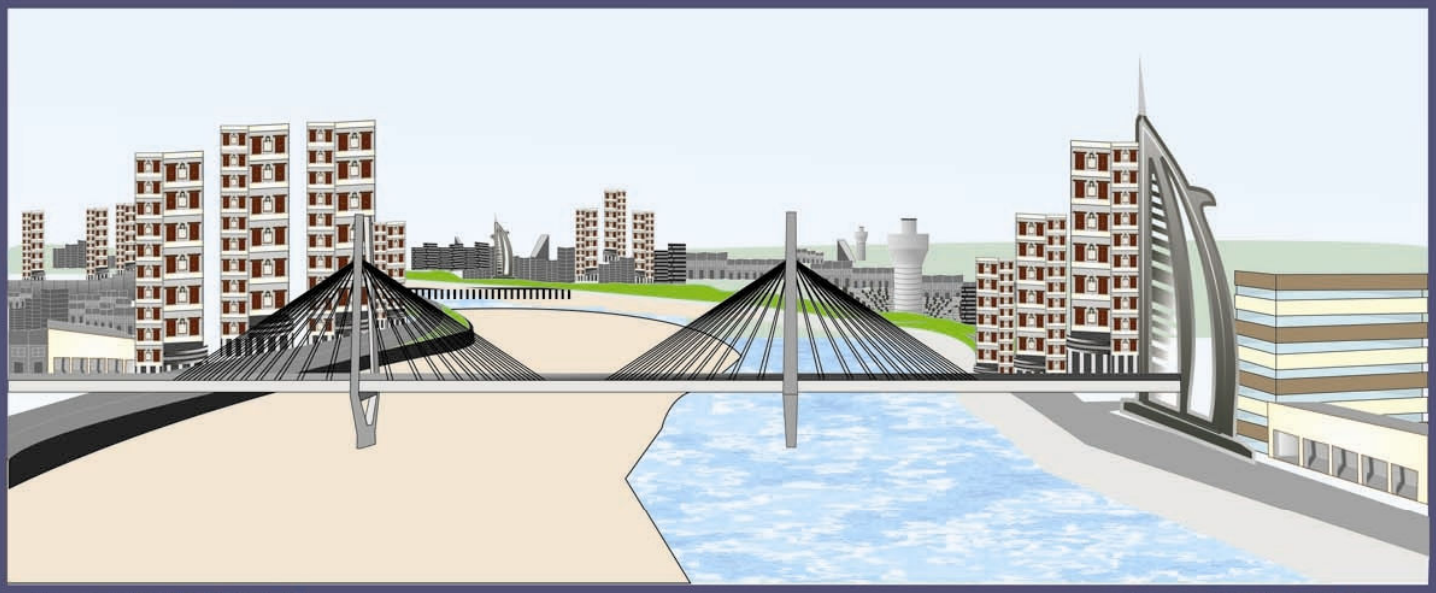
ARPA SPECIAL AREA DEVELOPMENT AUTHORITY, BILASPUR (C.G.)
www.arpasadabilaspur.in
EXPRESSION OF INTEREST (EOI) – 2nd Call
Request for EOI from INTERNATIONAL/ NATIONAL Legal Entities for Riverfront Development in Bilaspur, (C.G.)



No. 1358/ASADA/2014-15, Bilaspur Dated - 28/10/2014

- ARPA Special Area Development Authority (ASADA), a body constituted under the provisions of CG Town and Country Planning Act, 1973 by the Government of Chhattisgarh has conceptualized a riverfront development project through Public Private Participation (PPP).
- ASADA invites Expression of Interest (EOI) from reputed International/ National Legal Entities.
- The EOI document detailing the project information (summary) and requirements can be downloaded from Website www.arpasadabilaspur.in & cggovt.in & bilaspur.gov.in.
- Pre-EOI Meeting shall be held on Dated 14/11/2014 at 11:30 Hours in the conference Room of Arpa Special Area Development Authority, Nehru Chowk Bilaspur.
- EOI shall be submitted clearly super scribing the sealed envelope "Expression of Intrest for Development of Arpa Riverfront Projectg on Public Private Partnership (PPP) Mode" Before 4:00 pm on Dated 10/12/2014 by Speed or Registered Post.
- No drop box facility is available no hand delivery is allowed. ASADA will not be responsible for any postal/courier delay.
- Address for submission of EOIs; Chief Executive Officer, ARPA SADA, 1st Floor, Vikas Bhawan, Nehru Chowk, Bilaspur 495001, Chhattisgarh. Ph. No. 07752-222642, FAX No. 07752-413888 Mail- arpasadabilaspur@gmail.com
- ASADA reserves both discretion either to invite bids only from those firms, which express their interest in response to this invitation; OR choose to pursue a single stage bidding process by inviting RFPs through a subsequent advertisement ASADA reserves the right to reject any or all EOI received without assigning any reason whatsever.
- NOTE:- Those who have earlier participated in EOI, their EOI's shall stand considered.



GREEN CITY, CLEAN CITY, DREAM CITY



ARPA RIVERFRONT DEVELOPMENT PROJECT

SONMONI BORAH (IAS)
Divisional Commissioner, Bilaspur Deveision
Chairman, ARPA SADA
Phone & Fax : 07752-220546
Email : sonmonib23@gmail.com

SIDDHARTHA K. S. PARDESHI (IAS)
Collector, Bilaspur
Member Secretory, ARPA SADA
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RANU SAHU (IAS)
Commissioner B.M.C.
Chief Executive Officer, ARPA SADA
Phone & Fax : 07752-413888
Email : ranusahu042@gmail.com

EXPRESSION OF INTEREST (EOI Document)

FOR

DEVELOPMENT OF ARPA RIVERFRONT PROJECT

ON

PUBLIC PRIVATE PARTNERSHIP (PPP)

October - 2014

Issued by:

ARPA Special Area Development Authority (ASADA),
Bilaspur, Chhattisgarh

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1. Disclaimer

1. The purpose of this Request for Expression of Interest ("Request for EOI") is to invite suitably qualified local, regional and international companies to participate in the potential tendering of the Project and request them to indicate their interest in the Project by submitting an Expression of Interest ("EOI") to the ASADA.

2. Though adequate care has been taken in the preparation of this Expression of Interest Document (EOI document), interested firms should satisfy themselves that the Document is complete in all respects. Intimation of discrepancy, if any, should be given to the address mentioned in Section 6.4latest by 4:00PM of Dt: 12/11/2014. In case, no such intimation is received by the said deadline, it shall be deemed that the interested firm is satisfied that the Document is complete in all respects.

2. Neither ASADA nor their employees make any representation or warranty as to the accuracy, reliability or completeness of the information in this EoI document. Interested firms should conduct their own investigations and analysis and check the accuracy, reliability and completeness of the information in this EOI document and obtain independent advice from appropriate source before submission of this EOI document.

3. Neither ASADA nor their employees will have any liability to any interested firm or any other person under the law of contract, for any loss, expense or damage which may arise from or be incurred or suffered in connection with anything contained in this EOI document.

4. ASADA reserves the right to modify or amend or add to any or all of the provisions of this EOI document or cancel the present Invitation and call for fresh Invitations.

5. Neither ASADA nor their employees will have any liability in case of non-receipt of any correspondence from them to the interested firms due to the postal delays.

6. The applicable laws for the purpose are the laws of India. Courts of Bilaspur will have jurisdiction concerning or arising out of this EOI document.

7. The Pre-EOI Meeting being conducted by ASADA is to disseminate information about the project and exchange ideas; and may not be a pre-qualification for participating in the bid. The bidding for the project may take place through a single-stage or a double-stage system which will include a public advertisement inviting RFQ and / or RFP document being downloadable from the ASADA website.

8. The interested firms are expected to know the relevant rules and regulations of the respective local authorities concerning the site and building-byelaws and Master Plan.

9. This EOI shall not commit or bind the ASADA whatsoever in having to proceed to the RFQ stage, the RFP stage or to award a contract. The ASADA reserve the complete right to at anytime and for any reason disregard all EOIs and to

terminate the competitive selection process and proceed with the Project in some other manner or not at all, with no liability to any party whatsoever.

10. Each respondent is solely responsible for all costs it incurs in the preparation of its EOI response, including without limitation all costs of providing information requested by the ASADA, attending meetings and conducting due diligence. Under no circumstances will ASADA or any of its advisers be liable for any costs or expenses borne by the respondent or any of its advisers in this process, nor shall they be liable for any damages or consequential damages whatsoever

11. The ASADA reserves the right, in its sole and absolute discretion, with no liability whatsoever to:

a) amend the scope of the Project;

b) modify, cancel or suspend the EOI process or any or all stages of the competitive selection process, at any time for any reason;

c) waive a defect or irregularity in the form or content of any EOI;

d) re-advertise for new responses, call for tenders or enter into negotiations for this Project or for work of a similar nature;

e) make any changes to the terms of the business opportunity described in this Request for EOI and

f) extend, from time to time, any date, time period or deadline provided in this Request for EOI.

12. All responses submitted to the ASADA become the property of the ASADA immediately upon such submission.

2. Abbreviations

ASADA	ARPA Special Area Development Authority
EOI	Expression of Interest document
INR	Indian Rupees
PPP	Public Private Partnership
RFP	Request for Proposal
RFQ	Request for Qualification

3. SCHEDULE OF PRE-EOI PROCESS

The indicative timetable for development of this project is as follows:

Activity	Scheduled Date
Publication of EOI	Dt: 28/10/2014
Due date for EOI document submission	By 4 PM on 10/12/2014 at ASADA office
Pre-EOI meet	11.30 AM on 14/11/2014 at Conference Hall, ASADA.

4. Introduction

4.1. Project Background

The Government of Chhattisgarh has notified ARPA SPECIAL AREA under the provisions of Chhattisgarh Town and Country Planning Act, 1973 for the purpose of developing Arpa River Front and constituted ARPA Special Area Development Authority (ASADA), Bilaspur in 2010.

ASADA is desirous of implementing the Arpa River Front over a riverside developable area of around 653 Hectares. The Riverfront Development is envisaged to be developed in an **integrated manner through Public Private Partnership (PPP) mode in either of the following formats.**

1. Private developer to prepare project DPR, obtain clearances, finance and implement the project and recover costs through sale of developable lands in conformation with the Development Plan of ASADA or
2. Private developer to finance and implement the project and recover costs through sale of developable lands in conformation with the DPR provided by ASADA along with key project clearances and also in accordance with the Development Plan of ASAD and DPR as provided by ASADA along with key project clearances.

Expression of Interest (EOI) are invited from real estate developers, urban infrastructure developers, infrastructure companies, etc. for River Front Development of Arpa River over 653 Hectares of land at Bilaspur under Public Private Partnership (PPP) framework.

4.2. Project Objectives

- To develop13.4 km stretch of Arpa Riverfronton either banks along with all support Infrastructure;
- To cater to the demand for quality commercial, institutional, housing and recreational needs in and around Bilaspur city;
- To ensure better quality of life for the citizens of Bilaspur through provision of quality open space, housing and other city level support infrastructure at affordable prices.

4.3. Project details

The ARPA Riverfront Development Project comprises the following principal components:

- ARPA River channelization with gabions and retaining walls for a total length of 13.4 km along the river,
- Construction of 6.7kmlean period impervious channel along with weirs at regular intervals in the river bed to retain water throughout the year,
- Development of residential (including slum rehabilitation), commercial, institutional, recreational and other facilities in the riverside developable lands as per the notified ASADA Development Plan,
- Roads, Bridges and Pedestrian Network in the developable lands,

- Other Urban Infrastructure such as water supply, sewerage, drainage, power supply in the developable lands.

Total developable land is approx. 653 Ha. The total project cost is approximately INR 2,000 crores to be implemented in phases over 7 years.

The total land available for development is 653 ha (including private land). It is estimated that after utilization of land for infrastructure development and return of land to private land owners (based on land pooling formula), about 267 ha would be available for sale/development, which could be used by the Developer to recover its investment.



Figure showing stretch of Arpa River to be channelized

5. Bidding Procedure

5.1. Prospective Bidders

Assuming that the ASADA proceeds with the RFQ stage, parties that submit an EOI will be notified of the RFQ stage and, where applicable, requested to obtain the RFQ documents (this stage will also be advertised to the market).

The ASADA understands that interested participants may wish to form a consortium to bid for the Project, but at the stage of this Request for EOI, interested companies and firms may respond individually and demonstrate the expertise of their primary activity (-ies).

6. Preparation and Submission of EOI

6.1. Language

The EOI and all related correspondence and documents should be written in the English language. Supporting documents and printed literature furnished by the Interested Firm with the EOI may be in any other language provided that they are accompanied by appropriate translations of the pertinent passages in the English language. Supporting materials, which are not translated into English, may not be considered. For the purpose of interpretation and evaluation of the EOI, the English language translation shall prevail. It should be noted that any document in foreign language, not accompanied by an English version and duly authenticated, will be liable for rejection.

6.2. Currency

The currency for the purpose of the EOI shall be the Indian Rupee (INR).

6.3. Validity of EOI

The EOI submitted by Interested Firm shall be valid till the completion of bidding process.

6.4. Correspondence / Enquiries

All correspondence / enquiries should be submitted to the following in writing by fax /post / courier:

Chief Executive Officer
ARPA SADA
II Floor, Vikas Bhawan
Nehru Chowk, Bilaspur 495001
Chhattisgarh

6.5. Sealing and Marking of EOI

The envelope shall indicate the name, address and contact phone number of the Interested Firm (or the Lead Member in case of a Consortium).

The envelope shall clearly bear the following identification:

"Expression of interest for Development of Arpa Riverfront Project on Public Private Partnership (PPP) Mode"

The envelope shall be addressed to:

Chief Executive Officer
ARPA SADA
II Floor, Vikas Bhawan
Nehru Chowk, Bilaspur 495001
Chhattisgarh

6.6. EOI due date

EOI should be submitted on or before the EOI due date as set out in the Schedule for Bidding Process, at the address provided in Section 6.5 in the manner and form as detailed in this EOI Document. EOI submitted by either facsimile transmission or telex or e-mail will not be acceptable. EoI should be submitted only by Registered post/Courier only. No drop box facility is available.

