	3	0	O
7/17/2012	1.89	292.973	O	8/17/2012	3.34	868.082	O	9/17/2012	2.83	603.73	O	10/17/2012	1.555	199.342	O	11/17/2012	1	78.68	C	12/17/2012	2.97	0	O
7/18/2012	2.055	356.359	O	8/18/2012	3.32	861.614	O	9/18/2012	2.885	627.552	O	10/18/2012	1.46	184.204	O	11/18/2012	1.22	121.5	C	12/18/2012	2.99	0	O
7/19/2012	1.94	309.1	C	8/19/2012	3.3	831.4	C	9/19/2012	3.16	768.5	C	10/19/2012	1.375	163.739	O	11/19/2012	1.23	94.38	O	12/19/2012	2.98	0	O
7/20/2012	1.97	317.43	O	8/20/2012	3.09	737.8	C	9/20/2012	2.48	492.1	C	10/20/2012	1.36	159.519	O	11/20/2012	1.85	281.9	D	12/20/2012	2.98	0	O
7/21/2012	2.62	522.754	O	8/21/2012	3.07	695.498	O	9/21/2012	2.37	430.871	O	10/21/2012	1.48	181.2	C	11/21/2012	2.23	403.1	D	12/21/2012	2.97	0	O
7/22/2012	4.31	1342	C	8/22/2012	2.67	564.3	C	9/22/2012	2.2	355.251	O	10/22/2012	1.59	208.569	O	11/22/2012	2.69	572.2	D	12/22/2012	2.97	0	O
7/23/2012	4.65	1535	C	8/23/2012	2.65	547.188	O	9/23/2012	2.2	392.9	C	10/23/2012	2.05	343.6	C	11/23/2012	2.99	694.8	D	12/23/2012	2.99	0	O
7/24/2012	3.43	891.6	C	8/24/2012	2.52	492.155	O	9/24/2012	1.96	288.07	O	10/24/2012	2.05	343.6	C	11/24/2012	2.82	624.1	D	12/24/2012	2.99	0	O
7/25/2012	2.96	682.1	C	8/25/2012	2.63	548.8	C	9/25/2012	1.92	276.49	O	10/25/2012	1.35	156.976	O	11/25/2012	2.27	416.9	C	12/25/2012	2.99	0	O
7/26/2012	3.16	768.5	C	8/26/2012	3.2	786.3	C	9/26/2012	1.905	280.691	O	10/26/2012	1.39	166.306	O	11/26/2012	2.16	379.5	D	12/26/2012	2.97	0	O
7/27/2012	1.75	251.701	O	8/27/2012	4.21	1287	C	9/27/2012	1.85	261.995	O	10/27/2012	1.3	138.8	C	11/27/2012	2.35	444.9	D	12/27/2012	2.95	0	O
7/28/2012	5.01	1787.642	O	8/28/2012	3.65	1085.038	O	9/28/2012	1.86	268.111	O	10/28/2012	1.16	109.1	C	11/28/2012	1.69	236.2	C	12/28/2012	2.99	0	O
7/29/2012	4.2	1282	C	8/29/2012	4.85	1693.748	O	9/29/2012	1.82	249.261	O	10/29/2012	1.16	119.445	O	11/29/2012	1.68	233.4	D	12/29/2012	2.99	0	O
7/30/2012	3.425	993.583	O	8/30/2012	4.79	1629.146	O	9/30/2012	2.02	334	C	10/30/2012	1.14	116.654	O	11/30/2012	1.72	244.5	D	12/30/2012	2.96	0	O
7/31/2012	3.03	687.461	O	8/31/2012	5.36	2057.755	O					10/31/2012	1.08	109.694	O					12/31/2012	2.99	0	O

Gauge-Discharge Data: Bantwal (WN000G9)
Period: 2013 (HZS=Absolute Gauge; HHS=With M.S.L.)

January				February				March				April				May			
Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed	Day	Mean Gauge (m)	Discharge cumecs	Observed/Computed
1/1/2000	2.9	5.511	O	2/1/2013	2.91	5.278	O	3/1/2013	2.59	1.896	O	4/1/2013	2.78	1.974	O	5/1/2013	1.97	1.059	O
1/2/2000	2.99	6.067	C	2/2/2013	2.92	5.086	C	3/2/2013	2.46	1.165	C	4/2/2013	2.775	1.791	C	5/2/2013	1.905	1.026	C
1/3/2000	2.99	6.067	C	2/3/2013	2.93	5.216	C	3/3/2013	2.42	0.988	C	4/3/2013	2.76	1.776	C	5/3/2013	1.83	0.97	C
1/4/2000	2.98	5.92	C	2/4/2013	2.9	4.706	O	3/4/2013	2.4	0.903	O	4/4/2013	2.76	1.776	C	5/4/2013	1.76	0.92	C
1/5/2000	2.98	5.92	C	2/5/2013	2.91	4.956	C	3/5/2013	2.36	0.758	C	4/5/2013	2.75	1.766	C	5/5/2013	1.67	0.857	C
1/6/2000	2.95	5.492	C	2/6/2013	2.91	4.956	C	3/6/2013	2.36	0.758	C	4/6/2013	2.74	1.756	C	5/6/2013	1.6	1.016	O
1/7/2000	2.98	5.92	C	2/7/2013	2.87	4.457	C	3/7/2013	2.35	0.724	C	4/7/2013	2.73	1.746	C	5/7/2013	1.52	0.757	C
1/8/2000	2.95	5.492	C	2/8/2013	2.95	5.492	C	3/8/2013	2.37	0.794	C	4/8/2013	2.705	1.836	O	5/8/2013	1.66	0.85	C
1/9/2000	2.99	6.067	C	2/9/2013	2.86	4.338	C	3/9/2013	2.4	0.907	C	4/9/2013	2.7	1.716	C	5/9/2013	1.85	0.985	C
1/10/2000	2.97	5.775	C	2/10/2013	2.83	3.995	C	3/10/2013	2.42	0.988	C	4/10/2013	2.72	1.736	C	5/10/2013	2.01	1.106	C
1/11/2000	2.96	5.632	C	2/11/2013	2.83	3.995	O	3/11/2013	2.44	1.074	D	4/11/2013	2.72	1.736	C	5/11/2013	2	1.099	C
1/12/2000	2.96	5.632	C	2/12/2013	2.89	4.702	C	3/12/2013	2.64	2.246	C	4/12/2013	2.705	1.884	O	5/12/2013	1.94	1.052	C
1/13/2000	2.97	5.775	C	2/13/2013	2.91	4.956	C	3/13/2013	2.87	4.457	C	4/13/2013	2.69	1.706	C	5/13/2013	1.87	0.928	O
1/14/2000	2.97	5.775	C	2/14/2013	2.91	4.956	C	3/14/2013	2.89	4.702	C	4/14/2013	2.67	1.687	C	5/14/2013	1.82	0.963	C
1/15/2000	2.93	4.562	O	2/15/2013	2.86	4.338	C	3/15/2013	2.96	5.632	C	4/15/2013	2.66	1.822	O	5/15/2013	1.74	0.906	C
1/16/2000	2.97	5.775	C	2/16/2013	2.93	5.219	C	3/16/2013	2.885	4.64	C	4/16/2013	2.63	1.648	C	5/16/2013	1.71	0.885	C
1/17/2000	2.96	5.632	C	2/17/2013	2.93	5.219	C	3/17/2013	2.87	4.457	C	4/17/2013	2.64	1.658	C	5/17/2013	2.54	1.562	C
1/18/2000	2.97	5.775	C	2/18/2013	2.89	5.155	O	3/18/2013	2.88	4.27	O	4/18/2013	2.63	1.648	C	5/18/2013	2.985	2.009	C
1/19/2000	2.95	5.492	C	2/19/2013	2.87	4.457	C	3/19/2013	2.86	4.338	C	4/19/2013	2.61	1.629	C	5/19/2013	2.79	1.806	C
1/20/2000	2.93	5.219	C	2/20/2013	2.91	4.956	C	3/20/2013	2.865	4.398	O	4/20/2013	2.59	1.61	C	5/20/2013	2.69	1.706	D
1/21/2000	2.96	5.632	C	2/21/2013	2.91	4.956	C	3/21/2013	2.88	4.689	O	4/21/2013	2.56	1.581	C	5/21/2013	2.91	1.929	C
1/22/2000	2.84	4.05	O	2/22/2013	2.96	5.632	C	3/22/2013	2.87	1.888	C	4/22/2013	2.49	1.148	O	5/22/2013	2.35	1.389	C
1/23/2000	2.91	4.956	C	2/23/2013	2.9	4.828	C	3/23/2013	2.87	1.888	C	4/23/2013	2.41	1.443	C	5/23/2013	2.27	1.32	C
1/24/2000	2.91	4.956	C	2/24/2013	2.96	5.632	C	3/24/2013	2.87	1.888	C	4/24/2013	2.35	1.389	C	5/24/2013	2.215	1.273	C
1/25/2000	2.88	4.578	C	2/25/2013	2.82	3.885	O	3/25/2013	2.85	1.867	D	4/25/2013	2.3	1.346	C	5/25/2013	2.14	1.211	C
1/26/2000	2.9	4.828	C	2/26/2013	2.76	3.268	C	3/26/2013	2.83	1.847	C	4/26/2013	2.25	1.303	C	5/26/2013	2.07	1.154	C
1/27/2000	2.85	4.222	C	2/27/2013	2.69	2.64	C	3/27/2013	2.805	1.821	C	4/27/2013	2.2	1.26	C	5/27/2013	2.02	0.858	O
1/28/2000	2.9	4.531	O	2/28/2013	2.62	2.101	C	3/28/2013	2.8	1.816	C	4/28/2013	2.15	1.219	C	5/28/2013	1.8	0.948	C
1/29/2000	2.845	4.614	C					3/29/2013	2.81	1.826	C	4/29/2013	2.08	1.244	O	5/29/2013	1.8	0.948	C
1/30/2000	2.93	5.219	C					3/30/2013	2.805	1.821	C	4/30/2013	2.03	1.122	C	5/30/2013	1.66	0.85	C
1/31/2000	2.91	4.956	C					3/31/2013	2.79	1.806	C					5/31/2013	1.34	0.646	C

