Final Feasibility Report
National Waterways - 70
Region V – Manjira River
Confluence with Godavari River at Kandakurthi to Singur Dam (245.0km)

SURVEY PERIOD: 03 JUL TO 10 SEP 2016

Volume - I

Prepared for:

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

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CONTENTS

1 Introduction 3
1.1 Background 3
1.2 Tributaries of Manjira River 3
1.3 State/District through which Manjira River Passes 4
1.4 Map 4
1.4.1 Full Course of the Waterway 4
1.4.2 Course of the Waterway under Study 5
1.5 Scope of Work 5
2 Methodology Adopted to Undertake Study 6
2.1 Recce 6
2.2 Survey Resources and Methodology 6
2.2.1 Survey Launch 6
2.2.2 Survey Equipment 7
2.2.3 Topographic Survey 7
2.2.4 Bathymetric Survey and Survey Launch 8
2.2.5 Calibration 8
2.3 Description of Bench Marks/Authentic Reference Level Used 8
2.4 Tidal influence Zone and Tidal Variation 10
2.5 Methodology to fix Chart Datum / Sounding Datum 10
2.5.1 Sounding Datum 10
2.5.2 Datum Calculation 10
2.6 Average of 06 years minimum Water Levels to arrive at Chart Datum (CD) 12
2.7 Transfer of Sounding Datum 13
2.8 Table indicating Tidal Variation at Different Observation Points 13
2.9 Salient features of Dam, Barrages etc. 13
2.9.1 Singur Dam 13
2.9.2 Manjira Barrage 15
2.9.3 Nizamsagar Dam 15
2.10 Erected IWAI Benchmark Pillars 17
2.11 Chart Datum / Sounding Datum and Reductions Details 18
2.12 HFL values of Bridges/Cross Structures 18
2.13 Graph: Chart Datum and HFL v/s Chainage 19

2.14 Average Bed Slope 19
2.15 Details of Dam, Barrages, Weirs, Anicut, etc. 20
2.16 Details of Locks 21
2.17 Details of Aqueducts 21
2.18 Details of existing Bridges and Crossings over Waterway 21
2.19 Details of other Cross structures, pipe-lines, under water cables 23
2.20 Details of High Tension Lines / Electric lines / Tele-communication lines 23
2.21 Current Meter and Discharge Details 24
2.22 Water Sample Locations 24
3 Description of Waterway 25
3.1 Sub-Stretch-01: Confluence with Godavari to Karla Village (Chainage 0.0km to 16.0km) 26
3.1.1 Observed and reduced Bed Profile of the stretch 28
3.2 Sub-Stretch-02: Karla Village to Hangarga Village (Chainage 16.0km to 40.0km) 29
3.2.1 Observed and reduced Bed Profile of the stretch 31
3.3 Sub-Stretch-03: Hangarga Village to Chintal Nagaram Village (Chainage 40.0km to 68.4km) 32
3.3.1 Observed and reduced Bed Profile of the stretch 34
3.4 Sub-Stretch-04: Chintal Nagaram Village to Nizamsagar Dam (Chainage 68.4km to 91.9km) 35
3.4.1 Observed and reduced Bed Profile of the stretch 37
3.5 Sub-Stretch-05: Nizamsagar Dam to Muddapur Village (Chainage 91.9km to 118.6km) 38
3.5.1 Observed and reduced Bed Profile of the stretch 40
3.6 Sub-Stretch-06: Muddapur Village to Edupayala check dam (Chainage 118.6km to 146.6km) 41
3.6.1 Observed and reduced Bed Profile of the stretch 43
3.7 Sub-Stretch-07: Edupayala check dam to Rollpahad Village (Chainage 146.6km to 170.4km) 44
3.7.1 Observed and reduced Bed Profile of the stretch 46
3.8 Sub-Stretch-08: Rollpahad Village to Korpole Village (Chainage 170.4km to 197.2km) 47
3.8.1 Observed and reduced Bed Profile of the stretch 48
3.9 Sub-Stretch-09: Korpole Village to D/s of Manjira Barrage (Chainage 197.2km to 220km) 49
3.9.1 Observed and reduced Bed Profile of the stretch 51
3.10 Sub-Stretch-10: Upstream of Manjira Barrage to Downstream of Singur Dam (Chainage 220.0km to 245.0km) 52
3.10.1 Observed and reduced Bed Profile of the stretch 54
3.11 Other Aspects of Waterway 54

3.11.1 Fishing....54
3.11.2 Industries....54
3.11.3 Crops....55
3.11.4 Settlements and irrigation....55
3.11.5 Important cities/towns....56
3.11.6 Road Network....56
3.11.7 Rail Network....57
3.11.8 Land Use....57
3.11.9 Construction Material....58
3.11.10 Cargo Movement....58
3.11.11 Passenger Ferry Services....58
3.11.12 Historic Importance....58
3.11.13 Tourism....59
3.11.14 Details of Irrigation Canals and Outlets....60
4 Terminals....62
4.1 Proposed Locations for Construction of New Terminals....62
5 Fairway Development....62
5.1 Design Channel of the Waterway....63
5.2 Fairway Dimensions....63
5.3 Calculation of Dredging Quantity....63
6 Conclusion....68
6.1 Description of Waterways....68
6.2 Condition of Canal bed....69
6.3 Methods for Making Waterway Feasible....69
6.4 Modifications/ Improvement Measures....70
6.5 Recommendation....70
7 Details of Annexures....72
Annexure-1 Data Collected from Various Agencies....72
Annexure-2 Stretch wise Data of Observed Depths to Reduced Depths....74
Annexure-3 Dredge Volumes (per km) for different classification with length of shoal….....76
Annexure-4 Water Level Details....98
Annexure-5 Survey Dates....100
Annexure-6 Details of Bank Protection....102

Annexure-7 Details of Riverside Features.....104

Annexure-8 Horizontal and Vertical Control.....108

Annexure-9 Equipment Photographs.....113

Annexure-10 Bench Mark Pillar Forms.....115

Annexure-11 Current Meter Observation.....164

Annexure-12 Water Sample Analysis.....166

Annexure-13 Calibration Certificates.....168

Annexure-14 Survey Chart Scheming Index and Chart Details.....171

Annexure-15 Field Photographs.....176

Annexure-16 Levelling Data.....178

Figure 1 - Tributaries of Manjira River 3

Figure 2 - Full Course of Manjira River..... 4

Figure 3 - Course of Manjira River under Study..... 5

Figure 4 - DGPS Spot Levelling in Progress..... 8

Figure 5 - Chart Datum and HFL v/s Chainage..... 19

Figure 6 - Confluence with Godavari to Karla Village 26

Figure 7 - View of Kandakurthi Bridge (-0.51 km chainage) 27

Figure 8 - Impounded waters on un-even river bed and vegetation in Manjira River (sub-stretch1) 27

Figure 9 - River Bed Profile 28

Figure 10 - Karla Village to Hangarga Village 29

Figure 11 - Sand mining area (17km to 23km chainage area)..... 30

Figure 12 - River Bed Profile 31

Figure 13 - Hangarga Village to Chintal Nagaram Village 32

Figure 14 - Bridge under construction near Khatagaon (49.77km Chainage)..... 33

Figure 15 - Rock outcrops on sub-stretch-03 34

Figure 16 - River Bed Profile 34

Figure 17 - Chintal Nagaram Village to Nizamsagar Dam 35

Figure 18 - Downstream of Nizamsagar Dam (91.86 km chianage) with steep gradient..... 36

Figure 19 - The Rock outcrops in Manjira River (89-91 km chainage) 36

Figure 20 - River Bed Profile 37

Figure 21 - Nizamsagar Dam to Muddapur Village 38
Figure 22 - Levelling of Water level gauge of Nizamsagar Dam (91.71 km chainage) 39
Figure 23 - River Bed Profile 40
Figure 24 - Muddapur Village to Edupayala check dam 41
Figure 25 - Edupayala Temple (146.0km Chainage of Manjira River) 42
Figure 26 - River Bed Profile 43
Figure 27 - Edupayala check dam to Rollpahad Village 44
Figure 28 - Edupayala Check dam (147.25km Chainage of Manjira River) 45
Figure 29 - River Bed Profile 46
Figure 30 - Rollpahad Village to Korpole Village 47
Figure 31 - River Bed Profile 48
Figure 32 - Korpole Village to D/s of Manjira Barrage 49
Figure 33 - View of River bed (Sub-stretch-09) 50
Figure 34 - River Bed Profile 51
Figure 35 - Upstream of Manjira Barrage to Downstream of Singur Dam 52
Figure 36 - The power sub-station near Singur Dam (245.0 km chainage) 53
Figure 37 - Observed and reduced Bed Profile of the stretch 54
Figure 38 - Drinking Water Pump (6.5 km chainage) well on Manjira River 55
Figure 39 - Road Network 56
Figure 40 - Rail Network 57
Figure 41 - View of Medak Fort (139.0 km chainage) 58
Figure 42 - View of Medak Church (138 km chianage) 59
Figure 43 - View of Edupayala Temple (147.25 km chainage) 59
Figure 44 - Wild Life Sanctuary, Manjira (220.1 km chainage) 60
Figure 45 - Fairway Channel Dimensions 63

Table 1 - State wise waterway 4
Table 2 - Survey Equipment Used 7
Table 3 - Details of GTS Benchmark at CWC Guest House, Singur (ch. 244.8km) 8
Table 4 - Accepted Station co-ordinates (WGS-84) 9
Table 5 - Established CD for Manjira River 12
Table 6 - Nizamsagar Dam Data from 2009 to 2015 13
Table 7 - Salient features of Singur Dam 14
Table 8 - Salient features of Singur Reservoir 14
Table 9 - Salient features of Singur Power House 15
Table 10 - Salient features of Manjira Barrage 15

Table 11 - Salient features of Nizamsagar Dam 16
Table 12 - Nizamsagar Reservoir 16
Table 13 - Salient features of Nizamsagar Dam 17
Table 14 - Accepted coordinates (WGS-84) of established IWAI BM Pillars 18
Table 15 - HFL values of Bridges/Cross Structures 19
Table 16 - Average Bed Slope 20
Table 17 - Details of Dams and Barrages 21
Table 18 - Details of Existing Bridges and Crossings 23
Table 19 - Details of High Tension Lines 24
Table 20 - Dredging Quantity Details – Stretch 01 28
Table 21 - Dredging Quantity Details – Stretch 02 30
Table 22 - Dredging Quantity Details – Stretch 03 34
Table 23 - Dredging Quantity Details – Stretch 04 37
Table 24 - Dredging Quantity Details – Stretch 05 40
Table 25 - Dredging Quantity Details – Stretch 06 42
Table 26 - Dredging Quantity Details – Stretch 07 45
Table 27 - Dredging Quantity Details – Stretch 08 48
Table 28 - Dredging Quantity Details – Stretch 09 50
Table 29 - Dredging Quantity Details – Stretch 10 53
Table 30 - Details of Industries 54
Table 31 - Details of Irrigational Canals and Inlet/Outlets 61
Table 32 - Proposed Locations for Construction of New Terminals 62
Table 33 - Dredge Volumes Class-I 64
Table 34 - Dredge Volumes Class-II 65
Table 35 - Dredge Volumes Class-III 66
Table 36 - Dredge Volumes Class-IV 67
Table 37 - Stretch wise Average width and slope of waterway 68
Table 38 - Class-wise Reduced Dredging quantity 69
Table 39 - Class-wise availability of reduced depth of the waterway 70
Table 40 - Bridges and HTL Clearances less than Class no. 70

List of Abbreviations

CD	Chart Datum
DGPS	Differential Global Positioning Systems
ETS	Electronic Total Station
GPS	Global Positioning Systems
MJR	Manjira
LBM	Local Bench Mark
MSL	Mean Sea Level
RL	Reference Level
SD	Sounding Datum
SBAS	Satellite-Based Augmentation System
TBC	Trimble Business Center
NH	National Highway
SH	State Highway

SALIENT FEATURES AT A GLANCE

<table>
<tr><th>#</th><th>Particulars</th><th>Details</th></tr>
<tr><td>1.</td><td>Name of Consultant</td><td>IIC Technologies Limited, Hyderabad</td></tr>
<tr><td>2.</td><td>Region number & State(s)</td><td>Region – V, Telangana & Maharashtra</td></tr>
<tr><td>3.</td><td>Waterway stretch, NW # (from…. to; total length)</td><td>National Waterway No – 70
Kandakurthi to Singur Dam (245.0km)</td></tr>
<tr><td>4.</td><td>Navigability Status</td><td>No ferry/local boat services observed throughout the stretch except Nizamsagar Dam</td></tr>
<tr><td>a)</td><td>Tidal & non tidal portions (from… to, length, average tidal variation)</td><td>The survey Stretch of Manjira River is non-tidal.</td></tr>
<tr><td>b)</td><td>LAD status (w.r.t. CD)
i) Survey period (12 Feb to 08 Mar, 2016.)
ii) < 1.2 m (km)
iii) 1.2 m to 1.4 m (km)
iv) 1.5 m to 1.7 m (km)
v) 1.8 m to 2.0 m (km)
vi) > 2.0 m (km)</td><td>
<table>
<tr><th>LAD (m)</th><th>< 1.2</th><th>1.2 - 1.4</th><th>1.5 - 1.7</th><th>1.8 - 2.0</th><th>> 2</th><th>Total</th></tr>
<tr><td>0 - 16 km</td><td>16</td><td>0</td><td>0</td><td>0</td><td>0</td><td>16</td></tr>
<tr><td>16 - 40 km</td><td>24</td><td>0</td><td>0</td><td>0</td><td>0</td><td>24</td></tr>
<tr><td>40 - 68.4 km</td><td>28.4</td><td>0</td><td>0</td><td>0</td><td>0</td><td>28.4</td></tr>
<tr><td>68.4 - 91.9 km</td><td>23.5</td><td>0</td><td>0</td><td>0</td><td>0</td><td>23.5</td></tr>
<tr><td>91.9 - 118.6 km</td><td>26.7</td><td>0</td><td>0</td><td>0</td><td>0</td><td>26.7</td></tr>
<tr><td>118.6 - 146.6 km</td><td>28</td><td>0</td><td>0</td><td>0</td><td>0</td><td>28</td></tr>
<tr><td>146.6 - 170.4 km</td><td>23.8</td><td>0</td><td>0</td><td>0</td><td>0</td><td>23.8</td></tr>
<tr><td>170.4 - 197.2 km</td><td>26.8</td><td>0</td><td>0</td><td>0</td><td>0</td><td>26.8</td></tr>
<tr><td>197.2 - 220 km</td><td>22.8</td><td>0</td><td>0</td><td>0</td><td>0</td><td>22.8</td></tr>
<tr><td>220-245 km</td><td>25</td><td>0</td><td>0</td><td>0</td><td>0</td><td>25</td></tr>
<tr><td>Total</td><td>245</td><td>0</td><td>0</td><td>0</td><td>0</td><td>245</td></tr>
</table>
Manjira River is observed to be in dry state and the survey was conducted by topographic method.</td></tr>
<tr><td>c)</td><td>Cross structures
i) Dams, weirs, barrages etc. (total number; with navigation locks or not)
ii) Bridges, Power cables etc. [total number; range of horizontal and vertical clearances]</td><td>i) Dams, weirs, barrages etc. – 04 Nos.
ii) No Navigation Locks - Nil
iii) Bridges, Cross overs – 17 Nos
Horizontal Clearance – 2.508 to 42.149m
Vertical Clearance – 2.3 to 18.706m w.r.t. HFL
iv) High Tension Lines – 12 Nos
Vertical Clearance – 15 to 42.00 m</td></tr>
<tr><td>d)</td><td>Avg. discharge & no. of days</td><td>Discharge Data not available from authorities.</td></tr>
<tr><td>e)</td><td>Slope (1 in ….)</td><td>Average Slope = 1 : 0.763
<table>
<tr><th colspan="2">Chainage (km)</th><th rowspan="2">Slope (A/B)</th></tr>
<tr><th>From</th><th>To</th></tr>
<tr><td>0</td><td>16</td><td>1 : 0.485</td></tr>
<tr><td>16</td><td>40</td><td>1 : 0.424</td></tr>
<tr><td>40</td><td>68.4</td><td>1 : 0.427</td></tr>
<tr><td>68.4</td><td>91.9</td><td>1 : 2.376</td></tr>
<tr><td>91.9</td><td>118.6</td><td>1 : 0.305</td></tr>
<tr><td>118.6</td><td>146.6</td><td>1 : 1.329</td></tr>
<tr><td>146.6</td><td>170.4</td><td>1 : 0.423</td></tr>
<tr><td>170.4</td><td>197.2</td><td>1 : 0.587</td></tr>
<tr><td>197.2</td><td>220</td><td>1 : 0.207</td></tr>
<tr><td>220</td><td>244.9</td><td>1 : 1.011</td></tr>
</table></td></tr>
<tr><td>5.</td><td>Traffic potential</td><td>No Navigational traffic is present in the survey stretch of</td></tr>
</table>

#	Particulars	Details
		Manjira River.
a)	Present IWT operations, ferry services, tourism, cargo, if any	No local boats or ferry services exist except in Nizamsagar Dam
b)	Important industries within 50km	Ganesh Sugar Industries near Kulabgoor, Sangareddy, and Charminar Breweries near Shivampet, Sangareddy and Empee Distilleries near Choutkur, Medak are two major industries observed in the survey stretch of Manjira River.
c)	Distance of Rail & Road from Industry	All the industries are well connected with road network and established beside state highway SH-13. The area of interest is poorly connected by rail network.
6.	Consultant's recommendation for going ahead with TEF / DPR preparation	The waterway may be developed as a Class IV navigational canal by carrying out capital dredging to achieve the navigability. The stretches above reservoirs of Manjira River can be developed for navigation and transportation as per the scope of development. Due to continuous gradient of the river and the water level will not be available during the summer season the navigation aspect will not be fulfilled throughout the year. The navigational lock is required to maintain the minimum depth required for navigation and regulate the water level in the river. Boat jetties may be constructed at the upstream of Manjira Barrage and Nizamsagar Dam for the purpose of tourism only. The cargo movement is not envisaged as the industries are far from the river banks and are well connected with road network. As the river stretch is dried, this River Stretch is not-viable for developing as navigable channel.
7.	Any other information/ comment	-Nil-

(Signature)

Date: Name of Consultant

1 Introduction

1.1 Background

The Manjira River also spelled as Manjeera and Manjara at various administrative offices is a tributary of Godavari River. The Manjira River originates in the Balaghat range of hills near Ahmednagar district and the confluence with the Godavari River near Kandakurthi. The water from Manjira River is the main source for the irrigation supply for the vast spread agricultural areas of Telangana districts. The Singur and Nizamsagar Reservoir on Manjra River in Medak District is the main drinking water source for the Medak and Nizamabad districts as well as the adjoining twin cities of Hyderabad and Secunderabad.

1.2 Tributaries of Manjira River

The main tributaries of the Manjira River are Terna River, Tawajara River and Lendi River. Rivers Terna and Tawajara confluence with the Manjira River at the upstream of the Singur dam in Medak district which does not come under project influence area. River Lendi originates in Udgir taluka and flowing through the Ahmadpur taluka joins the Manjira River at Shelgaon in Nanded district, Maharashtra.

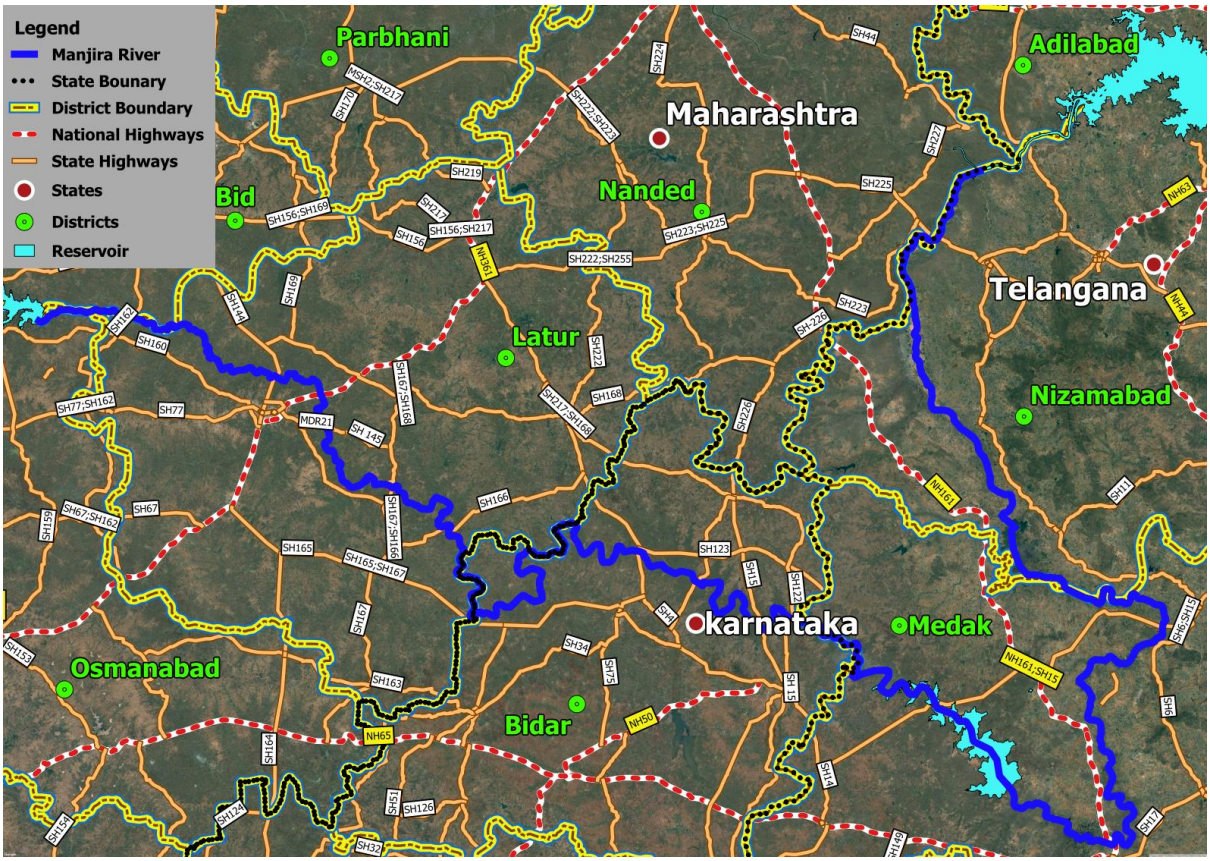


Figure 1 - Tributaries of Manjira River

1.3 State/District through which Manjira River Passes

The Manjira River flows down through Telangana and Maharashtra states and finally confluence with the Godavari River near Kandakurthi, Nizamabad district Telangana State.

State	Chainage From	Chainage To	Length (km)
Telangana & Maharashtra	0	35.5	35.5
Telangana	35.5	245.0	209.5
		Total	**245**

Table 1 - State wise waterway

1.4 Map

1.4.1 Full Course of the Waterway

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

Figure 2 - Full Course of Manjira River

1.4.2 Course of the Waterway under Study

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

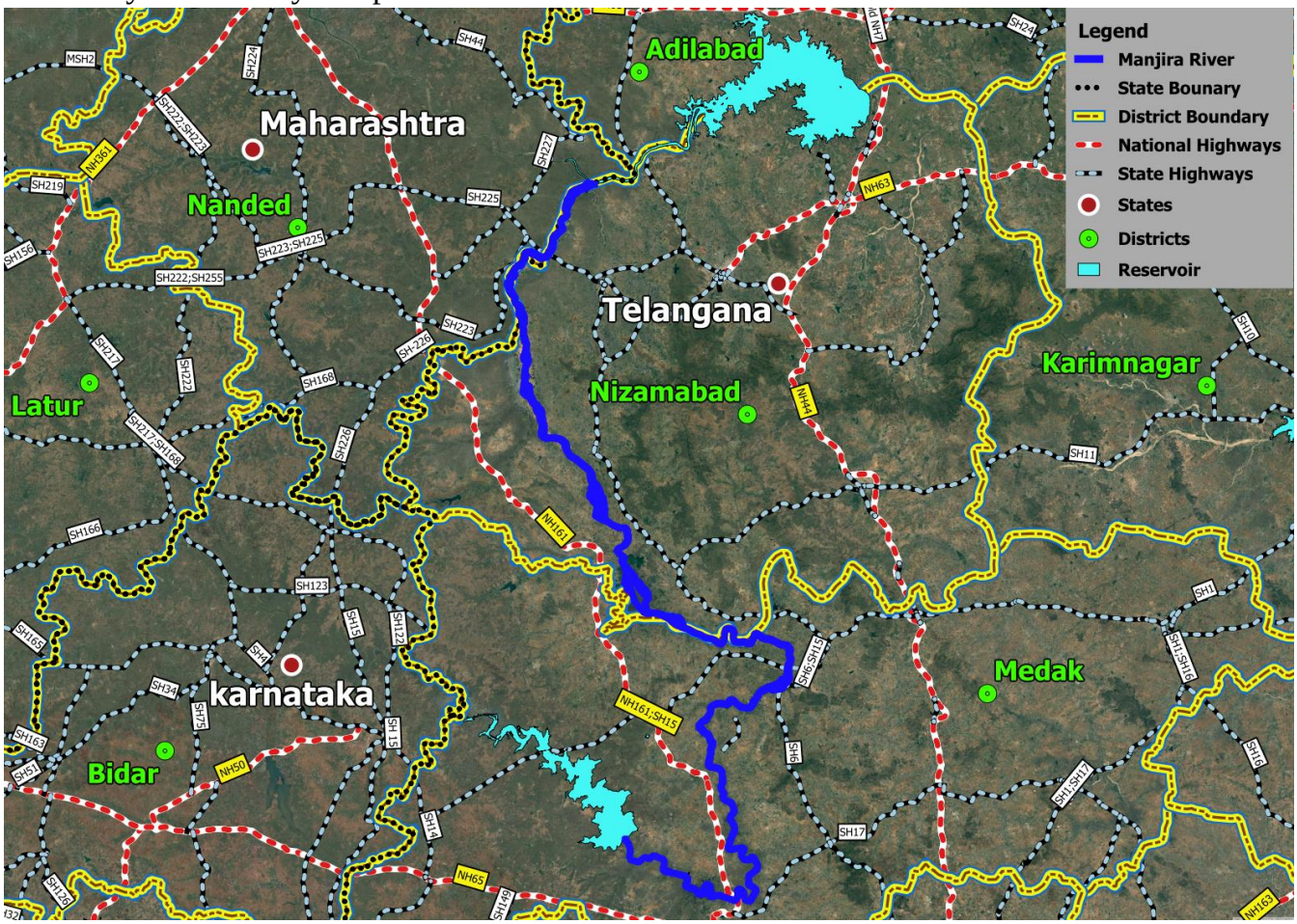


Figure 3 - Course of Manjira River under Study

1.5 Scope of Work

The scope of the work is, to conduct detailed hydrographic and topographic survey of 245.0kms length of the Manjira River from confluence with river Godavari at Kandakurthi at Lat 18°49'6.80"N, Long 77°52'20.48"E to Singur Dam at Lat 17°44'58.35"N, Long 77°55'40.79"E.