6.7. Late EOI

Any EOI received by ASADA after the due time and date will be returned unopened to the Interested Firm.

6.8. Pre-EOI meeting

All questions regarding the EOI phase of this project should be submitted by email, no later than 12 noon (India time) on Dt: 12/11/2014 the official email address for the project is:- arpasadabilaspur@gmail.com

Interested entities are invited to attend a Pre-EOI Meeting on 14/11/2014 at 11:30 AM at **Conference Hall (1stFloor), ASADA Office, Bilaspur.**

7. Check list

The EOI shall accompany the following:

1. Letter of Application duly signed by the Authorized person on the letterhead.
2. Details of Interested Firm along with the Incorporation and commencement of business certificate attested by the Authorized Person.
3. The details to be provided as per Annexure 3 and 4.

Annexure -1

FORMAT FOR LETTER OF APPLICATION

[On the Letter Head of the Interested Firm (in case of Single Firm) or Lead Member (in case of a Consortium)]

Chief Executive Officer
ARPA SADA
II Floor, Vikas Bhawan
Nehru Chowk, Bilaspur 495001
Chhattisgarh

Sir,

Subject: "Selection of Developer for ARPA River Front Development Project in Bilaspur on Public Private Partnership (PPP) Mode".

Being duly authorized to represent and act on behalf of _____ (hereinafter referred to as "the Interested Firm"), and having reviewed and fully understood all of the pre-qualification requirements and information provided, the undersigned hereby express our interest to develop ARPA River Front Development Project on PPP Mode.

We confirm that we have examined the terms and conditions published in the EOI and accordingly submitting the proposal for the captioned project.

(In case of Consortium add the following paragraph)

This EoI is submitted on behalf of a Consortium compromising .....(Applicant to site the name of each member).....and of which (Insert the name of lead member of Consortium) has agreed to act as lead member.

We are enclosing our EOI in Original with the details as per the requirements of the document for your evaluation.

The undersigned hereby also declares that the statements made and the information provided in the EOI is complete, true and correct in every detail and unconditional.

Yours faithfully,

(Signature of Authorised Signatory)

(Name, Title and Address of the Interested Firm)

Annexure -2

DETAILS OF INTERESTED FIRM

1. (a) Name
   (b) Country of Incorporation
   (c) Address of the corporate headquarters and its branch office (s), if any, in India
   (d) Date of incorporation and / or commencement of business
2. Brief description of the Company including details of its main lines of business and proposed roles and responsibilities in this Project
3. Reasons for interest in the Project
4. Name, Designation, Address and Phone Nos. of Authorized Signatory of the Interested Firm:
   (a) Name:
   (b) Designation:
   (c) Company:
   (d) Address:
   (e) Telephone No:
   (f) E-mail Address:
   (g) Fax No:
5. Details of individual (s) who will serve as the point of contact / communication for ASADA within the Company
   (a) Name:
   (b) Designation:
   (c) Address:
   (d) Telephone No.
   (e) E-mail address:
   (f) Fax No.

Annexure -3

FORMAT FOR TECHNICAL EXPERIENCE

Experience of Interested Firm

Experience details for technical qualification

Name of Interested Firm:	
1	Name of Project:
2	Location of the Project:
3	Cost of the Project (INR)* (excluding the Land Cost):
4	Project Start Date and End Date:
5	Type of the Project:
6	Total Built Up Area:

Note: The experience of projects under development shall not be considered for minimum technical qualification.

Signature of Authorized Person

Annexure -4

FORMAT FOR ESTABLISHING FINANCIAL CAPABILITY OF THE INTERESTED FIRM

Format for Financial Capability of Single Interested Firm

Tangible Networth

Networth (INR Crores)		
FY 2012-13	FY 2011-12	FY 2010-11

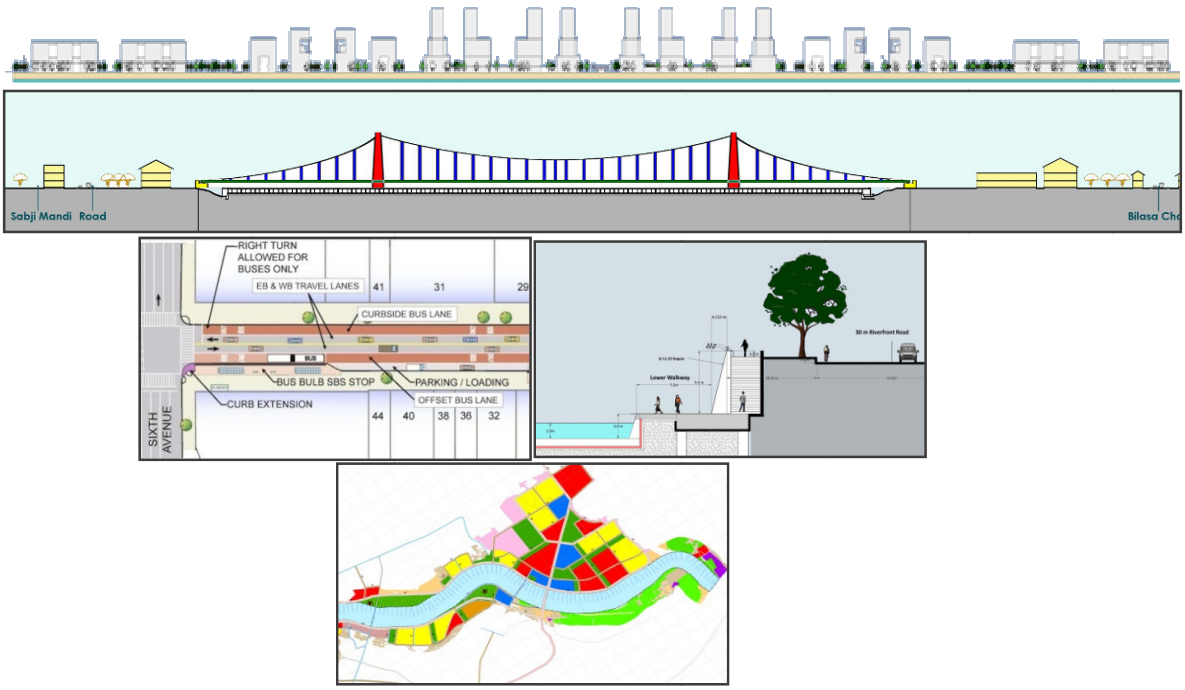
Note: Networth = (Paid up Share Capital + Reserves and Surplus) – (Revaluation reserve + Miscellaneous expenditure to the extent not written off + Debit balance of Profit/loss account)

Signature of Authorized Person

ARPA SPECIAL AREA DEVELOPMENT AUTHORITY

EXECUTIVE SUMMARY

FINAL PRELIMINARY PROJECT REPORT



October - 2014

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Executive Summary

E.1 INTRODUCTION

The Government of Chhattisgarh has notified ARPA SPECIAL AREA (ASA) under the provisions of CG Town and Country Planning Act, 1973 for the purpose of developing Arpa River Front and constituted Arpa Special Area Development Authority, Bilaspur vide Government notification no. 5 -111 / 18 / 2005 dated 25/10/2010consisting of 10 members with Divisional Commissioner, Bilaspur as the Chairman and the Collector Bilaspur District as its member secretary.

Government of Chhattisgarh has delineated an area comprising river bed and 200 m area on both sides for a length of 27.2 Km along the Arpa River as the ASADA area. This 27.2 km stretch starts atproposed Lofandi Barrage and ends at DomuhaniRapta. The total project area is 19.70 km^2.Table E-1 presents the area statement of the Project Area.

Table E-1: Summary of Project Area (Area in km^2)

S. No.	River Bed	Left Bank	Right Bank	Total
1	8.54	5.34	5.81	19.70

Arpa River is a seasonal river and is generally dry during late winter and summer months. During monsoons the river fills its bed which varies between 86 m to 500 m within the project area

The project area has three main characteristics. The central parts of the project area or near the Bilaspur core city are densely built on both banks of the river. Parts of the project area on the periphery of the city core has scattered urban development showing signs of urban growth zones. The north and south ends of the project area are largely agricultural in nature with few village settlements.

E.2 RIVER CHANNELIZATION PROPOSAL

The Draft Development Plan of the project area has been prepared based on proposed interventions within the project area. This includes channelization of part of the river stretch within the project area, utilization of the land recovered through channelization and adjacent areas and provision of adequate infrastructure to increase the development intensity of the region in a sustainable manner.

River channelization measures have been proposed to achieve the following objectives.

1. To ensure that the modified river channel is capable of conveying peak discharge safely during monsoons, and
2. To ensure minimum flow in the river during lean season to ensure a viable waterfront development.

E.2.1 PEAK DISCHARGE ANALYSIS AND CHANNELIZATION

Peak discharge analysis

Peak discharge in the river was calculated for 100 year return period considering the river passes through urban stretches. Based on the secondary data available five alternative methods for estimation of design discharge were adopted.Table E-2 presents peak discharge calculated using five different methods.

Table E-2:Peak discharge calculated through various methods

Sl. No.	Method	Return Period	Calculated Peak Discharge
1	Flood Frequency Analysis with CWC data	100 year	2626 cumec
2	Flood Frequency analysis with CWC data and additional Bilaspur Barrage DPR data	100 year	3285 cumec
3	Rational Method	100 year	2465 cumec
4	SCS Curve Number Method	100 year	3197 cumec
5	Carrying capacity of the existing river channel		3000 cumec

Flood frequency analysis of Ghatora station based on extremely high observed discharge data of 3200 cumec stated in Bilaspur Barrage DPR, has provided an extreme possible value of 3285 cumec for 100 years return period though such record is not available in CWC data. To this an allowance of 5% is added to create provision of carrying extreme flow beyond the present computed value, which provides a value of 3450 cumec.

The present capacity of the existing channel analyzed by rigorous 2D hydrodynamic model shows that the channel starts to overtop the natural banks towards downstream end for a discharge of 3000 cumec. However, the design discharge of the existing downstream Bilaspur barrage is in the order of 3500 cumec. ***Therefore, the peak design discharge for monsoon period is proposed as 3500cumec for channelization***.

E.2.1 CHANNELIZATION STRETCH

Alternate channel widths were tested for their adequacy of carrying the peak flow discharge and a channel width of 250m was selected. This width allows the river to carry a peak discharge of 3500 cumec without significantly raising of the river banks within the city areas. ***Thus a channel of 250m from KoniMangla Bridge till the Bilaspur barrage has been proposed as the design channel (Figure E-1).*** However, at some narrow locations the channel width has been retained as original since widthsare less than 250m at these locationsand scope of widening the river is not there.

Channelization of the river is a costly intervention and hence has been recommended only in stretches where the economic and financial returns of the project are higher. Channelization of the river downstream of the KoniMangla Bridge till Bilaspur Barrage is proposed to be initiated first due to high potential of project viability through private sector.

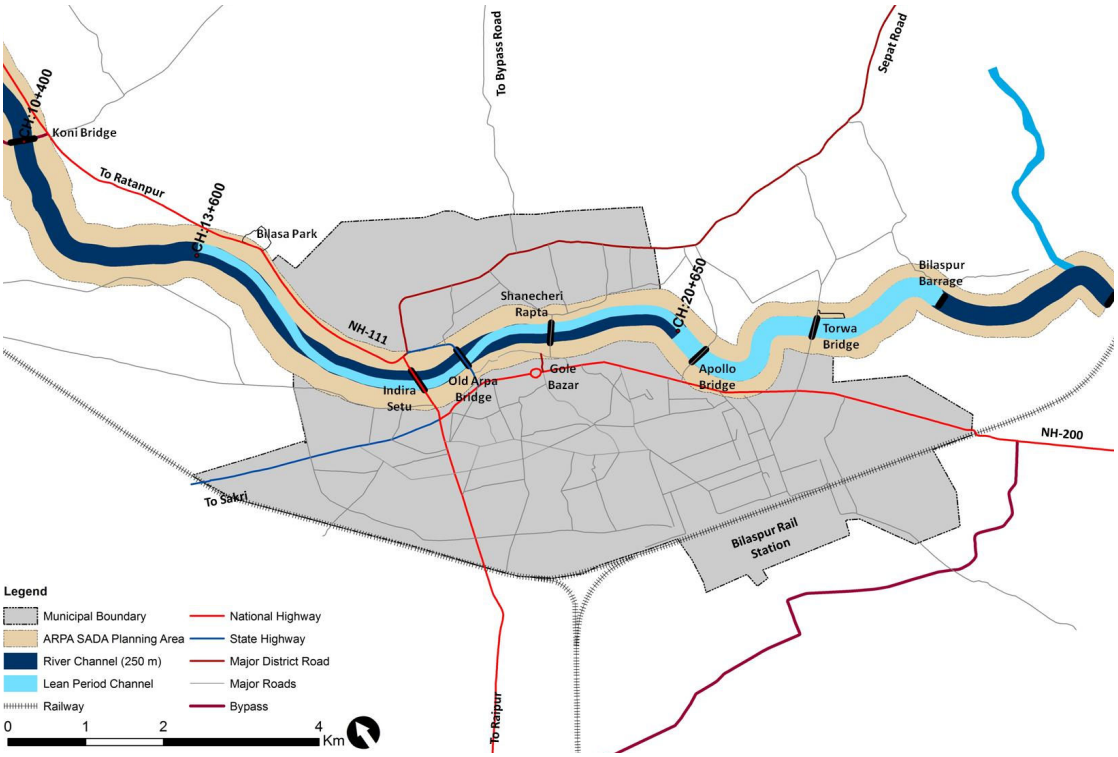


Figure 1-1:Channelization proposed from KoniMangla Bridge to Bilaspur Barrage

E.2.2 PROVISION FOR ADDITIONAL WATER DURING LEAN PERIOD

Wiers

In order to retain water to a minimum depth of 0.5 to 1.00m during lean period, low height weirs have been proposed along the channelized stretch of the river (Refer Figure E-2). The stretch up to Apollo Bridge from Bilaspur Barrage shall have water in its entire width in the form of back waters of the Bilaspur barrage.