ANNEXURE 3.6

RIVER BED PROFILE AS PER SINGLE LINE BATHYMETRIC & TOPOGRAPHIC SURVEY



LEGENDS

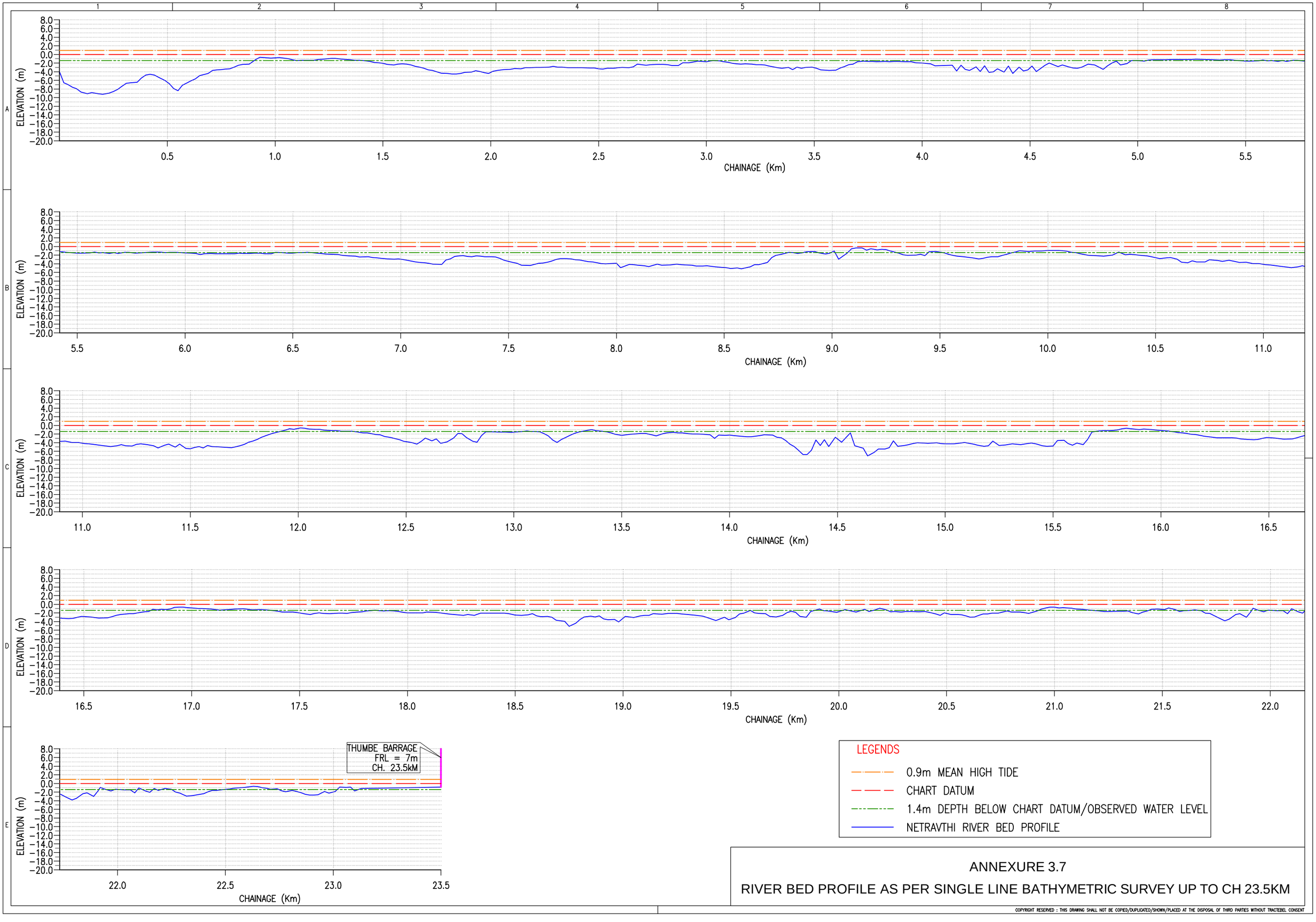
- MSL (MEAN SEA LEVEL)
- NETRAVATHI RIVER BED PROFILE

ANNEXURE 3.6

RIVER BED PROFILE AS PER SINGLE LINE BATHYMETRIC & TOPOGRAPHIC SURVEY

ANNEXURE 3.7

RIVER BED PROFILE AS PER SINGLE LINE BATHYMETRIC SURVEY UP TO CH 23.5KM



LEGENDS

- 0.9m MEAN HIGH TIDE
- CHART DATUM
- 1.4m DEPTH BELOW CHART DATUM/OBSERVED WATER LEVEL
- NETRAVTHI RIVER BED PROFILE

ANNEXURE 3.7

RIVER BED PROFILE AS PER SINGLE LINE BATHYMETRIC SURVEY UP TO CH 23.5KM

ANNEXURE 3.8

COMPILATION OF FIELD INFORMATION OF NETRAVATHI RIVER IN IWAI FORMAT

Annexure 3.6: Compilation of Field Information of Netravathi River in IWAI Format

SL#	DESCRIPTION	DETAILS	REMARKS
	NAME OF THE FIRM	**GeoInfosys**	
	REGION / CLUSTER NO.	**Cluster-6/ Stage-1/ Karnataka**	
1	NAME OF THE WATERWAY	Netravati River	
2	LENGTH OF THE WATERWAY (km)	78	
3	WATERWAY IN THE STATES OF	Karnatka	
4	FIELD WORK COMPLETED FOR THE LENGTH OF THE WATERWAY (km)	80.48	
TIDAL WATERWAYS			
5	Length of the waterway having tidal effects (km)	23.5	
6	Start & end location name having tidal effects	Starting Point: Bengre, End Point: Faisal Nagar Village	
7	Tidal variation (m)		
DEPTH INFORMATION			
8	Length of the waterway, where depths more than 2m is observed	24.50 km	Depths are w.r.t. CD
9	Length of the waterway, where depths more than 1.5m is observed	32.89 km	
	Length of the waterway, where depths more than 1.0m is observed	39.12 km	
10	Existing Water level (m)	Bengre : 0.0 M, Dharamsthala 75 M	Acoording to DGPS (MSL)
11	Minimum Water Level (m)	0 M	w.r.t. MSL
12	Highest Flood level (m)	2 M of current water leval near Bengre, 10m near Neerukatte	As discussed with local Boatman
CROSS-STRUCTURE INFORMATION			
13	Existing list of Dam, Barrages, Locks	(2 Dam & 3 Barrage), Karnatka Urben Water Supply Manglore, AMR Power Pvt. Ltd, Sagar Power Pvt. Ltd, Bharuka Power Pvt. Ltd, Dhratamsthala Temple Barrage	one dam is located at the end location
14	Existing Bridges (nos.)	11	one is under construction and one is located at the end stretch of waterway.
15	Minimum Vertical and Horizontal clearances (m) as per visual estimation	Min. Vertical Cl: 4 M , Min. Horizontal Cl: 30 M	Vertical clearance above MHWS/HFL
16	High Tension lines	6	three LT and two cable line
NAVIGATIONAL OBSTRUCTION			
17	Rocks	Yes	
18	Steep gradients	No	
ENVIRONMENTAL & OTHER ISSUES			
19	Details of wildlife /forest area	Foreat area is Available	
20	Protected areas		
21	Security clearances		

SL#	DESCRIPTION	DETAILS	REMARKS
CARGO AND OTHER DETAILS			
22	Availability of passenger ferry services.along the waterway	Not Available	
23	Estimated cargo movement through proposed waterway, road and rail		
24	Type of crops (in different seasons) and industries along the waterway	United Marine Products,Fahad Fishmeal and Oil Company, Peddy, Maize, Forest	
25	Availability of Prominent towns / City along the waterway.	Manglore, Mudipu, Kuntala Gudde, Adyarkatte,Thumbe, Bramharakotlu , B.C Road, Jakribettu , Farla, Shamboor, Gumboddy, Arikal, Saralikatte, Uppinangady , Valal, Neerukatte, Dharamsthala	
26	Historical and tourist places along waterway	Manglore, Dharamsthala	
27	Existing water sport and recreational activities and future probability		
28	Existing Jetties and Terminals	Not Available	