The scope of the work for the conduct of survey of Manjira River includes:

- Undertake bathymetric and topographic survey of proposed waterway.
- Establishing horizontal and vertical control stations.
- Construction of benchmark pillars and establishing its reduced level w.r.to MSL
- Setting up and deployment of water level gauges.
- Current velocity and discharge measurements.

- Collection and analysis of water and bottom samples.
- Collection of topographic features including existing cross structures.
- Preparation of inventory of industries in the project influence area (PIA).
- Analysis of survey data, including assessment of water availability for navigation.
- Preparation of survey charts and feasibility report.

2 Methodology Adopted to Undertake Study

2.1 Recce

Advanced recce of the survey area was undertaken on 30 and 31 May 2016. The Recce commenced from the Downstream of Singur Dam and proceed to towards Downstream through Manjira Barrage, Medak, Nizamsagar Dam, Banswada and Bodhan.

Towards the downstream portion of the Manjira River is mostly sandy river bed with farm lands on the river banks. The rock outcrops are found in isolated places, especially in the immediate downstream of dams. The Major Towns near to the river banks are Sangareddy, Jogipet, Medak, Yellareddy and Banswada.

There is no water available in the river except some areas with impounded water, so the operation of survey boat is found to be not possible through the entire stretch of the river.

River banks are mostly clear and without any obstruction as farmland are stretched up to river banks. Paddy, peanuts, Sugar cane and cotton cultivation are prominent in the entire stretch. The DGPS signal is expected to be good in the entire stretch of the river. The Survey operation is expected to be difficult as no availability of approach roads close to river banks.

2.2 Survey Resources and Methodology

The survey was commenced on 03rd Jul 2016 and completed on 10th Sep 2016. The survey was undertaken on a scale of 1:50000 with sounding line spacing, kept at 200m and plotted on UTM Projection at Zone 43N and 44N as directed in the contract.

2.2.1 Survey Launch

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

2.2.2 Survey Equipment

Following equipment were employed for topographic survey.

Equipment	Make	Eqpt. Serial No.	Qty. Employed
GPS Sets	Trimble R3/R4	-	05
Auto Level	Sokkia Auto level & Accessories	257222 ,234298	02
ETS	Trimble M3	120775	01
Software	AUTOCAD	2012	1
Software	Microsoft Office	2013	1
Software	Trimble Business center	Version -12	1

Table 2 - Survey Equipment Used

2.2.3 Topographic Survey

The survey was commenced on 03rd Jul and completed on 10th Sep 2016. The weather was cloudy with moderate to heavy showers through the period during survey operations. The weather was favorable with hot climate for the conduct of survey and the weather conditions remains same for the entire duration of the survey. The topographic survey was conducted to collect the following data:-

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

The spot levels along the river were obtained by using DGPS leveling technique. Local terrain and limitation of line of sight visibility prohibited the use of optical techniques to a large extent. The data was post processed using Trimble Business Center to get the correct position and height values of the rover locations visited during the day. These spot level heights were further compared and corrected in reference with the values obtained by Auto level and incorporated in the final map. The details of all spot levels are provided in the respective sheets being presented along-with this report. Additionally, a soft copy of the same in XYZ format is being handed over as deliverable data.

Figure 4 - DGPS Spot Levelling in Progress

2.2.4 Bathymetric Survey and Survey Launch

During the course of the survey Manjira river was dry and sufficient water level was not available in any of the reservoirs on the Manjira River for the conduct of Bathymetric Survey, hence entire river stretch of 245.0km of Manjira River was covered with topographic survey.

2.2.5 Calibration

The equipment used for the survey was calibrated by the equipment supplier. The equipment calibration certificates are placed at Annexure-13 to this report.

2.3 Description of Bench Marks/Authentic Reference Level Used

The MSL value inscribed near GTS benchmark at the CWC Guest house, Singur was recovered as 525.836m above MSL and this value was further clarified from the Assistant Engineer, Singur Dam. This Benchmark was used as the Initial horizontal and vertical control point. The details of GTS benchmark are as below:-

The Details of GTS Bench Mark, CWC Guest House, Singur		
Lat:-	17°45'40.93134" N	
Long:-	77°56'55.87624" E	
MSL Value	525.836 m	
Source:- Office of Assistant Engineer, Singur Dam		

Table 3 - Details of GTS Benchmark at CWC Guest House, Singur (ch. 244.8km)

The value of the GTS benchmark as 525.836m from MSL was further used as the Reference Level value for transfer of vertical control for remaining control points (IWAI BM Pillars) through Auto Level (optical leveling) method. This transferred value was further cross checked with the Tide gauge Reference Level value available at Nizamsagar Dam and is found to be within the tolerance limit. All values of spot leveling during topographic survey refer to Mean Sea Level. The leveling data for establishing the Reference Level for the newly constructed Benchmark pillars are placed at Annexure –10 to this report. The final accepted WGS 84 coordinates and details of station & IWAI Benchmark established during the conduct of the survey are as follows:

Sl. No.	Station	Chainage (km)	Latitude	Longitude	Height above MSL (m)	Source/ Type
1	IWAI_BM_MJR_024	-0.48	N18°49'00.61244"	E77°52'43.56608"	334.198	Baseline Processing
2	IWAI_BM_MJR_023	6.52	N18°47'07.76710"	E77°49'36.61166"	337.471	Baseline Processing
3	IWAI_BM_MJR_022	17.42	N18°42'05.55147"	E77°48'01.84658"	343.459	Baseline Processing
4	IWAI_BM_MJR_021	26.69	N18°40'13.23878"	E77°44'35.65384"	345.528	Baseline Processing
5	IWAI_BM_MJR_020	39.92	N18°33'51.78665"	E77°45'33.00663"	357.77	Baseline Processing
6	IWAI_BM_MJR_019	49.79	N18°29'09.18006"	E77°45'57.14453"	357.832	Baseline Processing
7	IWAI_BM_MJR_018	63.64	N18°23'50.07767"	E77°49'35.41983"	360.589	Baseline Processing
8	IWAI_BM_MJR_017	71.09	N18°20'53.62291"	E77°52'19.07410"	373.422	Baseline Processing
9	IWAI_BM_MJR_016	79.77	N18°16'30.61482"	E77°53'43.12030"	393.42	Baseline Processing
10	IWAI_BM_MJR_015	90.68	N18°12'47.70094"	E77°55'30.96549"	406.038	Baseline Processing
11	IWAI_BM_MJR_014	103.63	N18°07'12.36410"	E77°58'18.50503"	428.93	Baseline Processing
12	IWAI_BM_MJR_013	117.44	N18°04'23.86426"	E78°05'09.61093"	429.795	Baseline Processing
13	IWAI_BM_MJR_012	130.03	N18°05'00.44696"	E78°09'00.27403"	433.714	Baseline Processing
14	IWAI_BM_MJR_011	141.05	N18°01'37.78602"	E78°12'38.10147"	438.785	Baseline Processing
15	IWAI_BM_MJR_010	152.46	N17°57'54.78747"	E78°08'46.06625"	466.129	Baseline Processing
16	IWAI_BM_MJR_009	163.25	N17°56'43.94058"	E78°04'11.43126"	469.1	Baseline Processing
17	IWAI_BM_MJR_008	172.15	N17°53'00.77908"	E78°04'22.00880"	479.804	Baseline Processing
18	IWAI_BM_MJR_007	181.78	N17°48'49.94815"	E78°05'55.88158"	486.236	Baseline Processing
19	IWAI_BM_MJR_006	191.44	N17°44'31.65934"	E78°06'26.86541"	489.166	Baseline Processing
20	IWAI_BM_MJR_005	203.71	N17°41'29.60517"	E78°08'32.52681"	492.9	Baseline Processing
21	IWAI_BM_MJR_004	212.23	N17°39'55.04172"	E78°07'50.60888"	495.84	Baseline Processing
22	IWAI_BM_MJR_003	219.51	N17°39'48.67107"	E78°04'44.97627"	508.341	Baseline Processing
23	IWAI_BM_MJR_002	227.37	N17°41'00.62719"	E78°02'15.28704"	504.591	Baseline Processing
24	IWAI_BM_MJR_001	235.63	N17°43'17.72347"	E77°58'59.03800"	504.245	Baseline Processing
25	MJR - GTS - BM	244.63	N17°45'40.93134"	E77°56'55.87624"	525.836	Online Processing

Table 4 - Accepted Station co-ordinates (WGS-84)

2.4 Tidal influence Zone and Tidal Variation

The entire survey stretch of Manjira River is non-tidal water body receiving a primary source of water from the Singur Dam in Sangareddy district of Telangana State. Hence, no influence of tidal forces was observed through the survey period.

2.5 Methodology to fix Chart Datum / Sounding Datum

The Manjira River is 245.0km length from confluence with river Godavari at Kandakurthi to Singur Dam. The entire river stretch is not suitable for the conduct of hydrographic survey or establishing Tide gauge due to the absence of sufficient water level.

Manjira River receives a primary source of water from Singur dam, which has already reached to its dry down level, hence there was negligible water present throughout the survey stretch of Manjira River and in the existing dams for any use.

2.5.1 Sounding Datum

The datum value of 420.899m from MSL of Telangana state owned water level gauge at Nizamsagar Dam (90.5km chainage) was recovered during the conduct of the survey. The Gauge is found to be dry and water is not available at the Nizamsagar dam. The difference between the Datum Value (420.899m) and the Ground level value (417.37m) is found to be more than 03.5m.

2.5.2 Datum Calculation

The most of the survey stretches of Manjira River being in dry state, the survey stretches were divided as per-kilometer stretches and the least MSL value obtained in conducting Topographic survey for the per km stretch is accepted as the datum value for dredging volume computation. The presence of Dams Barrages, check dam and on field topography of the river are also considered for the computation of the final chart datum for the survey stretch of Manjira River. The details of established datum value for per- Km stretches are as tabulated below:-

Km Stretch	Least Level w.r.t. MSL (m)	Established CD (m)		Km Stretch	Least Level w.r.t. MSL (m)	Established CD (m)		Km Stretch	Least Level w.r.t. MSL (m)	Established CD (m)
0-1	329.173	329.173		83-84	388.467	388.467		164-165	469.318	469.318
1-2	330.115	330.115		84-85	389.735	389.735		165-166	469.374	469.374
2-3	330.713	330.713		85-86	391.973	391.973		166-167	469.895	469.895
3-4	330.715	330.715		86-87	393.263	393.263		167-168	469.782	469.782
4-5	331.115	331.115		87-88	393.963	393.963		168-169	471.472	471.472
5-6	332.888	332.888		88-89	393.908	393.908		169-170	472.023	472.023
6-7	333.589	333.589		89-90	396.179	396.179		170-171	472.975	472.975
7-8	333.963	333.963		90-91	397.515	397.515		171-172	472.365	472.365

Km Stretch	Least Level w.r.t. MSL (m)	Established CD (m)		Km Stretch	Least Level w.r.t. MSL (m)	Established CD (m)		Km Stretch	Least Level w.r.t. MSL (m)	Established CD (m)
8-9	333.96	333.96		91-91.9	400.727	400.727		172-173	475.612	475.612
9-10	334.325	334.325		91.9-92	417.426	417.426		173-174	476.695	476.695
10-11	334.325	334.325		92-93	417.37	417.37		174-175	477.006	477.006
11-12	334.844	334.844		93-94	417.637	417.637		175-176	476.786	476.786
12-13	334.573	334.573		94-95	418.448	418.448		176-177	476.983	476.983
13-14	335.094	335.094		95-96	419.133	419.133		177-178	477.063	477.063
14-15	335.029	335.029		96-97	420.032	420.032		178-179	478.532	478.532
15-16	336.318	336.318		97-98	420.032	420.032		179-180	477.045	477.045
16-17	336.112	336.112		98-99	420.032	420.032		180-181	478.152	478.152
17-18	338.088	338.088		99-100	420.032	420.032		181-182	480.02	480.02
18-19	338.105	338.105		100-101	420.032	420.032		182-183	478.096	478.096
19-20	338.298	338.298		101-102	420.426	420.426		183-184	478.361	478.361
20-21	339.115	339.115		102-103	420.471	420.471		184-185	479.100	479.100
21-22	339.283	339.283		103-104	420.409	420.409		185-186	480.144	480.144
22-23	339.711	339.711		104-105	421.032	421.032		186-187	480.197	480.197
23-24	339.752	339.752		105-106	421.032	421.032		187-188	483.049	483.049
24-25	339.785	339.785		106-106.4	421.032	421.032		188-189	480.365	480.365
25-26	339.966	339.966		106.4-107	421.112	421.112		189-190	482.291	482.291
26-27	340.574	340.574		107-108	421.112	421.112		190-191	482.726	482.726
27-28	340.79	340.79		108-109	421.112	421.112		191-192	483.117	483.117
28-29	341.032	341.032		109-110	421.112	421.112		192-193	484.107	484.107
29-30	342.041	342.041		110-111	422.332	422.332		193-194	484.155	484.155
30-31	342.201	342.201		111-112	422.274	422.274		194-195	485.636	485.636
31-32	342.354	342.354		112-113	423.05	423.05		195-196	484.445	484.445
32-33	342.409	342.409		113-114	423.032	423.032		196-197	485.027	485.027
33-34	344.098	344.098		114-115	423.032	423.032		197-198	485.388	485.388
34-35	345.112	345.112		115-116	424.005	424.005		198-199	485.536	485.536
35-36	345.099	345.099		116-117	424.264	424.264		199-200	486.112	486.112
36-37	346.67	346.67		117-118	424.409	424.409		200-201	486.112	486.112
37-38	346.956	346.956		118-119	425.032	425.032		201-202	486.112	486.112
38-39	347.195	347.195		119-120	425.107	425.107		202-203	486.308	486.308
39-40	347.643	347.643		120-121	425.105	425.105		203-204	487.092	487.092
40-41	347.679	347.679		121-122	425.118	425.118		204-205	487.019	487.019
41-42	348.788	348.788		122-123	425.605	425.605		205-206	487.029	487.029
42-43	350.051	350.051		123-124	425.623	425.623		206-207	487.304	487.304
43-44	351.217	351.217		124-125	425.09	425.09		207-208	487.581	487.581
44-45	351.607	351.607		125-126	425.038	425.038		208-209	488.033	488.033
45-46	352.631	352.631		126-127	425.678	425.678		209-210	488.018	488.018
46-47	352.893	352.893		127-128	426.112	426.112		210-211	488.055	488.055
47-48	353.917	353.917		128-129	426.566	426.566		211-212	488.174	488.174
48-49	353.983	353.983		129-130	426.886	426.886		212-213	488.094	488.094
49-50	354.073	354.073		130-131	428.112	428.112		213-214	487.104	487.104
50-51	353.965	353.965		131-132	428.514	428.514		214-215	488.556	488.556
51-52	354.194	354.194		132-133	428.955	428.955		215-216	488.512	488.512
52-53	354.156	354.156		133-134	428.246	428.246		216-217	488.604	488.604
53-54	354.112	354.112		134-135	428.246	428.246		217-218	488.847	488.847
54-55	354.152	354.152		135-136	428.743	428.743		218-219	488.906	488.906
55-56	354.148	354.148		136-137	427.705	427.705		219-220	488.992	488.992
56-57	354.21	354.21		137-138	430.318	430.318		220-221	491.27	491.27
57-58	354.318	354.318		138-139	430.401	430.401		221-222	491.273	491.273
58-59	355.106	355.106		139-140	431.075	431.075		222-223	491.335	491.335
59-60	355.342	355.342		140-141	432.032	432.032		223-224	491.335	491.335
60-61	355.985	355.985		141-142	431.66	431.66		224-225	491.355	491.355

Km Stretch	Least Level w.r.t. MSL (m)	Established CD (m)		Km Stretch	Least Level w.r.t. MSL (m)	Established CD (m)		Km Stretch	Least Level w.r.t. MSL (m)	Established CD (m)
61-62	356.707	356.707		142-143	431.595	431.595		225-226	491.346	491.346
62-63	359.115	359.115		143-144	437.122	437.122		226-227	491.615	491.615
63-64	359.423	359.423		144-145	442.062	442.062		227-228	491.664	491.664
64-65	359.672	359.672		145-146	445.05	445.05		228-229	491.712	491.712
65-66	360.145	360.145		146-147	458.495	458.495		229-230	492.348	492.348
66-67	361.115	361.115		147-148	456.708	456.708		230-231	492.433	492.433
67-68	361.045	361.045		148-149	456.938	456.938		231-231.5	492.432	492.432
68-69	359.409	359.409		149-150	457.082	457.082		231.5-232	493.933	493.933
69-70	361.526	361.526		150-151	458.081	458.081		232-233	493.497	493.497
70-71	361.526	361.526		151-152	458.589	458.589		233-234	493.663	493.663
71-72	363.045	363.045		152-153	458.587	458.587		234-235	495.795	495.795
72-73	367.115	367.115		153-154	459.702	459.702		235-236	495.879	495.879
73-74	368.722	368.722		154-155	460.398	460.398		236-237	496.029	496.029
74-75	371.423	371.423		155-156	461.031	461.031		237-238	496.345	496.345
75-76	372.758	372.758		156-157	463.342	463.342		238-239	496.663	496.663
76-77	374.815	374.815		157-158	464.412	464.412		239-240	497.849	497.849
77-78	377.339	377.339		158-159	464.506	464.506		240-241	497.846	497.846
78-79	381.844	381.844		159-160	466.039	466.039		241-242	498.335	498.335
79-80	386.74	386.74		160-161	466.457	466.457		242-243	498.369	498.369
80-81	390.115	390.115		161-162	466.752	466.752		243-244	499.339	499.339
81-82	385.112	385.112		162-163	466.551	466.551		244-245.0	499.339	499.339
82-83	388.55	388.55		163-164	466.032	466.032				

Table 5 - Established CD for Manjira River

2.6 Average of 06 years minimum Water Levels to arrive at Chart Datum (CD)

Manjira River is a non-tidal River body having the primary source of water receiving from dams and ends up in during summer. There is a Telangana state owned water level gauge at Nizamsagar Dam (91.86km chainage) and the Chart Datum at gauge observed to be 420.899m above MSL.

Nizamsagar Dam –Telangana State Water Level Gauge							
Period: 2010-2015 & Water level values w.r.t MSL							
		2010	**2011**	**2012**	**2013**	**2014**	**2015**
		Gauge	Gauge	Gauge	Gauge	Gauge	Gauge
Jan	min		426.683			427.293	421.020
	max		427.653			428.183	421.093
Feb	min		425.534	424.876		426.379	420.155
	max		426.674	426.848		427.281	421.014
Mar	min		423.617	424.026		425.324	420.112
	max		425.522	426.077		426.403	420.155
Apr	min		424.056	421.593		425.038	420.088
	max		425.891	423.913		426.007	420.112
May	min		424.858	421.435		424.845	420.045
	max		425.074	421.593		425.025	420.081
Jun	min	418.777	424.714		420.447	424.635	
	max	418.893	424.845		420.648	424.842	
Jul	min	418.771	424.696		420.435	424.440	

	max	419.045	425.434		425.888	424.617	
Aug	min	419.057	426.287		426.040	424.007	
	max	428.067	428.092		427.025	424.434	
Sep	min		428.028		426.854	423.495	
	max		428.244		427.799	424.739	
Oct	min	428.244	427.406		427.683	421.167	
	max	428.244	427.988		428.244	423.477	
Nov	min	428.244	427.156		428.244	421.148	
	max	428.244	427.406		428.244	421.167	
Dec	min	427.634	426.464		428.195	421.093	
	max	428.244	427.141		428.244	421.142	
6yr. Min.		418.771	423.617	421.435	420.435	421.093	420.045
6yr. Max.		428.244	428.244	426.848	428.244	428.183	421.093
Value of Chart Datum (CD)					**420.899**		

Table 6 - Nizamsagar Dam Data from 2009 to 2015

2.7 Transfer of Sounding Datum

The Manjira River is non-tidal river in nature and lowest MSL level for Per-km stretch is considered as the datum value for the computing sounding datum at different stretches since the river is dry.

2.8 Table indicating Tidal Variation at Different Observation Points

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

2.9 Salient features of Dam, Barrages etc.

The details of Dams, Barrages within the survey stretches were collected and the details are as below:-

2.9.1 Singur Dam

Salient features of Singur Dam		
Name of the Dam	Singur Dam	
River	Manjira	
Nearest City	Sangareddy	
District	Medak	
State	Telangana	
Basin Name	Godavari	
Seismic Zone	Seismic Zone-II	
Length of Dam (m)	7520	
Length of Spillway (m)	327	
Crest Level of Spillway	510.6	
Spillway Capacity (cumec)	23106	
Dam Status	Completed	
Purpose	Hydroelectric, Irrigation	
Completion Year	1989	
Operating and	Irrigation & CAD Dept.	

Salient features of Singur Dam		
Maintenance Agency		
Dam Type	Earthen/Gravity/ Masonry	
Max Height above Foundation(m)	33	
Total Volume content of Dam (TCM)	2694	
Type of Spillway Gates	RD	
Number of Spillway Gates	17	
Size of Spillway Gates (m X m)	15 x 13	
Design Flood (cumec)	23106	

Table 7 - Salient features of Singur Dam

Salient features of Singur Reservoir		
Name of Reservoir	Singur Reservoir	
River	Manjra	
Maximum Water Level	523.6	
Full Reservoir Level (m)	523.6	
Minimum Draw Down Level(m)	518.25	
Gross Storage Capacity(MCM)	850.7	
Status	-	
Basin	Godavari	
Live Storage Capacity(MCM)	566.8	
Dead Storage Capacity(MCM)	282.37562	
Submergence Area (Th.Ha.)	15.012	
Catchment Area(Sq. Km.)	16096	

Table 8 - Salient features of Singur Reservoir

Salient Features – Singur Power House		
Name of the Powerhouse	Singur Power House	
State Name	Telangana	
Basin Name	Godavari	
Hydroelectric Basin	East Flowing River	
Seismic Zone	Seismic Zone-II	
Type of Development	Storage	
Structure Type	DAM	
Position of Power House	Dam Toe	
Powerhouse Status	Operational	
Annual Design energy (MU)	49	
Firm Power (MW)	3.7	
No. of Turbines/Units (MW)	2	
Capacity per turbine (MW)	7.5	
Total Installed Capacity (MW) **Sum of IC of all turbines**	15	
Type of Turbines	Kaplan	

Turbine Make	BHEL-India	
Rated Head (Net RTD) (m)	18.3	
Year Commissioned	1999	

Table 9 - Salient features of Singur Power House

2.9.2 Manjira Barrage

Salient features of Manjira Barrage		
Name of the Dam	Manjira Barrage	
River	Manjira	
Nearest City	Sangareddy	
District	Medak	
State	Telangana	
Basin Name	Godavari	
Seismic Zone	Seismic Zone-II	
Length (m)	7240	
Catchment Area	4675 Sq. ml.	
Storage at	+1651.75 1500 MGD	
Dam Status	Completed	
Purpose	Irrigation/Drinking Water	
Completion Year	1989	
Operating and Maintenance Agency	Irrigation & CAD Dept./HMWS&SB	
Number & Size of Flood Gates	11 (40'x25'.9")	
Maximum Flood Level	+1661.0m	
Lat/Long	17°-39'E, 78°-04'N	
Basin	30,844 km2 (11,909 sq. mi)	
Crest Level	+ 491.270 m	
BC Weir Gates	20 (45'.11"x5')	

Table 10 - Salient features of Manjira Barrage

2.9.3 Nizamsagar Dam

Salient features of Nizamsagar Dam		
Name of the Dam	Nizamsagar Dam	
River	Manjira	
Nearest City	Banswada	
District	Nizamabad	
State	Telangana	
Basin Name	Godavari	
Seismic Zone	Seismic Zone-II	
Length of Dam (m)	5670	
Length of Spillway (m)	946	

Salient features of Nizamsagar Dam		
Spillway Capacity (cumec)	17981	
Dam Status	Completed	
Purpose	Hydroelectric, Irrigation	
Completion Year	1931	
Operating and Maintenance Agency	Irrigation & CAD Dept.	
Max Height above Foundation(m)	48	
Total Volume content of Dam (TCM)	867	
Dam Type	Earthen	
Crest Level of Spillway	422.1492732	
Number of Spillway Gates	48	
Design Flood (cumec)	17981	

Table 11 - Salient features of Nizamsagar Dam

Salient features of Nizamsagar Reservoir		
Name of Reservoir	Nizamsagar Reservoir	
River	Manjra	
Full Reservoir Level (m)	428.25	
Minimum Draw Down Level(m)	415.75	
Gross Storage Capacity(MCM)	504.4	
Live Storage Capacity(MCM)	478.5	
Submergence Area (Th.Ha.)	14.28638	
Catchment Area(Sq. Km.)	21694	
Number of Families Affected - Total	4232	
Water Allocation - Drinking(MCM)	36.415	

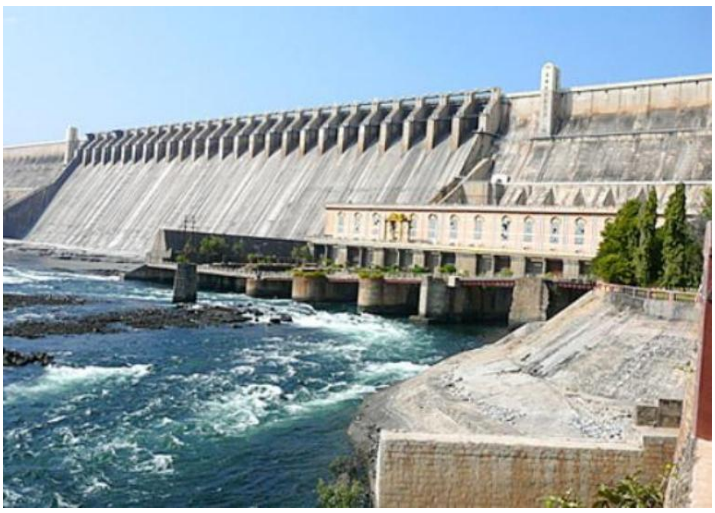


Table 12 - Nizamsagar Reservoir

Salient features of Nizamsagar Power House		
Name of the Powerhouse	Nizamsagar Power House	
Basin Name	Godavari	
Seismic Zone	Seismic Zone-II	
Type of Development	Canal Drop	
Position of Power House	Canal Drop	
Rated Head (Net RTD) (m)	21.336	
Total Installed Capacity (MW)	10	
Powerhouse Status	Operational	
Type of Project	Small	
Generator Make	English Electric - UK	
Number of Penstocks	4	
Length of Penstock (m)	110'	

Salient features of Nizamsagar Power House	
Hydraulic head (m)	1037
MDDL for Power house (m)	1376
Annual Design energy (MU)	30
Firm Power (MW)	3.7
No. of Turbines/Units (MW)	2
Capacity per turbine (MW)	5
Type of Turbines	Kaplan
Year Commissioned	1954
Project Owner Type	State
Project Sharing	None
Owner Name	APGENCO
Size of Penstocks	8.9'X111/2'