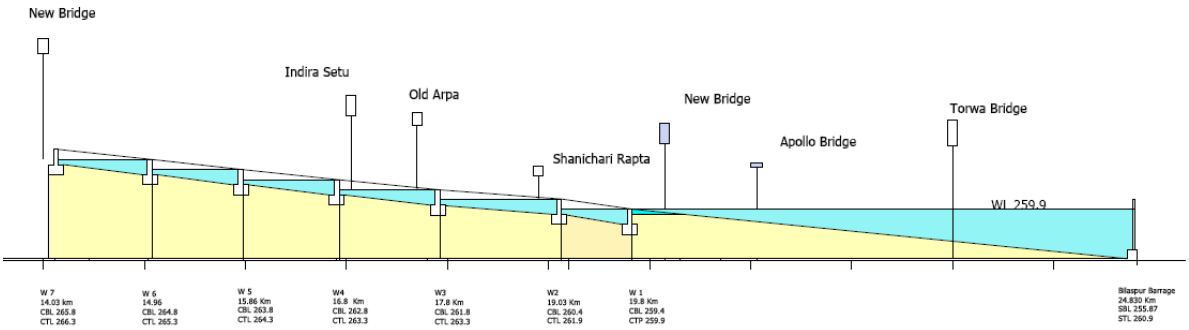


Figure 1-2: Low height weirs to retain water along the lean period sub-channel

Provision for additional water has been made for maintaining minimum 10 cm flow in lean period channel after monsoon. Due to limited availability of water, the flow shall be maintained only for 8 hours a day (7 AM to 11 AM and 5 PM to 9 PM).Water sources to maintain lean period channel water are Bilaspur Barrage water and treated sewerage water.

Summary of Water Demand for All Weather Channel

In the light of limited water resources available for late winter and summer season, the velocity of flow was considered is 0.36 meters / sec as per total availability including treated water from STP's.

The velocity considered is well within the range of critical velocity of water in canals. The critical velocity for sand laden water in canals is 0.3 meter/sec to 0.6 meter/ sec, where the velocity below 0.3 m / sec is considered as silting velocity and above 0.6 m / sec is taken as scouring velocity. For 0.36 m / sec velocity the quantity of water required works out as follows:

Water required for 10 cms depth of flow

- Q = 100 x 0.10 x 0.36 = 3.6 Cumecs
- For 8 hours per day flow: 3.6 x 8 x 3600 = 103680 cum = 104 mld.

Available water:

- From existing STPs = 57.0 mld
- From proposed small STPs = 1.8 mld
- From Bhainsajhar dam = 47.0 mld

Total = 105.8 mld

E.3 SUMMARY OF DEVELOPABLE LAND IN ASA

Channelization of the river is proposed between KoniMangla Bridge and Bilaspur Barrage. Channelization of the river will free up stretches presently under the river bed within ASA.

The following lands have been identified for riverfront development out of the overall land availability within ASA.

- Land reclaimed after 250m wide river channelization from Koni Mangla Bridge to Bilaspur Barrage,
- Land available on both banks within ASA from Koni Mangla Bridge to Bilaspur Barrage, and
- Additional lands available at Lokhandi and Mopka which are adjoining the project area.

A breakup and land ownership of the above mentioned lands proposed for development is presented in Table E-3 and Figure E-3.

Table E-3:Summary of Developable Land Area

Sl. No.	Developable Area	Govt Land (ha)	Private Land (ha)	Total (ha)
1	Reclaimed Land from Koni to Bilaspur Barrage	70.12	21.32	91.44
2	Developable land on both banks from Koni to BilaspurBarrage, included Left Bank from Bilaspur Barrage to Kharung river	134.12	249.52	383.64
3	**Sub Total**	**204.24**	**270.84**	**475.00**
4	Additional lands at Lokhandi and Mopka	156.52	21.19	177.71
	Total	**360.76**	**292.03**	**652.79**

As per the above table 475 ha is the potential developable land in the selected stretch, of which 204 ha (43.0%) is government owned land. In the additional lands at Lokhandi and Mopka, 88% is government owned lands. However, disposition of government land is patchy in the project area and to carry out comprehensive master planning and infrastructure development, procurement of private land within the project area is inevitable.

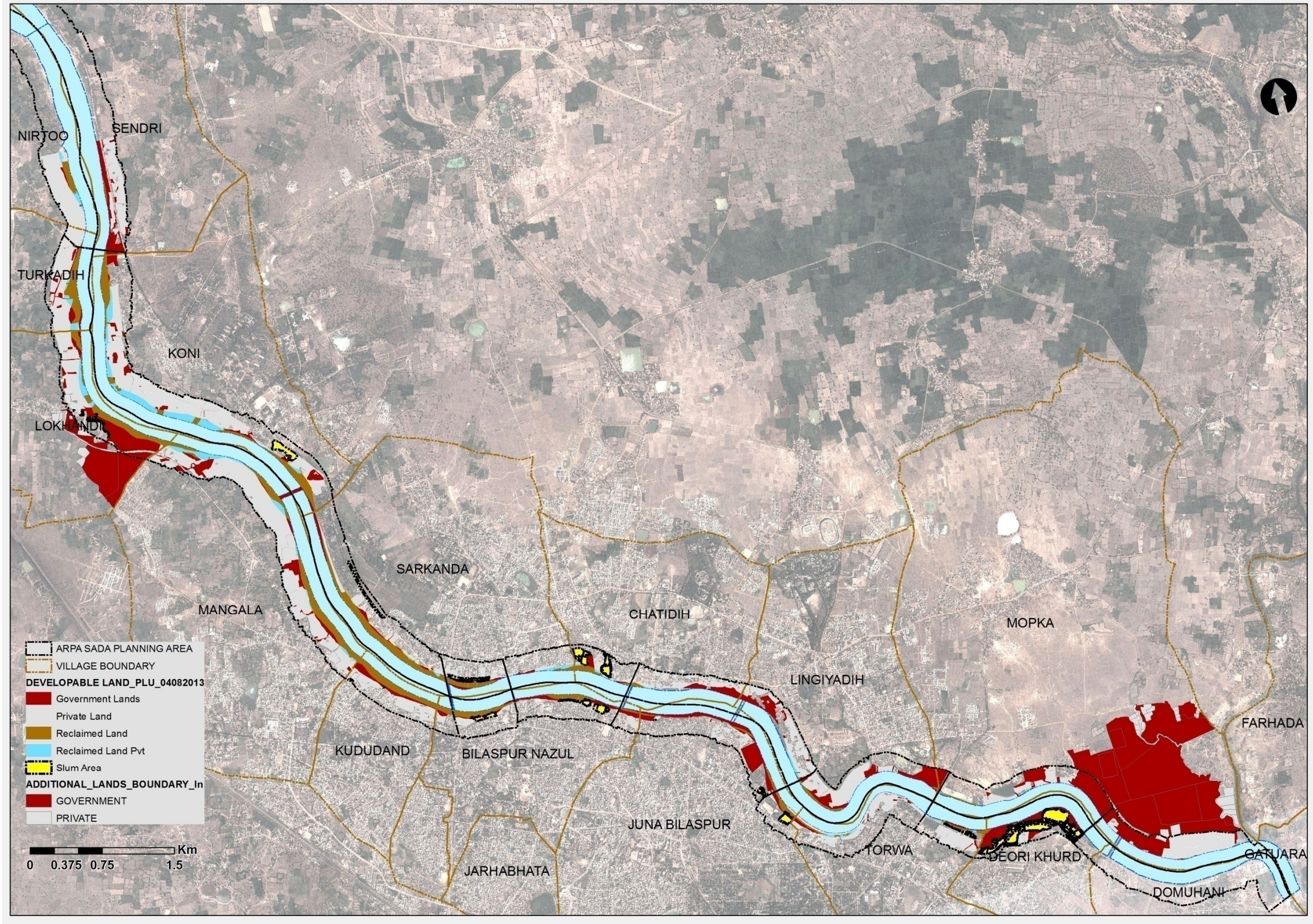


Figure 1-3: Land Ownership Map of ASA, including additional lands at Lokhandi and Mopka

E.4 INCLUSION OF ADDITIONAL LANDS IN ASA

Approximately 178 Ha lands have been identified at Lokhandi and Mopka which are largely government owned lands for adding to the project area (Figure E-4 shows additional lands). The development potential of these additional lands adjoining the project area will benefit from urban infrastructure in ASA and riverfront environment. The details of additional lands are presented in Table E-4. Majority (88%) of the additional lands are government owned.

Table E-4:Summary of Additional Lands Available

Additional Land	Area (in Ha)
Total Additional Government Land	**156.52**
Mopka	*130.17*
Lokhandi	*26.35*
Total Additional Private Land	**21.19**
Total Additional Land	**177.71**

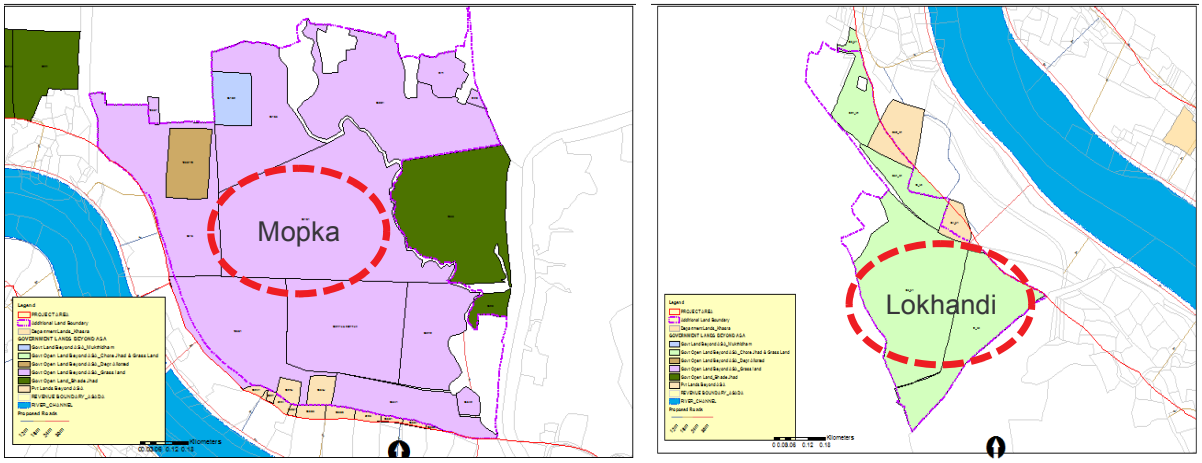


Figure 1-4: Additional Lands at Lokhandi&Mopka

E.5 PRODUCT MIX & CONCEPT LAND USE PLAN

As stated earlier, the product mix within the proposed development stretch along Arpa has been derived based on following consideration and summarized below.

- Product mix assessment is based on current real estate environment in Bilaspur city, experience from Sabarmati River Front Development Project and International Riverfront Development Projects, and Real Estate Operators' Perception.
- The envisaged role of the project area in the city as a major environmental and public corridor. Thus the project area will not be planned like a township but as a city spine with larger city level functions which will support the city as well as the nearby regions.
- Location advantage of various stretches of the project area and land available for development in each stretch.
- Inclusion of additional lands adjoining the project area expands the potential of project area development.

Table E-5:Summary of Proposed Product Mix and Development Program within ASA (Area in Ha)

Sl.No	Product Mix	KoniMangla Bridge - Indira Setu		Indira Setu - Apollo bridge		Apollo bridge to Bilaspur barrage		Summary	
		Area	%	Area	%	Area	%	Area	%
I	**Common Infrastructure**								
1	Roads and Utilities	78.94	27.57	24.78	34.09	38.61	33.19	142.33	29.94
2	Parks and Pedestrian Promenades	29.67	10.36	10.59	14.57	22.77	19.57	63.03	13.26
	Sub Total	**108.61**	**37.93**	**35.37**	**48.65**	**61.38**	**52.76**	**205.36**	**43.20**
II	**Land Development**								
1	Commercial	13.22	4.62	0.00	0.00	0.00	0.00	13.22	2.78
2	Shopping, Ent., Hotels etc.	50.09	17.50	11.04	15.18	15.07	12.96	76.20	16.03
3	Residential	77.63	27.11	7.11	9.77	23.70	20.37	108.44	22.81
4	Mixed Use	0.00	0.00	16.70	22.98	4.59	3.95	21.30	4.48
5	Institutional & Cultural	36.76	12.84	2.48	3.42	11.59	9.96	50.84	10.69
	Sub Total	**177.71**	**62.07**	**37.33**	**51.35**	**54.96**	**47.24**	**269.99**	**56.80**
	Total	**286.32**	**100.00**	**72.70**	**100.00**	**116.34**	**100.00**	**475.36**	**100.00**

E.5.1 PRODUCT MIX AND AREA DEVELOPMENT PROGRAMME FOR ADDITIONAL LAND

Product mix proposed for additional lands of 177 ha at Mopka and Lokhandi are further derivation of product mix proposed for ASA. Mopka is planned like a small consolidated mixed used development near Bilaspur Barrage whereas Lokhandi additional area is planned largely for residential development.

Product mix proposed for Additional Lands at Lokhandi and Mopka is as follows.