ANNEXURE 4.1

LIST OF INDUSTRIES IN NETRAVATHI RIVER CATCHMENT REGION

Annexure 4.1: Large and Medium Scale Industries in Netravathi Catchment Region

Sl. No.	Name of the unit	Product Manufactured	Fixed Investment (Rs. in Crores)	Taluk
1	BASF INDIA LIMITED	DYES & DISPERSIONS	379.29	MANGALORE
2	BHARAT PETROLEUM LPG BOTTLING PLANT	LPG FILLILNG	26.20	MANGALORE
3	TOTAL LPG INDIA# 62	BULK LPG LOADING, CYLINDER REFILING	92.02	MANGALORE
4	MANGALORE CHEMICALS & FERTILIZERS,	AMMONIA, UREA,SULPHURIC ACID	829.17	MANGALORE
5	STRAIDS ARC LAB & SPECIALTY LTD.	CHEMICAL BULK DRUGS	88.54	MANGALORE
6	KUDREMUKH IRON ORE PROJECTS,	PELLETS PLANT BLAST FURNANCE.	578.46	MANGALORE
7	M/s MANGALORE REFINERY & PETROCHEMICALS LTD.	CRUDE, LPG, MS (PETROL)	20141.00	MANGALORE
8	M/S. ULTRARECH CEMENT LTD.	CEMENT PACKING	21.58	MANGALORE
9	M/S. ADANI WILMAR LTD. (Formally known as RAJASHREE PACKAGERS PVT. LTD.)	REFINERY EDIBLE OIL	102.58	MANGALORE
10	RUCHI SOYA INDUSTRIES LTD.	REFINERY EDIBLE OIL	190.68	MANGALORE
11	M/S BLUE WATER FOODS & EXPORTS PVT.LTD,	Frozen sea food	6.23	MANGALORE
		Total	**22455.75**	

Source: District Industries Centre, Dakshina Kannada District.

ANNEXURE 4.2

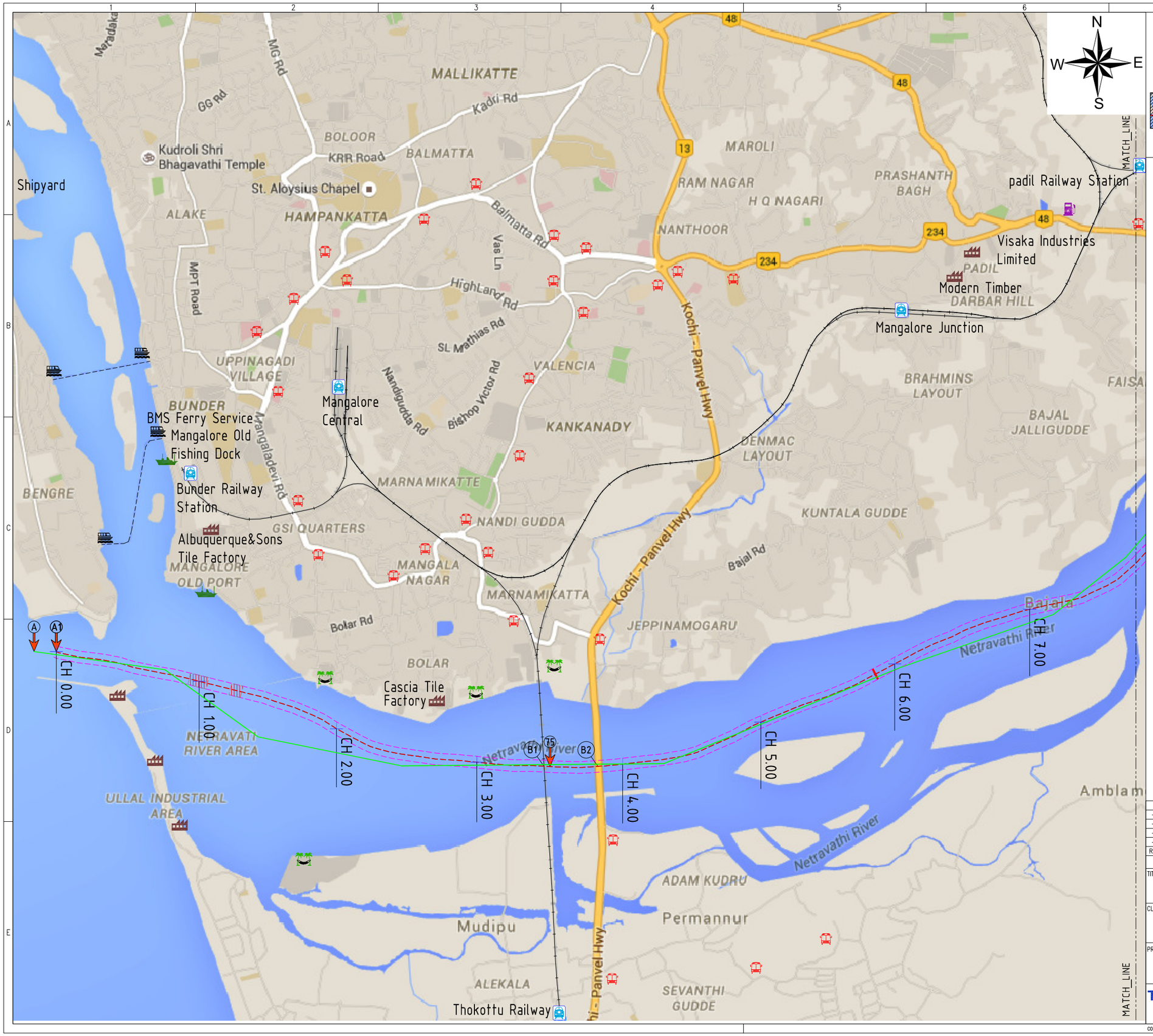
MEETING AND DISCUSSIONS

Annexure 4.2: Meetings and Discussions

District	S. No.	Department	Persons met
Dakshina Kannada District	1	Old Mangalore Port Office	Port Conservator
	2	Directorate of Industries	Jt. Director
	3	Association of Industries	Treasurer
	4	District Collector Office Dakshina Kannada	JD Agriculture, DFO Forest, Fisheries, Disaster Management Unit
Udipi District	1	Malpe Port Office	Ports Officer
	2	Hannover Port	Ports officer
	3	Directorate of Industries	Jt. Director
	4	District Collector Office Udipi District	JD Agriculture, DFO Forest, Fisheries, Disaster Management Unit, Department of Economics and Statistics
North Kannada District	1	Directorate of Ports and Inland Water Transport	Director Port, Ports Engineer, Superintending Engineer
	2	Directorate of Industries	Jt. Director
	3	District Collector Office Uttar Kannada District	JD Agriculture, DFO Forest, Fisheries, Disaster Management Unit, Department of Economics and Statistics

DRAWINGS

P.009050-W-20201-008 R0 (SHEET-9 NOS.): NETRAVATHI RIVER (KARNATAKA) PROPOSED NATIONAL WATERWAY NUMBER 74 - LAYOUT PLAN



KEY PLAN

LEGEND

	DAM/BARRAGE
	BUS STOP
	PORT
	INDUSTRY
	PLACE NAME
	FUEL STATION/PUMP
	JETTY
	RAILWAY STATION
	RESORT
	NATIONAL/STATE HIGHWAY (Hwy)
	ROAD
	FERRY LINE
	ROUTE PROVIDED BY IWAI
	SURVEY VESSEL TRACK (THALWEG)
	DREDGING REQUIRED
	RAILWAY LINE
A	START POINT CONFLUENCE WITH ARABIAN SEA AT BENGRE LAT. 12°50'42.73" N, LON. 74°49'28.86" E
A1	RECONNAISSANCE SURVEY FROM CONFLUENCE WITH ARABIAN SEA AT BENGRE LAT. 12°50'42.18" N, LON. 74°49'28.20" E
B	END PINT FROM NETRAVATHI DAM, DHARMSTHALA AT LAT. 12°57'55.23" N, LONG 75°22'10.19" E
B1	END POINT OF RECONNAISSANCE SURVEY NEAR NETRAVATHI DAM, DHARMSTHALA AT LAT. 12°57'54.35" N, LONG 75°22'10.42" E

BRIDGE DETAILS

BRIDGE No.	CHAINAGE (Km)
B1	3.432
B2	3.817

PROPOSED WATERWAY LENGTH 78.0Km (AS PER TENDER)

TOTAL WATERWAY LENGTH FROM POINT 'A' TO POINT 'B' 80.48Km

SCALE 0 0.5 1.25KM

BACKGROUND IMAGE REFERENCE FROM "GOOGLE MAP"

REV.	DATE	SIGN	SIGN	SIGN	SIGN	
REVISION		DRAWN	DESIGNED	CHECKED	APPROVED	SUBJECT OF REVISION
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TITLE: NETRAVATHI RIVER (KARNATAKA)
PROPOSED NATIONAL WATERWAY NUMBER 74
LAYOUT PLAN