Table 13 - Salient features of Nizamsagar Dam

2.10 Erected IWAI Benchmark Pillars

New bench Mark Pillars were constructed as per specification at suitable locations as specified in the contract. The extension of horizontal control was made by the baseline processing of 06 hourly DGPS observations carried out with the nearest control points. The value of these benchmarks w.r.t. MSL was obtained by Auto leveling from the GTS-Benchmark at CWC Guest house, Singur (525.836m from MSL). The details of IWAI BM Pillars are as tabulated below:

Sl. No.	Station	Chainage (km)	Location	Latitude (N) Longitude (E)	Easting Northing	Ellipsoidal Height (m)	Height above MSL (m)	BM Height w.r.t. Established CD (m)
1	IWAI_BM_MJR_024	-0.48	Kandakurthi	18°49'00.61244"N 77°52'43.56608"E	803421.83 2083021.12	263.58	334.198	5.025
2	IWAI_BM_MJR_023	6.52	Bodhan	18°47'07.76710"N 77°49'36.61166"E	797999.90 2079461.43	268.902	337.471	3.882
3	IWAI_BM_MJR_022	17.42	Bodhan	18°42'05.55147"N 77°48'01.84658"E	795369.28 2070120.12	270.309	343.459	5.371
4	IWAI_BM_MJR_021	26.69	Mandarna	18°40'13.23878"N 77°44'35.65384"E	789377.73 2066571.25	278.082	345.528	4.954
5	IWAI_BM_MJR_020	39.92	Hangarga	18°33'51.78665"N 77°45'33.00663"E	791239.87 2054862.57	288.692	357.77	10.127
6	IWAI_BM_MJR_019	49.79	Birkur	18°29'09.18006"N 77°45'57.14453"E	792081.49 2046179.70	285.474	357.832	3.759
7	IWAI_BM_MJR_018	63.64	Chinna Damarancha	18°23'50.07767"N 77°49'35.41983"E	798641.81 2036462.12	287.599	360.589	1.166
8	IWAI_BM_MJR_017	71.09	Banswada	18°20'53.62291"N 77°52'19.07410"E	803534.01 2031109.05	301.242	373.422	10.377
9	IWAI_BM_MJR_016	79.77	Komalancha	18°16'30.61482"N 77°53'43.12030"E	806131.70 2023056.77	323.27	393.42	6.68
10	IWAI_BM_MJR_015	90.68	Achampet	18°12'47.70094"N 77°55'30.96549"E	809411.09 2016249.25	331.078	406.038	8.523
11	IWAI_BM_MJR_014	103.63	Rudraram	18°07'12.36410"N 77°58'18.50503"E	814504.13 2006011.46	356.238	428.93	8.521
12	IWAI_BM_MJR_013	117.44	Venkampalle	18°04'23.86426"N 78°05'09.61093"E	191536.22 2000729.70	357.713	429.795	5.386
13	IWAI_BM_MJR_012	130.03	Golilingal	18°05'00.44696"N 78°09'00.27403"E	198340.72 2001749.11	362.979	433.714	5.602
14	IWAI_BM_MJR_011	141.05	Peroor	18°01'37.78602"N 78°12'38.10147"E	204655.36 1995416.86	367.444	438.785	7.125
15	IWAI_BM_MJR_010	152.46	Sangaipet	17°57'54.78747"N	197720.71	394.452	466.129	7.542

Sl. No.	Station	Chainage (km)	Location	Latitude (N) Longitude (E)	Easting Northing	Ellipsoidal Height (m)	Height above MSL (m)	BM Height w.r.t. Established CD (m)
				78°08'46.06625"E	1988660.84			
16	IWAI_BM_MJR_009	163.25	Rangampet	17°56'43.94058"N 78°04'11.43126"E	189600.35 1986607.24	471.802	469.1	3.068
17	IWAI_BM_MJR_008	172.15	Chintakunta	17°53'00.77908"N 78°04'22.00880"E	189803.83 1979736.82	404.903	479.804	4.192
18	IWAI_BM_MJR_007	181.78	Andole	17°48'49.94815"N 78°05'55.88158"E	192449.15 1971977.03	413.078	486.236	6.216
19	IWAI_BM_MJR_006	191.44	Chowtkur	17°44'31.65934"N 78°06'26.86541"E	193239.59 1964016.99	415.934	489.166	6.049
20	IWAI_BM_MJR_005	203.71	Lingampally	17°41'29.60517"N 78°08'32.52681"E	196858.90 1958359.81	419.208	492.9	5.808
21	IWAI_BM_MJR_004	212.23	Vendikole	17°39'55.04172"N 78°07'50.60888"E	195578.58 1955469.55	422.564	495.84	7.746
22	IWAI_BM_MJR_003	219.51	Shivampet	17°39'48.67107"N 78°04'44.97627"E	190100.84 1955357.58	436.769	508.341	19.349
23	IWAI_BM_MJR_002	227.37	Gangojipet	17°41'00.62719"N 78°02'15.28704"E	185720.77 1957640.15	432.117	504.591	12.927
24	IWAI_BM_MJR_001	235.63	Singur	17°43'17.72347"N 77°58'59.03800"E	816404.31 1961892.56	429.715	504.245	8.366

Table 14 - Accepted coordinates (WGS-84) of established IWAI BM Pillars

2.11 Chart Datum / Sounding Datum and Reductions Details

The water availability in Manjira River is very less, hence the spot leveling by topographic method was attempted for the entire survey stretch of Manjira River. The least MSL level for the per-kilometer stretch was obtained as the established Chart Datum. The details of Topographic level converted as Depth for volume calculations are forwarded as soft copy along with the report.

2.12 HFL values of Bridges/Cross Structures

The FRL value of 428.25m from MSL at Nizamsagar Dam on 91.86 km chainage was the only established HFL value available for Manjira River. The HFL values for the remaining survey stretch of Manjira River was computed and the details are as follows:-

Sl. No.	Location and description of CWC gauge / Dam / Barrages / Weirs / Anicut / Locks / Aqueducts / BM	Cross-Structure Details	Chainage (km)	Established HFL / MHWS / FSL / MWL / FRL w.r.t. MSL (m)	Computed HFL at Cross-Structures w.r.t. MSL (m)
1	Kandakurthi Bridge	Bridge	-0.51	-	336.173
2	Bhiknalli Bridge	Bridge	6.38	-	345.65
3	Saloora Bridge	Bridge	17.54	-	346.2
4	Saloora Bridge	Bridge	17.59	-	346.22
5	Hangarga Bridge	Bridge	39.82	-	359.2
6	Khatagaon Bridge	Bridge	49.77	-	364.55
7	Bollakpally Bridge	Bridge	71.08	-	377

Sl. No.	Location and description of CWC gauge / Dam / Barrages / Weirs / Anicut / Locks / Aqueducts / BM	Cross-Structure Details	Chainage (km)	Established HFL / MHWS / FSL / MWL / FRL w.r.t. MSL (m)	Computed HFL at Cross-Structures w.r.t. MSL (m)
8	Nizamsagar Village Bridge	Bridge	87.46	-	405.27
9	Nizamsagar Dam	Dam	91.86	428.25	-
10	Yellapur Bridge	Bridge	140.94	-	439.44
11	Kistapur Bridge	Bridge	143.78	-	450.06
12	Yenkapally Bridge	Bridge	157.32	-	469.93
13	Chintakunta Old Bridge	Bridge	172.11	-	476.64
14	Chintakunta Bridge	Bridge	172.12	-	476.66
15	Koniyal Bridge	Bridge	188.91	-	484.5
16	Fasalwadi (Old Bridge)	Bridge	214.84	-	496.51
17	Fasalwadi Bridge	Bridge	214.98	-	496.51
18	Manjira Barrage	Dam	220.11	-	501.27
19	Singur Bridge	Bridge	244.45	-	509.21

Table 15 - HFL values of Bridges/Cross Structures

2.13 Graph: Chart Datum and HFL v/s Chainage

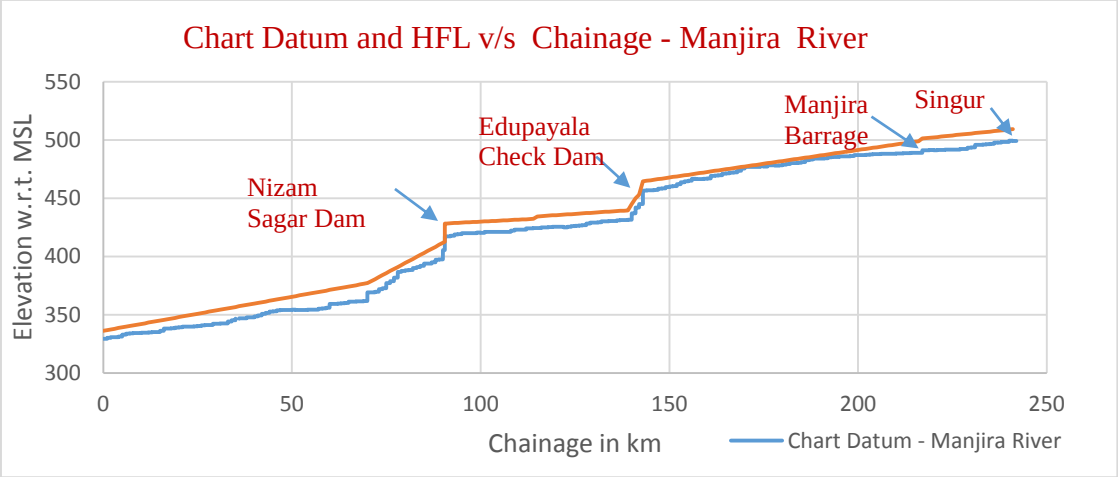


Figure 5 - Chart Datum and HFL v/s Chainage

2.14 Average Bed Slope

Reach and River-bed Level (RBL)		River-bed Level Change (m) (A)	Distance (km) (B)	Slope (A/B)
From	To			
Ch. 0 - RBL_331.672	Ch. 16 - RBL_339.426	7.754	16	1 : 0.485
Ch. 16 - RBL_339.426	Ch. 40 - RBL_349.605	10.179	24	1 : 0.424
Ch. 40 - RBL_349.605	Ch. 68.4 - RBL_361.727	12.122	28.4	1 : 0.427
Ch. 68.4 - RBL_361.727	Ch. 91.9 - RBL_417.56	55.833	23.5	1 : 2.376
Ch. 91.9 - RBL_417.56	Ch. 118.6 - RBL_425.716	8.156	26.7	1 : 0.305
Ch. 118.6 - RBL_425.716	Ch. 146.6 - RBL_462.917	37.201	28	1 : 1.329
Ch. 146.6 - RBL_462.917	Ch. 170.4 - RBL_472.975	10.058	23.8	1 : 0.423
Ch. 170.4 - RBL_472.975	Ch. 197.2 - RBL_488.715	15.74	26.8	1 : 0.587

Reach and River-bed Level (RBL)		River-bed Level Change (m) (A)	Distance (km) (B)	Slope (A/B)
From	To			
Ch. 197.2 - RBL_488.715	Ch. 220 - RBL_493.445	4.73	22.8	1 : 0.207
Ch. 220 - RBL_493.445	Ch. 244.9 - RBL_518.617	25.172	24.9	1 : 1.011

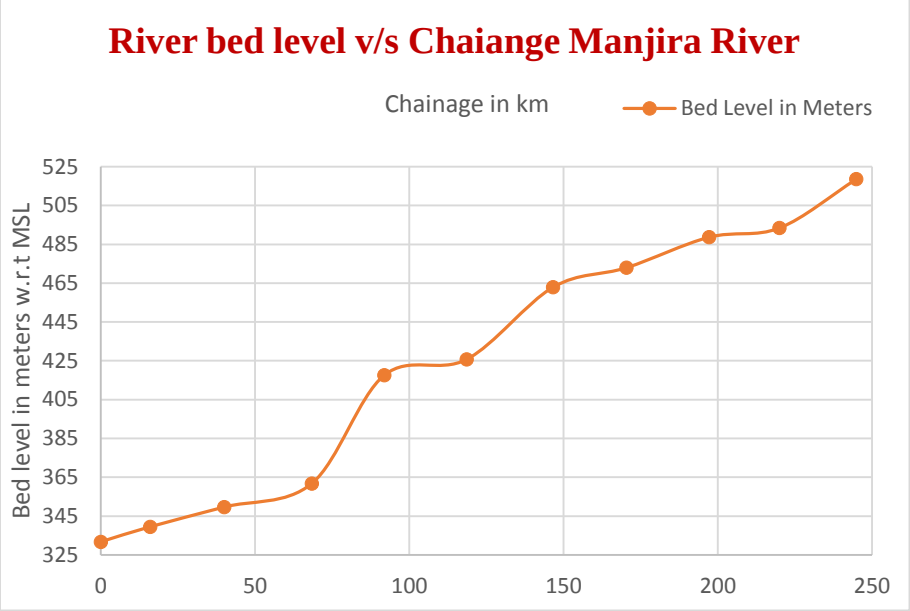


Table 16 - Average Bed Slope

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

Sl. No.	Structure Name	Chainage (km)	Location	Position (Lat Long) Left Bank Right Bank	Position UTM Left Bank Right Bank	Length (m)	Width (m)	Height w.r.t. Crest Level above MSL (m)	Present Condition
1	Nizamsagar Dam	91.86	Hasanpalle	**Left Bank:** 18°12'8.82"N 77°55'21.28"E **Right Bank:** 18°12'9.54"N 77°55'29.93"E	**Left Bank:** 809145.41 2015048.51 **Right Bank:** 809399.39 2015074.72	5670	6	420.899	Operational
2	Edupayala Check Dam	147.25	Edupayala	**Left Bank:** 17°59'47.84"N 78°10'36.61"E **Right Bank:** 18°00'1.83"N 78°10'54.56"E	**Left Bank:** 201028.23 1992088.86 **Right Bank:** 201563.15 1992511.19	7620	1.5	466.00	Operational
3	Manjira Barrage	220.11	Chakrial	**Left Bank:** 17°39'10.74"N 78°4'23.61"E **Right Bank:** 17°39'22.34"N 78°4'35.76"E	**Left Bank:** 189452.58 1954200.43 **Right Bank:** 189816.47 1954551.74	7240	6.809	491.27	Operational
4	Singur Dam	245.01	Singur	**Left Bank:** 17°44'55.11"N 77°55'36.21"E **Right Bank:** 17°45'3.70"N 77°55'47.28"E	**Left Bank:** 810377.42 1964794.63 **Right Bank:** 810699.63 1965063.99	7520	17.719	510.6	Operational

Table 17 - Details of Dams and Barrages

2.16 Details of Locks

There are no Locks present in the entire survey stretch of Manjira River.

2.17 Details of Aqueducts

There are no Aqueducts present in the survey stretch of Manjira River.

2.18 Details of existing Bridges and Crossings over Waterway

Sl. No.	Structure Name and for road / rail	Chainage (km)	Type of Structure (RCC / Iron / Wooden)	Location	Position (Lat Long)	Position (UTM)	Length (m)	Width (m)	No of Piers	HC (clear dist. Between piers) (m)	VC w.r.t. HFL (m)	Remarks (complete / under - construction), in use or not, condition
1	Bridge	-0.51	RCC	Kandakurthi	**Left Bank:** 18°49'0.92"N 77°52'45.11"E **Right Bank:** 18°49'17.46"N 77°52'40.07"E	**Left Bank:** 803466.91 2083031.32 **Right Bank:** 803311.00 2083537.79	465	7.881	14	31.75	8.598	In Use
2	Bridge	6.38	RCC	Bhiknalli	**Left Bank:** 18°47'0.05"N 77°49'57.90"E **Right Bank:** 18°47'8.36"N 77°49'36.24"E	**Left Bank:** 798627.47 2079233.95 **Right Bank:** 797988.72 2079479.50	691	7.458	22	30.05	4.576	In Use
3	Bridge	17.54	RCC	Saloora	**Left Bank:** 18°42'6.79"N 77°48'1.50"E **Right Bank:** 18°42'14.87"N 77°47'33.55"E	**Left Bank:** 795358.52 2070158.07 **Right Bank:** 794535.26 2070393.80	843	8.979	19	42.149	11.19	In Use
4	Bridge	17.59	RCC	Saloora	**Left Bank:** 18°42'7.50"N 77°47'53.29"E **Right Bank:** 18°42'13.11"N 77°47'34.47"E	**Left Bank:** 795117.50 2070176.13 **Right Bank:** 794563.08 2070340.08	520	6.167	154	3.352	2.298	Old Bridge, Not In Use
5	Bridge	39.82	RCC	Hangarga	**Left Bank:** 18°33'51.48"N 77°45'32.34"E **Right Bank:** 18°33'53.24"N 77°45'14.63"E	**Left Bank:** 791220.46 2054852.84 **Right Bank:** 790700.04 2054899.02	507	8.59	19	25.14	3.798	In Use
6	Bridge	49.77	RCC	Khatagaon	**Left Bank:** 18°29'7.98"N 77°45'58.04"E **Right Bank:** 18°29'9.29"N 77°45'12.19"E	**Left Bank:** 792108.34 2046143.19 **Right Bank:** 790761.93 2046162.92	1152	8.025	44	25.588	3.400	Under Construction
7	Bridge	71.08	RCC	Bollakpally	**Left Bank:** 18°20'53.09"N 77°52'18.53"E **Right Bank:** 18°20'47.68"N 77°52'2.47"E	**Left Bank:** 803518.29 2031092.41 **Right Bank:** 803049.10 2030918.53	505	8.334	24	20.183	10.649	In Use

Sl. No.	Structure Name and for road / rail	Chainage (km)	Type of Structure (RCC / Iron / Wooden)	Location	Position (Lat Long)	Position (UTM)	Length (m)	Width (m)	No of Piers	HC (clear dist. Between piers) (m)	VC w.r.t. HFL (m)	Remarks (complete / under - construction), in use or not, condition
8	Bridge	87.46	RCC	Nizamsagar Village	**Left Bank:** 18°13'50.01"N 77°55'52.10"E **Right Bank:** 18°13'53.64"N 77°55'37.34"E	**Left Bank:** 810001.79 2018176.15 **Right Bank:** 809566.08 2018280.89	473	8.256	18	22.238	15.427	In Use
9	Bridge	140.94	RCC	Yellapur	**Left Bank:** 18°1'39.46"N 78°12'36.59"E **Right Bank:** 18°1'40.99"N 78°12'23.85"E	**Left Bank:** 204611.65 1995469.02 **Right Bank:** 204237.42 1995521.75	384.68	7.866	26	13.559	7.053	In Use
10	Bridge	143.78	RCC	Kistapur	**Left Bank:** 18°00'11.76"N 78°12'16.26"E **Right Bank:** 18°0'15.47"N 78°12'13.65"E	**Left Bank:** 203972.00 1992780.00 **Right Bank:** 203897.00 1992895.00	150	7	8	6.6	2.700	Under Construction
11	Bridge	157.32	RCC	Yenkapally	**Left Bank:** 17°58'20.49"N 78°6'32.20"E **Right Bank:** 17°58'25.46"N 78°6'19.90"E	**Left Bank:** 193791.72 1989512.56 **Right Bank:** 193431.97 1989671.10	407	10.231	36	10.738	17.923	Under Construction
12	Bridge	172.11	RCC	Chintakunta	**Left Bank:** 17°53'2.01"N 78°4'32.82"E **Right Bank:** 17°53'0.87"N 78°4'23.82"E	**Left Bank:** 190122.89 1979769.69 **Right Bank:** 189857.23 1979738.78	349	6.905	130 Arcs	2.508	3.816	Old Bridge, Not In Use
13	Bridge	172.12	RCC	Chintakunta	**Left Bank:** 17°53'1.81"N 78°4'34.06"E **Right Bank:** 17°53'0.01"N 78°4'21.88"E	**Left Bank:** 190159.32 1979762.97 **Right Bank:** 189799.67 1979713.22	362	8.711	15	22.35	8.952	In Use
14	Bridge	188.91	RCC	Koniyal	**Left Bank:** 17°45'47.19"N 78°6'56.63"E **Right Bank:** 17°45'47.19"N 78°6'56.63"E	**Left Bank:** 194416.57 1966267.64 **Right Bank:** 194152.72 1966327.08	279.18	8.148	24	10.568	8.623	In Use
15	Bridge	214.84	RCC	Fasalwadi	**Left Bank:** 17°39'8.39"N 78°7'22.58"E **Right Bank:** 17°39'13.01"N 78°7'13.53"E	**Left Bank:** 194730.08 1954046.99 **Right Bank:** 194465.33 1954193.19	249	6.552	10	22.672	17.341	Not In Use
16	Bridge	214.98	RCC	Fasalwadi	**Left Bank:** 17°39'2.78"N 78°07'20.41"E **Right Bank:** 17°39'9.94"N 78°7'12.60"E	**Left Bank:** 194663.45 1953875.39 **Right Bank:** 194436.46 1954099.16	328	5.044	12	25.221	18.706	In Use
17	Bridge	244.45	RCC	Singur	**Left Bank:** 17°44'41.49"N 77°55'49.23"E **Right Bank:**	**Left Bank:** 810767.78 1964381.60 **Right Bank:**	269.892	8.136	11	22.381	5.112	In Use

Sl. No.	Structure Name and for road / rail	Chainage (km)	Type of Structure (RCC / Iron / Wooden)	Location	Position (Lat Long)	Position (UTM)	Length (m)	Width (m)	No of Piers	HC (clear dist. Between piers) (m)	VC w.r.t. HFL (m)	Remarks (complete / under - construction), in use or not, condition
					17°44'47.85"N 77°55'55.69"E	810955.16 1964580.24						

Table 18 - Details of Existing Bridges and Crossings

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

There is no major Pipelines or underwater cables cross-through Manjira River.

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

Total of 12 in number High Tension electrical lines were present in the Manjira River and the height of the high tension line was also measured by ETS. There are no piers for electrical lines constructed in the river bed of Manjira River.

Sl. No.	Type of Line	Chainage (km)	Location	Position (Lat Long) Left Bank Right Bank	Position UTM Left Bank Right Bank	Vertical clearance w.r.t. HFL (m)	Remarks (complete / under - construction)
1	HTL	18.84	Azgi	**Left Bank:** 18°41'27.59"N 77°47'17.23"E **Right Bank:** 18°42'0.83"N 77°47'8.00"E	**Left Bank:** 794079.55 2068931.82 **Right Bank:** 793793.00 2069950.18	32	Complete
2	HTL	57.17	Kistapur	**Left Bank:** 18°25'34.34"N 77°47'30.85"E **Right Bank:** 18°25'25.67"N 77°46'59.75"E	**Left Bank:** 794934.89 2039613.51 **Right Bank:** 794025.52 2039332.13	42	Complete
3	HTL	87.09	Nizamsagar Village	**Left Bank:** 18°13'57.76"N 77°55'57.60"E **Right Bank:** 18°14'6.94"N 77°55'44.23"E	**Left Bank:** 810159.67 2018417.18 **Right Bank:** 809762.09 2018693.31	36	Complete
4	HTL	90.61	Nizamsagar	**Left Bank:** 18°12'46.57"N 77°55'27.61"E **Right Bank:** 18°12'43.65"N 77°55'23.21"E	**Left Bank:** 809313.57 2016213.50 **Right Bank:** 809185.93 2016121.30	32	Complete
5	HTL	119.15	Venkampalle	**Left Bank:** 18°04'18.12"N 78°05'46.94"E **Right Bank:** 18°04'17.13"N 78°05'55.43"E	**Left Bank:** 192631.84 2000535.66 **Right Bank:** 192881.18 2000501.28	30	Complete
6	HTL	137.56	Podichanpally	**Left Bank:** 18°3'25.70"N 78°12'49.35"E	**Left Bank:** 205036.45 1998731.62	38	Complete

Sl. No.	Type of Line	Chainage (km)	Location	Position (Lat Long) Left Bank Right Bank	Position UTM Left Bank Right Bank	Vertical clearance w.r.t. HFL (m)	Remarks (complete / under - construction)
				Right Bank: 18°3'26.30"N 78°12'35.49"E	**Right Bank:** 204629.64 1998756.96		
7	HTL	150.01	Chinna Ghanpur	**Left Bank:** 17°59'0.66"N 78°9'30.28"E **Right Bank:** 17°59'6.45"N 78°9'25.07"E	**Left Bank:** 199053.48 1990667.31 **Right Bank:** 198902.84 1990847.78	32	Complete
8	HTL	150.05	Chinna Ghanpur	**Left Bank:** 17°58'59.65"N 78°9'28.75"E **Right Bank:** 17°59'5.20"N 78°9'24.81"E	**Left Bank:** 199007.96 1990636.93 **Right Bank:** 198894.59 1990809.44	32	Complete
9	HTL	172.15	Chintakunta	**Left Bank:** 17°53'0.73"N 78°04'33.32"E **Right Bank:** 17°52'59.50"N 78°04'22.99"E	**Left Bank:** 190137.90 1979730.69 **Right Bank:** 189832.43 1979697.94	20	Complete
10	HTL	244.00	Nearby Singur	**Left Bank:** 17°44'30.42"N 77°56'1.03"E **Right Bank:** 17°44'37.19"N 77°56'4.45"E	**Left Bank:** 811120.96 1964046.47 **Right Bank:** 811218.53 1964256.32	20	Complete
11	HTL	244.55	Singur	**Left Bank:** 17°44'43.07"N 77°55'48.89"E **Right Bank:** 17°44'49.92"N 77°55'56.16"E	**Left Bank:** 810757.58 1964430.68 **Right Bank:** 810968.02 1964644.75	15	Complete
12	HTL	244.50	Singur	**Left Bank:** 17°44'43.93"N 77°55'47.68"E **Right Bank:** 17°44'51.33"N 77°55'55.13"E	**Left Bank:** 810721.50 1964456.27 **Right Bank:** 810937.56 1964687.67	15	Complete

Table 19 - Details of High Tension Lines

2.21 Current Meter and Discharge Details

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

2.22 Water Sample Locations

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

3 Description of Waterway

The Waterway of Manjira River for the 245.0km river chainage is divided into 10 different sections for the easy interpretation. The topographic feature, presence of reservoir and nature of river stream were also considered for dividing the survey stretch to these 10 sub division. The details of the stretches are as follows:-

3.1 Sub-Stretch-01: Confluence with Godavari to Karla Village (Chainage 0.0km to 16.0km)

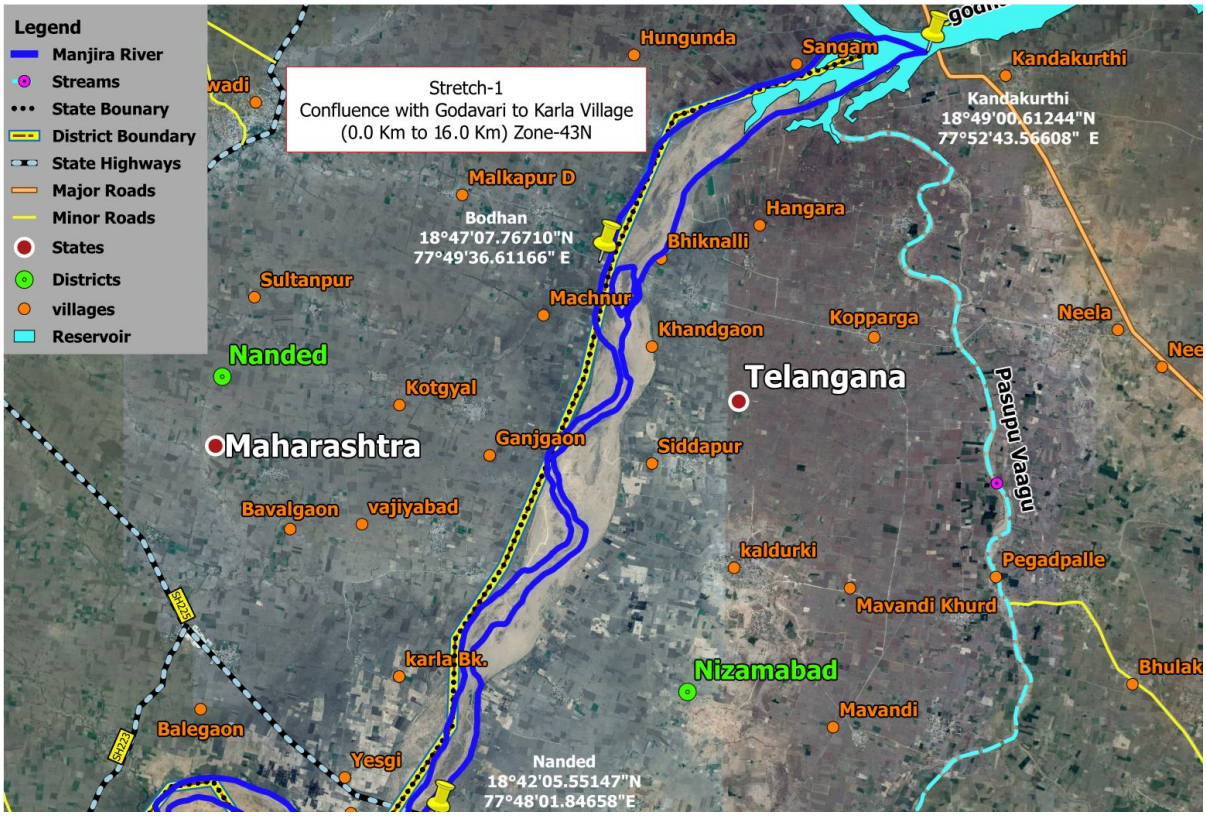


Figure 6 - Confluence with Godavari to Karla Village

- **Bathymetry Survey**
  a) No bathymetric survey is conducted due to the unavailability of water level
- **Topographic Survey**
  b) 16 km of the length of the stretch for which the topographic survey has been carried out.