Table E-6: Summary of Proposed Product Mix for Additional Lands (Area in Ha)

Sl. No	Product Mix	Lokhandi		Mopka		Summary	
		Area (Ha)	%	Area (Ha)	%	Area (Ha)	%
I	**Common Infrastructure**						
1	Roads and Utilities	5.08	15.38	22.22	15.36	27.30	15.35
2	Parks and Pedestrian Promenades	0.00	0.00	23.07	15.95	23.07	12.99
	Sub-Total	5.08	15.38	45.29	31.31	50.37	28.37
II	**Land Development**						
1	Commercial	1.15	3.48	10.30	7.12	11.45	6.45
2	Residential	21.38	64.71	31.11	21.50	52.49	29.56
3	Institutional & Cultural	3.89	11.77	31.43	21.73	35.32	19.89
4	ELU consider in mixed built-up	1.54	4.66	26.54	18.35	28.08	15.81
	Sub-Total	27.96	84.62	99.38	68.69	127.34	71.72
	Total	31.78	100.00	145.79	100.00	177.56	100.00

E.5.2 DISPOSITION OF NODES AND OTHER IMPORTANT FUNCTIONS

The broad project structure along with the proposed transport network plan has been detailed into a proposed land use plan. Project area assessment, location advantage, land values, land availability and proposed transport connectivity define the proposed land use structure. The key nodes and hubs for the proposed land uses in ASA are as follows.

Commercial and Business Nodes

- Commercial Hub near Koni Bridge,
- Business District near Lokhandi,
- Commercial and Business Node near Apollo Bridge, and
- Commercial and Business Node in Mopka
- Commercial hub near Sendri

Entertainment and Cultural Hubs

- Major city level Entertainment and Cultural Hub at Smritivan near Torwa Bridge,
- Entertainment and Cultural Hub at Bilasa Park(Left Bank), and
- Entertainment and Cultural Hub near Bilaspur Barrage (Right Bank

Institutional and Education Hubs

- Educational/Institutional Hub near Koni and Mangla
- Institutional Hub near Apollo Bridge
- Institutional Hub in Mopka and
- Institutional Hub near Sendri

High Density Residential Neighborhoods

- Turkadih,
- Koni and Lokhandi,
- Kududand,
- Sendri to Kachhar
- Mopka and
- Other smaller residential areas

Parks and Open Space Network

Approximately 69 ha of parks and open spaces are proposed within the ASA. There are total 10 major and other smaller parks proposed in ASA to provide public space for social and recreational activities. Sizes of these parks vary from 2 ha to 7 ha approximately. The parks are distributed through the project area. These parks will not only work as open spaces for the project area but for rest of the city as well.

During non-monsoon periods the natural river bed, other than the All Weather Channel will work as a pedestrian open space. This space can be used for open space based sports and other pedestrian activities. The river bed as a whole will act as 250 m wide open space reservoir for the city. The total area of river bed from Koni Bridge to Bilaspur Barrage is 360 Ha.

Slum Area Improvement

There are approximately 46.2 ha of slum areas having total population of 12,780 within ASA. These slum areas are proposed for in situ rehabilitation. Physical infrastructure and Social infrastructure development on these areas need to be developed as per the UDPFI guidelines.

E.5.3 PROPOSED LAND USE PLAN

Proposed Land use breakup of of entire ASA is presented in Table E-7**.**FigureE-5 presents thedraft proposed land use of Arpa Special Area.

Table E-7: Proposed Land Use of Arpa Special Area

S.No	Project Stretch	AGRICULTURE		COMMERCIAL		FOREST LAND		INDUSTRIAL		MIXED USE		PUBLIC & SEMI PUBLIC		PUBLIC UTILITY & FACILITIES		RAILWAY LAND		RECREATIONAL		RESIDENTIAL		TRANSPORTATION		WATER BODY		Total		
		Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Total
1	Lofandi to Kachhar	68.8	79.5	0	0	8.5	21.7	0	0	0	0	0	0	0	0	0	0	0	0	2.3	0	0	0	65.5	73.8	145.2	175	320.2
2	Kachhar to Sendri	0.4	56.8	3.6	0	0	0	0	0	0	0	6.2	0	0.9	0	0	0	2.4	0	42.4	13.4	18.1	0	69	73.2	143.1	143.3	286.5
3	Sendri to Koni Bridge	0	27.8	8.6	14.8	0	0	0.2	0	4.6	0	7.8	0	0.5	0.5	0	0	3.2	0.9	24.8	3.9	13.4	5.8	44.7	39.8	107.8	93.6	201.3
4	Koni Bridge to Bilasa Park	0	0	12.1	24.4	0	0	0	0	2.4	0	10.3	13.6	0.6	0.9	0	0	10.2	11	35.8	32	22.2	23.6	47.4	47.4	140.9	152.8	293.7
5	Bilasa Park to Indira Setu	0	0	9	11.8	0	0	0	0	1.5	1.5	21.5	4.3	2.1	1.5	0	0	2.6	8.9	11.1	34.5	15.8	19.2	32.7	37.4	96.3	119	215.4
6	Indira Setu to Apollo Bridge	0	0	10.6	19.1	0	0	0	0	21.6	11.4	3.6	5.1	1	0.8	0	2.2	6.6	4.5	27	23.7	22.2	19.5	54.3	45	146.8	131.2	278
7	Apollo Bridge to Bilaspur Barrage	0	0	6.4	8.8	0	0	0	0	2.8	9.8	1.7	5	0.9	0.9	0	5.8	26.9	9.2	14.6	28.5	17.3	20.9	46.7	43.4	117.2	132.4	249.6
8	Bilaspur Barrage - Domuhani Anicut	0	0	3.9	4.3	0	0	0	0	0	0	4.8	2.1	0.5	10.2	0	0	5.7	7.5	4.8	11.9	9	9	23.8	27.5	52.6	72.4	125
	Total	69.2	164	54.2	83.2	8.5	21.7	0.2	0	33	22.7	56	30.1	6.5	14.8	0	8	57.5	41.9	162.8	147.7	117.9	97.9	384.1	387.5	949.9	1019.8	1969.7
	Use Wise Total	233.3		137.5		30.2		0.2		55.7		86.1		21.3		8		99.4		310.5		215.9		771.6		1969.7		
	%	11.844		6.9788		1.536		0.011		2.8265		4.3698		1.082		0.4074		5.0479		15.7655		10.959		39.1724		100		100

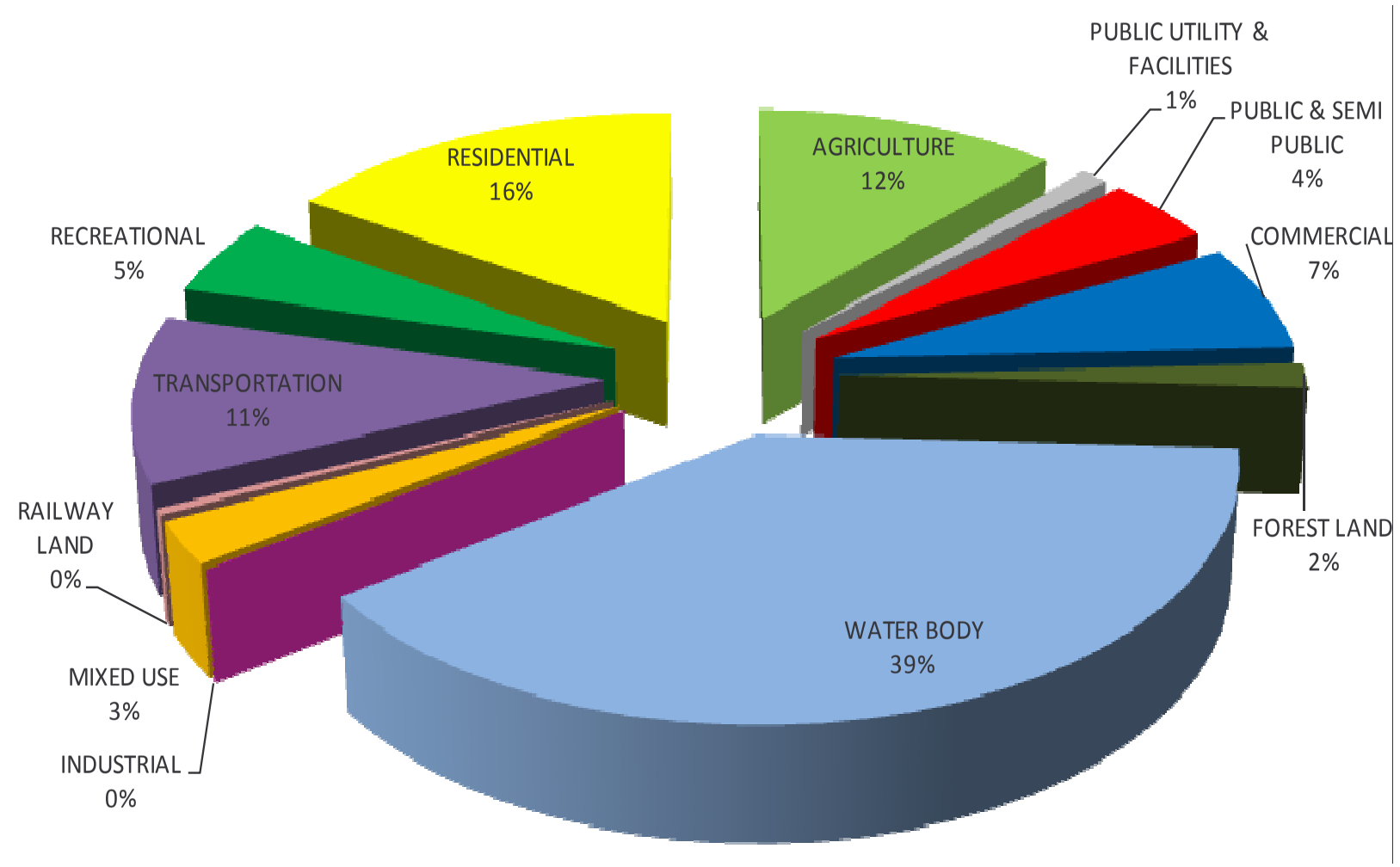


Figure 1-5: Summary of Proposed Land Use

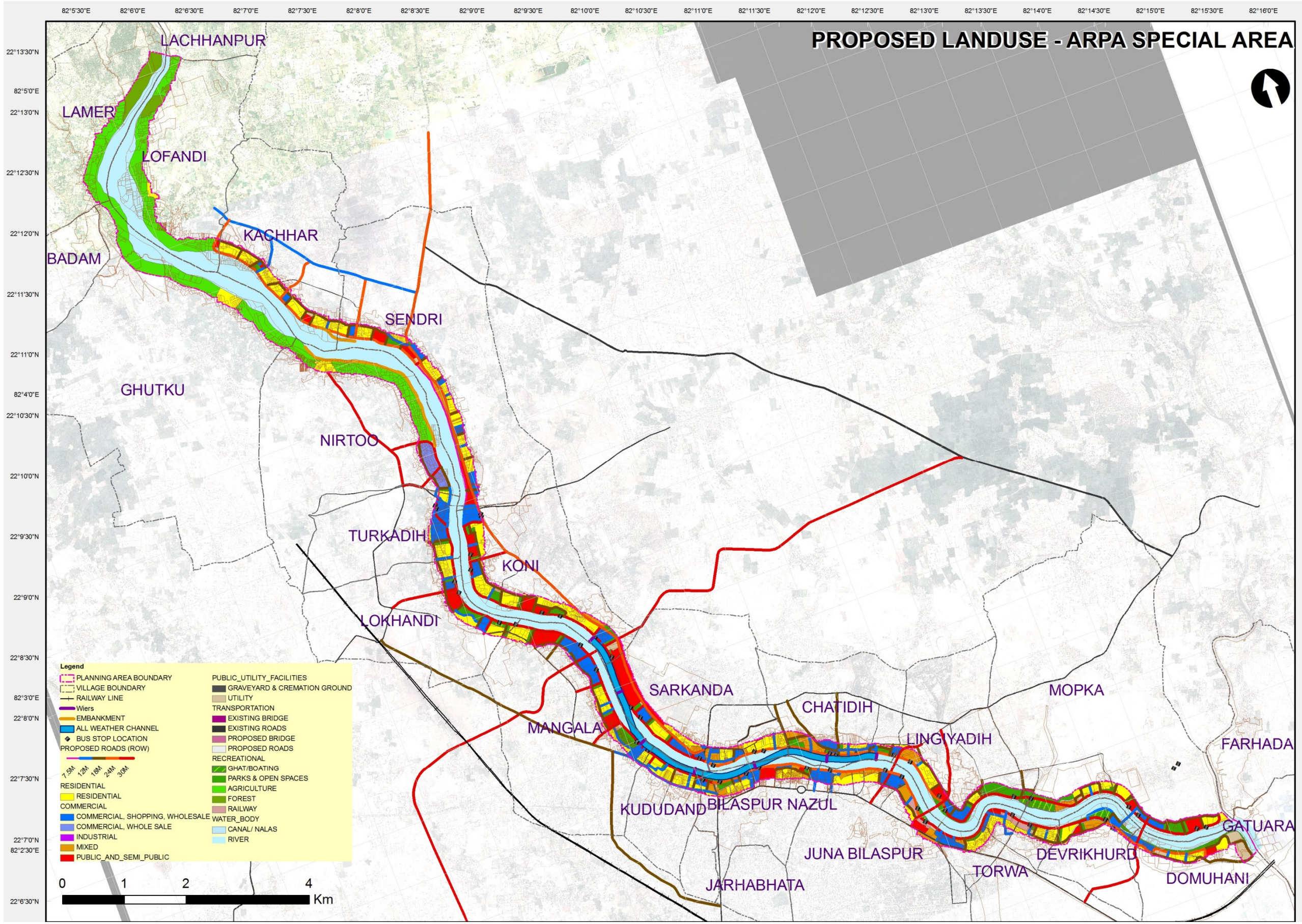


Figure E-6: Proposed Land Use Plan of Arpa Special Area

E.6 INFRASTRUCTURE DEVELOPMENT

E.6.1 RIVER WORKS

For channelization of river to 250 meter width, continuous retaining wall needs to be constructed to retain the load of the earth fill on reclaimed land. The water level in river at 3500 cumecs discharge (for 100 years return period) has been calculated and plotted at every 27.5 meters interval for entire stretch of the designated plan area. For a peak discharge of 3500 cumecs, free board of 1.5 meters is required to be maintained in urban populated area. Thus the height of retaining wall above river bed has been established after adding a height of 1.5 meter above HFL in the river at 3500 cumecs.