CLIENT: INLAND WATERWAYS AUTHORITY OF INDIA
MINISTRY OF SHIPPING

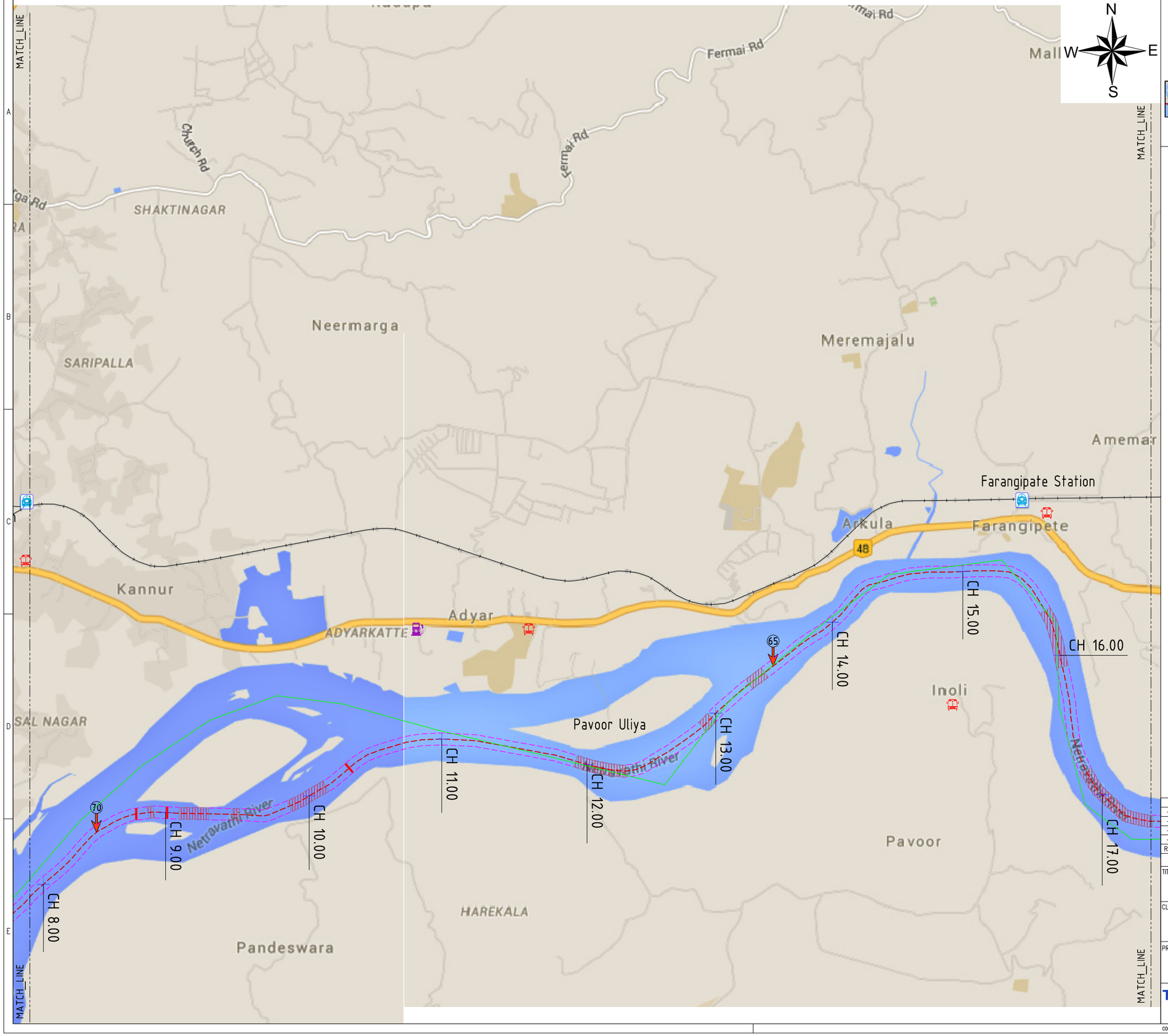
PROJECT: CONSULTANCY SERVICES FOR PREPARATION OF TWO STAGE DETAILED PROJECT REPORT (DPR) OF CLUSTER 6 OF PROPOSED 53 NATIONAL WATERWAYS.
STAGE 1 - FEASIBILITY REPORT

PROJECT NO. P.009050

TRACTEBEL Engineering GDF SUEZ

SIZE: A3 | SCALE: 1:25000 | SHEET: 1–9

DRAWING NUMBER P.009050-W-20201-0080 REV 0



KEY PLAN

LEGEND

	DAM/BARRAGE
	BUS STOP
	PORT
	INDUSTRY
	PLACE NAME
	FUEL STATION/PUMP
	JETTY
	RAILWAY STATION
	RESORT
	NATIONAL/STATE HIGHWAY (Hwy)
	ROAD
	FERRY LINE
	ROUTE PROVIDED BY IWAI
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	DREDGING REQUIRED
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BRIDGE DETAILS

BRIDGE No.	CHAINAGE (Km)
-	-

PROPOSED WATERWAY LENGTH 78.0Km (AS PER TENDER)
TOTAL WATERWAY LENGTH FROM POINT 'A' TO POINT 'B' 80.48Km

SCALE 0 0.5 1.25KM

BACKGROUND IMAGE REFERENCE FROM "GOOGLE MAP"

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REVISION		DRAWN	DESIGNED	CHECKED	APPROVED	SUBJECT OF REVISION
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TITLE
NETRAVATHI RIVER (KARNATAKA)
PROPOSED NATIONAL WATERWAY NUMBER 74
LAYOUT PLAN

CLIENT
INLAND WATERWAYS AUTHORITY OF INDIA
MINISTRY OF SHIPPING

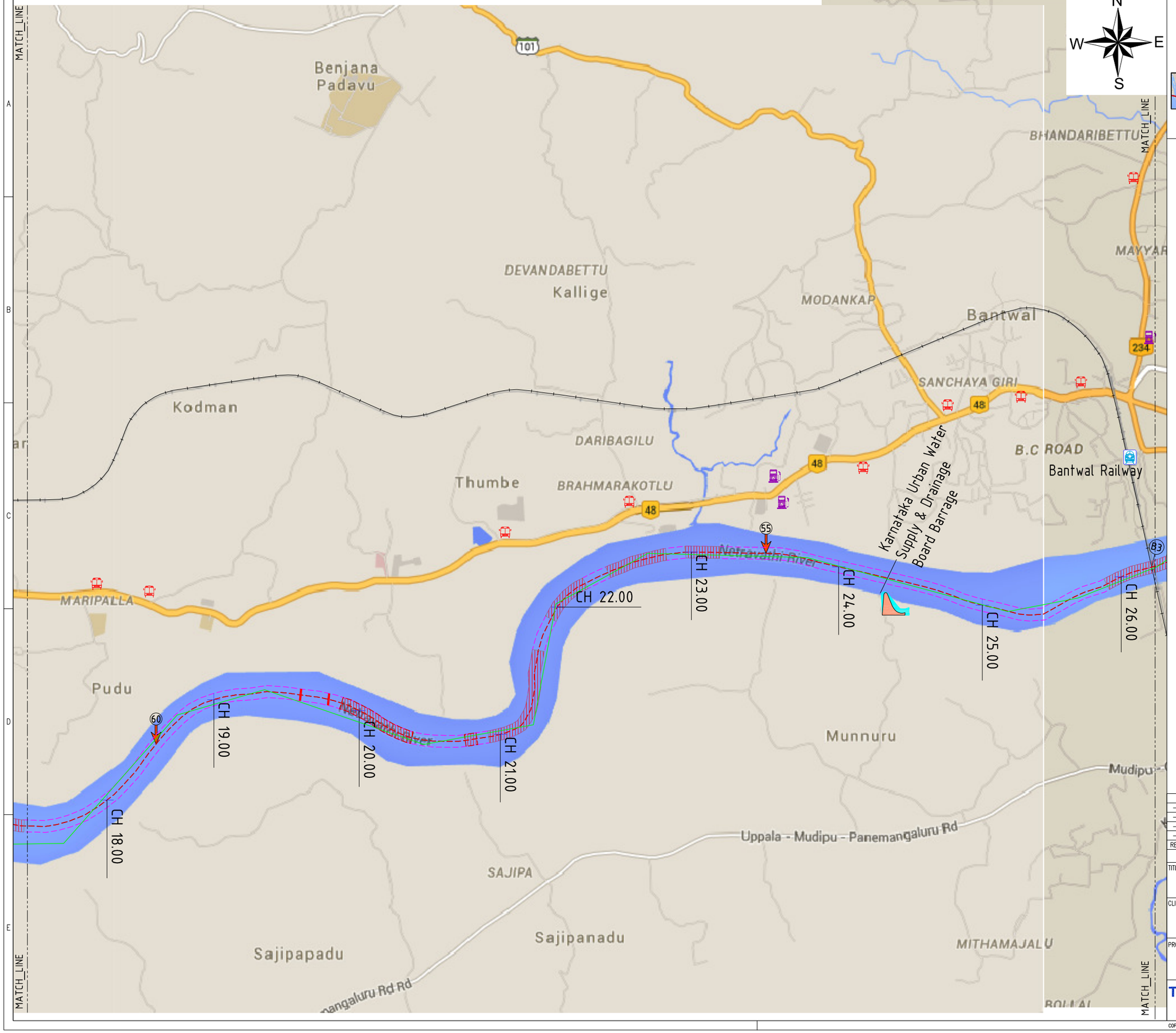
PROJECT
CONSULTANCY SERVICES FOR PREPARATION OF TWO STAGE DETAILED PROJECT REPORT (DPR) OF CLUSTER 6 OF PROPOSED 53 NATIONAL WATERWAYS.
STAGE 1 - FEASIBILITY REPORT