This stretch is between 0 to 16km chainage of Manjira River starting from the confluence with the Godavari River near at Kandakurthi Village to Karla village. The water from this sub-stretch of Manjira River is utilized for drinking and agricultural purpose. Small clusters of settlements are situated near to the river banks.

The villages like Kandakurthi, Bhiknalli, Siddapur Ganjgaon and Thaggelli are the villages situated near to this stretch. Bodhan Town is the prominent town situated 12km South East of the Manjira River bank. The mixed cultivation patterns of Cotton, Soya, Groundnut and Paddy are found in this stretch.

Figure 7 - View of Kandakurthi Bridge (-0.51 km chainage)

The riverbed is mostly sandy and are very un-even in nature. Small amount of shallow water level are found to be spread on the low elevation areas in the river bed. The gentle gradient is observed in this stretch and the river banks are unprotected in nature with shrubs and dense vegetation on the both sides of the river banks. There are no industries present in the vicinity of this stretch. Sangameshwar Temple is situated on the Left bank side of the Manjira River at the confluence of Godavari River. This stretch is not being used for navigation, water transport or any other fishing activates. No ferry services or local boats are available in this stretch. There is no tourist point of attraction is present in this stretch. No other check dams/obstructions are present in this stretch of Manjira River.

Figure 8 - Impounded waters on un-even river bed and vegetation in Manjira River (sub-stretch1)

Class	Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.

I	0	16	0.000	0.000	16000	6,82,614.12	6,82,614.12	-0.300	0.000	16000	8,71,321.85	8,71,321.85
II	0	16	0.000	0.000	16000	1,039,645.42	1,039,645.42	-0.300	0.000	16000	1,281,881.34	1,281,881.34
III	0	16	0.000	0.000	16000	1,571,391.76	1,571,391.76	-0.300	0.000	16000	1,872,007.60	1,872,007.60
IV	0	16	0.000	0.000	16000	1,896,093.10	1,896,093.10	-0.300	0.000	16000	2,210,225.21	2,210,225.21

Table 20 - Dredging Quantity Details – Stretch 01

3.1.1 Observed and reduced Bed Profile of the stretch

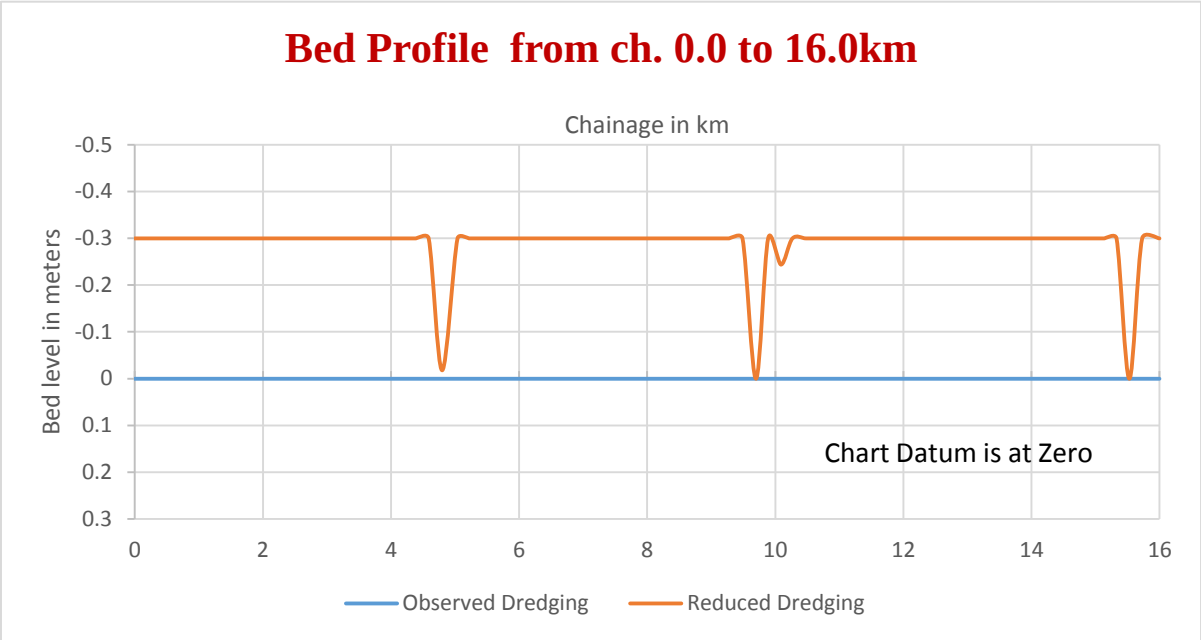


Figure 9 - River Bed Profile

3.2 Sub-Stretch-02: Karla Village to Hangarga Village (Chainage 16.0km to 40.0km)

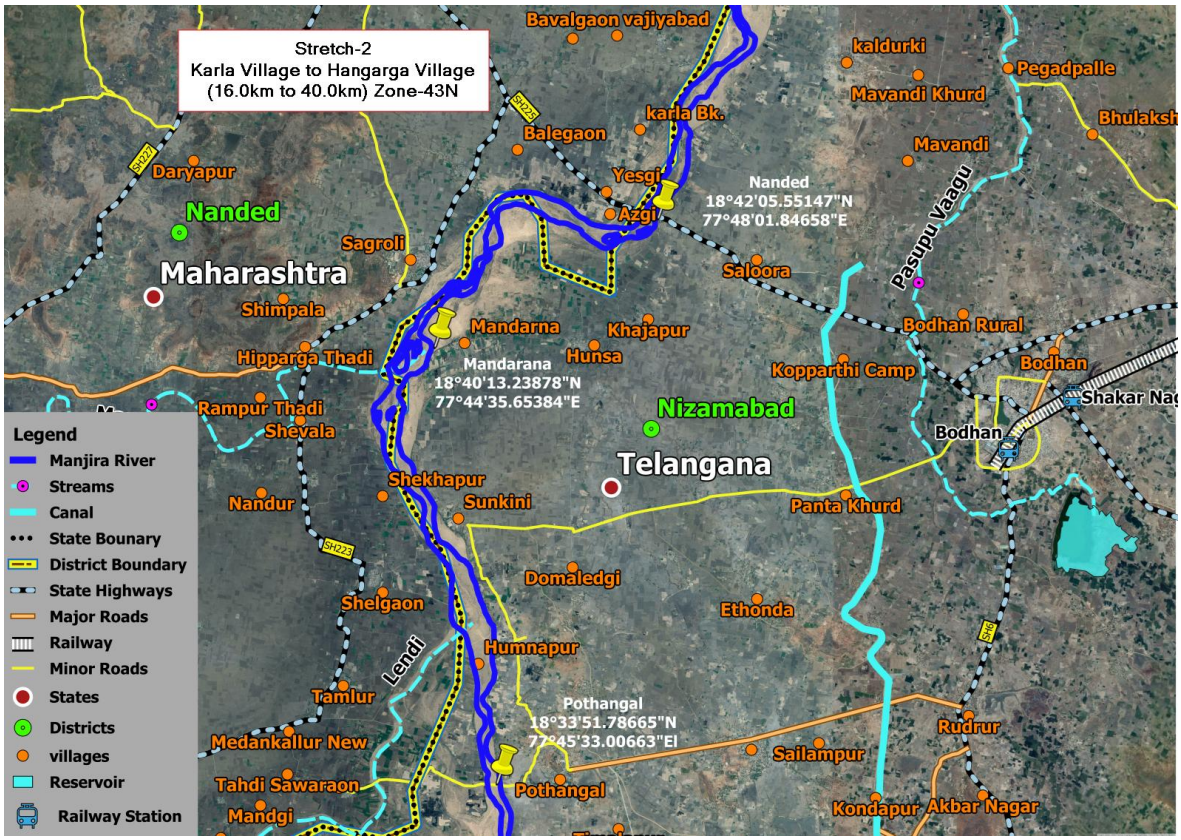


Figure 10 - Karla Village to Hangarga Village

- **Bathymetry Survey**
  a) No bathymetric survey is conducted due to the unavailability of water level
- **Topographic Survey**
  b) 24 km of the length of the stretch for which the Topographic survey has been carried out.

This stretch is between 16.0 to 40.0km chainage of Manjira River starting from Karla to Hangarga Village. The water from this sub-stretch of Manjira River is utilized for drinking water and agricultural purpose. The river basin is wide and extending up to 1km in some places of this stretch. Small clusters of settlements are situated near to the river banks.

The villages like Karla, Azgi, Sagroli, Mandarna and Sunkini are the villages situated near to this stretch. Bodhan is the prominent town situated 11km east of the Manjira River bank. The mixed cultivation patterns of Cotton, Soya, Groundnut and Paddy are found in this stretch.

The riverbed is mostly sandy with isolated rocks and the river banks are unprotected in nature with shrubs and dense vegetation on the both sides of the river banks. Sand mining in large scale is found on this stretch primarily between 17km to 23km chainage. The small temporary track is used by the trucks and other vehicle travelling towards the river bed center to collect the excavated sand.

Figure 11 - Sand mining area (17km to 23km chainage area)

This stretch is not being used for navigation, water transport or any other fishing activates. No ferry services or local boats are available in this stretch. There is no tourist point of attraction is present in this stretch. The water in the area is generally used for drinking and agricultural purpose. No other check dams/obstructions are present in this stretch of Manjira River.

Class	Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
I	16	40	0.000	0.000	24000	1,025,113.45	1,707,727.57	-0.300	0.000	24000	1,305,613.35	2,176,935.20
II	16	40	0.000	0.000	24000	1,561,405.41	2,601,050.83	-0.300	0.000	24000	1,922,466.40	3,204,347.74
III	16	40	0.000	0.000	24000	2,359,917.73	3,931,309.49	-0.300	0.000	24000	2,808,027.94	4,680,035.54
IV	16	40	0.000	0.000	24000	2,847,575.37	4,743,668.47	-0.300	0.000	24000	3,315,762.19	5,525,987.40

Table 21 - Dredging Quantity Details – Stretch 02

3.2.1 Observed and reduced Bed Profile of the stretch

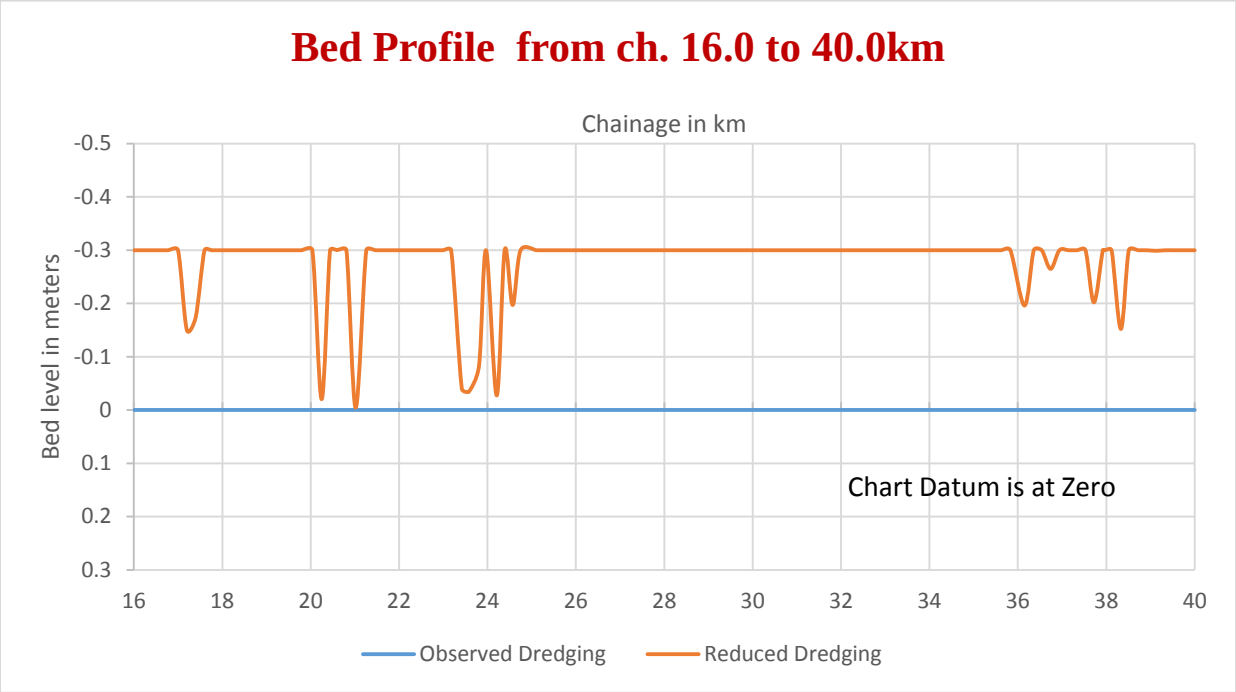


Figure 12 - River Bed Profile

3.3 Sub-Stretch-03: Hangarga Village to Chintal Nagaram Village (Chainage 40.0km to 68.4km)

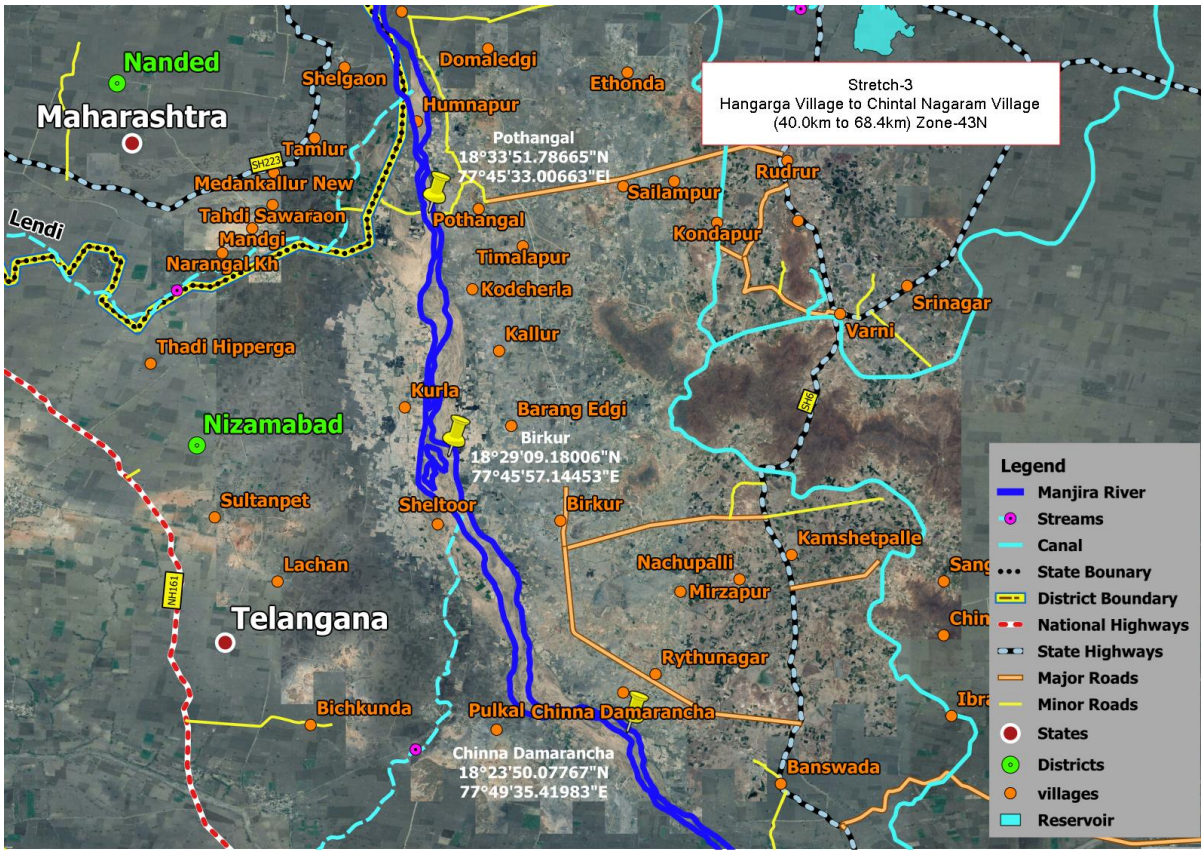


Figure 13 - Hangarga Village to Chintal Nagaram Village

- **Bathymetry Survey**
  a) No bathymetric survey is conducted due to the unavailability of water level
- **Topographic Survey**
  b) 28.4 km of the length of the stretch for which the Topographic survey has been carried out.

This stretch is between 40.0km to 68.4km chainage starting from Hangarga Village to Chintal Nagaram village. The water from this sub-stretch of Manjira River is utilized for drinking water and agricultural purpose. The river basin is wide and extending up to 1.5km in some places of this stretch.

The villages like Hangarga, Pothangal, Kodcherla, Hasgul, Kurla and Birkur are village situated near to this stretch. Pothangal is a small town situated 1.7km east of the Manjira River bank. The mixed cultivation patterns of Cotton, Soya, Groundnut and Paddy are found in this stretch.

Figure 14 - Bridge under construction near Khatagaon (49.77km Chainage)

The riverbed is mostly sandy and the river banks are unprotected in nature with shrubs and dense vegetation on the both sides of the river banks. Slight Rock outcrops were found towards the left bank side of the Manjira River chainage from 47km to 50km stretch.

Figure 15 - Rock outcrops on sub-stretch-03

There are no industries present in the vicinity of this stretch. This stretch is not being used for navigation, water transport or any other fishing activates. No ferry services or local boats are available in this stretch. There is no tourist point of attraction in this stretch. The water in the area is generally used for drinking and agricultural purpose. No other check dams/obstructions are present in this stretch of Manjira River.

Class	Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
I	40	68.4	0.000	0.000	28400	1,213,470.79	2,921,198.36	-0.300	0.000	28400	1,553,216.58	3,730,151.78
II	40	68.4	0.000	0.000	28400	1,848,292.82	4,449,343.65	-0.300	0.000	28400	2,285,784.56	5,490,132.30
III	40	68.4	0.000	0.000	28400	2,793,469.45	6,724,778.94	-0.300	0.000	28400	3,337,070.07	8,017105.61
IV	40	68.4	0.000	0.000	28400	3,370,696.18	8,114,364.65	-0.300	0.000	28400	3,938,831.90	9,464,819.30

Table 22 - Dredging Quantity Details – Stretch 03

3.3.1 Observed and reduced Bed Profile of the stretch

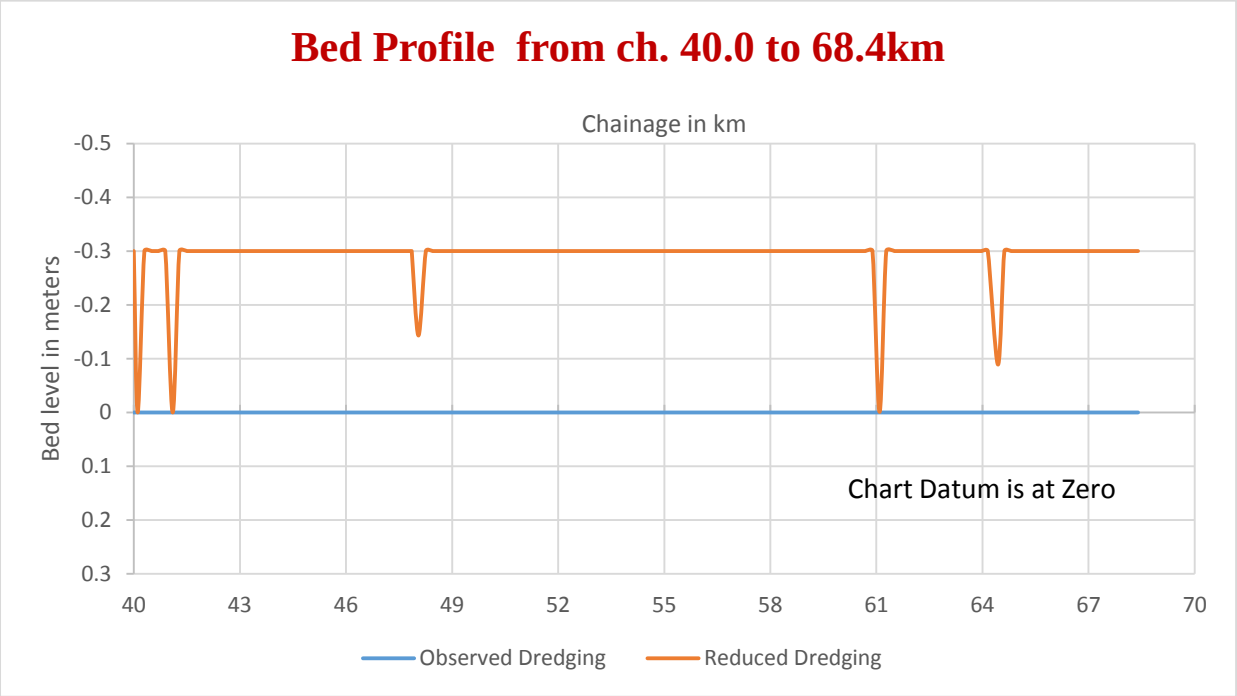


Figure 16 - River Bed Profile

3.4 Sub-Stretch-04: Chintal Nagaram Village to Nizamsagar Dam (Chainage 68.4km to 91.9km)

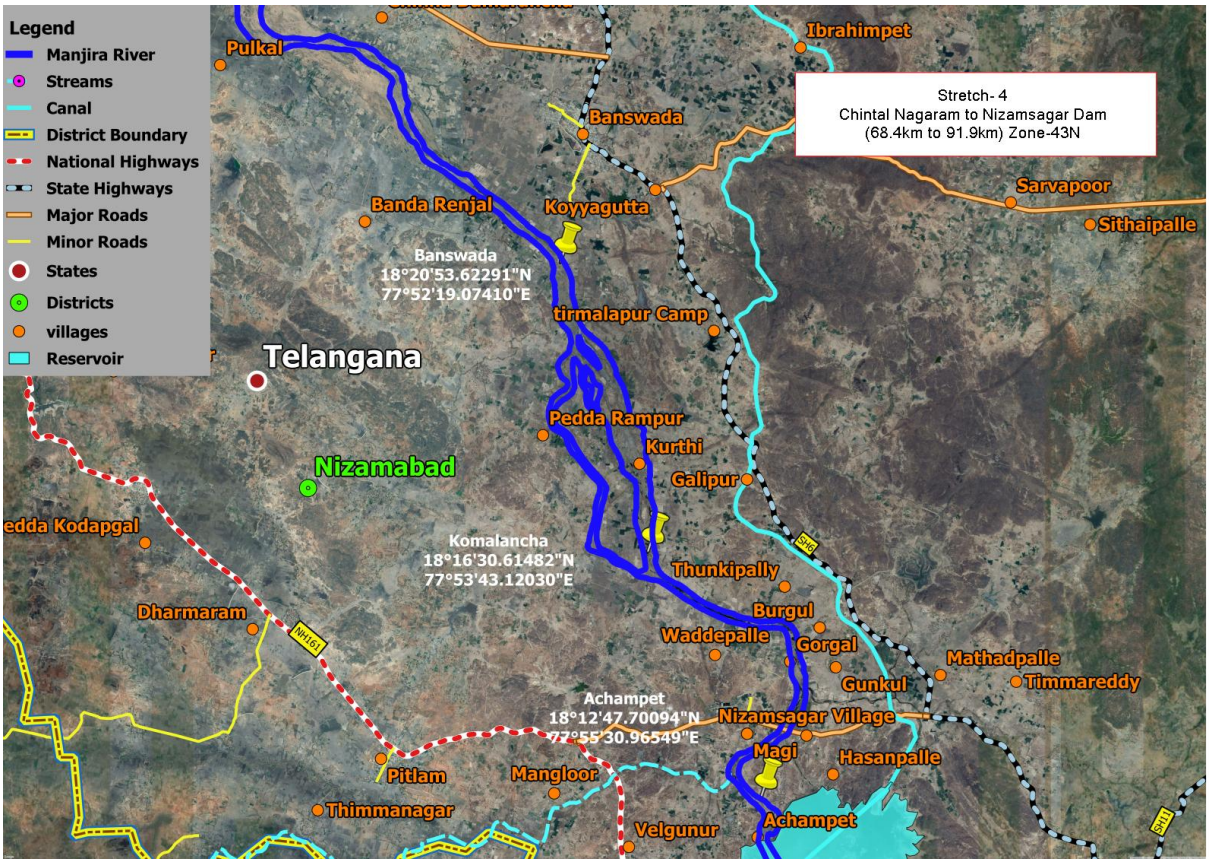


Figure 17 - Chintal Nagaram Village to Nizamsagar Dam

- **Bathymetry Survey**
  a) No bathymetric survey is conducted due to the unavailability of water level
- **Topographic Survey**
  b) 23.5 km of the length of the stretch for which the Topographic survey has been carried out.