The channelization is proposed from KoniMangla Bridge (chainagekm 10/150) to Bilaspur Barrage (chainagekm 24/800). As already discussed, it is proposed to construct the lean water channel in a width of 100 meters in the bed of river. The lean water channel shall be constructed to follow the present Thalweg flow pattern, so that the natural appearance of the channel is maintained. Along the lean water channel a walk way of 7.5 meters width shall be constructed.

Seven low height weirs shall be constructed in the lean water channel to retain water during lean period with a sheet flow of about 10 cm. From Apollo Bridge (chainage km 10/150) the water shall be retained in full 250 meter width of river and there shall be no lean water channel, as the RL at Bilaspur barrage when door closed shall permit the storage of water up to Apollo Bridge.

Thus at the stretches where lean water channel is flowing along the bank, it is proposed to construct RCC retaining wall for aesthetic appearance while on other face stone gabion wall shall be constructed. In the stretch from Apollo Bridge to Bilaspur Barrage there is no lower walk way, thus Gabion retaining wall is proposed on both the banks. The required height of retaining wall has been worked out after taking average of height in particular stretch. Table E-8 shows the proposed length and height of RCC and Gabion retaining wall.Figure E-6 presents the location of proposed Gabion and RCC retaining wall location.

Table E-8:Proposed length and height of RCC / Gabion Retaining wall

Left Bank					Right Bank				
Chainage (km)		Length (m)	Adpted average Height (m)	Type of Retaining Wall	Chainage (km)		Length (m)	Adpted average Height (m)	Type of Retaining Wall
From	To				From	To			
10/150	14/000	3850	6.00	Gabion	9/300	14/000	4700	6.00	Gabion
14/000	15/400	1400	6.00	RCC	14/000	15/400	1400	6.00	Gabion
15/400	18/200	2800	7.00	Gabion	15/400	18/200	2800	7.00	RCC
18/200	19800	1600	6.00	RCC	18/200	19/800	1600	6.00	Gabion
19/800	24800	5000	7.00	Gabion	19/800	24/800	5000	7.00	Gabion

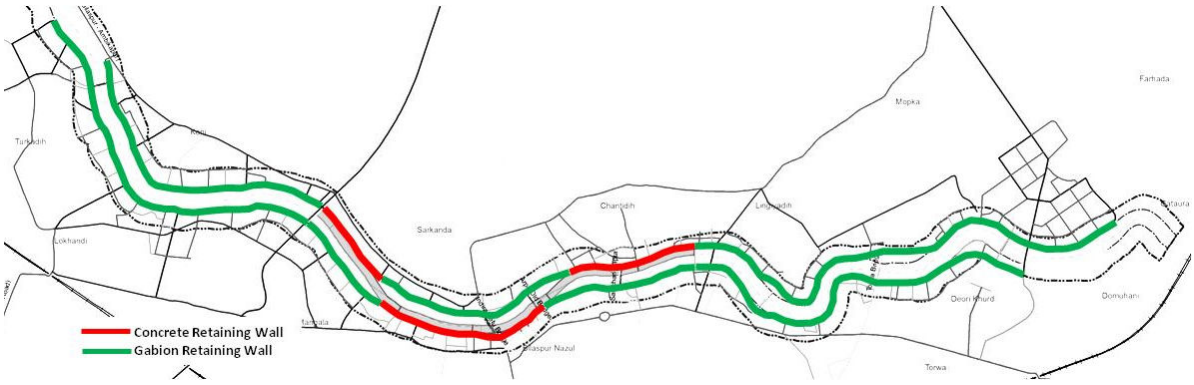


Figure 1-7: Extents of gabion and concrete retaining walls

E.6.2 TRANSPORT CONNECTIVITY AND INFRASTRUCTURE PLAN

Existing traffic conditions of roads within ASA and rest of the city are very congested.Carrying out riverfront development in Arpa Special Area is an opportunity to augment road and pedestrian movement network in the city. Following strategic improvements are made to augment transport network in the project area.

Road Network Plan

The road and transportation network primarily consist of proposed and existing roads and bridges in the project area. Central parts of Arpa Special Area (ASA) are located in middle of the city hence its road network will act as city level movement system also. The proposed network comprises the following. Figure E-7 presents proposed road network of ARPA Special Area.

- Riverfront roads with RoWs of 30m and 24 m which will be treated as 4 lanes carriageways with wide footpaths;
- Three new bridges across Arpa River and expansion of Indira Setu/bridge by additional two lanes;
- Suspension Bridge near SanichariRapta for Pedestrians cum vehicular movement;
- Local roads within the project area to provide access to the proposed development;
- Approach roads to the project area that are falling outside the project area, and are having RoWs of 30 m.

Table E-9: Summary of proposed road lengths of various widths

Stretch	Proposed Road Length (m)				
	12 m	18 m	24 m	30 m	Total
Sendri to KoniMangla Bridge	491	1608	0	883	2983
KoniMangla to Indirasethu Bridge	6491	7803	5	16718	31017
IndiraSethu to Old Arpa Bridge	767	360	1327	11	2465
Old Arpa to SanichariRapta	621	1099	2430	0	4149
Sanichari to Apollo Bridge	1701	3162	4393	761	10017
Apollo Bridge to Torwa Bridge	1089	1669	4	3790	6553
Torwa to Bilaspur Barrage	1165	2465	0	3418	7047
Bilaspur Barrage to DomuhaniAnicut	455	144	0	2038	2637
Total	**12780**	**18310**	**8159**	**27619**	**66869**

Details of the bridge locations are given in**Table E-10**.

Table E-10:Summary of proposed Bridges over ArpaRiver

S. No.	New Bridge Location	Chainage	Length*	Width	Description
1	Bilasa Park Bridge	14.200 Km	250 m	18 m	4 Lane with footpath on both sides
2	Indira Setu 2 lane expansion Bridge	17.050 Km	450 m	10 m	2 Lane with footpath on both sides
3	Suspension Bridge	18.925 Km	395 m	6 m	Pedestrian cum vehicular bridge proposed at SanichariRapta
4	Dayalband Bridge	20.100 km	320 m	18 m	4 Lane with footpath on both sides
5	Mopka Bridge	25.150 Km	320 m	18 m	4 Lane with footpath on both sides

*Actual Length of the bridge will be determined at the time of DPR preparation for the bridges.

It is desirable to extend the proposed road and pedestrian network proposed within ASA to the rest of the city as new Development Plan for Bilaspur City is under preparation.Approximately 15.2 Km of approach roads beyond the ASA are proposed to improve access to the project area.

Public Transport

Riverfront roads proposed in the project area will act as major connectors in the city by providing access to city core areas and emerging new growth areas along the river banks. Riverfronts in the project area will also act as a city level recreational space along with promoting high density commercial, institutional, and residential development within ASA. Hence, it is highly desirable to promote quality public transport on the riverfront roads.

The proposed public transport will comprise of following aspects.

- Bus based public transport running along riverfront roads on both banks between KoniMangla Bridge and Bilaspur Barrage.
- Line marking for bus lanes is recommended along the side lanes to provide priority for bus based public transport.
- Dedicated space for bus stops outside the regular carriageway is proposed.
- Provision of pedestrian markings or zebra crossings with signals, for pedestrian crossings near the bus stops.
- It is recommended that bus stops are located at an average every one km and near the high density development and activity areas.

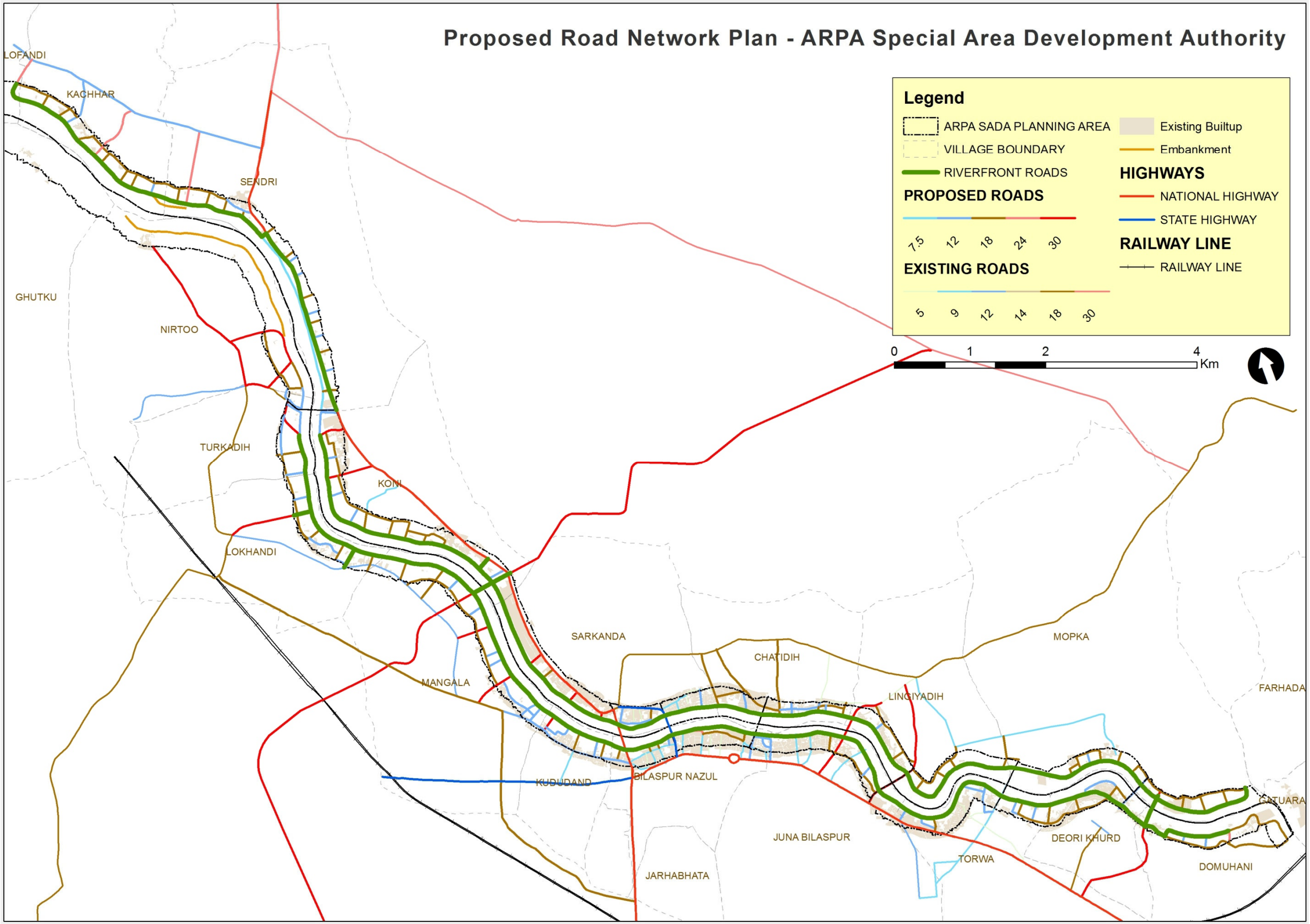


Figure 1-8: Proposed Transportation Network of Arpa Special Area

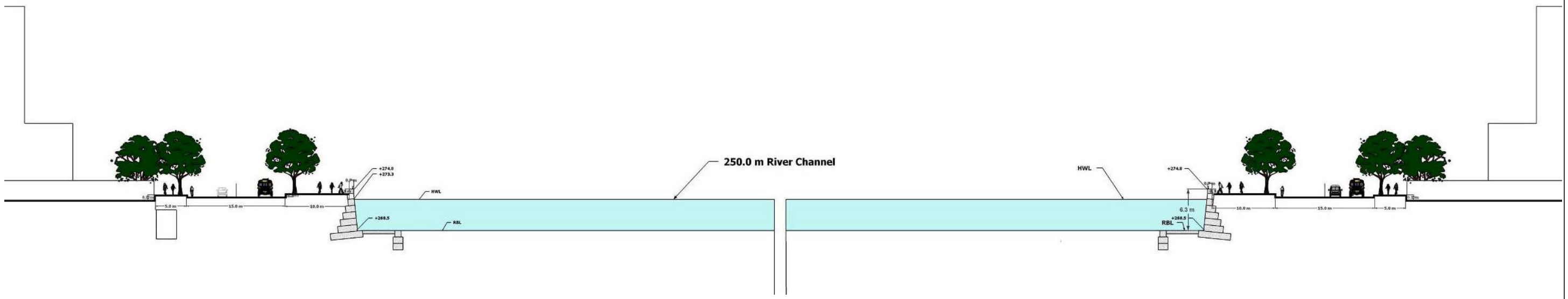


Figure 1-9: Arpa River Channel Section @ Chainage km 16/500

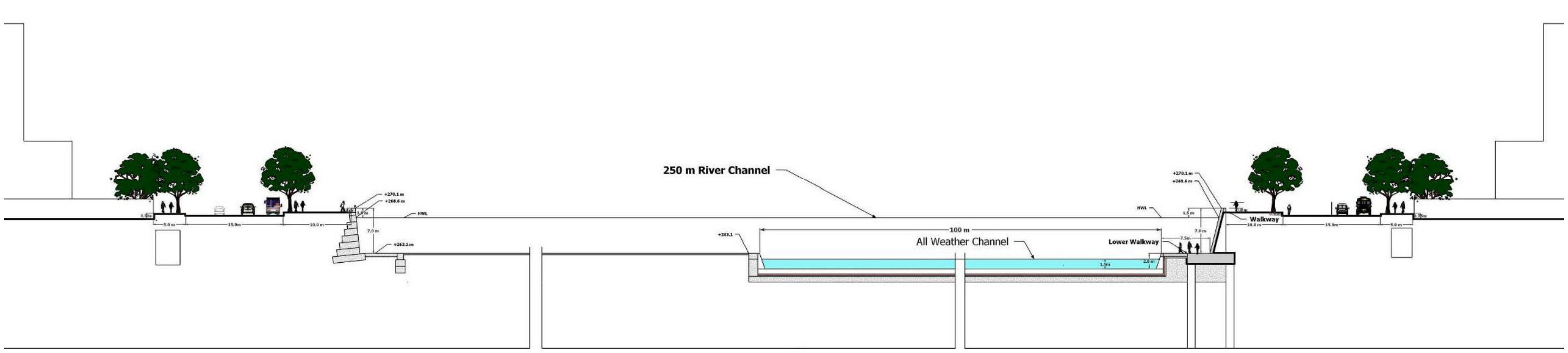


Figure 1-10: Arpa River Channel Section @ Chainage km 16/500

E.6.3 WATER SUPPLY

Water demand for the new development has been estimated based on the UDPFI guidelines. The norms considered are 135 lpcd for domestic purpose and 45 lpcd at employment centers. The total additional water demand for the proposed new developments the water losses is 34.6mld. Table E-11 presents the stretch wise water demand.