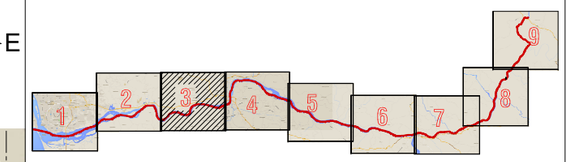
PROJECT NO. **P.009050**

SIZE: A3 | SCALE: 1:25000 | SHEET: 2–9

TRACTEBEL Engineering GDF SUEZ

DRAWING NUMBER
P.I.0.0.9.0.5.0.-W-2.0.2.0.1.-0.0.8 REV 0





KEY PLAN

LEGEND

	DAM/BARRAGE
	BUS STOP
	PORT
	INDUSTRY
	PLACE NAME
	FUEL STATION/PUMP
	JETTY
	RAILWAY STATION
	RESORT
	NATIONAL/STATE HIGHWAY (Hwy)
	ROAD
	FERRY LINE
	ROUTE PROVIDED BY IWAI
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	DREDGING REQUIRED
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BRIDGE DETAILS

BRIDGE No.	CHAINAGE (Km)
B3	27.048

PROPOSED WATERWAY LENGTH 78.0Km (AS PER TENDER)
TOTAL WATERWAY LENGTH FROM POINT 'A' TO POINT 'B' 80.48Km

SCALE 0 0.5 1.25KM

BACKGROUND IMAGE REFERENCE FROM "GOOGLE MAP"

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TITLE
NETRAVATHI RIVER (KARNATAKA)
PROPOSED NATIONAL WATERWAY NUMBER 74
LAYOUT PLAN

CLIENT
INLAND WATERWAYS AUTHORITY OF INDIA
MINISTRY OF SHIPPING

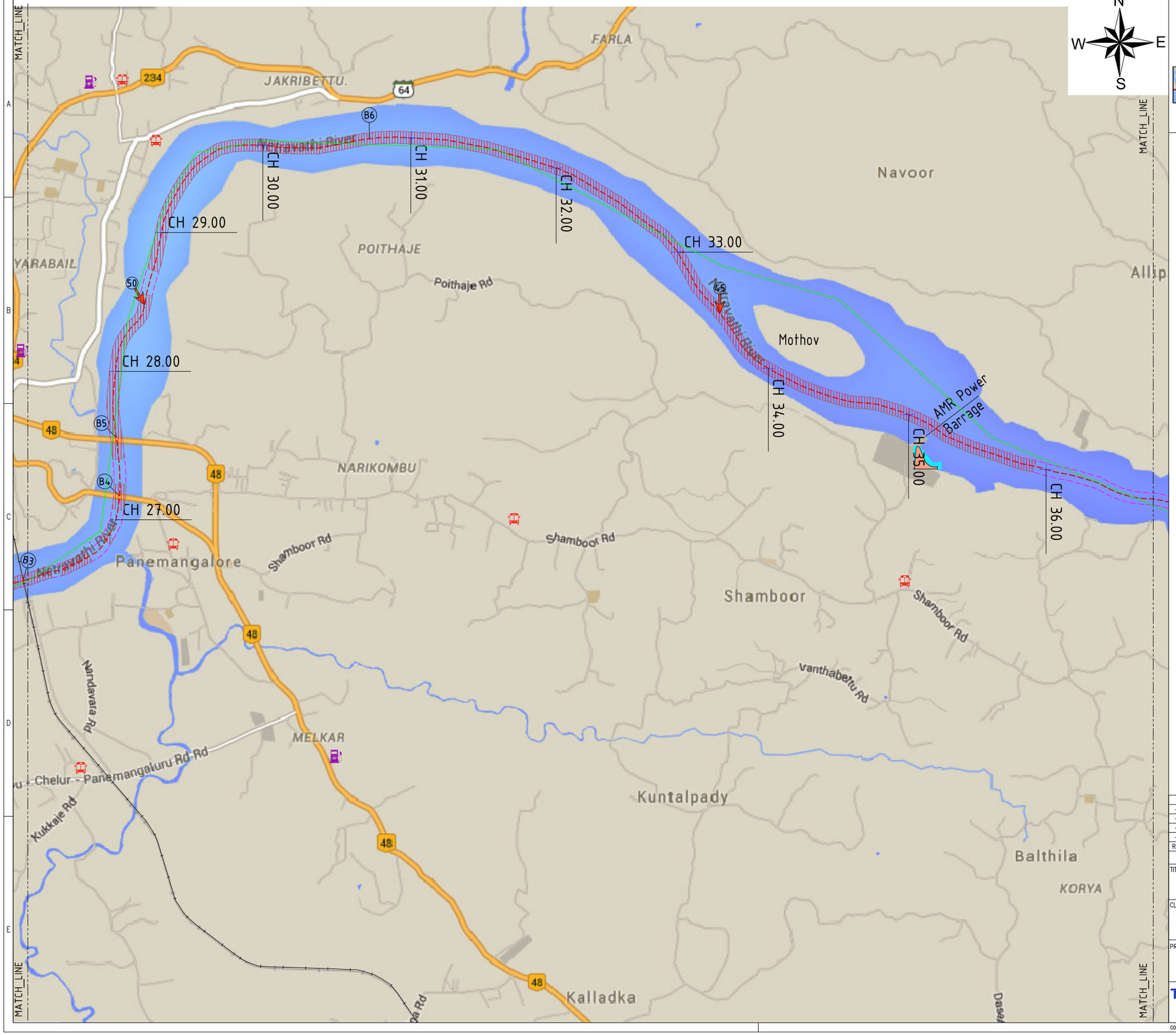
PROJECT
CONSULTANCY SERVICES FOR PREPARATION OF TWO STAGE DETAILED PROJECT REPORT (DPR) OF CLUSTER 6 OF PROPOSED 53 NATIONAL WATERWAYS.
STAGE 1 - FEASIBILITY REPORT

PROJECT NO. **P.009050**

SIZE: A3 | SCALE: 1:25000 | SHEET: 3-9

TRACTEBEL Engineering GDF SUEZ

DRAWING NUMBER
P.I.0.0.9.0.5.0.-W-2.0.2.0.1-0.0.8 REV 0



KEY PLAN

LEGEND

- DAM/BARRAGE
- BUS STOP
- PORT
- INDUSTRY
- PLACE NAME
- FUEL STATION/PUMP
- JETTY
- RAILWAY STATION
- RESORT
- NATIONAL/STATE HIGHWAY (Hwy)
- ROAD
- FERRY LINE
- ROUTE PROVIDED BY IWAI
- SURVEY VESSEL TRACK (THALWEG)
- DREDGING REQUIRED
- RAILWAY LINE
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BRIDGE DETAILS

BRIDGE No.	CHAINAGE (Km)
B3	27.048
B4	28.000
B5	29.360
B6	31.500

PROPOSED WATERWAY LENGTH 78.0Km (AS PER TENDER)

TOTAL WATERWAY LENGTH FROM POINT 'A' TO POINT 'B' 80.48Km

SCALE 0 0.5 1.25KM

BACKGROUND IMAGE REFERENCE FROM "GOOGLE MAP"

REV.	DATE	SIGN	SIGN	SIGN	SIGN	SUBJECT OF REVISION
	REVISION	DRAWN	DESIGNED	CHECKED	APPROVED	
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TITLE: NETRAVATHI RIVER (KARNATAKA)
PROPOSED NATIONAL WATERWAY NUMBER 74
LAYOUT PLAN