This stretch is between 68.4km to 91.9km chainage starting from Chintal Nagaram village near Banswada Town to downstream of Nizamsagar Dam. The downstream of Nizamsagar Dam is rock in nature with step gradient. The water from this sub-stretch of Manjira River is utilized for agricultural purpose and small clusters of settlements are present near to the river banks.

The villages like Chintal Nagaram, Tadkole, Madalcharu and Bollakpally are situated near to this stretch. Banswada is the prominent town situated 3.3km east of the Manjira River bank. The mixed cultivation patterns of Cotton, Groundnut and Paddy are found in this stretch.

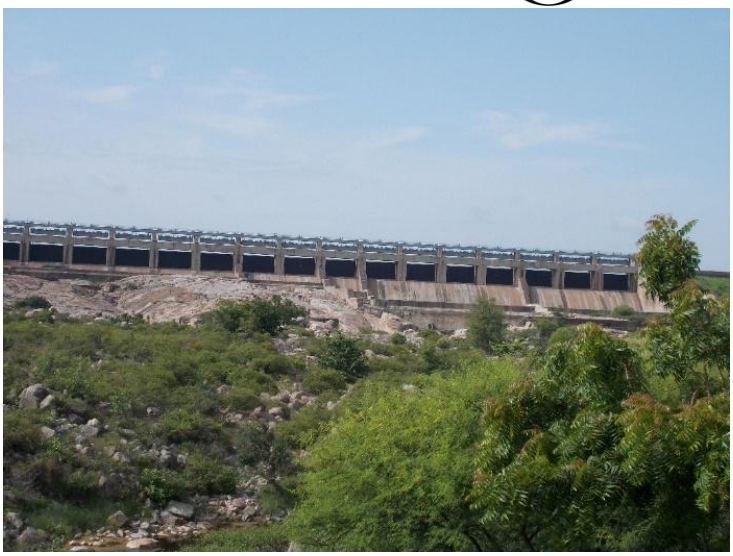


Figure 18 - Downstream of Nizamsagar Dam (91.86 km chianage) with steep gradient.

The river bed is mostly sandy in nature and the river banks are unprotected in nature with shrubs and dense vegetation on the river bed and both sides of the river banks. The rock outcrops with impounded water was found on immediate downstream of Nizamsagar Dam and from 89 km to 91 km chainage near Chinalnagaram village.

Figure 19 - The Rock outcrops in Manjira River (89-91 km chainage)

There are no industries present in the vicinity of this stretch. This stretch is not being used for navigation, water transport or any other fishing activates. Ferry services or local boats are not available in this stretch. There is no tourist point of attraction in this stretch. The water in the area is generally used for drinking and agricultural purpose. No other check dams/obstructions area present in this stretch of Manjira River.

Class	Chainage (km)	Observed	Reduced w.r.t. Sounding Datum

	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
I	68.4	91.9	0.000	0.000	23500	1,002,708.00	3,923,906.36	-0.300	0.000	23500	1,285,085.25	5,015,237.03
II	68.4	91.9	0.000	0.000	23500	1,527,269.00	5,976,612.65	-0.300	0.000	23500	1,890,648.64	7,380,780.94
III	68.4	91.9	0.000	0.000	23500	2,308,318.44	9,033,097.38	-0.300	0.000	23500	2,759,255.63	10,776,361.24
IV	68.4	91.9	0.000	0.000	23500	2,785,303.41	10,899,668.06	-0.300	0.000	23500	3,256,430.25	12,721,249.55

Table 23 - Dredging Quantity Details – Stretch 04

3.4.1 Observed and reduced Bed Profile of the stretch

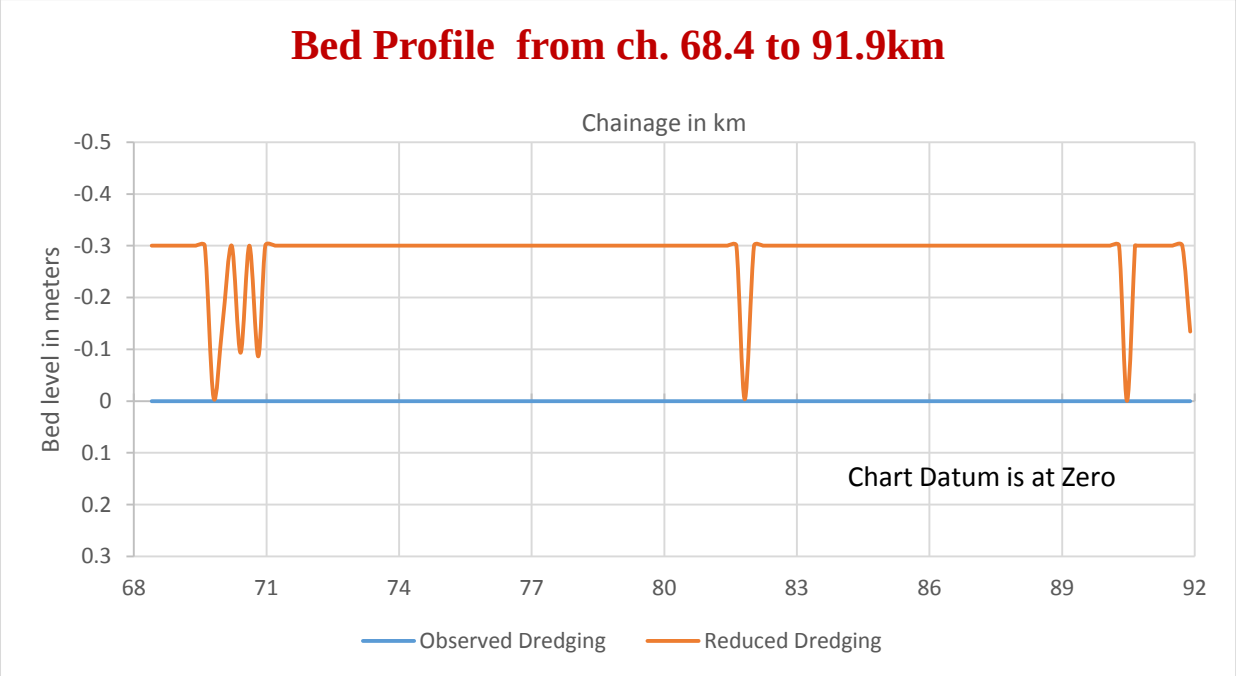


Figure 20 - River Bed Profile

3.5 Sub-Stretch-05: Nizamsagar Dam to Muddapur Village (Chainage 91.9km to 118.6km)

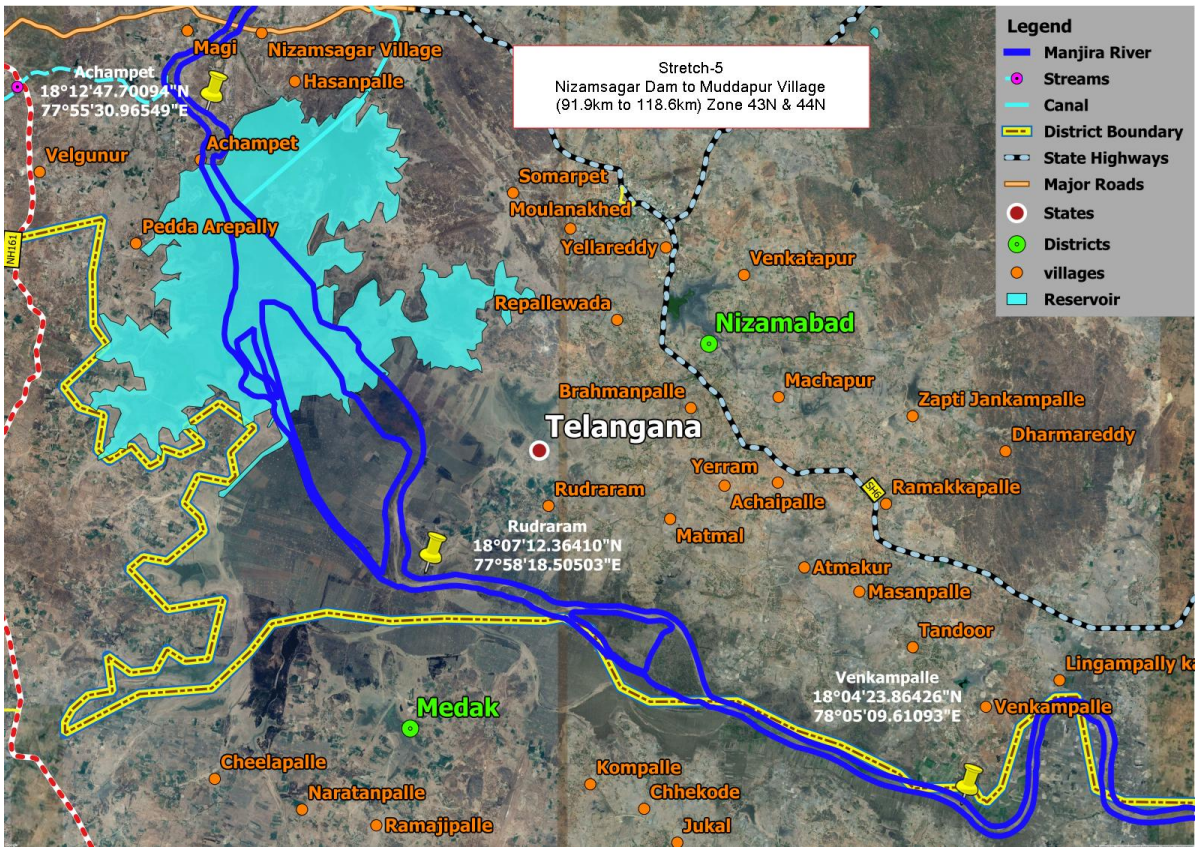


Figure 21 - Nizamsagar Dam to Muddapur Village

- **Bathymetry Survey**
  a) No bathymetric survey is conducted due to the unavailability of water level
- **Topographic Survey**
  b) 26.7 km of the length of the stretch for which the Topographic survey has been carried out.

This stretch is between 91.9km to 118.6km chainage starting from the Upstream of Nizamsagar Dam to Muddapur Village. The nearby area of this stretch is utilized for agricultural purpose and small clusters of settlements are present near to the river banks.

The villages like Mallampet, Bachepalle Masanpalle and Rudraram are situated near to this stretch. Yellareddy is the prominent town situated 9.0 km east of the Manjira River bank. The mixed cultivation patterns of Cotton, Groundnut, pulses and Paddy is found in this stretch.

The riverbed is mostly sandy in nature and isolated boulders are also present in the various places of this stretch. The river divided into two streams at 140.9km chainage for 6km in length with cotton plantation in between. The river banks are widely used for cultivation of various pulses. The river banks are unprotected in nature with shrubs and dense vegetation on the river bed and both sides of the river banks. There are no industries present in the vicinity of this stretch. A small scale fishing activities are observed near to Nizamsagar Dam.

A small park is situated on the right side bank of the Manjira River near Nizamsagar Dam. Small boats for recreational purpose are available to the Nizamsagar Dam authority for the tourists visiting Nizamsagar Dam Park. The water in the area is generally used for drinking and agricultural purpose. No other check dams/obstructions are present in this stretch of Manjira River.

Nizamsagar Dam was constructed across the Manjra River between Achampet and Banjapalle villages of the Nizamabad district in Telangana, India. The most outstanding feature of the project is the gigantic masonry dam sprawling across the river for 3 kilometers with a motorable road of 14 feet width.

Figure 22 - Levelling of Water level gauge of Nizamsagar Dam (91.71 km chainage)

Class	Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
I	91.9	106.5	0.000	0.000	14600	6,33,902.35	4,557,808.71	0.000	-0.300	14600	8,00,286.46	5,815,523.49
II	91.9	106.5	0.000	0.000	14600	9,65,526.88	6,942,139.53	0.000	-0.300	14600	1,178,369.15	8,559,150.09
III	91.9	106.5	0.000	0.000	14600	1,459,302.81	10,492,400.19	0.000	-0.300	14600	1,722,151.50	12,498,512.74

IV	91.9	106.5	0.000	0.000	14600	1,744,049.88	12,643,717.94	0.000	-0.300	14600	2,015,791.92	14,737,041.47

Class	Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
I	106.5	118.6	0.000	0.000	12100	5,05,217.14	5,05,217.14	-0.300	0.000	12100	6,40,745.88	6,40,745.88
II	106.5	118.6	0.000	0.000	12100	7,69,418.31	7,69,418.31	-0.300	0.000	12100	9,43,713.28	9,43,713.28
III	106.5	118.6	0.000	0.000	12100	1,162,614.87	1,162,614.87	-0.300	0.000	12100	1,378,885.71	1,378,885.71
IV	106.5	118.6	0.000	0.000	12100	1,402,839.77	1,402,839.77	-0.300	0.000	12100	1,628,895.72	1,628,895.72

Table 24 - Dredging Quantity Details – Stretch 05

3.5.1 Observed and reduced Bed Profile of the stretch

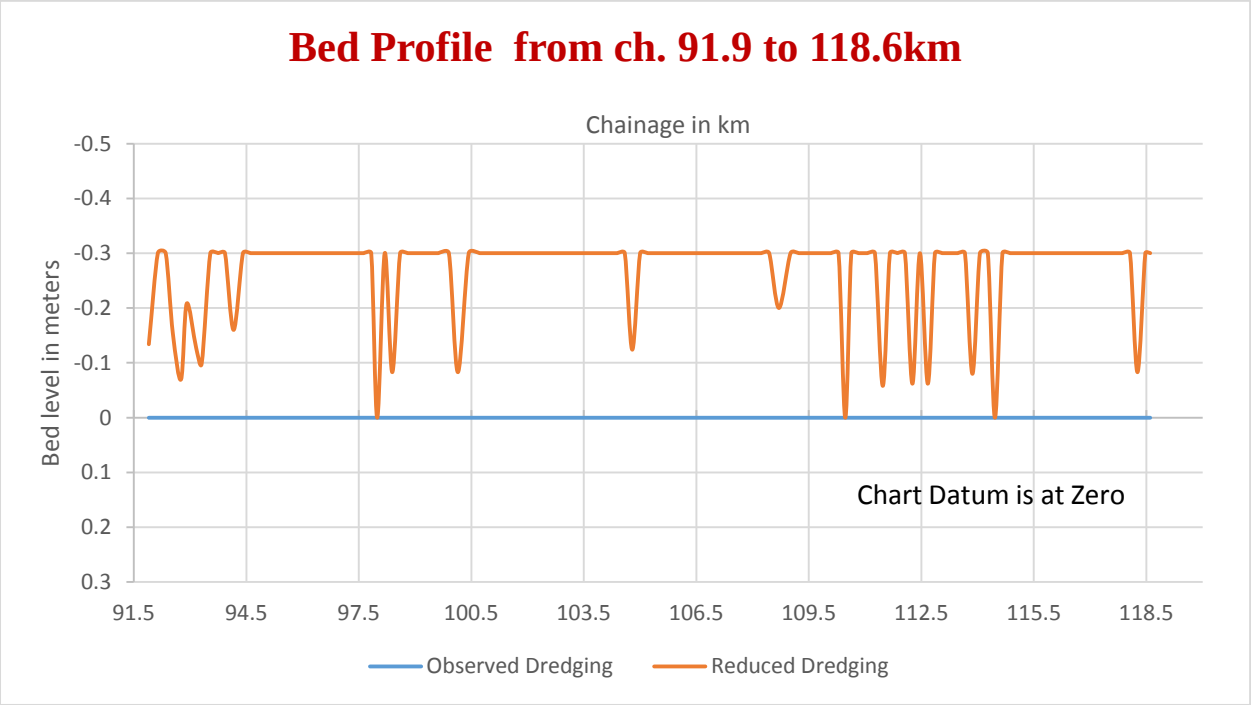


Figure 23 - River Bed Profile

3.6 Sub-Stretch-06: Muddapur Village to Edupayala check dam (Chainage 118.6km to 146.6km)

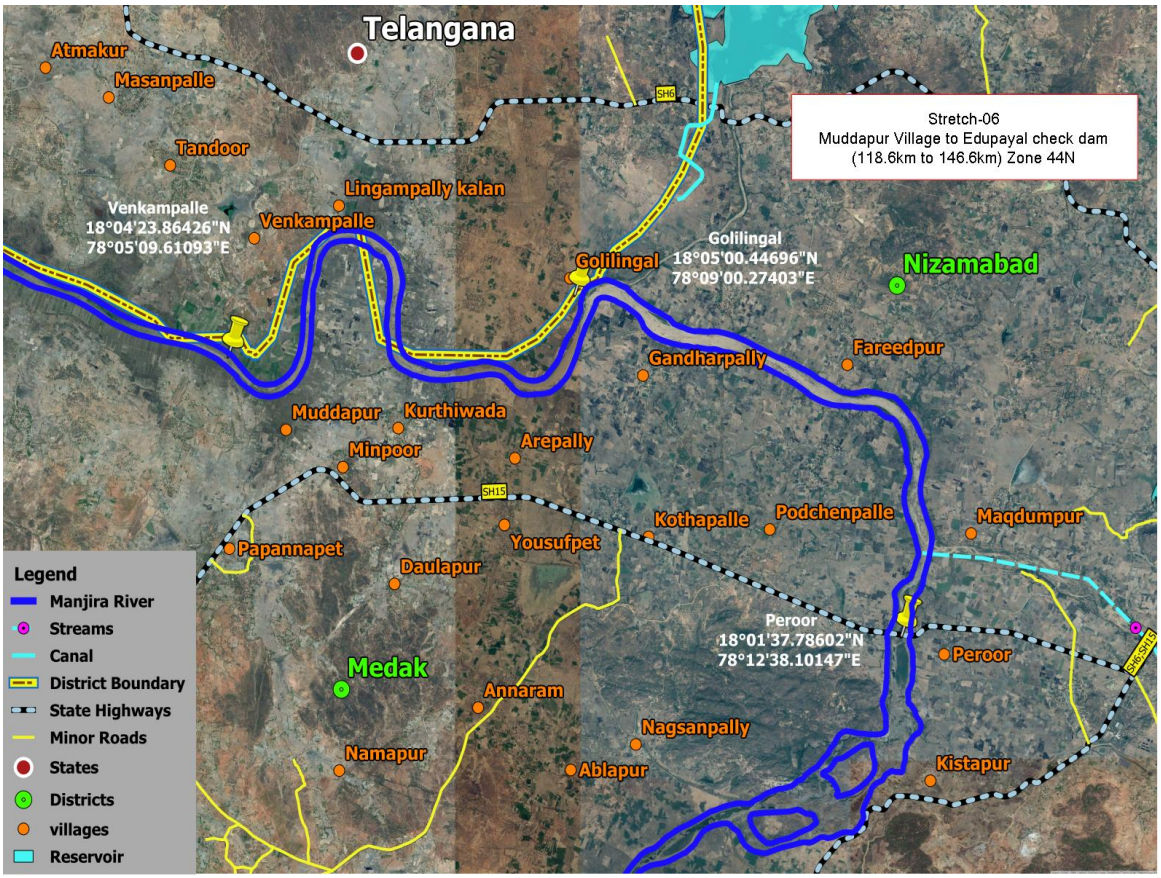


Figure 24 - Muddapur Village to Edupayala check dam

- **Bathymetry Survey**
  a) No bathymetric survey is conducted due to the unavailability of water level
- **Topographic Survey**
  b) 28.0 km of the length of the stretch for which the Topographic survey has been carried out.

This stretch is between 118.6 to 146.6km chainage starting from Muddapur to downstream of the Edupayala Check dam. The nearby area of this stretch is utilized for agricultural purpose and small clusters of settlements are present near to the river banks.

The villages like Fareedpur, Sardhana, Golilingal and Muddapur are situated near to this stretch. The mixed cultivation patterns of Cotton, Groundnut and Paddy is found in this stretch. The Deccan Sugars (18°0'43.81"N 78°14'55.38"E) near Mombojipally present in this stretch.

Figure 25 - Edupayala Temple (146.0km Chainage of Manjira River)

The riverbed is mostly sandy in nature and isolated boulders are also present in the various places of this stretch. The river banks are unprotected in nature with shrubs and dense vegetation on both sides of the river banks.

There are no industries present in the vicinity of this stretch. This stretch is not being used for water transport or any other fishing activates. No ferry services or local boats are available in this stretch.

There is no tourist point of attraction in this stretch. The water in the area is generally used for the agricultural purpose. No other check dams/obstructions are present in this stretch of Manjira River.

Class	Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
I	118.6	146.6	0.000	0.000	28000	1,197,951.79	1,703,168.93	-0.300	0.000	28000	1,465,110.98	2,105,856.86
II	118.6	146.6	0.000	0.000	28000	1,824,641.30	2,594,059.61	-0.300	0.000	28000	2,171,478.42	3,115,191.70
III	118.6	146.6	0.000	0.000	28000	2,757,778.74	3,920,393.61	-0.300	0.000	28000	3,191,724.55	4,570,610.26
IV	118.6	146.6	0.000	0.000	28000	3,327,642.68	4,730,482.45	-0.300	0.000	28000	3,781,633.17	5,410,528.89

Table 25 - Dredging Quantity Details – Stretch 06

3.6.1 Observed and reduced Bed Profile of the stretch

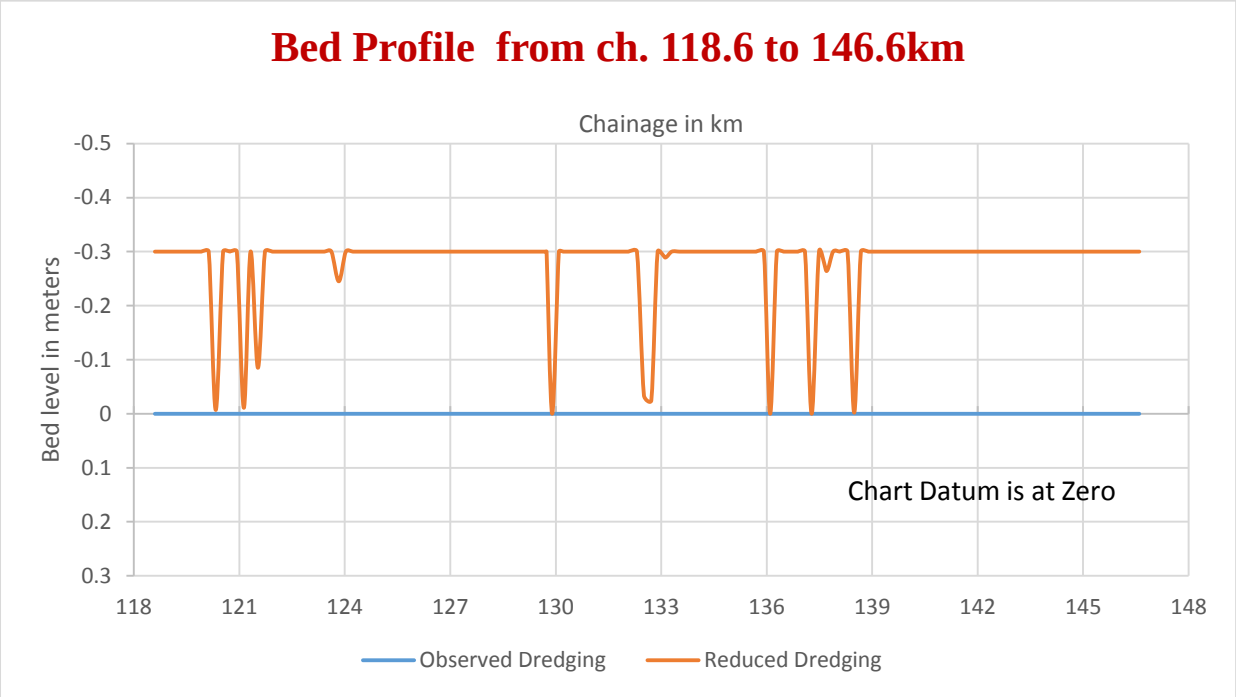


Figure 26 - River Bed Profile

3.7 Sub-Stretch-07: Edupayala check dam to Rollpahad Village (Chainage 146.6km to 170.4km)

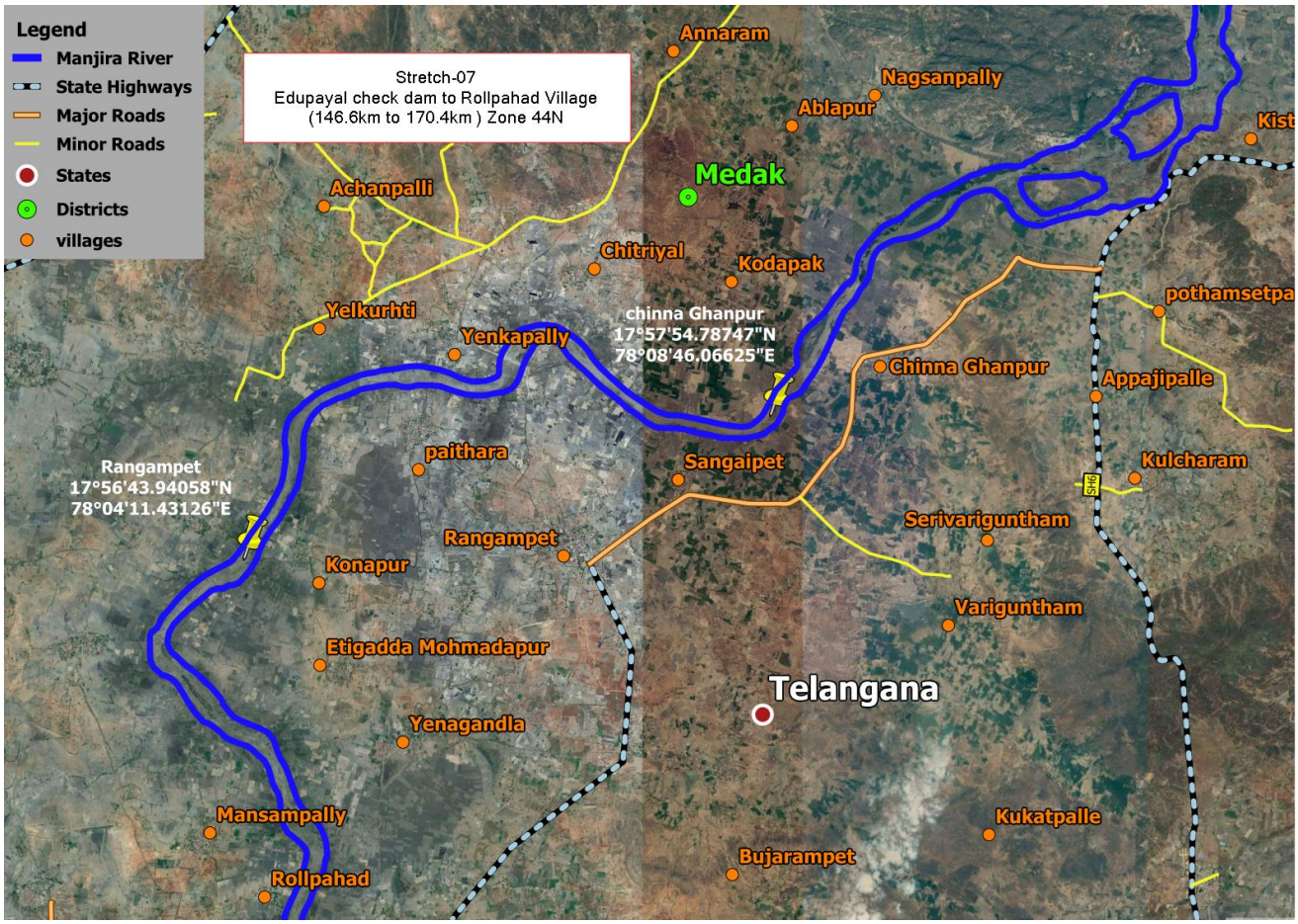


Figure 27 - Edupayala check dam to Rollpahad Village

- **Bathymetry Survey**
  a) No bathymetric survey is conducted due to the unavailability of water level
- **Topographic Survey**
  b) 23.8 km of the length of the stretch for which the Topographic survey has been carried out.