Table E-11:Stretch Wise Water Demand

S.No.	Sub Zone	Projected Population in plan area	Employment	Water Demand consumer end mld			Water Demand including losses
				Res	Emp	Total	Mld
2	Koni Mangla to BMC Boundary (LB-1)	19802	12287	2.7	0.6	3.2	3.8
3	Koni Mangla to BMC Boundary (RB-1)	41558	27614	5.6	1.2	6.9	8.1
4	BMC Boundary to Apollo Bridge (LB-2)	8870	13941	1.2	0.6	1.8	2.1
5	BMC Boundary to Apollo Bridge (RB-2)	21499	15350	2.9	0.7	3.6	4.2
6	Apollo Bridge to DomuhaniRapta (LB-3)	13110	10625	1.8	0.5	2.2	2.6
7	Apollo Bridge to DomuhaniRapta (RB-3)	21214	9677	2.9	0.4	3.3	3.9
	Total "A"	**126053**	**89494**	**17.1**	**4.0**	**21.0**	**24.7**
	Additional area						
1	Mopka (LB-4)	30960	25080	4.18	1.13	5.31	6.24
2	Lokhandi (RB-4)	22100	2816	2.98	0.13	3.11	3.66
	Total "B"	**53060**	**27896**	**7.16**	**1.26**	**8.42**	**9.90**
	Grand Total	**179113**	**117390**	**24.26**	**5.26**	**29.42**	**34.6**

Since the area is rich in ground water, it is proposed to drill tube wells of 400 x 200 / 90 m depth. On enquiry it was found that yield in gravel packed tube wells in the area ranges between 50, 000 to 100,000 litres per hour. Thus an average yield of 75,000 litres has been assumed for working out number of tube wells required for each zone.

Each zone shall have its separate production as well as distribution system. The pumping system has been designed for 22 hours working and the distribution system for 24 hours water supply with 2.5 peak factor. Provision has been taken for a CWR in each zone for collection of water from tube wells, pumping station for pumping water to Service Reservoir, separate Service Reservoir and distribution system. The rising mains have been designed as per provisions in CPHEEO manual. The capacity of CWR is kept equivalent of two hours pumping capacity to take care of power / system break downs and that of Service Reservoir is kept as 30% of zone demand based upon mass demand calculations as per CPHEEO manual.

The quantity / capacity of various components is summarized in the **Table E-12.**

Table E-12: Infrastructure Requirement for Water Supply

S.No.	Sub Zone	Number of Tube wells	Pumps for tube wells of 19 lps and 100 m head		CWR Cap.	Pumps at CWR (1 W+ 1SB)			SR Cap.	Rising main CWR to SR	
		Qty	Nos	KW	ML	Q in lps	Head	Cap KW	ML	Dia in mm	Length m
2	KoniMangla to BMC Boundary (LB-1)	3	3	35	0.28	38.51	40.00	25	0.91	200.00	150
3	KoniMangla to BMC Boundary (RB-1)	5	5	35	0.57	79.41	40.00	50	1.89	250.00	100
4	BMC Boundary to Apollo Bridge (LB-2)	1	1	35	0.14	18.87	40.00	12.5	0.45	150.00	150
5	BMC Boundary to Apollo Bridge (RB-2)	2	2	35	0.24	33.46	40.00	22.5	0.80	200.00	150
6	Apollo Bridge to DomuhaniRapta (LB-3)	2	2	35	0.25	34.26	40.00	22.5	0.81	200.00	150
7	Apollo Bridge to DomuhaniRapta (RB-3)	2	2	35	0.17	24.06	40.00	17.5	0.57	150.00	150
	Total "A"	**15.00**	**15.00**		**1.70**				**5.43**		
	Additional area										
1	Mopka-(LB-4)	5	5	**35**	0.57	78.85	40.00	50	1.87	250.00	150
2	Lokhandi(RB-4)	3	3	**35**	0.33	46.20	40.00	30	1.10	200.00	150
	Total "B"	8.00	8.00		0.90				2.97		
	Grand Total	**23.00**	**23.00**		**2.55**				**8.40**		

The distribution system has been designed as per EPANET programme. It is proposed to provide Ductile Iron pipes class K-7. The size and length of pipe lines proposed for distribution system in each zone is being given in **Table E-13.**

Table E-13: Stretch Wise Proposed Water Distribution System

Pipe Size (mm)		Zone							
		LB-1	LB-2	LB-3	Lokhandi	Mopka	RB-1	RB-2	RB-3
100mm	1271	2906	4031	1491	62	3152	4014	4173	1559
150mm	1695	3086	3146	1501	669	3388	2824	2743	3411
200mm	2287	2764	2563	2766	1174	2401	2565	3032	1301
250mm	3022	782	851	973			931	1196	
300 mm	3742		514	887	555	1742	1639	209	
350mm	4759						1106		
400mm	6088					151		716	
450mm	7093	287							
600mm	10398						218		
Total		**9825**	**11105**	**7618**	**2460**	**10834**	**13297**	**12069**	**6271**

E.6.4 SEWERAGE

As prescribed in CPHEEO manual, it is assumed that 80% of water actually supplied at consumer end for domestic use shall be generated as sewage. Accordingly the sewage generation from each pocket of development has been worked out and laterals have been designed.The sewage collector has been proposed to be laid on river front road. The sewage collector has been designed to cater the sewage from new development as well as for the sewage diverted from Nala diversion system.

It is proposed to provide RCC hume pipes class NP-3 for sewage collection system. Necessary provision has also been taken for ventilating shafts in the out fall sewer lines. The sewage collected from KoniMangla Bridge to Bilasa Park is proposed to be treated in proposed two STP's one on left bank of 1.20 mld and the other on right bank of 1.05 mld. Figure 5-35 presents typical arrangement for connecting laterals to sewer lines.

Table E-14: Proposed length and size of sewerage lines in each zone

Pipe Size	Laterals and Collector Sewers								Outfall Sewer	Total
	LB-1	LB-2	LB-3	Lokhandi	Mopka	RB-1	RB-2	RB-3		
1000mm		1137								1137
1100mm		1010	1788							2798
1200mm			3555		555				646	4757
1400mm							3865	251		4116
1600mm								3228	2188	5417
150 mm	2534	4197	1913	1328	6136	3269	5725	2569		27672
200 mm		466	727	887	3017	773				5871
250 mm			139		819					958
300 mm	3747					4544				8291
400mm	457	1998								2455
450mm						211	1364			1575
500mm							1824			1824
600mm		1673								1673
750mm		442								442
800mm		649								649
Total	**6738**	**11573**	**8123**	**2215**	**10528**	**8797**	**12777**	**6048**	**2834**	69632

E.6.5 STORM WATER DRAINAGE

Diversion of storm water drains presently draining into the Arpa River is an important project component. This scheme ensures improvement of river water quality to acceptable levels which is a pre-requisite for success of the riverfront development project.

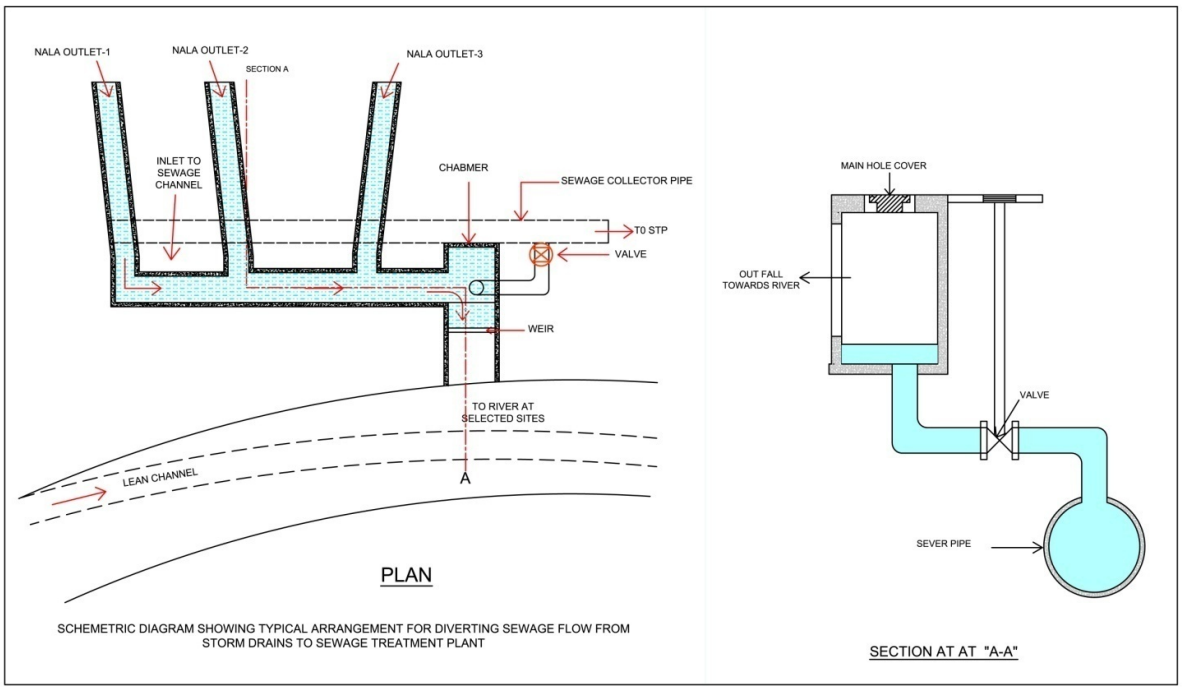
As per the Sewerage DPR, 51 drains will be discharging storm water into the river. In addition, a comprehensive Sewerage Project covering the entire city area is also under execution. However, past performance of sewerage projects in other towns and cities of the country indicate that even though the city is 100% covered with sewerage network all houses are never connected to the sewerage system and part of the city sewage still flows into the open drains.

The likely reasons for the above are as follows.

- Almost 30% citizens do not take sewerage connection since they have already developed a septic tank system with its out fall discharging into open drains,
- Of the households which do connect to the city sewerage system only few connect their entire waste water of the house to the system. Only water from the WC is connected to the sewerage system thus draining waste water from kitchens and bathrooms to the open drains.

It is proposed that sewage water in these drains during lean period shall be collected separately and carried to the Sewage Treatment Plants under construction near DomuhaniAnicut. During monsoons household sewage mixed with large amount of rain water will be allowed to be discharged into the river.

Figure E-10 shows general arrangement for diverting sewage flow to sewage collector channel. For this a chamber with manhole shall be constructed at the present drain outfall. This chamber shall have two outlets, one for sewage collection and diverting to a sewage collector channel while the other shall be for allowing the storm water to flow through to the river during monsoons. A weir shall be constructed at the opening of the storm water channel which will restrict the flow towards river during lean period when the flow shall primarily comprise sewage water only. In rainy season the storm water shall over top this weir and flow into the river.



SCHEMETRIC DIAGRAM SHOWING TYPICAL ARRANGEMENT FOR DIVERTING SEWAGE FLOW FROM STORM DRAINS TO SEWAGE TREATMENT PLANT

Figure 1-11: Proposed Drain Diversion Scheme

The diversion drain and sewage collector pipe shall run along the farthest edge of the river front roads away from the river front (Refer E-11).

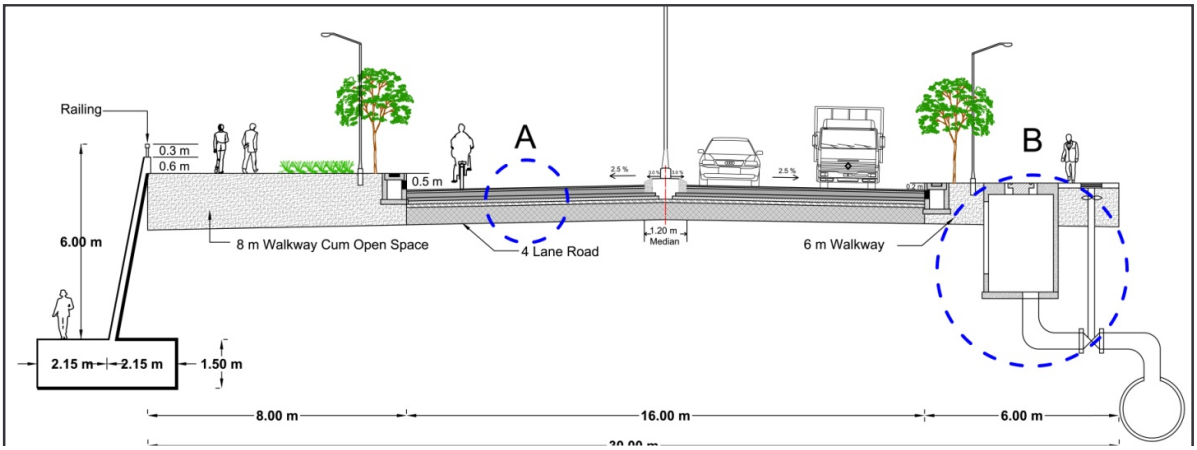


Figure 1-12: Road cross section showing location of Drain Diversion Scheme

E.7 CAPITAL INVESTMENT PLAN

E.7.1 MAIN PROJECT COMPONENTS

Arpa Special Area Development project constitutes four project components. These components are Arpa River Channelization, All Weather Channel to retain water throughout the year, Road and Pedestrian Network and Urban Infrastructure Development.