CLIENT: **INLAND WATERWAYS AUTHORITY OF INDIA**
MINISTRY OF SHIPPING

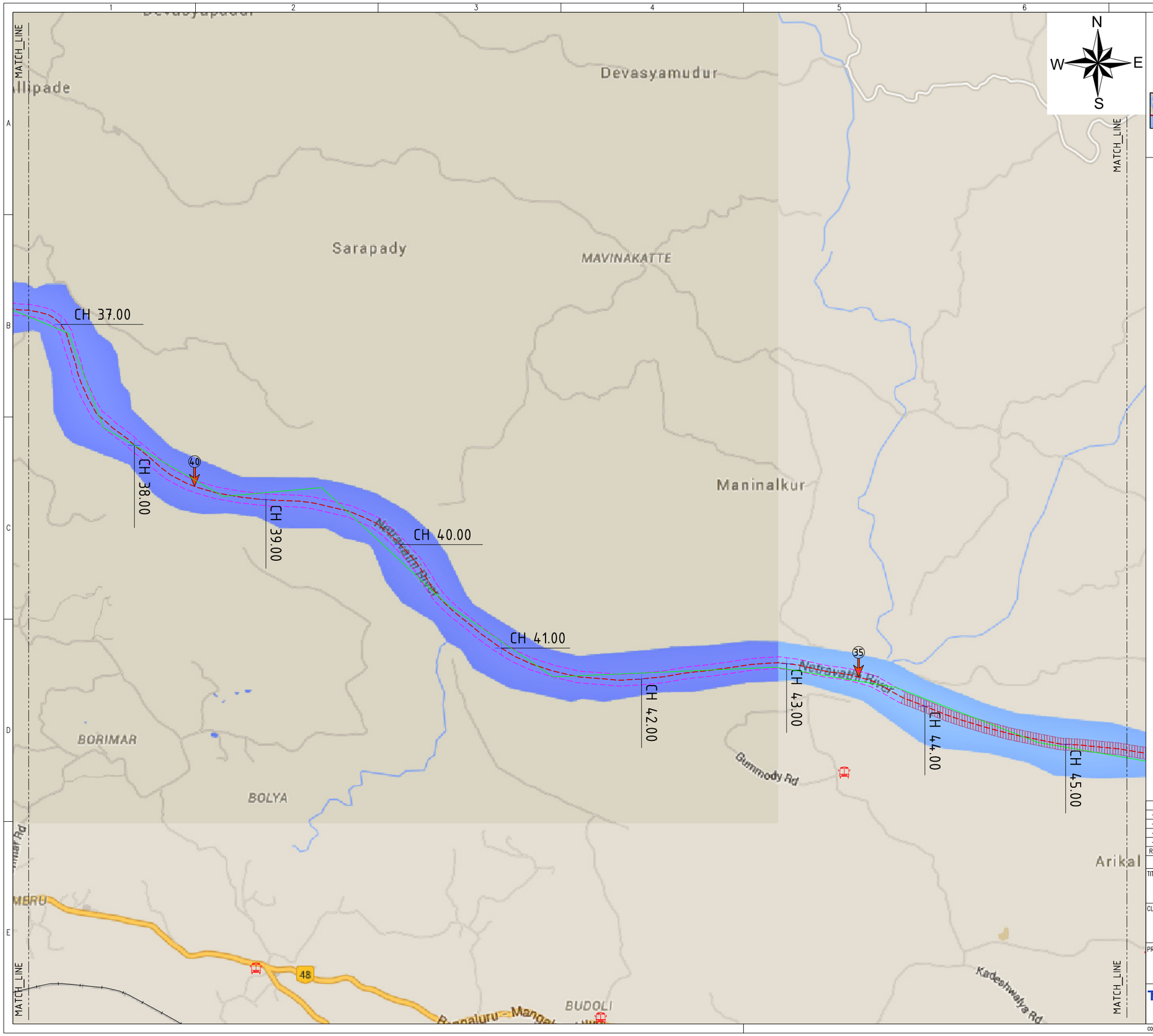
PROJECT: CONSULTANCY SERVICES FOR PREPARATION OF TWO STAGE DETAILED PROJECT REPORT (DPR) OF CLUSTER 6 OF PROPOSED 53 NATIONAL WATERWAYS.
STAGE 1 - FEASIBILITY REPORT

PROJECT NO. **P.009050**

TRACTEBEL Engineering GDF SUEZ

SIZE: A3 | SCALE: 1:25000 | SHEET: 4–9

DRAWING NUMBER P.009050-W-20201-0008 REV 0



KEY PLAN

LEGEND

	DAM/BARRAGE
	BUS STOP
	PORT
	INDUSTRY
	PLACE NAME
	FUEL STATION/PUMP
	JETTY
	RAILWAY STATION
	RESORT
	NATIONAL/STATE HIGHWAY (Hwy)
	ROAD
	FERRY LINE
	ROUTE PROVIDED BY IWAI
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	DREDGING REQUIRED
	RAILWAY LINE
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BRIDGE DETAILS

BRIDGE No.	CHAINAGE (Km)
-	-

PROPOSED WATERWAY LENGTH 78.0Km (AS PER TENDER)
TOTAL WATERWAY LENGTH FROM POINT 'A' TO POINT 'B' 80.48Km

SCALE 0 0.5 1.25KM

BACKGROUND IMAGE REFERENCE FROM "GOOGLE MAP"

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REVISION		DRAWN	DESIGNED	CHECKED	APPROVED	
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TITLE
NETRAVATHI RIVER (KARNATAKA)
PROPOSED NATIONAL WATERWAY NUMBER 74
LAYOUT PLAN

CLIENT
INLAND WATERWAYS AUTHORITY OF INDIA
MINISTRY OF SHIPPING

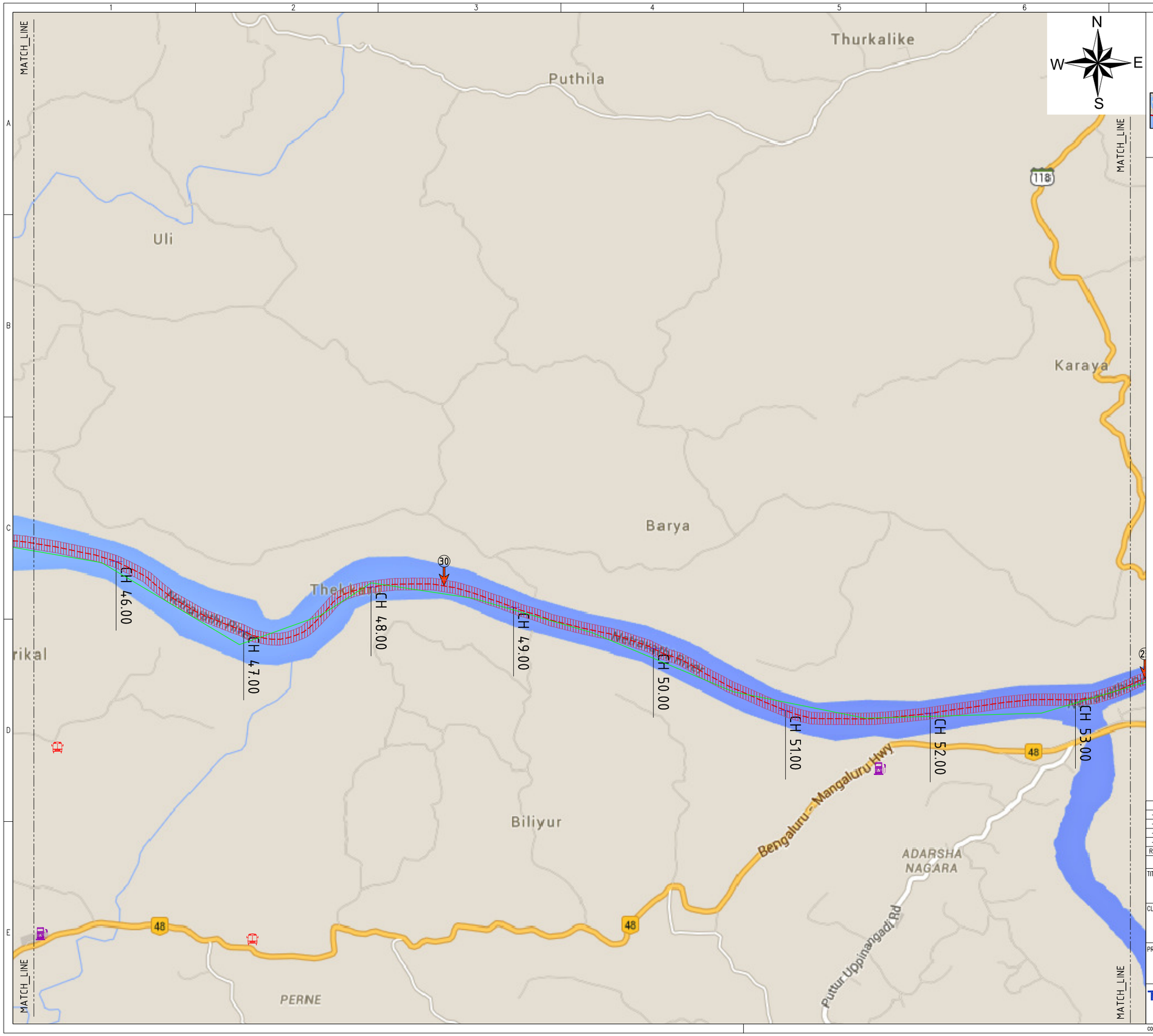
PROJECT
CONSULTANCY SERVICES FOR PREPARATION OF TWO STAGE DETAILED PROJECT REPORT (DPR) OF CLUSTER 6 OF PROPOSED 53 NATIONAL WATERWAYS.
STAGE 1 - FEASIBILITY REPORT

PROJECT NO. **P.009050**

SIZE: A3 | SCALE: 1:25000 | SHEET: 5-9

TRACTEBEL Engineering GDF SUEZ

DRAWING NUMBER P.0090 50-W-2020 1-0008 REV 0



KEY PLAN

LEGEND

	DAM/BARRAGE
	BUS STOP
	PORT
	INDUSTRY
	PLACE NAME
	FUEL STATION/PUMP
	JETTY
	RAILWAY STATION
	RESORT
	NATIONAL/STATE HIGHWAY (Hwy)
	ROAD
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BRIDGE DETAILS