This stretch is between 146.6km to 170.4km chainage starting from Edupayala Check dam to Rollpahad. The nearby area of this stretch is utilized for agricultural purpose and small clusters of settlements are present near the river banks.

The villages like Konapur, Paithara, Yenkapally, Sangaipet and Chinna Ghanpur are situated near to this stretch. The mixed cultivation patterns of Cotton, Groundnut, Paddy and Banana is found in this stretch.

Figure 28 - Edupayala Check dam (147.25km Chainage of Manjira River)

The riverbed is mostly sandy in nature and isolated boulders are also present in the various places of this stretch. The river banks are unprotected in nature with shrubs and dense vegetation on both sides of the river banks.

There are no industries present in the vicinity of this stretch. This stretch is not being used for water transport or any other fishing activates. No ferry services or local boats are available in this stretch.

There is no tourist point of attraction in this stretch. The water in the area is generally used in the agricultural and drinking purpose. The water outlet canal is present near the check dam and is used for irrigation of agricultural land. No other check dams/obstructions are present in this stretch of Manjira River.

Class	Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
I	146.6	170.4	0.000	0.000	23800	1,014,359.66	2,717,528.59	-0.300	0.000	23800	1,300,007.45	3,405,864.31
II	146.6	170.4	0.000	0.000	23800	1,545,008.43	4,139,068.04	-0.300	0.000	23800	1,912,515.66	5,0277,07.36
III	146.6	170.4	0.000	0.000	23800	2,335,131.38	6,255,524.99	-0.300	0.000	23800	2,791,165.86	7,361,776.12
IV	146.6	170.4	0.000	0.000	23800	2,817,667.37	7,548,149.82	-0.300	0.000	23800	3,294,230.16	8,704,759.05

Table 26 - Dredging Quantity Details – Stretch 07

3.7.1 Observed and reduced Bed Profile of the stretch

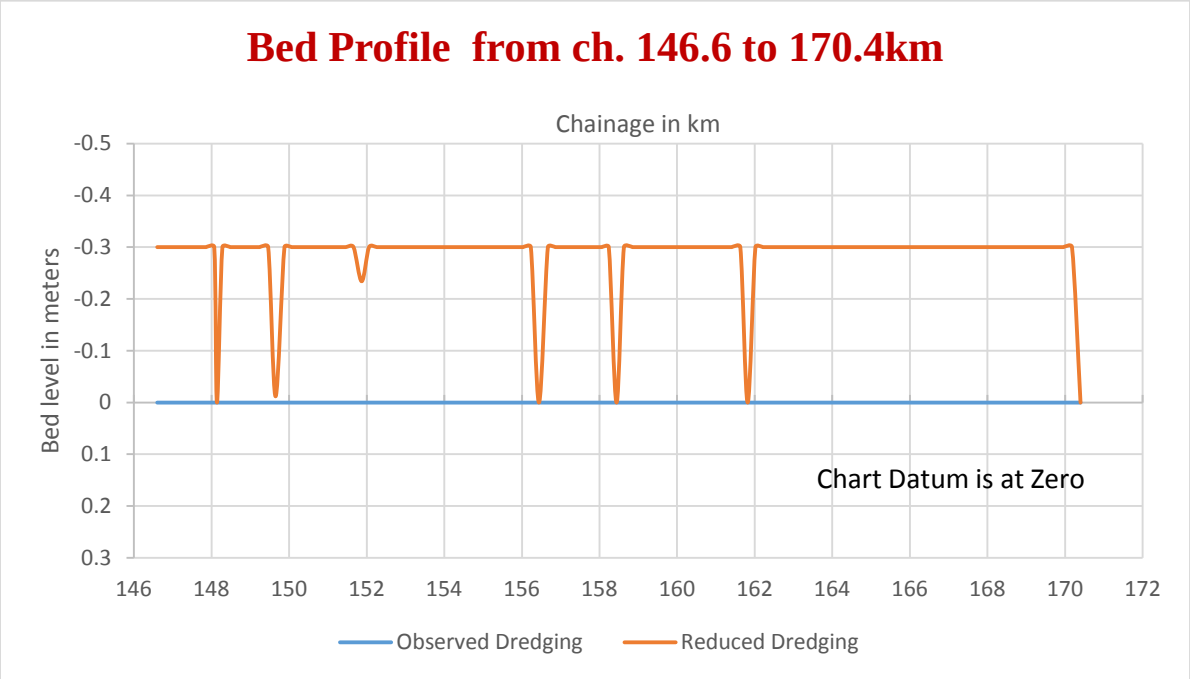


Figure 29 - River Bed Profile

3.8 Sub-Stretch-08: Rollpahad Village to Korpole Village (Chainage 170.4km to 197.2km)

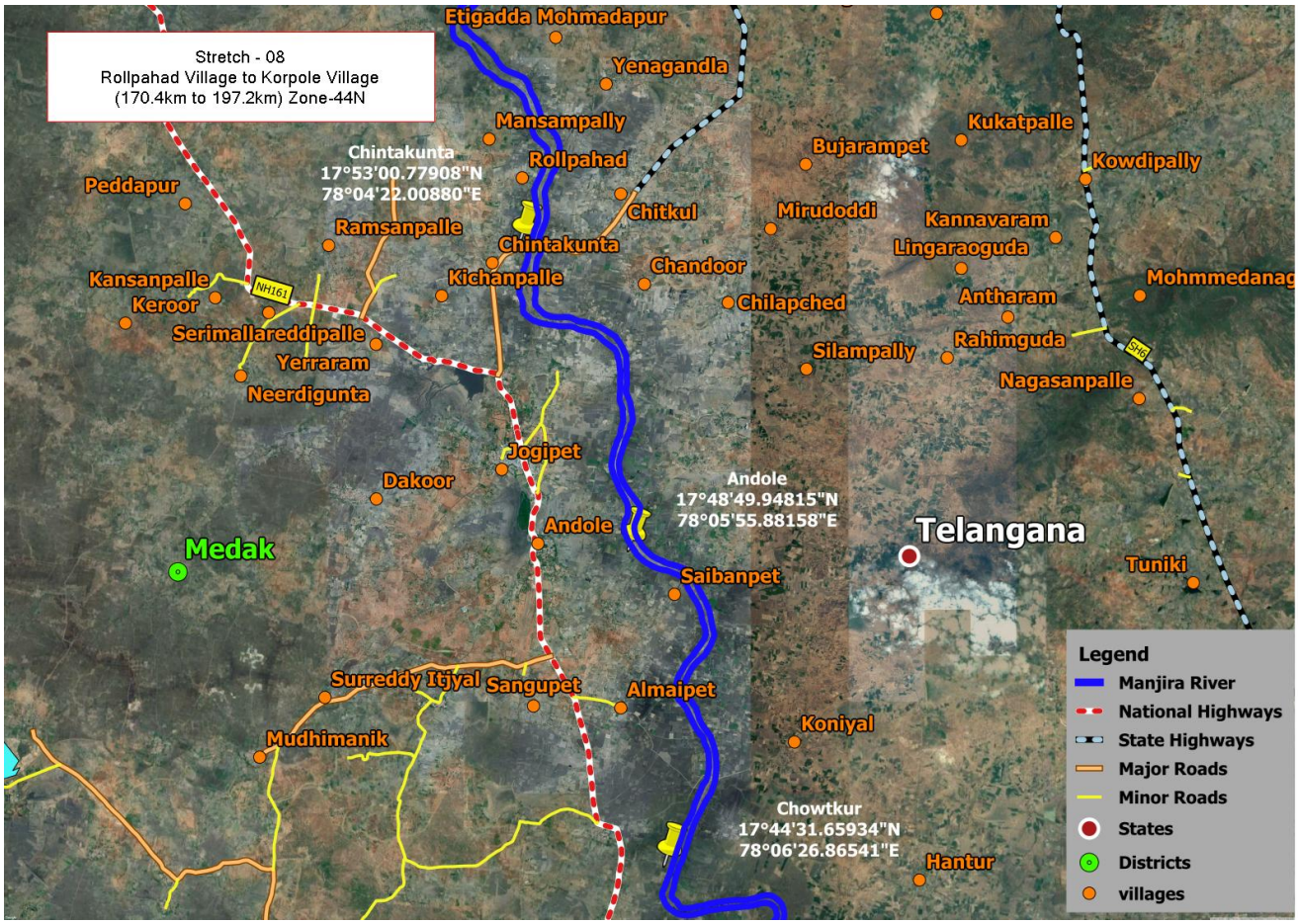


Figure 30 - Rollpahad Village to Korpole Village

- **Bathymetry Survey**
  a) No bathymetric survey is conducted due to the unavailability of water level
- **Topographic Survey**
  b) 26.8 km of the length of the stretch for which the Topographic survey has been carried out.

This stretch is between 170.4km to 197.2km chainage starting from Rollpahad village to Korpole. The nearby area of this stretch is utilized for agricultural purpose and small cluster of settlement is found near the river banks. The Jogipet and Andole are the prominent cities situated 04 km away from this stretch.

The villages like Rollpahad, Aiiamari, Saraffpally and Almaipet are situated near to this stretch. The Empee distilleries near Chowtkur is present in this stretch. The mixed cultivation patterns of Cotton, Groundnut, Paddy and Banana is found in this stretch.

The riverbed is mostly sandy in nature and isolated boulders are also present in the various places of this stretch. The river banks are unprotected in nature with shrubs and dense vegetation on both sides of the river banks. There are no industries present in the vicinity of this stretch. This stretch is not being used for water transport or any other fishing activates. No ferry services or local boats are available in this stretch.

The Chamundeshwari temple, Chitkul near Chintakunta Bridge exist in this stretch, rest there are no other tourist points of attraction in this stretch. The water in the area is generally used for the agricultural purpose. No other check dams/obstructions are present in this stretch of Manjira River. There are three bridges/overhead obstruction in this stretch, bridge near Koniyal village and Chintakunta new and old bridge.

Class	Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
I	170.4	197.2	0.000	0.000	26800	1,134,949.52	3,852,478.11	-0.300	0.000	26800	1,454,480.89	4,860,345.20
II	170.4	197.2	0.000	0.000	26800	1,728,685.55	5,867,753.59	-0.300	0.000	26800	2,139,039.07	7,166,746.43
III	170.4	197.2	0.000	0.000	26800	2,612,636.19	8,868,161.18	-0.300	0.000	26800	3,121,227.28	10,483,003.40
IV	170.4	197.2	0.000	0.000	26800	3,152,477.68	10,700,627.50	-0.300	0.000	26800	3,683,663.95	12,388,423.00

Table 27 - Dredging Quantity Details – Stretch 08

3.8.1 Observed and reduced Bed Profile of the stretch

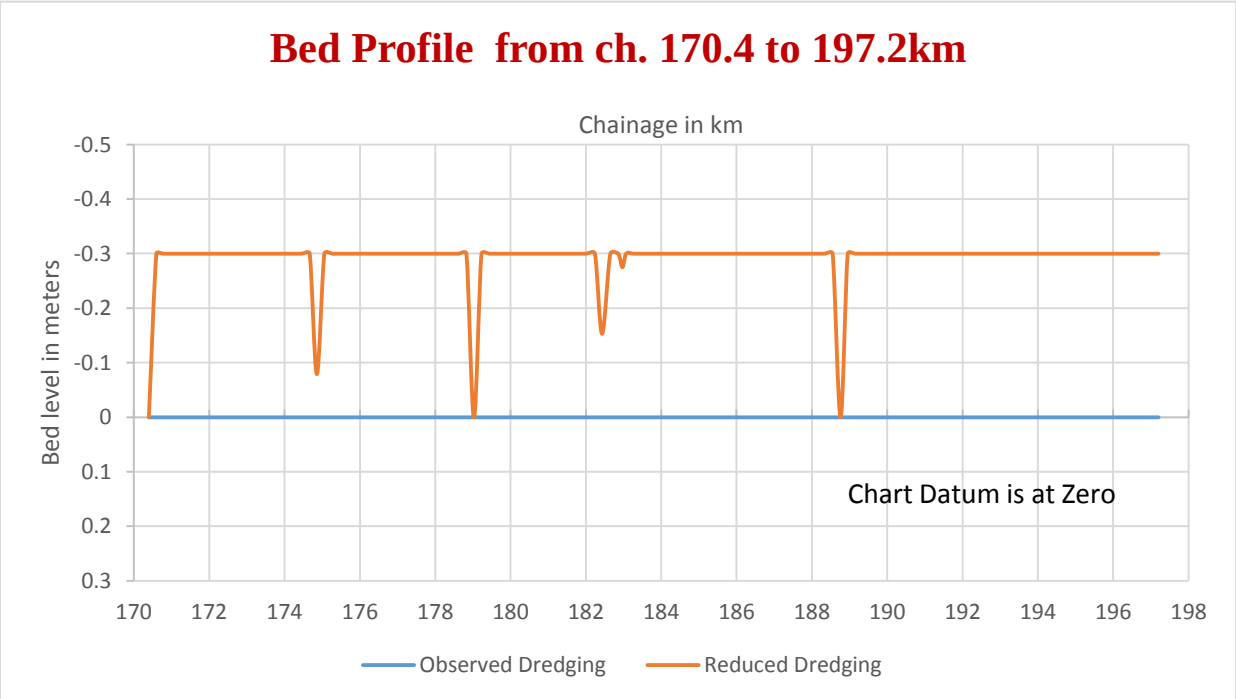


Figure 31 - River Bed Profile

3.9 Sub-Stretch-09: Korpole Village to D/s of Manjira Barrage (Chainage 197.2km to 220km)

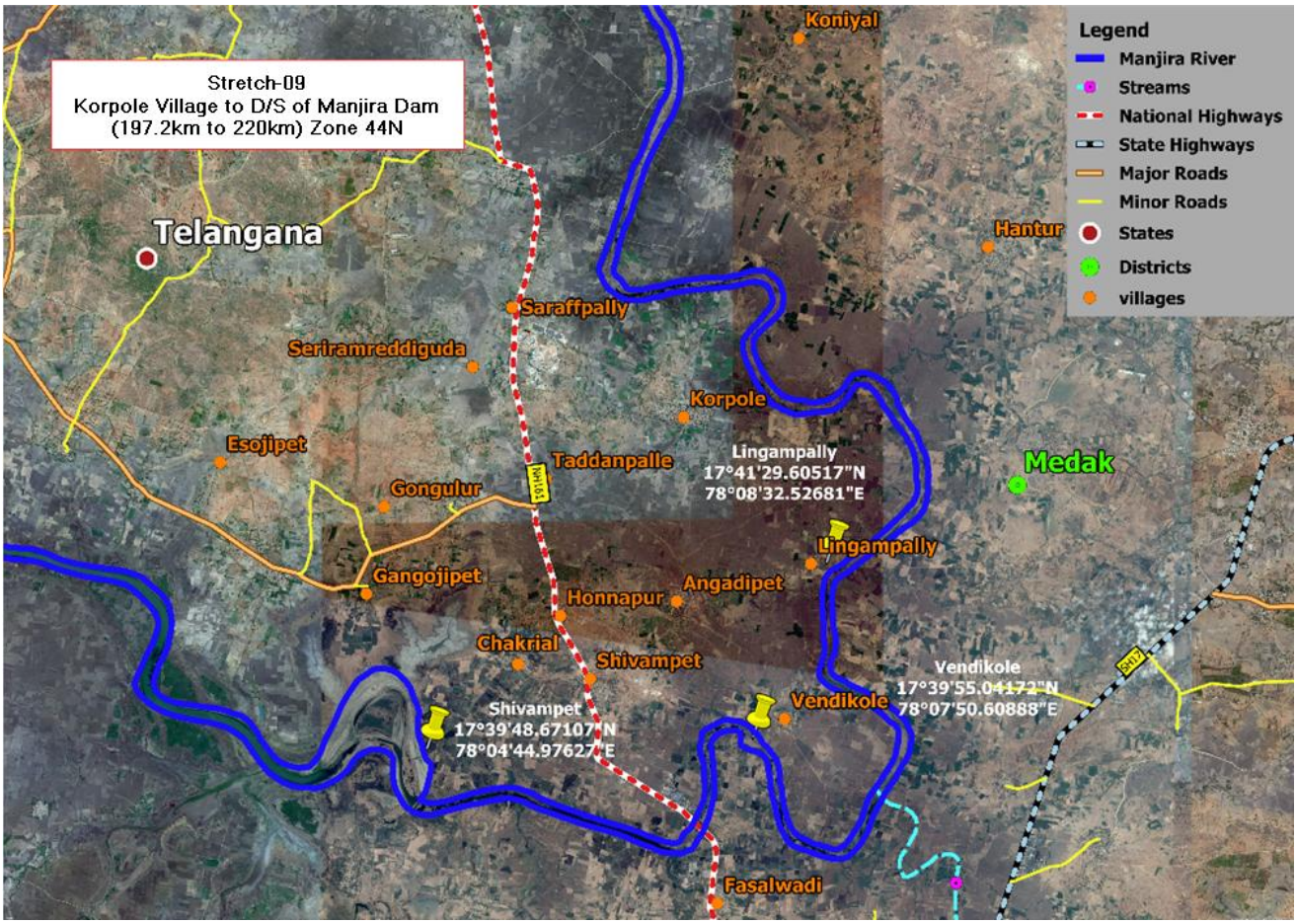


Figure 32 - Korpole Village to D/s of Manjira Barrage

- **Bathymetry Survey**
  a) No bathymetric survey is conducted due to the unavailability of water level
- **Topographic Survey**
  b) 22.8 km of the length of the stretch for which the Topographic survey has been carried out.

This stretch is between 197.2km to 220km chainage starting from Korpole Village to downstream of Manjira Barrage. The nearby area of this stretch is utilized for agricultural purpose and small cluster of settlement are found near the river banks.

The Sangareddy town is situated 05 km from the survey area is the prominent town nearby. The villages like Fasalwadi, Vendikole and Lingampally are present near to this stretch of Manjira River. The mixed cultivation pattern of Cotton, Groundnut, Paddy and Maze is found in this stretch.

The river bed is mostly flat muddy in nature and isolated boulders are also present in the various places of this stretch. The river banks are unprotected in nature with shrubs and dense vegetation on both sides of the river banks. The Charminar Breweries factory is present near to Fasalwadi Bridge and Empee Distilleries near Chowtkur village beside state Highway SH-13. This stretch is not being used for water transport or any other fishing activates. No ferry services or local boats are available in this stretch.

Figure 33 - View of River bed (Sub-stretch-09)

The Manjira Barrage situated on this stretch and is one of the prominent tourism spots in this area. The water in the area is generally used in the agricultural and drinking purpose. The crocodile breeding center is situated near to the Manjira Barrage. The presence of crocodiles are also confirmed by the dam officials during the conduct of the survey. No other check dams/obstructions are present in this stretch of Manjira River.

There are 02 bridges/overhead obstructions are present in the area are Fasalwadi old and new bridge. River takes a U turn towards North-West direction from Southeast direction near Fasalwadi Bridge.

Class	Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
I	197.2	220	0.000	0.000	22800	9,52,763.98	4,805,242.09	-0.300	0.000	22800	1,202,177.63	6,062,522.83
II	197.2	220	0.000	0.000	22800	1,451,188.17	7,318,941.76	-0.300	0.000	22800	1,772,331.91	8,939,078.34
III	197.2	220	0.000	0.000	22800	2,193,308.66	11,061,469.84	-0.300	0.000	22800	2,592,928.46	13,075,931.86
IV	197.2	220	0.000	0.000	22800	2,646,518.34	13,347,145.84	-0.300	0.000	22800	3,064,442.52	15,452,865.52

Table 28 - Dredging Quantity Details – Stretch 09

3.9.1 Observed and reduced Bed Profile of the stretch

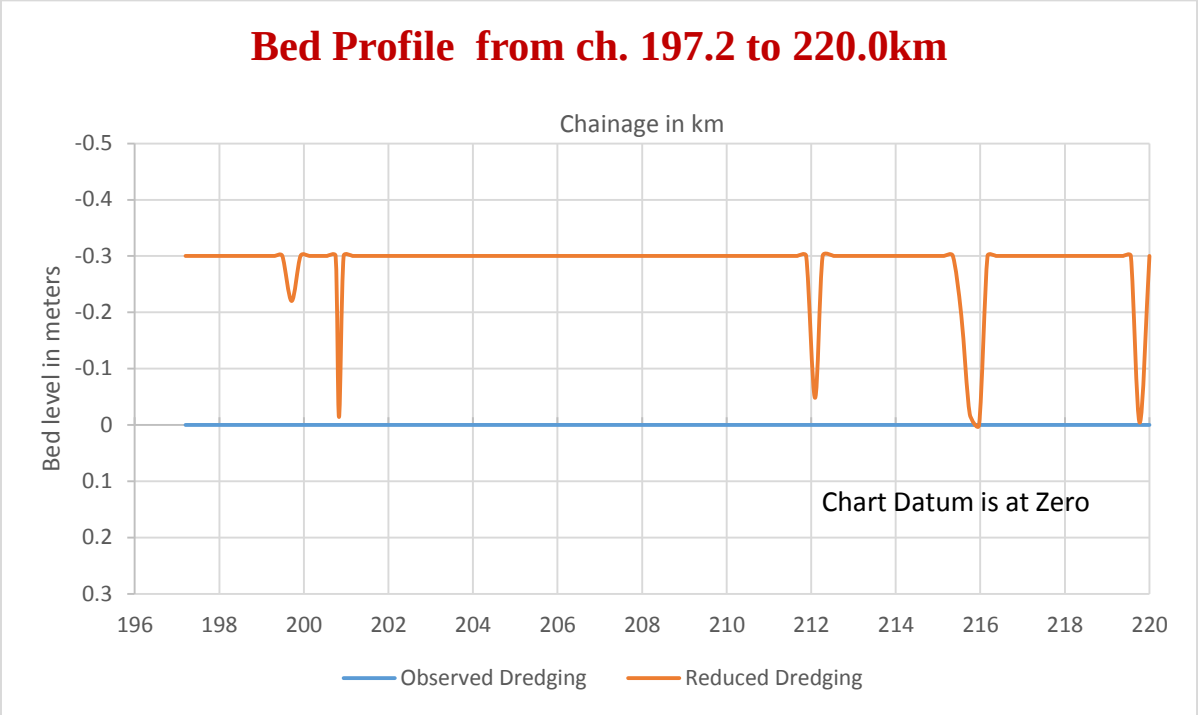


Figure 34 - River Bed Profile

3.10 Sub-Stretch-10: Upstream of Manjira Barrage to Downstream of Singur Dam (Chainage 220.0km to 245.0km)

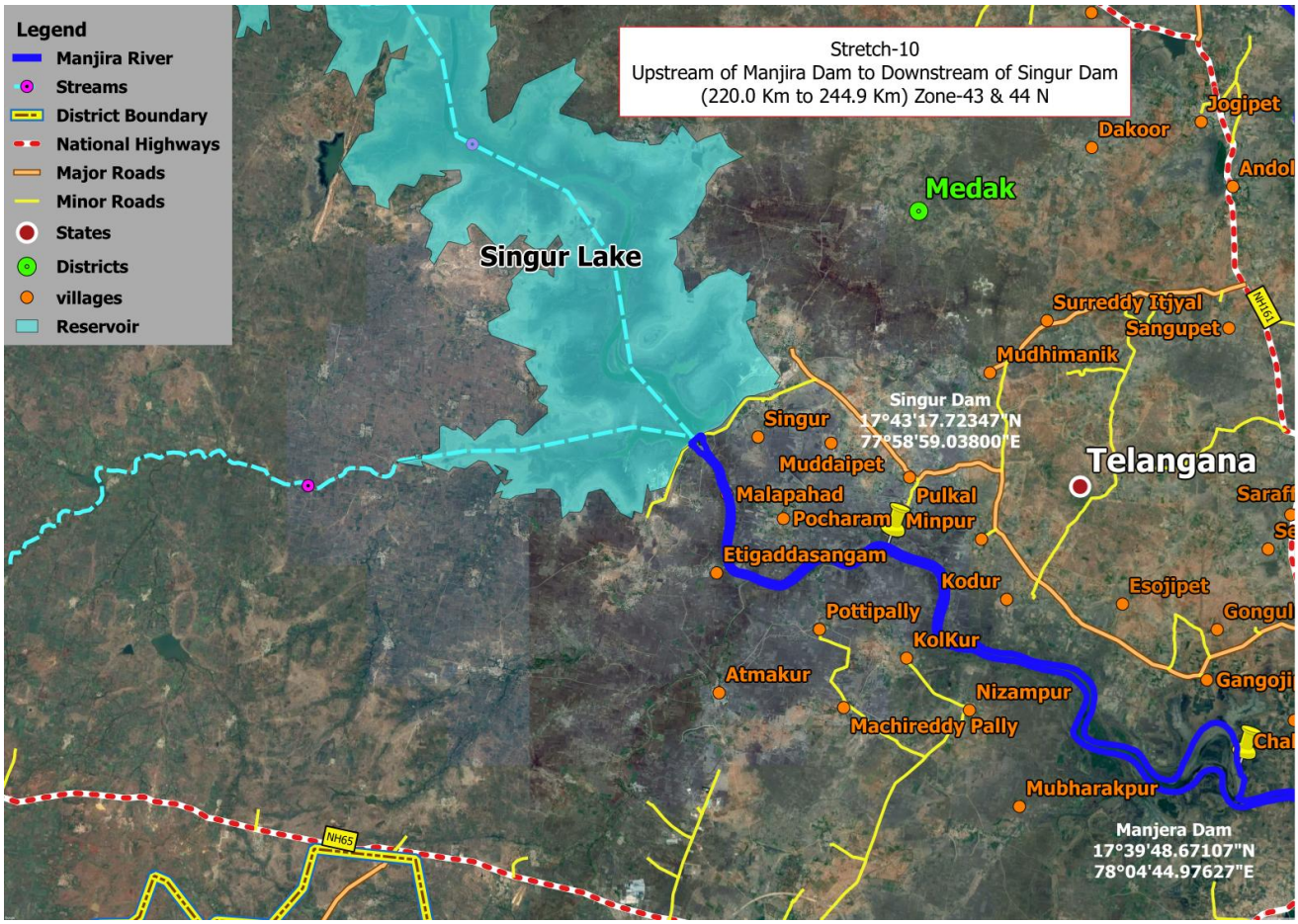


Figure 35 - Upstream of Manjira Barrage to Downstream of Singur Dam

- **Bathymetry Survey**
  a) No bathymetric survey is conducted due to the unavailability of water level
- **Topographic Survey**
  b) 25 km of the length of the stretch for which the Topographic survey has been carried out.