E.7.2 PROJECT COSTING

The cost estimates for Water supply and Sewerage works have been prepared using Chhattisgarh Unified Schedule of Rates for water supply & sewerage, issued in February 2013. Similarly the estimates for other civil works, bridges, roads etc are based on Chhattisgarh Schedule of Rates for Bridge works and Road works, issued in 2013. Prevailing market rates have been used for items which do not feature in the above SOR. The quantity estimates are based on concept infrastructure plan for roads, water supply, drainage and other urban development components. Project components which have been included in the estimates are as follows.TableE-15 gives the summary of the project costing for all project components.

Table E-15: Summary of Project Costing of Arpa Special Area Project

S. No.	Project Components	Project Cost (Crores)
1	River channel	366.5
2	Lean period channel	346.2
3	Road and pedestrian infrastructure network	401.9
4	Urban infrastructure and open spaces	649.6
5	DPRs and project management and quality control	79.4
	Total	1843.5

The overall project cost of Arpa Special Area Development is INR 1843.5 Crores. Cost of river channelization comprises approximately INR 712.7 crores (38.7%) including All Weather Channel. Road and pedestrian infrastructure network comprises approximately INR 401.8 crores (21.8%). Urban infrastructure development and land procurement cost is INR 649.6 Crores (35.2%).

The cost of private land procurement and government land value is a major component, if acquired, private land cost would be approximately 642.7 Crores and cost of government land would 748 Crores.

Table E-16 gives details of various project components and their year on year project costing with respect the project implementation period. The project implementation period for river channelization and infrastructure development is considered between 2015 to 2021.

Table E-16: Investment Phasing for Project Implementation

Capital Cost of Arpa Special Area (rupees crores)										
			Year Wise Capital Cost (in Rupees cr)							
			Project Implementation Period: 2015 to 2021							
S.No.	Project Component	Brief Description	2015	2016	2017	2018	2019	2020	2021	Total
1	**RIVER CHANNEL**									
1a	River Bed		20.11	20.11	20.11	20.11	0	0	0	**80.4**
1b	Embankments Conrete		15.78	26.30	26.30	36.8235	0	0	0	**105.2**
1c	Embankments Stone Gabions		25.572	42.62	42.62	42.62	17.048	0	0	**170.5**
1d	Ghats for boating and recreational activities		0	0	1.25	1.25	0	0	0	**2.5**
1e	Bank Protection at Select Locations with Spurs/Gabions for		0	0	0	0	0	3.94	3.94	**7.9**
	Sub Total		**61.4635**	**89.0325**	**90.2825**	**100.8035**	**17.048**	**3.94**	3.94	**366.5**
2	**LEAN PERIOD CHANNEL**									
2a	Lean Period Channel		0	30.44	30.44	30.44	30.44	0	0	**121.8**
2b	Anicuts		0	1.695	1.695	1.695	1.695	0	0	**6.8**
2c	Water Supply from Bainsajhar		0	24.2154	24.2154	24.9492	0	0	0	**73.4**
2d	Nalas Diversion Duct/Pipe		0	0	0	37.235	37.235	0	0	**74.5**
2e	Waste Water Recycling from City STPs including maintaining a water testing Lab		0	0	34.08	34.08	0	0	0	**68.2**
2f	Backwater of Bilaspur Barrage bed cleaning		0	0	0	1.1	0	0	0	**1.1**
2g	Improvement and Repairs Bilaspur Barrage		0	0	0	0.5	0	0	0	**0.5**
	Sub Total		**0**	**56.3504**	**90.4304**	**129.9992**	**69.37**	**0**	0	**346.2**
3	**ROAD AND PEDESTRIAN INFRASTRUCTURE NETWORK**									
3a	Land Acquisition		31.93	0	0	0	0	0	0	**31.9**
3b	Riverfront Roads and other 30 m RoW Roads		0	45.40836	44.07282	44.07282	0	0	0	**133.6**
3c	Approach Roads		0	0	53.3205	53.3205	0	0	0	**106.6**
3d	Bridges		16.5	11.088	11.088	11.424	0	12.5955	12.5955	**75.3**
3e	Local Access Roads		0	0	13.6155	13.6155	13.6155	13.6155	0	**54.5**
	Sub Total		**48.43**	**56.49636**	**122.09682**	**122.4328**	**13.6155**	**26.211**	12.5955	**401.9**
4	**URBAN INFRASTRUCTURE AND OPEN SPACES**									
4a	Land Procurement		0.0	0	0	0	0	0	0	0.0
4b	Water Supply Trunk Network		0	8.17	8.17	8.17	8.17	0	0	32.7
4c	Sewerage Trunk Network		0	0	18.41	18.41	18.41	18.41	0	73.6
4d	Power Supply and Distribution		15.48	30.96	30.96	30.96	30.96	15.48	0	154.8
4e	Storm Water Drainage (Included in Roads Cost)		0	0.00	0.00	0.00	0.00	0	0	0
4f	Parks, Promenade, and Open Spaces		0	0	30.175	30.175	30.175	30.175	0	120.7
4g	Slum Redevelopment		0	34.167	56.945	56.945	56.945	22.778	0	227.8
4h	City Museum		0	0	8.5	8.25	8.25	0	0	25.0
4i	ASADA Administration Building		5.1	4.95	4.95	0	0	0	0	15.0
	Sub Total		**20.6**	**78.2**	**158.1**	**152.9**	**152.9**	**86.8**	0	**649.6**
	Total (Without Escalation)		130.5	280.1	460.9	506.1	252.9	117.0	16.5355	1764.1
5	**DPRs AND PROJECT MANAGEMENT AND QUALITY CONTROL**									
	4.5% of Phase 1 Capital Cost		**19.85**	**19.85**	**19.85**	**19.84655**	**0**	**0**	0	**79.4**
	Total (Without Escalation)		**150.32**	**299.97**	**480.77**	**525.99**	**252.94**	**116.99**	**33.071**	**1843.5**

E.7.3 PROJECT PHASING

Considering the large size of Arpa Special Area Development (19.70 sq. km) the project needs to be implemented over a period of time. It is proposed to implement the project in seven years. The phasing and implementation period for the project is proposed between 2015 and 2021. It is important to mention that phasing scheme largely refers to implementation of the proposed river channelization, road and pedestrian network, and urban infrastructure development, and it is envision to implement the project on a fast track basis with time span of seven years.

Strategies for overall project phasing

The following considerations aretaken into account while determining the project implementation schedule.

E.7.4 PROJECT IMPLEMENTATION SCHEDULE

Prioritize majority of Urban Infrastructure and Real Estate Development in Phase 1: The focus of the project implementation schedule will be between Koni Bridge and Bilaspur Barrage. It is proposed that majority project components and sub project components for urban infrastructure improvement needs to be implemented in the initial years of implementation of the project to ensure urban infrastructure led riverfront development. These include:

- Focus on river channelization and development of All Weather Channel in the initial years.
- Initiate urban infrastructure along with provision of water supply, sewerage, drainage and power distribution network in the project area between KoniMangla Bridge and Bilaspur Barrage,
- Construct pedestrian promenades, parks and open spaces in city section of Arpa Special Area between Indira Setu and Apollo Bridge,

    - Construct suspension bridge for pedestrians at ShanichariRapta which can be a flagship and image maker project for the Arpa Special Area,
    - Promote a City Museum project of national and international importance near Smriti Van as an urban icon of Bilaspur city,
    - Development of ASADA Administration Building to project image of the organization and provide a business environment.
- **River channelization from Koni Bridge to Bilaspur Barrage:**River channelization between Koni Bridge and Bilaspur Barrage would be first activity to be initiated. This would be followed by development of riverfront roads and All Weather Channel construction. It is recommended that river channelization be carried out only between Koni Bridge and Bilaspur Barrage in initial years of implementation of the project. Riverfront roads need to take up along with the construction of embankments.The river embankment development would be between Koni Bridge and Bilaspur Barrage, which will be a combination of concrete embankments and stone gabions.
- **Riverfront Roads:** Riverfront roads need to be taken up in concurrence with river channelization, land development, and embankment construction. Riverfront roads would also facilitate sale of land with improved infrastructure facilities.
- **All Weather Channel:** The above two activities would be followed by construction of All Weather Channel to create11.2 km of waterfront environment in ASA. The All weather Channel can be constructed from Bilasa Park upto Apollo Bridge in the initial years, followed by improvement of embankments between Bilaspur Barrage and Apollo Bridge.
- **Water Supply from Bhainsajhar Diversion Scheme:**It is desirable that Bhainsajhar Diversion Scheme be implemented either before or concurrently with the All Weather Channel construction to ensure water availability in the river during lean period. The proposed pipeline from Bhansajhar to BilasaPark) (25.0 Km) is required to be constructed along with too.
- **Diversion of Nalas and Riverfront Roads Development:** Currently the river is quite polluted due to waste water entering the river in the city section. It is utmost important to divert the lean period urban wastewater to the existing STPs near DomuhaniRapta through a covered drain along the proposed riverfront development.
- **Basic Infrastructure Development:** To promote real estate development in the project area, promotion of water supply, sewerage network, drainage network, and power supply needs to be parallel taken up along with land development and riverfront roads development.
- **New Bridges over Arpa River:** To integrate the two sides of the river and rest of the city it is proposed to have three new bridges over Arpa in addition to widening of the Indira Setu. To improve connectivity the new bridges proposed near Bilasa Park and between SanichariRapta and Apollo Bridge should be built in the initial years. Expansion of Indira Setu and a new bridge downstream of Bilaspur Barrage maybe implemented in later years of project implementation.
- **Parks and Landscape of Open Spaces:** To achieve quality of built environment on the riverfront role of parks and open spaces for urban and pedestrian activities is very important. Parallel to development of basic physical infrastructure would be important to development of parks and open spaces. Road side plantation needs to be taken up in the initial years project implementation.

The above project implementation is only possible if land consolidation is carried out before the construction of any of the project components. Majority of project area is privately owned hence adopting land owners friendly land consolidation mechanism is critical to success of the project.

Table E-17 gives detail of project phasing with respect to major project components of Arpa Special Area.

Table E-17: Project Phasing Schedule, Arpa Special Area Development

S. No.	Project Component	Brief Description	Quantity/Area	2015	2016	2017	2018	2019	2020	2021
1	**RIVER CHANNELIZATION**									
1a	Earth Work and River Channel Preparation including Land Development	Readjusting river bed to achieve 250 m channel as designed (Chainage 10.4 Km to 24.8 Km)	11.2 Km	√	√	√	√			
1b	River Channel Embankment Development	Bilaspur Barrage to Bilasa Park (Chainage 10.4 Km to 19.8 Km)	11.6 Km	√	√	√	√			
1c	Embankment Stabilization with Stone Gabion	Koni Bridge to Bilasa Park (Chainage9.8 Km to 14.0 Km)	8.4 Km	√	√	√				
1d	Ghats and Boating	Apollo to Bilaspur Barrage (Between chainage19.8 Km to 24.8 Km)	0.6 Km			√	√			
1e	River Bank Stabilization at erosion sites only	Koni Bridge to Lofandi (Between 0.0 Km to 10.4 Km)	3.0 Km						√	√
2	**ALL WEATHER CHANNEL**									
2a	100 m wide All Weather Channel including Lower Walkway	Bilasa Park to Apollo Bridge (Chainage 14.0 Km to 19.8 Km)	5.8 Km	√	√	√	√	√		
2b	Embankment for Backwaters of Bilaspur Barrage	Apollo Bridge to Bilaspur Barrage (Chainage19.8 Km to 24.8 Km)	10.0 Km		√	√	√	√		
2c	Weirs	For storing water in All Weather Channel (Between chainage14.0 Km to 19.8 Km)	7 Nos.		√	√	√	√		
2c	Water Supply Pipeline from Bainsajhar Diversion Scheme	Laying Water Pipeline along existing road to Bilasa Park for Lean Period Channel	24.0 Km		√	√	√			
2d	Diversion of Nalas	Diversion Duct for Nalas to convey wastewater to STPs from BMA	15.3 Km (Left Bank Duct) 11.5 Km (Right Bank Duct)				√	√		
2e	Wastewater Recycling from STPs after tertiary treatment	15.5 Km Pipeline (Right Bank Pipe) Conveyance of Wastewater from STP on left bank to right bank STP at Domuhani.	15.5 Km Pipeline (Right Bank)			√	√			
3	**ROADS AND PEDESTRIAN NETWORK**									
3a	Private Land Procurement	For Development of Riverfront Roads	29.98 ha	√						
3b	Left and Right Banks Riverfront Road	With 30 m RoW from Koni to Indira Setu (Chainage10.4 Km to 17.0 Km)	13.2 Km		√	√	√			
3c	Left and Right Bank Riverfront Road	With 24 m RoW from Indira Setu to Apollo Bridge (Chainage 17.0 Km	8.0 Km		√	√	√			

S. No.	Project Component	Brief Description	Quantity/Area	2015	2016	2017	2018	2019	2020	2021
		to 21.0 Km)								
3d	Left and Right Banks Riverfront Road	With 30 m from Apollo Bridge to DomuhaniRapta (Chainage21.0 Km to 27.4 Km)	12.8 Km		√	√	√			
3e	Approach and Entry Roads	30 m RoW Roads connecting to City and Regional Road Network	12.7 Km			√	√			
3g	New Bridges	@ Chainage 14.2 Km, @ Chainage 21.1 Km, and at Chainage 25.2 Km	2 Lanes and 4 lanes and each one 250 m length		√	√	√		√	√
3h	Additional 2Lanes to Indira Setu/Bridge	2 Lanes additional Bridge at Indira Setu	250 m Length						√	√
3i	Pedestrian cum Vehicular Bridge	Suspension bridge at ShanichariRapta	250 m Length	√						
3k	Local and Approach Roads	To caters access for new Development (Rows 12 m to 18 Km)	39.6 Km			√	√	√	√	
4	**URBAN INFRASTRUCTURE AND REAL ESTATE DEVELOPMENT**									
4a	Land Procurement	Based on the land development Strategy to be adopted	271 ha	√	√					
4b	Land Development	For Arpa Special Area	475 ha	√	√	√				
4c	Physical Infrastructure Development	For Water Supply, Sewerage Network, Power Supply, and Drainage in ASA	475 ha	√	√	√	√	√	√	
4d	Landscaping, Open Spaces and Parks	14.65 % of Developable Area	63.03			√	√	√	√	
4e	City Museum	As an Urban Icon on riverfront of national and international importance near Smriti Van	5 ha			√	√	√		
4f	Slum Area Redevelopment	Within ASA (4451 Units)	46.2 ha		√	√	√	√	√	
4g	ASADA Administration Building		2 Ha	√	√	√				

1. BUSINESS PLAN AND PROJECT IMPLEMENTATION STRATEGY

E.1 BUSINESS PLAN

E.1.1 Statement of Purpose

Vision for ARPA project: To make Arpa Special Area a quality place for work, living, and leisure

To achieve such a vision specific development strategies are important to make Arpa riverfront unique and put city of Bilaspur on a path of urban prosperity. Though the use of global wisdom available in riverfront development is important but to act locally for resolving problems and tapping potential of the Arpa riverfront is central to the project. Specific development goals for achieving the vision for Arpa Special Area are as follows.