BRIDGE No.	CHAINAGE (Km)
-	-

PROPOSED WATERWAY LENGTH 78.0Km (AS PER TENDER)
TOTAL WATERWAY LENGTH FROM POINT 'A' TO POINT 'B' 80.48Km

SCALE 0 0.5 1.25KM

BACKGROUND IMAGE REFERENCE FROM "GOOGLE MAP"

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TITLE
NETRAVATHI RIVER (KARNATAKA)
PROPOSED NATIONAL WATERWAY NUMBER 74
LAYOUT PLAN

CLIENT
INLAND WATERWAYS AUTHORITY OF INDIA
MINISTRY OF SHIPPING

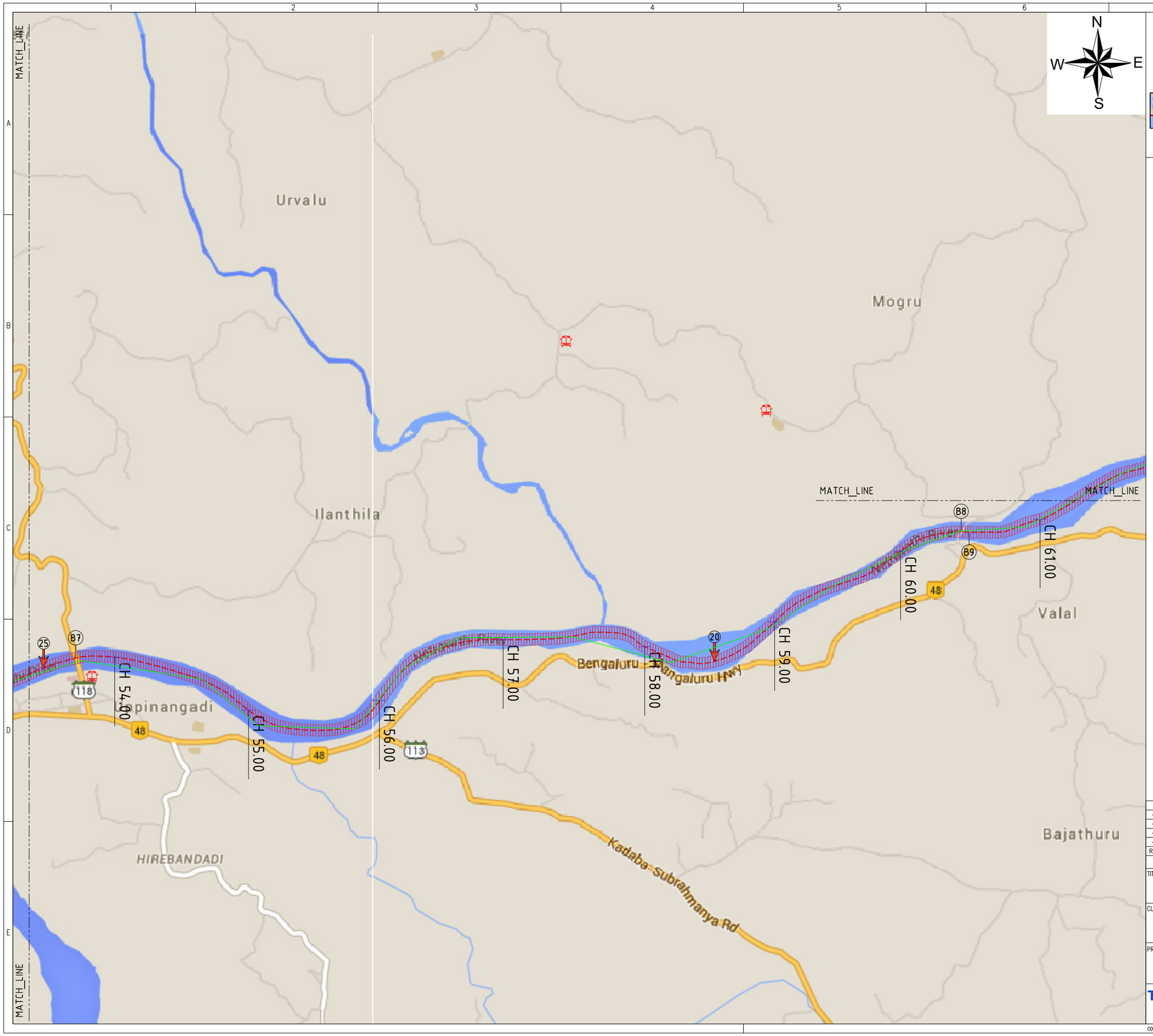
PROJECT: CONSULTANCY SERVICES FOR PREPARATION OF TWO STAGE DETAILED PROJECT REPORT (DPR) OF CLUSTER 6 OF PROPOSED 53 NATIONAL WATERWAYS.
STAGE 1 - FEASIBILITY REPORT

PROJECT NO. **P.009050**

TRACTEBEL Engineering GDF SUEZ

SIZE: A3 | SCALE: 1:25000 | SHEET: 6–9

DRAWING NUMBER P.009050-W-2020 1-0088 REV 0



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KEY PLAN

LEGEND

	DAM/BARRAGE
	BUS STOP
	PORT
	INDUSTRY
	PLACE NAME
	FUEL STATION/PUMP
	JETTY
	RAILWAY STATION
	RESORT
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BRIDGE DETAILS

BRIDGE No.	CHAINAGE (Km)
B7	55.340
B8	62300
B9	62.446

PROPOSED WATERWAY LENGTH 78.0Km (AS PER TENDER)

TOTAL WATERWAY LENGTH FROM POINT 'A' TO POINT 'B' 80.48Km

SCALE 0 0.5 1.25KM

BACKGROUND IMAGE REFERENCE FROM "GOOGLE MAP"

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TITLE
NETRAVATHI RIVER (KARNATAKA)
PROPOSED NATIONAL WATERWAY NUMBER 74
LAYOUT PLAN

CLIENT
INLAND WATERWAYS AUTHORITY OF INDIA
MINISTRY OF SHIPPING

PROJECT
CONSULTANCY SERVICES FOR PREPARATION OF TWO STAGE DETAILED PROJECT REPORT (DPR) OF CLUSTER 6 OF PROPOSED 53 NATIONAL WATERWAYS.
STAGE 1 - FEASIBILITY REPORT

PROJECT NO. **P.009050**

SIZE: A3 | SCALE: 1:25000 | SHEET: 7–9

TRACTEBEL Engineering
GDF SUEZ

DRAWING NUMBER
P.I.0.0.9.0.5.0.-W-2.0.2.0.1-0.0.8 REV 0

MATCH_LINE

MATCH_LINE

CH 70.00

CH 69.00

CH 68.00

CH 67.00

CH 66.00

CH 65.00

CH 64.00

CH 63.00

CH 62.00

Bandaru

Mogru

Sagar Power Barrage

MATCH_LINE

MATCH_LINE

B8

N

W

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S

KEY PLAN

LEGEND

	DAM/BARRAGE
	BUS STOP
	PORT
	INDUSTRY
	PLACE NAME
	FUEL STATION/PUMP
	JETTY
	RAILWAY STATION
	RESORT
	NATIONAL/STATE HIGHWAY (Hwy)
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BRIDGE DETAILS

BRIDGE No.	CHAINAGE (Km)
-	-

PROPOSED WATERWAY LENGTH 78.0Km (AS PER TENDER)

TOTAL WATERWAY LENGTH FROM POINT 'A' TO POINT 'B' 80.48Km

SCALE 0 0.5 1.25KM

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TITLE
NETRAVATHI RIVER (KARNATAKA)
PROPOSED NATIONAL WATERWAY NUMBER 74
LAYOUT PLAN