This stretch is between 220km to 245km chainage starting from the upstream of Manjira Barrage to downstream of Singur Dam. The nearby area of this stretch is mainly utilized for agricultural purpose. The mixed cultivation patterns Cotton, Groundnut, Paddy and Maze are observed in this stretch.

Figure 36 - The power sub-station near Singur Dam (245.0 km chainage)

The riverbed is mostly flat muddy in nature and the river banks are unprotected in nature with shrubs and small plants growing on both sides. There are no industries present on this stretch and this stretch in not being used for water transport or any other fishing activates. The crocodiles are said to be present in the area as per the local information. The settlement are not available in this area. No check dams/obstructions are present in the area. The water in the area is generally used for the agricultural purpose. The main tourist attraction in this stretch is Singur Dam. Not major town or cities are present in the area. No ferry services or any local boats are available in this stretch.

Class	Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
I	220	231.6	0.000	0.000	11600	4,93,412.02	5,298,654.11	-0.300	0.000	11600	6,28,467.49	6,690,990.32
II	220	231.6	0.000	0.000	11600	7,51,551.82	8,070,493.58	-0.300	0.000	11600	9,24,625.02	9,863,703.36
III	220	231.6	0.000	0.000	11600	1,135,878.71	12,197,348.55	-0.300	0.000	11600	1,349,796.64	14,425,728.50
IV	220	231.6	0.000	0.000	11600	1,370,586.65	14,717,732.49	-0.300	0.000	11600	1,593,850.24	17,046,715.76

Class	Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
I	231.6	245.0	0.00	0.00	13300	5,51,482.24	5,51,482.24	-0.300	0.000	13300	7,05,542.22	7,05,542.22
II	231.6	245.0	0.00	0.00	13300	8,39,988.72	8,39988.72	-0.300	0.000	13300	1,036,797.83	1,036,797.83
III	231.6	245.0	0.00	0.00	13300	1,269,540.39	1,269,540.39	-0.300	0.000	13300	1,512,239.94	1,512,239.94
IV	231.6	245.0	0.00	0.00	13300	1,531,862.51	1,531,862.51	-0.300	0.000	13300	1,785,205.57	1,785,205.57

Table 29 - Dredging Quantity Details – Stretch 10

3.10.1 Observed and reduced Bed Profile of the stretch

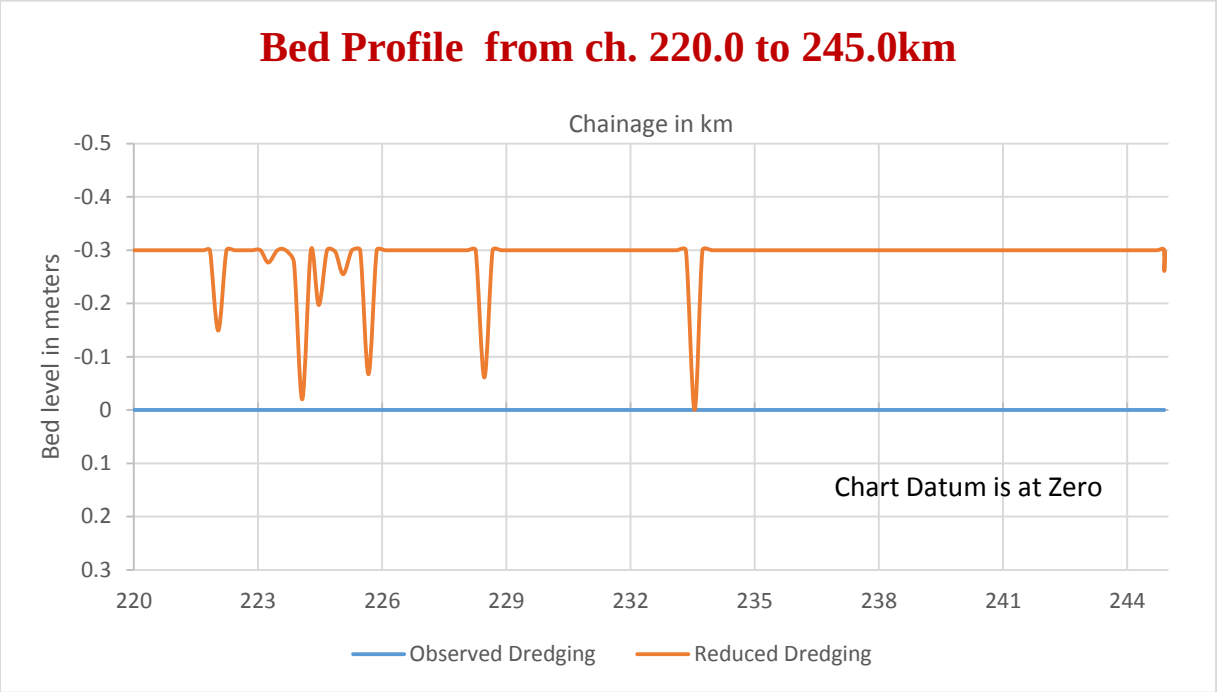


Figure 37 - Observed and reduced Bed Profile of the stretch

3.11 Other Aspects of Waterway

3.11.1 Fishing

The fishing activities in the river are found in very small scale near Singur, Manjira and Nizamsagar Reservoirs. No other fishing activities exist on the entire stretch of the Manjira River. The fishing boats/any other type country boats are not available throughout the survey stretch of Manjira River. The crocodile breeding center is located near to the Manjira Reservoir.

3.11.2 Industries

The Nizamabad and Bodhan are the town nearby to the survey stretch where industrials units were present. The details of industries exist very near to the survey stretch are as follows:-

Sl. No.	Industries	Chainage (km)	Position	
			Latitude	Longitude
01	Empee Distilleries, Chowtkur, Medak	192.0km	17°44'22.53"N	78° 5'24.51"E
02	Ganesh Sugar Industry, Kulabgoor, Sangareddy	215.5 km	17°38'41.24"N	78° 7'10.35"E
03	Charminar Breweries, Shivampet, Sangareddy	214.5 km	17°39'21.52"N	78° 7'3.63"E
04	Tirumala Rice industries, Banswada	70.0 km	18°21'40.22"N	77°52'22.00"E

Table 30 - Details of Industries

3.11.3 Crops

The river banks of Manjira River are used for agricultural purpose only. The mixed cropping patterns are followed in the area. The irrigation canals and usage of ground water through bore well are used widely for the irrigation of agricultural land on the entire survey stretch. The farmers are not only depending on field and horticultural crops, but also on animal husbandry for their livelihoods.

The Rice crops are widely found and are grown only under irrigated conditions. The pulse crops like green gram and black gram are grown in the area, Bengal gram is also found to be widely grown in the area especially in the upstream of Nizamsagar Dam. The cultivation of cotton is also widely seen in the less irrigated areas as it is found to be surviving even in drought conditions. The state owned seed farm is situated at Sadasivpet to cater the needs of foundation seed in the district and the seed chain process.

3.11.4 Settlements and irrigation

3.11.4.1 Settlements

The overall River banks are moderately populated with very small clusters of settlements on the entire survey stretch of Manjira River. These small villages are connected with main towns with the road transportation network.

3.11.4.2 Irrigation/Drinking water

The Singur Reservoir on Manjira River in Medak District is a sustained drinking water source of Hyderabad. The Manjra River is the main drinking water source for the Medak and Nizamabad districts as well as the adjoining twin cities of Hyderabad and Secunderabad.

Figure 38 - Drinking Water Pump (6.5 km chainage) well on Manjira River

3.11.5 Important cities/towns

There are no Major Cities/Town nearby river banks of Manjira River. The people settled near Manjira River depend on towns like Sangareddy, Jogipet, Medak, Banswada and Bodhan for any major requirements. Sangareddy and Medak are the district headquarters of Sangareddy and Medak Districts respectively. Local Taxis and Autos are also available occasionally along the entire river stretch.

3.11.6 Road Network

The both sides of Manjira River are well connected with road network and frequent state transport buses run between Sangareddy, Jogipet, Medal, Banswada and Bodhan towns and to other places/villages nearby to these cities. There is good connectivity to and from Hyderabad and Secunderabad cities and other cities of the state. Local hired/sharing transport is also available along the entire River stretch. The details of National Highways present in the project influence area are NH-07, NH-09, NH-16 and State Highways SH-06, SH-11, SH-13, SH-16, SH-17 and SH-25 also connects these cities to villages.

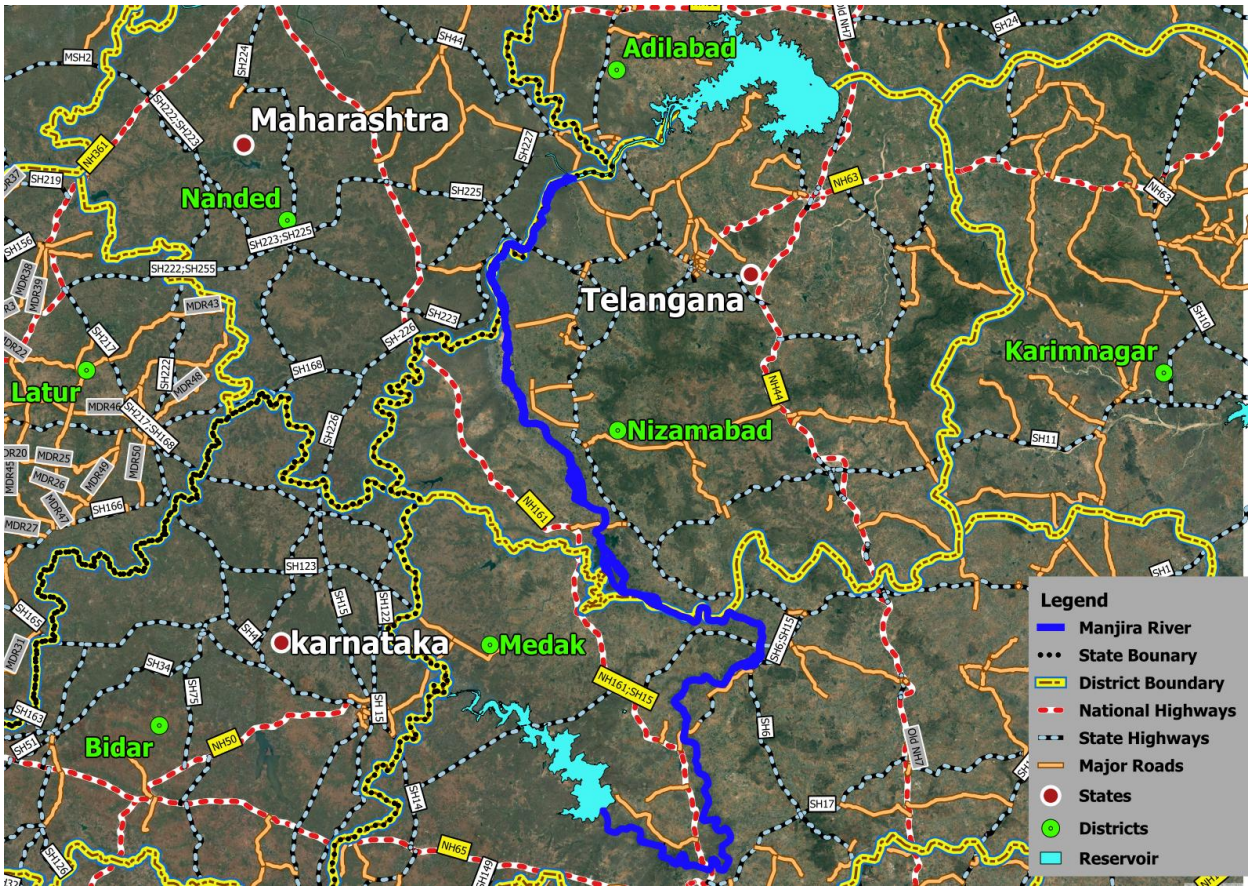


Figure 39 - Road Network

3.11.7 Rail Network

Railway network is not very good along Manjira River. Gandhi Park Railway Station, Bodhan, Nizamabad is the only railway station near to the Manjira River (15km) which comes under project influence area.

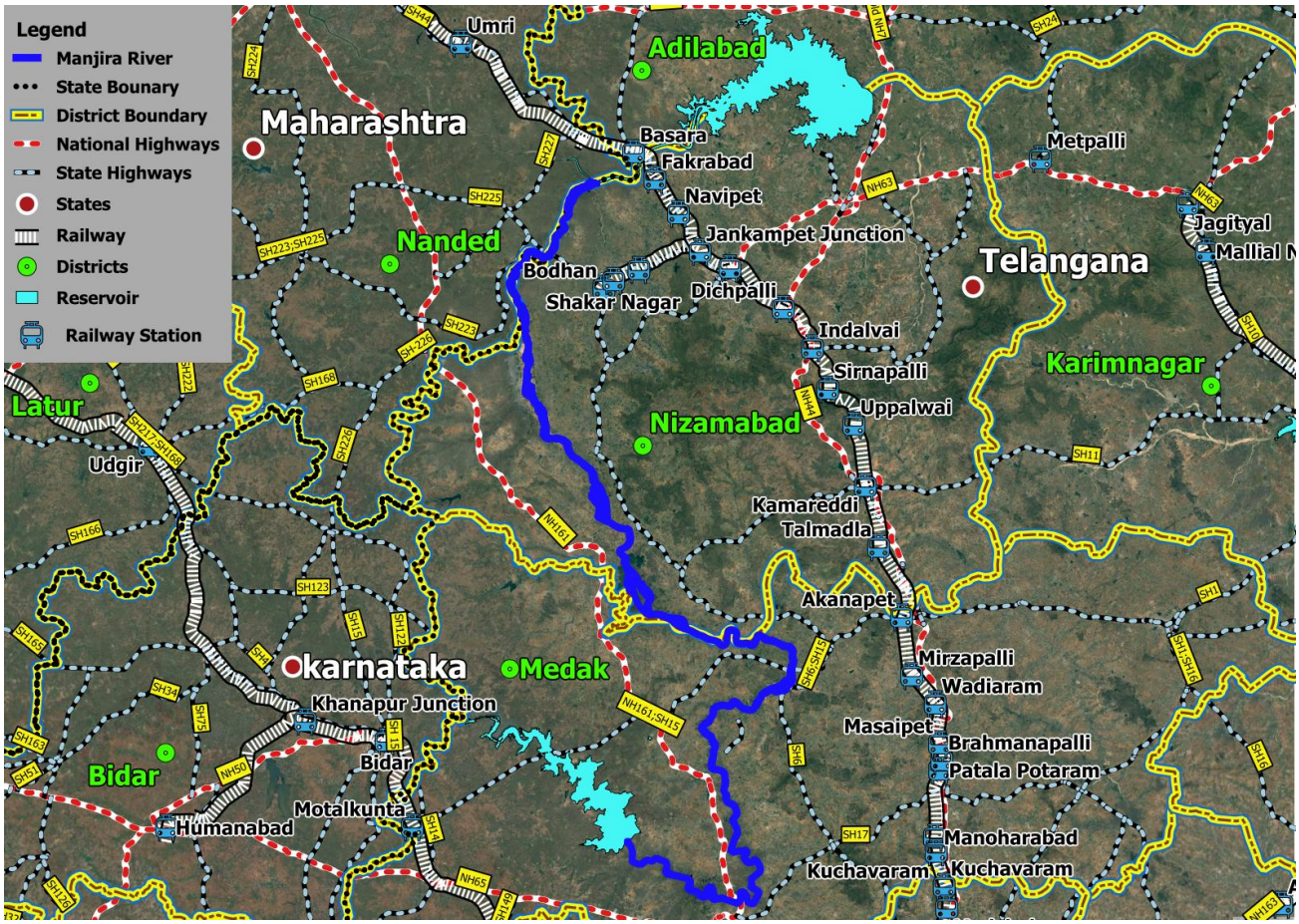


Figure 40 - Rail Network

3.11.8 Land Use

The Sangareddy, Medak, Banswada and Bodhan are the important cities/towns are situated near to the survey stretch of Manjira River. The land near the cities/towns is being used for the commercial and residential purpose. The small scale industries are also situated on both the banks of Tungabhadra River nearby these cities. These towns are located away from the river banks and the area near the river banks are exclusively used for agricultural purpose only. Small villages are located near to the survey stretch of Manjira River and the field are utilized for agricultural purposes like cotton, sugar canes, peanut farms, and rice.

3.11.9 Construction Material

All types of construction material like cement, Iron etc. are available in bulk quantity. Manjira River is sandy in nature at some places, however sand mining activities in large scale were observed only in the downstream area near Bodhan and Saloora (Sub-stretch-02).

3.11.10 Cargo Movement

The cargo movement is not envisaged through the waterway as the water will not be available throughout the year and the cities/towns are well connected through road network. Cargo movement mostly is being carried through road transport for small scale industries present in nearby villages.

3.11.11 Passenger Ferry Services

A small recreational boating facility is available at Manjira Barrage wildlife sanctuary and Nizamsagar Dam, however services are not available presently due to non-availability of navigable waters.

3.11.12 Historic Importance

The Historical places like Medak Fort, The fort is said to have been originally constructed by the Kakatiya kings and later renovated by Qutub-Shahi kings and stands 90 meters above the surrounding plains. It is one of the important hill forts in the Deccan and contains a brass gun of 10 ft. length.

Figure 41 - View of Medak Fort (139.0 km chainage)

The Medak Church is situated neat to the Medak city center and the Medak church is said to be one of the three big churches in South India and it was completed in 1924. The Cathedral is 61 meters high and can accommodate 5000 people.

Figure 42 - View of Medak Church (138 km chianage)

Edupayala Temple is situated south east of Medak town known as Edupayala. The temple is very famous and the Rathotsavam festival begins on the day of Shivaratri and it is estimated that more than 5 lakh people would visit the temple during these three day festival.

Figure 43 - View of Edupayala Temple (147.25 km chainage)

3.11.13 Tourism

Manjira wildlife Sanctuary, located 75km from Medak and 5km from Sangareddy is nestling between Manjira and Singur barrages. The Manjira wild life sanctuary is home for a number of resident and migratory birds in addition to marsh crocodiles and muggar.

Figure 44 - Wild Life Sanctuary, Manjira (220.1 km chainage)

Narsapur Forest, located 35km from Hyderabad, is spread between Gummadidala and Narsapur. This forest has a variety of trees, many lakes and supports wildlife. Lately, this has become a hotspot for Telugu film shootings.

Nizamsagar Dam was constructed across the Manjira River between Achampet and Banjapalle villages of the Nizamabad district. The most outstanding feature of the project is the gigantic masonry dam sprawling across the river for 3 kilometers with a motorable road of 14 feet width. A small park with boat riding facility is also situated on the right bank side of the Manjira River.

3.11.14 Details of Irrigation Canals and Outlets

The water from Manjira River is the primary source of Drinking water for nearby cities like Hyderabad, Secunderabad, Sangareddy, Jogipet, Medak, Banswada, Bodhan etc. Several pumping stations are present in the Manjira River for supply of drinking water and the water available in the river along with the ground water is extensively used to fulfil the water supply demand for both drinking and agricultural purpose of the area. The details of inlet and outlet canal present in the area are as follows:-

Sl. No.	Position		Chainage (km)	Type	Description
	Lat	Long			
01	17°42'48.41"N	77°56'36.24"E	240.3	Inlet	The stream joining on RBS of Manjira River originating from small reservoir near Bilkal. The stream is in dry condition during the conduct of survey.
02	17°43'01.87"N	77°59'37.81"E	234.4	Inlet	A small stream joining on LBS of Manjira River flowing through Pulkal Village. The stream is in dry condition during the conduct of survey.
03	17°41'42.63"N	78°00'00.16"E	231.5	Inlet	A small stream Joining on RBS flowing near Kolkur village. The stream is in dry condition

Sl. No.	Position		Chainage (km)	Type	Description
	Lat	Long			
					during the conduct of survey.
04	17°39'36.93"N	78°03'05.94"E	223.6	Inlet	A group of small streams Joining on RBS of Manjira River and originating from Mehboob Sagar and small reservoir near Kaslabad village. The stream is in dry condition during the conduct of survey.
05	17°39'23.34"N	78°08'58.69"E	208.5	Inlet	A stream Joining on RBS of Manjira River and flowing near Ismailkhanpet Village. The stream is in dry condition during the conduct of survey.
06	17°59'47.37"N	78°10'36.15"E	147.3	Outlet	The outlet irrigational canal situated on the LBS of Manjira river near Edupayala Barrage. The Canal is in dry condition during the conduct of survey.
07	18°00'01.69"N	78°10'54.10"E	147.2	Outlet	The outlet irrigational canal situated on the RBS of Manjira river near Edupayala Barrage. The Canal is in dry condition during the conduct of survey.
08	18°02'29.77"N	78°12'53.21"E	139.3	Inlet	A stream Joining on RBS of Manjira River and flowing near Ryalamadugu Village. The stream is in dry condition during the conduct of survey.
09	18°05'08.25"N	78°09'20.03"E	130.5	Inlet	A stream Joining on RBS of Manjira River and originating from Pocharam Dam. The stream is in dry condition during the conduct of survey.
10	18°13'01.72"N	77°57'27.27"E	93.1	Outlet	The outlet irrigational canal situated on the RBS of Manjira river near Nizamsagar Dam. The renewal of the canal is in progress and canal is in dry condition during the conduct of survey.
11	18°27'32.92"N	77°45'44.54"E	52.4	Inlet	A stream Joining on LBS of Manjira River and originating from Kylas nala Dam. The stream is in dry condition during the conduct of survey.
12	18°36'04.50"N	77°44'45.85"E	35.1	Inlet	A small river Joining on LBS of Manjira River and flowing near Medankalur Village. The river is in dry condition during the conduct of survey.
13	18°39'53.70"N	77°43'41.52"E	27.8	Inlet	A stream Joining on LBS of Manjira River and flowing near Hipparga Thadi Village. The stream is in dry condition during the conduct of survey.
14	18°48'35.18"N	77°51'45.54"E	1.4	Inlet	A stream Joining on RBS of Manjira River and flowing near Chinna Mavandhi and Langdapur Villages. The stream is in dry condition during the conduct of survey.

Table 31 - Details of Irrigational Canals and Inlet/Outlets

4 Terminals

The survey stretch of Manjira River is 245.0km in length with various reservoirs and obstructions. The water availability is very low on the river and there is very less possibility for the scope for continuous navigation.

4.1 Proposed Locations for Construction of New Terminals

The locations for the construction of terminals are chosen near to the reservoir and barrage where the water level is available at its maximum throughout the year and also by considering the possibility for future development and tourism. The possible locations for construction of terminals are as tabulated below:-

Sl. No.	Terminal Location	Lat	Long	Land Use	Owner
01	Manjira Barrage	17°39'16.70"N	78° 4'28.95"E	Reservoir	State Gov.
	The proposed location is at upstream of Manjira Barrage the place has a significant historical as well as Tourism value. The area is well connected with road network. The Depth in the area needs to be improved for the berthing of boats throughout the period. A Terminal may be developed as a tourism point of view as Manjira wildlife sanctuary may be a huge point of attraction for tourist around the country.				
02	Nizamsagar Dam	18°12'51.51"N	77°56'33.05"E	Reservoir	State Gov.
	The proposed location is at upstream of Nizamsagar Dam the place has a significant historical as well as Tourism value. The area is well connected with road network. The Depth in the area needs to be improved for the berthing of boats throughout the period. A Terminal may be developed as a tourism point of view.				

Table 32 - Proposed Locations for Construction of New Terminals

5 Fairway Development

The surveyed stretch of Manjira River is 245.0km in length and is not being explored for any navigational possibility. This survey stretches starts from the Singur Dam to confluence with river Godavari at Kandakurthi. The scope for the navigational aspect of the waterway was not utilized till now due to its geographic condition and non-availability of water throughout the season.

The area nearby Manjira River is mainly used for agriculture purpose and the road transportation network is not available up to the Manjira River banks. Ganesh Sugar Industries near Kulabgoor, Sangareddy and Charminar Breweries near Shivampet, Sangareddy and Empee Distilleries near Chowtkur, Medak are three major industries observed near the river banks and the scope of cargo movement through Manjira River is very less with the present infrastructure available near Manjira River.

5.1 Design Channel of the Waterway

The upstream for the survey stretch starts from Singur Dam and the River flows southeasterly for 30km and it changes its course sharply in a north western direction near Fasalwadi and flows with several bend and turns. The river again deviates near Tekmal village (156km chainage) and drastic change in course is also observed near the Medak town and flows in northwestern direction with several bends and finally confluence with the Godavari River near Kandakurthi village.

The waterway and reservoirs are used mainly for irrigation purpose and drinking water supply. A major capital dredging alone will not improve the depth of the channel as there is no facility to retain the water throughout the stretch. The construction of barrages on the downstream of the required navigational waterway needs to be considered to maintain the water depth. However, the continuous gradient of the river also needs to be considered for any alteration in the channel design. With this current channel design, the possibility of having navigational water way is less during dry seasons.

5.2 Fairway Dimensions

As per the specification of the survey, dredging quantity was required to be estimated for different channel classifications along the deepest route. Class-II channel with dimension 40m width, 1.4m depth and side slop of 1:5 is shown below.