- Maintain a clean river and attempt to retain water round the year through available resources;
- To make the riverfront public in nature and accessible to people in general;
- To improve road network and public transport to riverfront to enhance interaction between the city and the riverfront;
- To use developable land for urban infrastructure improvement, open spaces, riverfront promenades, and real estate development.
- To identify ways to make the project financially sustainable through public and private sector investments where government and representative agencies can take a lead role.

E.1.2 PROJECT DETAILS

Project Location and Description

The Government of Chhattisgarh has notified ARPA SPECIAL AREA (ASA) under the provisions of CG Town and Country Planning Act, 1973 for the purpose of developing Arpa River Front and constituted Arpa Special Area Development Authority, Bilaspur vide Govt. notification no. 5 -111 / 18 / 2005 dated 25/10/2010 consisting of 10 members with Divisional Commissioner, Bilaspur as the Chairman and the Collector Bilaspur District as its member secretary.

An area of about 200 m in width and 27.2 Km in length along the Arpa River has been delineated as the ASA. The 26.7 km river stretch plus 200 m on both sides starting from Lofandi Barrage to Domuhani Rapta is the Project Area (Refer Figure 1-1).

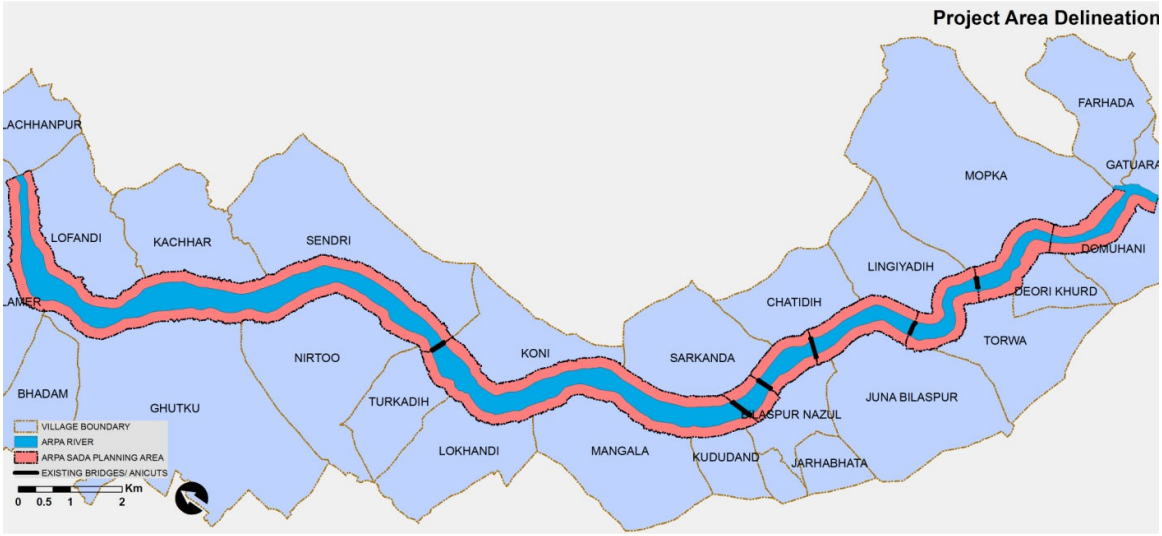


Figure 1-1: Map showing Project Area delineation for Arpa Special Area

Details of Project Components

Arpa Special Area Development project primarily comprises four project components. These components are as follows.

- Arpa River Channelization,
- Lean Period Channel to retain water throughout the year,
- Road and Pedestrian Network and Urban Infrastructure and
- Development of residential (including slum rehabilitation), commercial, institutional, recreational and other facilities in the riverside developable lands.

E.1.3 PROJECT FINANCES

Assumptions Common to All Options

A number of alternative scenarios have been considered for financial analysis. A summary of assumptions common to all options is given below:

CONSTRUCTION AND FINANCING ASSUMPTIONS

Base Year	2013
Construction start date	01 April 2015
Constn Schedule (Months)	36
Commercial Operations Date	01 April 2018
The first Financial Year	2019
Concession Upto	2022
Debt : Equity Ratio	2.00 :1

Land Pooling: The cost of private land required for this project has not been considered in financial analysis as it is proposed that the land pooling method of consolidation of private land be adopted to take over such land. It is assumed that each private land owner would get back 35% of developed land as compensation. Hence no separate compensation is to be paid to private land owners.

Cost of Government land: Cost of land provided by the Government has also not been considered in financial analysis as it is taken that government provides this land for creation of city level infrastructure as part of this project and also due to the reason that a substantial portion of this land is actually used for creation of infrastructure like roads, parks, etc.

OPERATION AND MAINTENANCE COST ASSUMPTIONS

The O&M costs without escalation for some years are given in

Table 1-1: Breakup of O&M Costs (Rs in Crores)

S.No.	Project Development	2019	2022
1	RIVER CHANNEL	1.12	1.22
2	LEAN PERIOD CHANNEL	3.70	5.11
3	ROAD AND PEDESTRIAN INFRASTRUCTURE NETWORK	0.94	3.14
4	URBAN INFRASTRUCTURE AND OPEN SPACES	3.85	7.25
	Total	**9.62**	**16.72**

LAND SALE PRICE ASSUMPTIONS

Table 1-2: Sale price for land at current (Rs in Crores per Ha)

The assumed sale price for land at current prices has been presented in Table 1-2.

SALE PRICE PER HECTARE		RUPEES IN CRORES		
2013 prices				EDUCATIONAL/
	COMMERCIAL	RESIDENTIAL	MIXED USE	INSTITUTIONAL
Sendri to Koni Mangla Bridge	7.24	5.10	0.00	4.35
Koni Mangla Bridge to Indira Bridge	12.74	9.11	0.00	6.34
Indira Bridge to Old Arpa Bridge	27.11	18.20	20.94	0.00
Old Arpa Bridge to Sanichari Rapta	27.96	18.20	22.50	0.00
Sanichari Rapta to Apollo Bridge	26.85	18.78	23.75	16.35
Apollo Bridge to Torwa Bridge	17.94	13.50	15.73	8.18
Torwa Bridge to Bilaspur Barrage	9.20	6.54	0.00	5.25
Bilaspur Barrage to Domohani Anicut	9.40	6.60	0.00	5.29

LAND SALE PRICE ESCALATION ASSUMPTIONS

The rates of escalation of land prices differs based on land usage the details of which are presented in Table7-3.

Table 1-3: Revenue escalation

REVENUE ESCALATION	per annum
COMMERCIAL	8%
RESIDENTIAL	10%
MIXED USE	8%
INSTITUTIONAL	6%

FINANCING OF THE PROJECT

Even though the developer has to invest monies every year to continuously develop the facilities, the Project cost has been frozen at the end of the third year of development as the land sale is expected to commence in the fourth year of commencement of construction. Consequently it is assumed that the developer arranges for finance only for this amount and subsequently the investments are funded out of operational cash flows and any shortfall is funded out of borrowed funds.

Capital Cost

The cost of development of ARPA riverfront project consists of various components. The breakup of the capital costs is presented in

Table 1-4.

The project area comprises of 652.3 Ha of developable lands in ASA outside of the area. The total cost of the project (without escalation) excluding cost of land (both Government land and Private Land) is approximately **1843.52 Crores**. The project is to be implemented in a single phase during the period from 2015 (FY 2015-16) to 2021 (FY 2021-22).

Table 1-4: Breakup of Capital Costs (Rs in crores)

S.No.	Project Component	SINGLE PHASE 2015-2021
1	**RIVER CHANNEL**	
1a	River Bed	80.44
1b	Embankments Conrete	105.21
1c	Embankments Stone Gabions	170.48
1d	Ghats for boating and recreational activities	2.50
1e	Bank Protection at Select Locations with Spurs/Gabions	7.88
2	**LEAN PERIOD CHANNEL**	
2a	Lean Period Channel	121.76
2b	Anicuts	6.78
2c	Water Supply from Bainsajhar	73.38
2d	Nalas Diversion Duct/Pipe	74.47
2e	Waste Water Recycling from City STPs including maintaining a water testing Lab	68.16
2f	Backwater of Bilaspur Barrage bed cleaning	1.10
2g	Improvement and Repairs Bilaspur Barrage	0.50
3	**ROAD AND PEDESTRIAN INFRASTRUCTURE NETWORK**	
3a	Land Acquisition	31.93
3b	Riverfront Roads	133.55
3c	Approach Roads	106.64
3d	Bridges	75.29
3e	Local Access Roads	54.46
4	**URBAN INFRASTRUCTURE AND OPEN SPACES**	
4a	Land Procurement	
4b	Water Supply Trunk Network	32.68
4c	Sewerage Trunk Network	73.64
4d	Power Supply and Distribution	154.80
4e	Storm Water Drainage (Included in Roads Cost)	
4f	Parks, Promenade, and Open Spaces	120.70
4g	Slum Redevelopment	227.78
4h	City Museum	25.00
4i	ASADA Administration Building	15.00
	Total (Without Escalation)	**1764.14**
	DPRs AND PROJECT MANAGEMENT COSTS, ETC. - 4.5%	79.39
	Total	**1843.52**

ADDITIONAL GOVERNMENT LANDS INCLUDED

it is proposed that the Government transfers additional land of about 156 Ha available in the vicinity of the project area also to the project. Apart from the Government land, private land to the extent of 21 Ha also needs to be acquired to make this area part of the project area. This would give additional income to the developer to improve its overall return. The developer would however also develop approach roads,

bridges, slum redevelopment in this Option. The detail of the total area available for sale in this Option is as follows:

LAND AREA IN HECTARES

	TOTAL	INFRA USE	NET FOR SALE
TOTAL LAND IN PROJECT AREA	475.36	205.36	269.99
TOTAL LAND IN ADDITIONAL AREA	177.00	77.85	99.15
TOTAL LAND AREA	652.36	283.22	369.14

	AVAILABLE	LAND POOL RETURNED	LOSS OF SLUM LAND	NET AVAILABLE
LAND FOR SALE - MAIN PROJECT	269.99	94.85	0.00	175.14
LAND FOR SALE - ADDL LAND	99.15	7.35		91.80
TOTAL LAND AVAILABLE FOR SALE	369.14	102.20	0.00	266.94

As can be seen, the total land available for sale increases from 175.14 Ha in case of Option 1 to 266.94 Ha in this Option. This will improve the financial viability of the project and consequently private sector interest in this project.

The inclusion of additional land also increases the total project cost as additional expenditure needs to be incurred for development of infrastructure facilities in this area. In this case, the total cost amounts to Rs 1843.52 crs (without escalation).

The total project cost at constant prices amounts to Rs 1843.52 crores while the escalated cost for the project period is Rs 2411.53 crores.

The revenue in various years is as follows:

Rs in crores

PARTICULARS	FY	2019	2020	2021	2022
COMMERCIAL		412.52	445.52	481.16	519.65
RESIDENTIAL		323.07	355.37	390.91	430.00
MIXED USE		137.23	148.21	160.07	172.87
EDUCATIONAL/INSTITUTIONAL		108.07	114.56	121.43	128.72
TOTAL		980.89	1,063.66	1,153.56	1,251.24

The financial summary for this Option 3 is given below:

COST OF FACILITIES (IN CONSTANT PRICES)	1764.14	crs
SUPERVISION CHARGES	79.39	crs
TOTAL COST	1,843.52	crs
COST OF FACILITIES (ESCALATED PRICES)	2312.50	crs
SUPERVISION CHARGES	99.02	crs
TOTAL COS (ESCALATED PRICES)	2411.53	crs
REVENUE (ESCALATED PRICES)	4449.35	crs
PROJECT COST DURING CONSTRUCTION PERIOD OF 3 YEARS	1210.95	crs
EQUITY	403.65	crs
DEBT	807.30	crs
PROJECT IRR	20.73%	pa
EQUITY IRR	22.49%	pa

With inclusion of additional land of 91.80 Ha of saleable area, the Equity return to potential developers improves to 22.49% pa providing an attractive risk-reward ratio for the private sector.