CLIENT
INLAND WATERWAYS AUTHORITY OF INDIA
MINISTRY OF SHIPPING

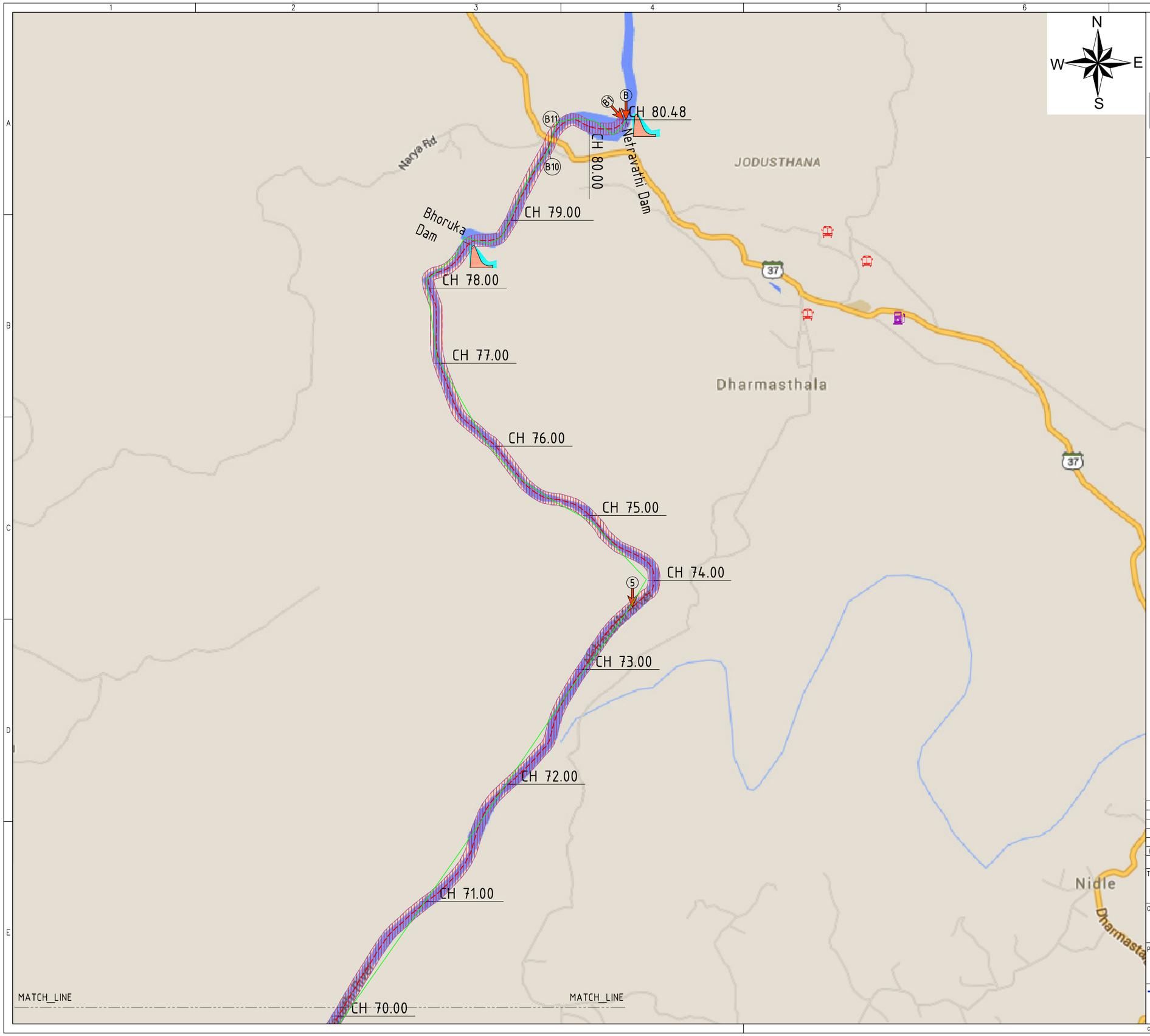
PROJECT
CONSULTANCY SERVICES FOR PREPARATION OF TWO STAGE DETAILED PROJECT REPORT (DPR) OF CLUSTER 6 OF PROPOSED 53 NATIONAL WATERWAYS.
STAGE 1 - FEASIBILITY REPORT

PROJECT NO.
P.009050

TRACTEBEL Engineering
GDF SUEZ

SIZE: A3 | SCALE: 1:25000 | SHEET: 8-9

DRAWING NUMBER
P.009050-W-20201-0008 REV 0



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KEY PLAN

LEGEND

	DAM/BARRAGE
	BUS STOP
	PORT
	INDUSTRY
	PLACE NAME
	FUEL STATION/PUMP
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	RAILWAY STATION
	RESORT
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BRIDGE DETAILS

BRIDGE No.	CHAINAGE (Km)
B10	80.000
B11	80.140

PROPOSED WATERWAY LENGTH 78.0Km (AS PER TENDER)

TOTAL WATERWAY LENGTH FROM POINT 'A' TO POINT 'B' 80.48Km

SCALE 0 0.5 1.25KM

BACKGROUND IMAGE REFERENCE FROM "GOOGLE MAP"

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TITLE
NETRAVATHI RIVER (KARNATAKA)
PROPOSED NATIONAL WATERWAY NUMBER 74
LAYOUT PLAN

CLIENT
INLAND WATERWAYS AUTHORITY OF INDIA
MINISTRY OF SHIPPING

PROJECT
CONSULTANCY SERVICES FOR PREPARATION OF TWO STAGE DETAILED PROJECT REPORT (DPR) OF CLUSTER 6 OF PROPOSED 53 NATIONAL WATERWAYS.
STAGE 1 – FEASIBILITY REPORT

PROJECT NO. **P.009050**

SIZE: A3 | SCALE: 1:25000 | SHEET: 9–9

TRACTEBEL Engineering
GDF SUEZ

DRAWING NUMBER P.0090 50-W-2020 1-0008 REV 0

MAPS

MAP 4.1 – LAYOUT MAP SHOWING EXISTING JETTIES AND INDUSTRIES IN VICINITY OF NETRAVATHI & GURUPUR RIVER

MAP 4.1

LEGEND

	DAM/BARRAGE
	PORT
	INDUSTRY
	PLACE NAME
	JETTY
	RAILWAY STATION
	NATIONAL/STATE HIGHWAY (Hwy)
	ROAD
	FERRY LINE
	ROUTE PROVIDED BY IWAI
	SURVEY (VESSEL TRACK)/THALWEG
	RAILWAY LINE

GURUPUR RIVER DETAILS

A	START POINT FROM CONFLUENCE OF NETRAVATHI RIVER AT LAT. 12°50'44.04" LON. 74°49'44.51"
B	END POINT AT MANGALORE PORT BRIDGE AT LAT. 12°50'44.04" LON. 74°49'44.51"
A1	START POINT FROM CONFLUENCE OF NETRAVATHI RIVER AT LAT. 12°50'42.43" LON. 74°49'27.67"
B1	END POINT AT MANGALORE PORT BRIDGE AT LAT. 12°55'37.85" LON. 74°49'40.54"

PROPOSED WATERWAY LENGTH 10.00Km (AS PER TENDER)

NETRAVATHI RIVER DETAILS

C	START POINT CONFLUENCE WITH ARABIAN SEA AT BENGRE LAT. 12°50'42.73" N, LON. 74°49'28.86" E
D	END PINT FROM NETRAVATHI DAM, DHARMSTHALA AT LAT. 12°57'55.23" N, LONG 75°22'10.19" E
C1	RECONNAISSANCE SURVEY FROM CONFLUENCE WITH ARABIAN SEA AT BENGRE LAT. 12°50'42.18" N, LON. 74°49'28.20" E
D1	END POINT OF RECONNAISSANCE SURVEY NEAR NETRAVATHI DAM, DHARMSTHALA AT LAT. 12°57'54.35" N, LONG 75°22'10.42" E

PROPOSED WATERWAY LENGTH 78.0Km (AS PER TENDER)

SCALE 0 0.4 1.0KM

GURUPUR LIST OF JETTIES		
SL.	DESCRIPTION	SYMB.
1	OLD MANGALORE PORT	J1
2	BMS FERRY (RIGHT BANK- BENGRE)	J2
3	OLD FISHING DOCK	J3
4	BMS FERRY (LEFT BANK- BUNDER)	J4
5	BENGRE FERRY LINE (RIGHT BANK - BUNDER)	J5
6	BENGRE FERRY LINE (LEFT BANK- BUNDER)	J6
7	BHARATI SHIPYARD	J7
8	FERRY- FATIMA	J8
9	FERRY - SULTAN BATTER	J9
10	MANGALORE PORT	J10

NETRAVATHI RIVER LIST OF JETTIES		
SL.	DESCRIPTION	SYMB.
1	ADYAR FERRY	J11
2	PAVOOR FERRY	J12
3	FARANGIPETE FERRY	J13
4	THUMBE FERRY	J14
5	SAJIPANADU FERRY	J15

GURUPUR & NETRAVATHI LIST OF EXISTING INDUSTRY		
SL.	DESCRIPTION	SYMB.
1	BASF INDIA LIMITED	I1
2	BHARAT PETROLEUM LPG BOTTLING PLANT	I2
3	TOTAL LPG INDIA - 62	I3
4	MANGALORE CHEMICALS & FERTILIZERS	I4
5	STRAIDS ARC LAB & SPECIALITY LTD.	I5
6	KUDREMUKH IRON ORE PROJECTS	I6
7	M/S MANGALORE REFINERY & PETROCHEMICALS LTD.	I7
8	M/S ULTRARECH CEMENT LTD.	I8
9	M/S ADANI WILMAR LTD. (FORMALLY KNOWN AS RAJASHREE PACKAGERS PVT. LTD.)	I9
10	RUCHI SOYA INDUSTRIES LTD.	I10
11	M/S BLUE WATER FOODS & EXPORTS PVT. LTD.	I11

TITLE: LAYOUT MAP SHOWING EXISTING JETTIES & INDUSTRIES IN VICINITY OF NETRAVATHI & GURUPUR RIVER (MAP 4.1)

CLIENT: INLAND WATERWAYS AUTHORITY OF INDIA
MINISTRY OF SHIPPING

PROJECT: CONSULTANCY SERVICE FOR PREPARATION OF TWO STAGE DETAILED PROJECT REPORT (DPR) OF CLUSTER 6 OF PROPOSED 53 NATIONAL WATERWAYS. STAGE 1 - FEASIBILITY REPORT

PROJECT NO. P.009050

TRACTEBEL Engineering GDF SUEZ

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