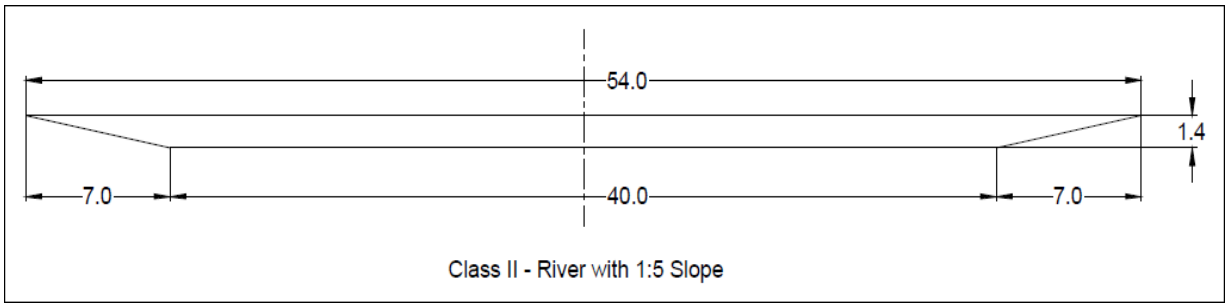
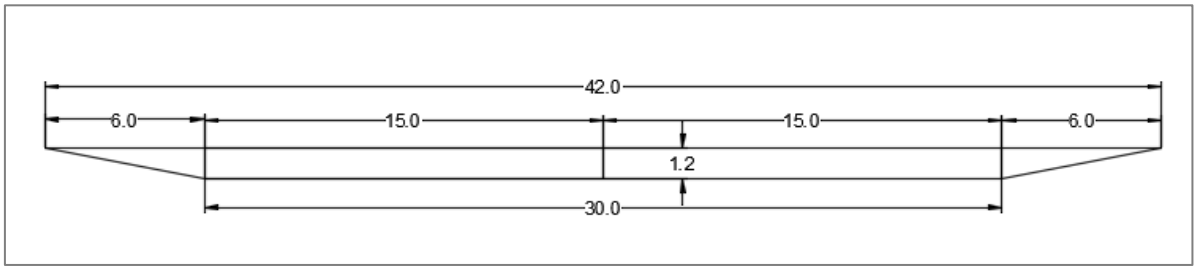


Figure 45 - Fairway Channel Dimensions

5.3 Calculation of Dredging Quantity

The dredge volume calculations were accomplished using the HYPACK dredge volume computation utility. The channel template was created as per the different classification and kilo meter wise dredging calculation was carried out. (Enclosed at Annexures 3) Hypack Standard volume algorithm was used to calculate the dredge volume in each segment. The stretch wise summary of the dredge volume for different class of fairway is as follows:-

Class I



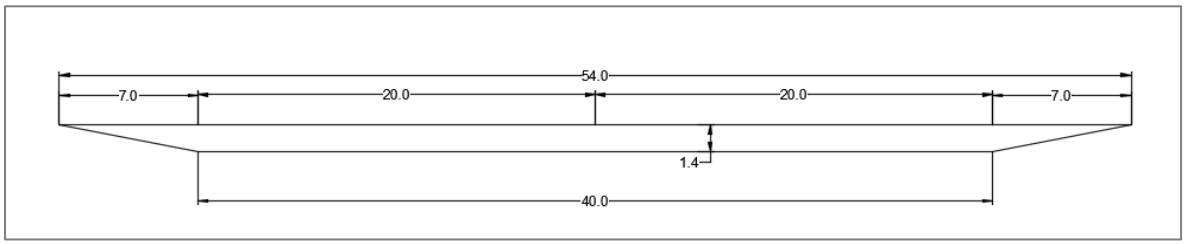
Class I Zone 43a													
Location		Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
From	To	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
Confluence with Godavari	Karla	0	16	0.000	0.000	16000	6,82,614.12	6,82,614.12	-0.300	0.000	16000	8,71,321.85	8,71,321.85
Karla	Hangarga	16	40	0.000	0.000	24000	1,025,113.45	1,707,727.57	-0.300	0.000	24000	1,305,613.35	2,176,935.20
Hangarga	Chintal Nagaram	40	68.4	0.000	0.000	28400	1,213,470.79	2,921,198.36	-0.300	0.000	28400	1,553,216.58	3,730,151.78
Chintal Nagaram	Nizamsagar Dam	68.4	91.9	0.000	0.000	23500	1,002,708.00	3,923,906.36	-0.300	0.000	23500	1,285,085.25	5,015,237.03
Nizamsagar Dam	Rudraram	91.9	106.5	0.000	0.000	14600	6,33,902.35	4,557,808.71	-0.300	0.000	14600	8,00,286.46	5,815,523.49
					Total	**106500**	**4,557,808.71**	**4,557,808.71**		**Total**	**106500**	**5,815,523.49**	**5,815,523.49**

Class I Zone 44													
Location		Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
From	To	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
Rudraram	Muddapur	106.5	118.6	0.000	0.000	12100	5,05,217.14	5,063,025.85	-0.300	0.000	12100	6,40,745.88	6,456,269.37
Muddapur	Edupayala check dam	118.6	146.6	0.000	0.000	28000	1,197,951.79	6,260,977.64	-0.300	0.000	28000	1,465,110.98	7,921,380.35
Edupayala check dam	Rollpahad	146.6	170.4	0.000	0.000	23800	1,014,359.66	7,275,337.30	-0.300	0.000	23800	1,300,007.45	9,221,387.80
Rollpahad	Korpole	170.4	197.2	0.000	0.000	26800	1,134,949.52	8,410,286.82	-0.300	0.000	26800	1,454,480.89	10,675,868.69
Korpole	D/s of Manjira Barrage	197.2	220.0	0.000	0.000	22800	9,52,763.98	9,363,050.80	-0.300	0.000	22800	1,202,177.63	11,878,046.32
D/s of Manjira Barrage	Kolkur	220.0	231.6	0.000	0.000	11600	4,93,412.02	9,856,462.82	-0.300	0.000	11600	6,28,467.49	12,506,513.81
					Total	**125100**	**5,298,654.11**	**9,856,462.82**		**Total**	**125100**	**6,690,990.32**	**12,506,513.81**

Class I Zone 43b													
Location		Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
From	To	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
Kolkur	D/s of Singur Dam	231.6	245.0	0.000	0.000	13300	5,51,482.24	10,407,945.06	-0.300	0.000	13300	7,05,542.22	13,212,056.03
					Total	**13300**	**5,51,482.24**	**10,407,945.06**		**Total**	**13300**	**7,05,542.22**	**13,212,056.03**

Table 33 - Dredge Volumes Class-I

Class II



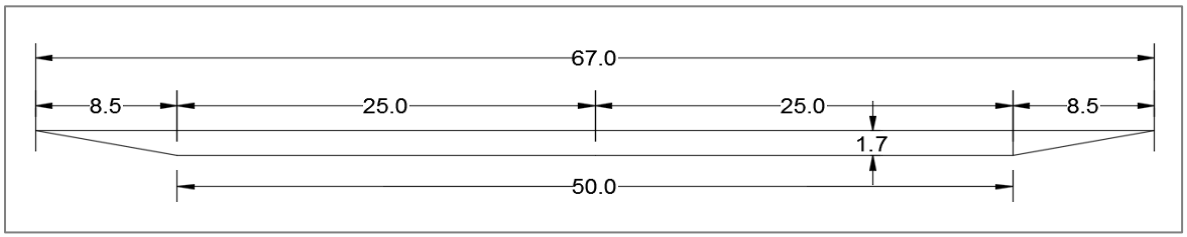
Class II Zone 43a													
Location		Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
From	To	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
Confluence with Godavari	Karla	0	16	0.000	0.000	16000	1,039,645.42	1,039,645.42	-0.300	0.000	16000	1,281,881.34	1,281,881.34
Karla	Hangarga	16	40	0.000	0.000	24000	1,561,405.41	2,601,050.83	-0.300	0.000	24000	1,922,466.40	3,204,347.74
Hangarga	Chintal Nagaram	40	68.4	0.000	0.000	28400	1,848,292.82	4,449,343.65	-0.300	0.000	28400	2,285,784.56	5,490,132.30
Chintal Nagaram	Nizamsagar Dam	68.4	91.9	0.000	0.000	23500	1,527,269.00	5,976,612.65	-0.300	0.000	23500	1,890,648.64	7,380,780.94
Nizamsagar Dam	Rudraram	91.9	106.5	0.000	0.000	14600	9,65,526.88	6,942,139.53	-0.300	0.000	14600	1,178,369.15	8,559,150.09
			Total			**106500**	**6,942,139.53**	**6,942,139.53**		**Total**	**106500**	**8,559,150.09**	**8,559,150.09**

Class II Zone 44													
Location		Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
From	To	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
Rudraram	Muddapur	106.5	118.6	0.000	0.000	12100	7,69,418.31	7,711,557.84	-0.300	0.000	12100	9,43,713.28	9,502,863.37
Muddapur	Edupayala check dam	118.6	146.6	0.000	0.000	28000	1,824,641.30	9,536,199.14	-0.300	0.000	28000	2,171,478.42	11,674,341.79
Edupayala check dam	Rollpahad	146.6	170.4	0.000	0.000	23800	1,545,008.43	11,081,207.57	-0.300	0.000	23800	1,912,515.66	13,586,857.45
Rollpahad	Korpole	170.4	197.2	0.000	0.000	26800	1,728,685.55	12,809,893.12	-0.300	0.000	26800	2,139,039.07	15,725,896.52
Korpole	D/s of Manjira Barrage	197.2	220.0	0.000	0.000	22800	1,451,188.17	14,261,081.29	-0.300	0.000	22800	1,772,331.91	17,498,228.43
D/s of Manjira Barrage	Kolkur	220.0	231.6	0.000	0.000	11600	7,51,551.82	15,012,633.11	-0.300	0.000	11600	9,24,625.02	18,422,853.45
				Total		**125100**	**8,070,493.58**	**15,012,633.11**		**Total**	**125100**	**9,863,703.36**	**18,422,853.45**

Class II Zone 43b													
Location		Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
From	To	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
Kolkur	D/s of Singur Dam	231.6	245.0	0.000	0.000	13300	8,39,988.72	15,852,621.83	-0.300	0.000	13300	1,036,797.83	19,459,651.28
				Total		**13300**	**8,39,988.72**	**15,852,621.83**		**Total**	**13300**	**1,036,797.83**	**19,459,651.28**

Table 34 - Dredge Volumes Class-II

Class III



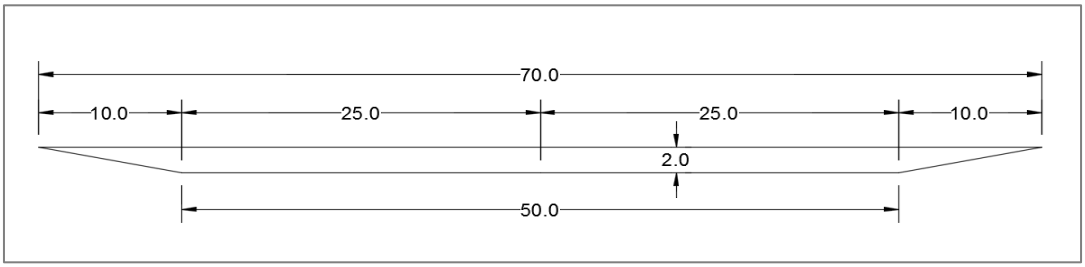
Class III Zone 43a													
Location		Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
From	To	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
Confluence with Godavari	Karla	0	16	0.000	0.000	16000	1,571,391.76	1,571,391.76	-0.300	0.000	16000	1,872,007.60	1,872,007.60
Karla	Hangarga	16	40	0.000	0.000	24000	2,359,917.73	3,931,309.49	-0.300	0.000	24000	2,808,027.94	4,680,035.54
Hangarga	Chintal Nagaram	40	68.4	0.000	0.000	28400	2,793,469.45	6,724,778.94	-0.300	0.000	28400	3,337,070.07	8,017,105.61
Chintal Nagaram	Nizamsagar Dam	68.4	91.9	0.000	0.000	23500	2,308,318.44	9,033,097.38	-0.300	0.000	23500	2,759,255.63	10,776,361.24
Nizamsagar Dam	Rudraram	91.9	106.5	0.000	0.000	14600	1,459,302.81	10,492,400.19	-0.300	0.000	14600	1,722,151.50	12,498,512.74
					Total	**106500**	**1,049,2400.19**	**10,492,400.19**		**Total**	**106500**	**12,498,512.74**	**12,498,512.74**

Class III Zone 44													
Location		Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
From	To	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
Rudraram	Muddapur	106.5	118.6	0.000	0.000	12100	1,162,614.87	11,655,015.06	-0.300	0.000	12100	1,378,885.71	13,877,398.45
Muddapur	Edupayala check dam	118.6	146.6	0.000	0.000	28000	2,757,778.74	14,412,793.80	-0.300	0.000	28000	3,191,724.55	17,069,123.00
Edupayala check dam	Rollpahad	146.6	170.4	0.000	0.000	23800	2,335,131.38	16,747,925.18	-0.300	0.000	23800	2,791,165.86	19,860,288.86
Rollpahad	Korpole	170.4	197.2	0.000	0.000	26800	2,612,636.19	19,360,561.37	-0.300	0.000	26800	3,121,227.28	22,981,516.14
Korpole	D/s of Manjira Barrage	197.2	220.0	0.000	0.000	22800	2,193,308.66	21,553,870.03	-0.300	0.000	22800	2,592,928.46	25,574,444.60
D/s of Manjira Barrage	Kolkur	220.0	231.6	0.000	0.000	11600	1,135,878.71	22,689,748.74	-0.300	0.000	11600	1,349,796.64	26,924,241.24
					Total	**125100**	**12,197,348.55**	**22,689,748.74**		**Total**	**125100**	**14,425,728.50**	**26,924,241.24**

Class III Zone 43b													
Location		Chainage (km)		Observed					Reduced w.r.t. Sounding Datum				
From	To	From	To	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.	Min. Depth (m)	Max. Depth (m)	Length of Shoal (m)	Dredging Qty. (cu.m.)	Accumulated Qty.
Kolkur	D/s of Singur Dam	231.6	245.0	0.000	0.000	13300	1,269,540.39	23,959,289.13	-0.300	0.000	13300	1,512,239.94	28,436,481.18
					Total	**13300**	**1,269,540.39**	**23,959,289.13**		**Total**	**13300**	**1,512,239.94**	**28,436,481.18**

Table 35 - Dredge Volumes Class-III

Class IV



Class IV Zone 43a														
Location		**Chainage (km)**		**Observed**					**Reduced w.r.t. Sounding Datum**					
From	**To**	**From**	**To**	**Min. Depth (m)**	**Max. Depth (m)**	**Length of Shoal (m)**	**Dredging Qty. (cu.m.)**	**Accumulated Qty.**	**Min. Depth (m)**	**Max. Depth (m)**	**Length of Shoal (m)**	**Dredging Qty. (cu.m.)**	**Accumulated Qty.**
Confluence with Godavari	Karla	0	16	0.000	0.000	16000	1,896,093.10	18,96,093.10	-0.300	0.000	16000	2,210,225.21	2,210,225.21
Karla	Hangarga	16	40	0.000	0.000	24000	2,847,575.37	4,743,668.47	-0.300	0.000	24000	3,31,5762.19	5,525,987.40
Hangarga	Chintal Nagaram	40	68.4	0.000	0.000	28400	3,370,696.18	8,114,364.65	-0.300	0.000	28400	3,938,831.90	9,464,819.30
Chintal Nagaram	Nizamsagar Dam	68.4	91.9	0.000	0.000	23500	2,785,303.41	10,899,668.06	-0.300	0.000	23500	3,256,430.25	12,721,249.55
Nizamsagar Dam	Rudraram	91.9	106.5	0.000	0.000	14600	1,744,049.88	12,643,717.94	-0.300	0.000	14600	2,015,791.92	14,737,041.47
			Total			**106500**	**12,643,717.94**	**12,643,717.94**		**Total**	**106500**	**14,737,041.47**	**14,737,041.47**

Class IV Zone 44													
Location		**Chainage (km)**		**Observed**					**Reduced w.r.t. Sounding Datum**				
From	**To**	**From**	**To**	**Min. Depth (m)**	**Max. Depth (m)**	**Length of Shoal (m)**	**Dredging Qty. (cu.m.)**	**Accumulated Qty.**	**Min. Depth (m)**	**Max. Depth (m)**	**Length of Shoal (m)**	**Dredging Qty. (cu.m.)**	**Accumulated Qty.**
Rudraram	Muddapur	106.5	118.6	0.000	0.000	12100	1,402,839.77	14,046,557.71	-0.300	0.000	12100	1,628,895.72	16,365,937.19
Muddapur	Edupayala check dam	118.6	146.6	0.000	0.000	28000	3,327,642.68	17,374,200.39	-0.300	0.000	28000	3,781,633.17	20,147,570.36
Edupayala check dam	Rollpahad	146.6	170.4	0.000	0.000	23800	2,817,667.37	20,191,867.76	-0.300	0.000	23800	3,294,230.16	23,441,800.52
Rollpahad	Korpole	170.4	197.2	0.000	0.000	26800	3,152,477.68	23,344,345.44	-0.300	0.000	26800	3,683,663.95	27,125,464.47
Korpole	D/s of Manjira Barrage	197.2	220.0	0.000	0.000	22800	2,646,518.34	25,990,863.78	-0.300	0.000	22800	3,064,442.52	30,189,906.99
D/s of Manjira Barrage	Kolkur	220.0	231.6	0.000	0.000	11600	1,370,586.65	27,361,450.43	-0.300	0.000	11600	1,593,850.24	31,783,757.23
			Total			**125100**	**14,717,732.49**	**27,361,450.43**		**Total**	**125100**	**17,046,715.76**	**31,783,757.23**

Class IV Zone 43b													
Location		**Chainage (km)**		**Observed**					**Reduced w.r.t. Sounding Datum**				
From	**To**	**From**	**To**	**Min. Depth (m)**	**Max. Depth (m)**	**Length of Shoal (m)**	**Dredging Qty. (cu.m.)**	**Accumulated Qty.**	**Min. Depth (m)**	**Max. Depth (m)**	**Length of Shoal (m)**	**Dredging Qty. (cu.m.)**	**Accumulated Qty.**
Kolkur	D/s of Singur Dam	231.6	245.0	0.000	0.000	13300	1,531,862.51	28,893,312.94	-0.300	0.000	13300	1,785,205.57	33,568,962.80
			Total			**13300**	**1,531,862.51**	**28,893,312.94**	**Total**		**13300**	**1,785,205.57**	**33,568,962.80**

Table 36 - Dredge Volumes Class-IV

6 Conclusion

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

6.1 Description of Waterways

The surveyed stretch of Manjira River is 245.0km in length, Tourism boating facilities were observed at Manjira Barrage and Nizamsagar Dam, and however services are not available presently due to no availability of sufficient water depths. This survey stretches starts from the Singur Dam to confluence with river Godavari at Kandakurthi. The area nearby the Manjira River is mainly used for agriculture purpose. The villages are well connected with road network, however the road transportation network is not available up to the Manjira River banks.

There is no major scope for a navigational aspect of the waterway due to non-availability of water throughout the season. The riverbed is mostly sandy in nature with intermediate presence of small rock outcrops. The road network is good through the river stretch and major distribution of settlements are there near to Sangareddy, Jogipet, Medak, Banswada and Bodhan towns rest river stretch is moderately populated.

There are three major industries Ganesh Sugar Industries near Kulabgoor, Sangareddy, Charminar Breweries near Shivampet, Sangareddy and Empee Distilleries near Chowtkur, Medak settled beside the banks of Manjira River, but the scope of cargo transportation is also very limited due to availability of good road transportation on both sides of the river. The stretch wise minimum and maximum width range, average width and average slope of the waterway are as below:

Sl. No.	Location		Chainage (km)		Width Range of the waterway (m)		Average Width (m)	Average slope (in m/km)
	From	To	From	To	Min	Max		
1	Confluence with Godavari	Karla Village	0	16	210.55	1183.00	580.27	1 : 0.485
2	Karla Village	Hangarga Village	16	40	185.08	982.73	475.51	1 : 0.424
3	Hangarga Village	Chintal Nagaram Village	40	68.4	148.38	1895.00	680.78	1 : 0.427
4	Chintal Nagaram Village	Nizamsagar Dam	68.4	91.9	208.94	2594.00	795.68	1 : 2.376
5	Nizamsagar Dam	Muddapur Village	91.9	118.6	170.69	3275.00	1056.31	1 : 0.305
6	Muddapur Village	Edupayala check dam	118.6	146.6	146.27	1400.00	404.68	1 : 1.329
7	Edupayala check dam	Rollpahad Village	146.6	170.4	144.13	490.62	278.27	1 : 0.423
8	Rollpahad Village	Korpole Village	170.4	197.2	127.39	420.57	216.64	1 : 0.587
9	Korpole Village	D/s of Manjira Barrage	197.2	220.0	135.04	650.80	197.92	1 : 0.207
10	Upstream of Manjira Barrage	D/s of Singur Dam	220.0	245.0	142.27	1344.00	256.44	1 : 1.011

Table 37 - Stretch wise Average width and slope of waterway

6.2 Condition of Canal bed

The entire river bed of Manjira River starting from the confluence with the Godavari River at Kandakurthi is generally sandy in nature, with intermediate presence of rocky bed. The Sand mining in large scale is observed near 17km to 23km chainage of Manjira River. The river banks of entire stretch are covered with farmlands, dense vegetation and shrubs are also observed at some places. The water flow of the Manjira River is not obstructed for the entire stretch other than the above mentioned Dams/Barrages.

6.3 Methods for Making Waterway Feasible

The waterway may be developed as a Class IV navigational canal by carrying out capital dredging to achieve the navigability. The stretches above reservoirs of Manjira River can be developed for tourism and transportation as per the scope of development. Due to continuous gradient of the river and the water level will not be available during the summer season and the navigation aspect will not be fulfilled throughout the year. The navigational lock is required to maintain the minimum depth required for navigation and regulate the water level in the river. The class-wise details of reduced dredging quantities of the waterways as are tabulated below:

Reduced Dredging Values w.r.t. CD				
Class / km Stretch	**I**	**II**	**III**	**IV**
0 - 16 (km)	871,321.85	1,281,881.34	1872007.6	2,210,225.21
16 - 40 (km)	1,305,613.35	1,922,466.40	2808027.94	3,315,762.19
40 - 68.4 (km)	1,553,216.58	2,285,784.56	3337070.07	3,938,831.90
68.4 - 91.9 (km)	1,285,085.25	1,890,648.64	2759255.63	3,256,430.25
91.9 - 106.5 (km)	800,286.46	1,178,369.15	1722151.5	2,015,791.92
106.5 - 118.6 (km)	640,745.88	943,713.28	1378885.71	1,628,895.72
118.6 - 146.6 (km)	1,465,110.98	2,171,478.42	3191724.55	3,781,633.17
146.6 - 170.4 (km)	1,300,007.45	1,912,515.66	2791165.86	3,294,230.16
170.4 - 197.2 (km)	1,454,480.89	2,139,039.07	3121227.28	3,683,663.95
197.2 - 220 (km)	1,202,177.63	1,772,331.91	2,592,928.46	3,064,442.52
220 - 231.6 (km)	628,467.49	924,625.02	1,349,796.64	1,593,850.24
231.6 - 245.0 (km)	705,542.22	1,036,797.83	1,512,239.94	1,785,205.57
Total	**13,212,056.03**	**19,459,651.28**	**28,436,481.18**	**33,568,962.80**

Table 38 - Class-wise Reduced Dredging quantity

Boat jetties may be constructed at the upstream of Manjira Barrage and Nizamsagar Dam for the purpose of tourism only. The cargo movement is not envisaged as the industries are far from the river banks and are well connected with road network. The class-wise details of reduced depth at different stretches of the waterways are as tabulated below:-

Sl. No.	Chainage (km)	< 1.2	1.2 - 1.4	1.5 - 1.7	1.8 - 2.0	> 2.0

	From	To	Availability of Depth (km)	% of availability	Availability of Depth (km)	% of availability	Availability of Depth (km)	% of availability	Availability of Depth (km)	% of availability	Availability of Depth (km)	% of availability
1	0	16	16	100%	0	0 %	0	0 %	0	0 %	0	0 %
2	16	40	24	100%	0	0 %	0	0 %	0	0 %	0	0 %
3	40	68.4	28.4	100%	0	0 %	0	0 %	0	0 %	0	0 %
4	68.4	91.9	23.5	100%	0	0 %	0	0 %	0	0 %	0	0 %
5	91.9	118.6	26.7	100%	0	0 %	0	0 %	0	0 %	0	0 %
6	118.6	146.6	28	100%	0	0 %	0	0 %	0	0 %	0	0 %
7	146.6	170.4	23.8	100%	0	0 %	0	0 %	0	0 %	0	0 %
8	170.4	197.2	26.8	100%	0	0 %	0	0 %	0	0 %	0	0 %
9	197.2	220.0	22.8	100%	0	0 %	0	0 %	0	0 %	0	0 %
10	220.0	245.0	25	100%	0	0 %	0	0 %	0	0 %	0	0 %
Total			**245.0**	**100%**	**0**	**0 %**	**0**	**0 %**	**0**	**0 %**	**0**	**0 %**

Table 39 - Class-wise availability of reduced depth of the waterway

6.4 Modifications/ Improvement Measures

Improvement measures for design and depth improvement is required on first phase of the development. River bed is very vast and the river banks are not protected in nature. The water level is not available throughout the duration in Manjira River. There are no signs of erosion of the river banks, however, precaution to be taken for the possible siltation of the newly dredged waterways of Manjira River. The measure for retaining water level on the small stretches to achieve navigable depths are also to be considered. The class-wise modification details of cross structure and high tension line clearance are as tabulated below:-

Bridges Clearances less than Class			High Tension lines Clearances less than Class	
Class	**Horizontal**	**Vertical**	**Horizontal**	**Vertical**
I	14	5	0	2
II	16	6		
III	17	7		
IV	17	11		

Table 40 - Bridges and HTL Clearances less than Class no.

6.5 Recommendation

There is no major scope for a navigational aspect of the waterway due to its geographic condition and non-availability of water throughout the region. The River banks are connected with the road network and major distribution of settlements. The rock outcrops are observed on the immediate chainage of Manjira River and on the downstream of the Dam and Barrages of the survey stretch of Manjira River.

The road is a near parallel on both sides throughout the River stretch. No scope for the future development of the River was recommended for navigational purpose other than local tourism projects near Nizamsagar dam and Manjira Barrage. The scope of cargo movement from industries are also not envisaged through the survey stretch, in

view of the above the survey Stretch is not-viable for developing as continuous navigable channel.

The purpose of the survey was for assessing the river stretch from the confluence with river Godavari at Kandakurthi to Singur Dam for the development of water transport facilities in the new National Waterway (NW- 70). All conspicuous objects within and in the vicinity of the survey area have been fixed. The deliverable sheets contain mean sea level values of elevation information, important landmarks with the state of the river banks. The survey is considered complete in all respects.

7 Details of Annexures

Annexure-1 Data Collected from Various Agencies.....72

Annexure-2 Stretch wise Data of Observed Depths to Reduced Depths.....74

Annexure-3 Dredge Volumes (per km) for different classification with length of shoal…....76

Annexure-4 Water Level Details.....98

Annexure-5 Survey Dates.....100

Annexure-6 Details of Bank Protection.....102

Annexure-7 Details of Riverside Features.....104

Annexure-8 Horizontal and Vertical Control.....108

Annexure-9 Equipment Photographs.....113

Annexure-10 Bench Mark Pillar Forms.....115

Annexure-11 Current Meter Observation.....164

Annexure-12 Water Sample Analysis.....166

Annexure-13 Calibration Certificates.....168

Annexure-14 Survey Chart Scheming Index and Chart Details.....171

Annexure-15 Field Photographs.....176

Annexure-16 Levelling Data.....178

Volume - II