

# Geospatial Technology in Inter linking of rivers

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Chief Engineer

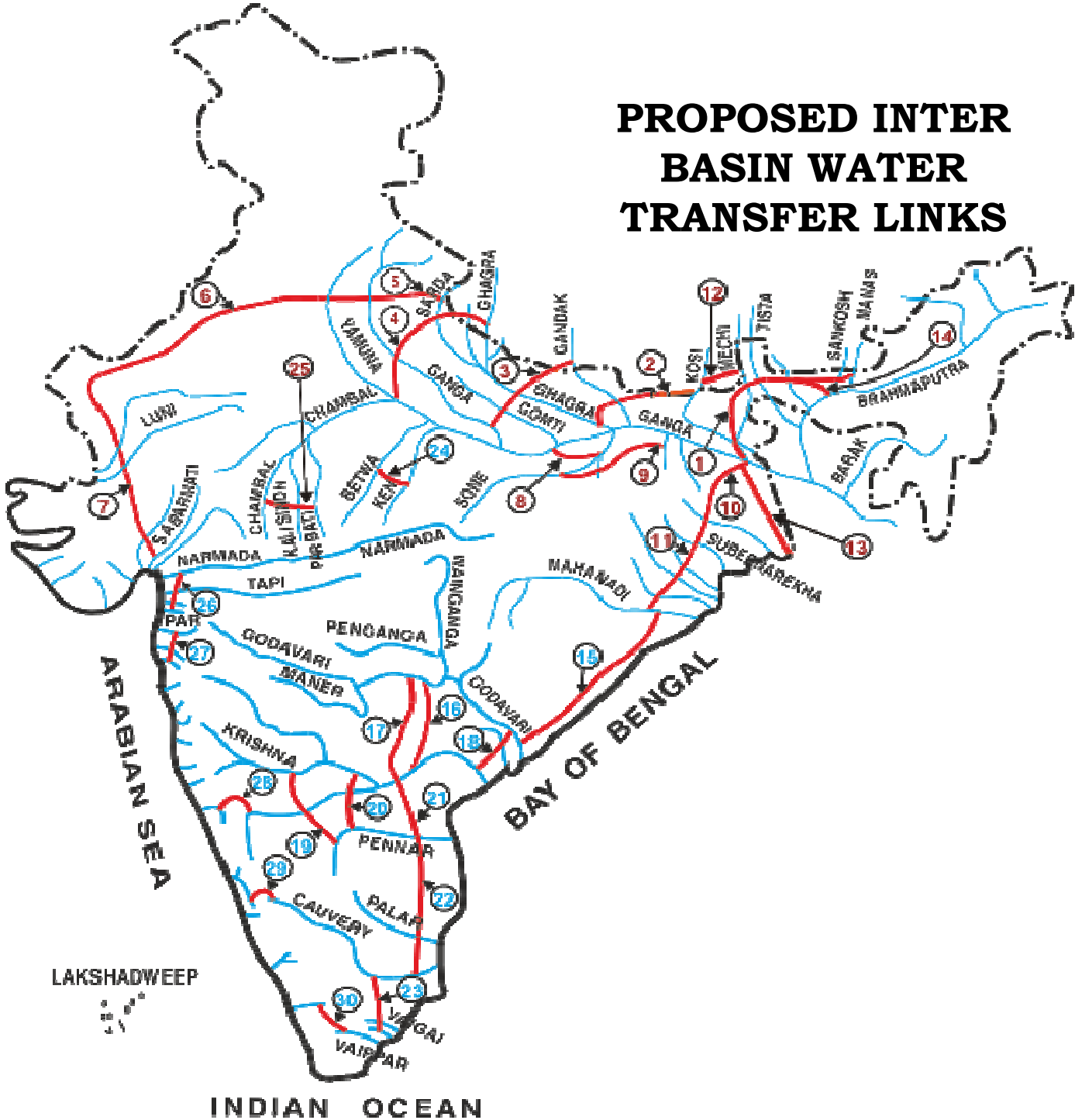
National Water Development Agency

Ministry of Water Resources, RD & GR

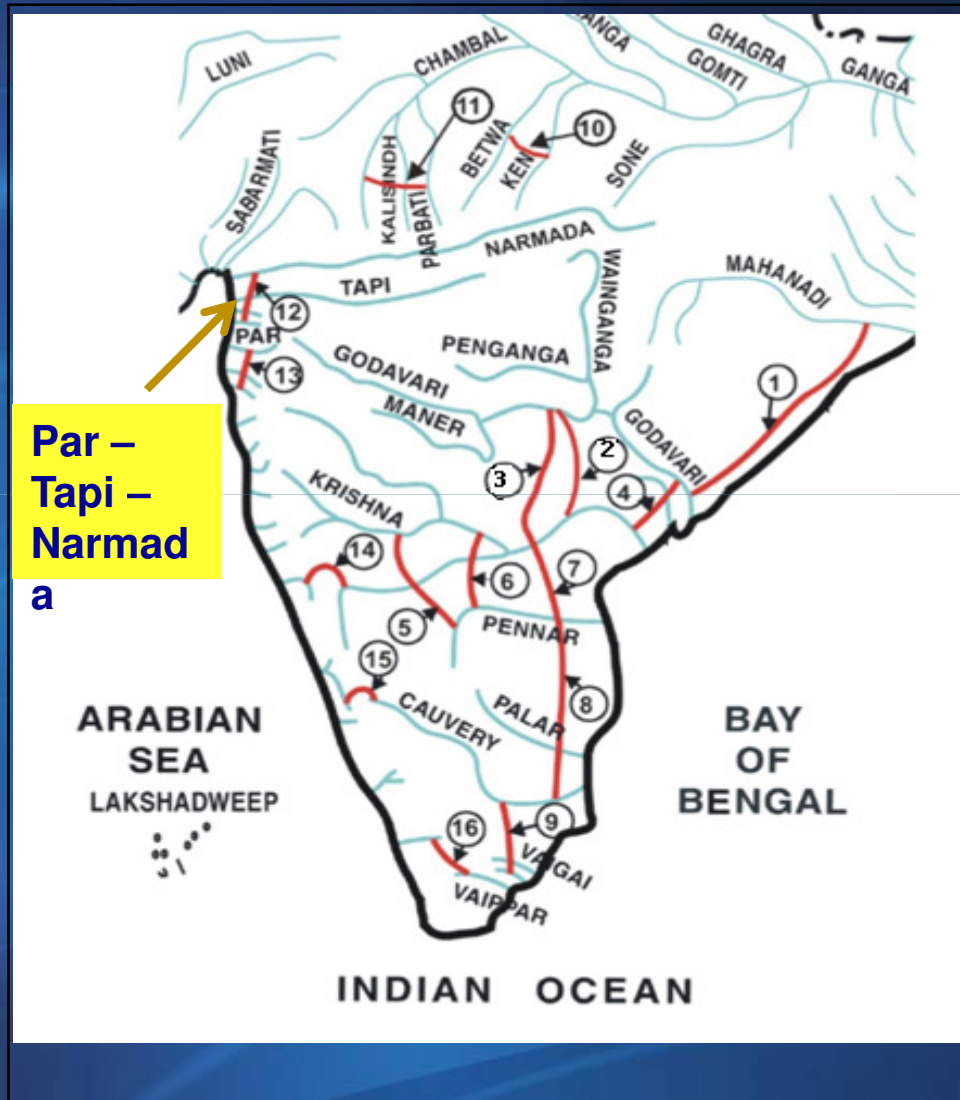
# INTERLINKING OF RIVERS PROJECT

- Government of India formulated a National Perspective Plan for Interlinking of rivers
- 30 links are envisaged
- Two Components
  - Himalayan Component – 14 links
  - Peninsular Component – 16 links

# PROPOSED INTER BASIN WATER TRANSFER LINKS



# PENINSULAR COMPONENT



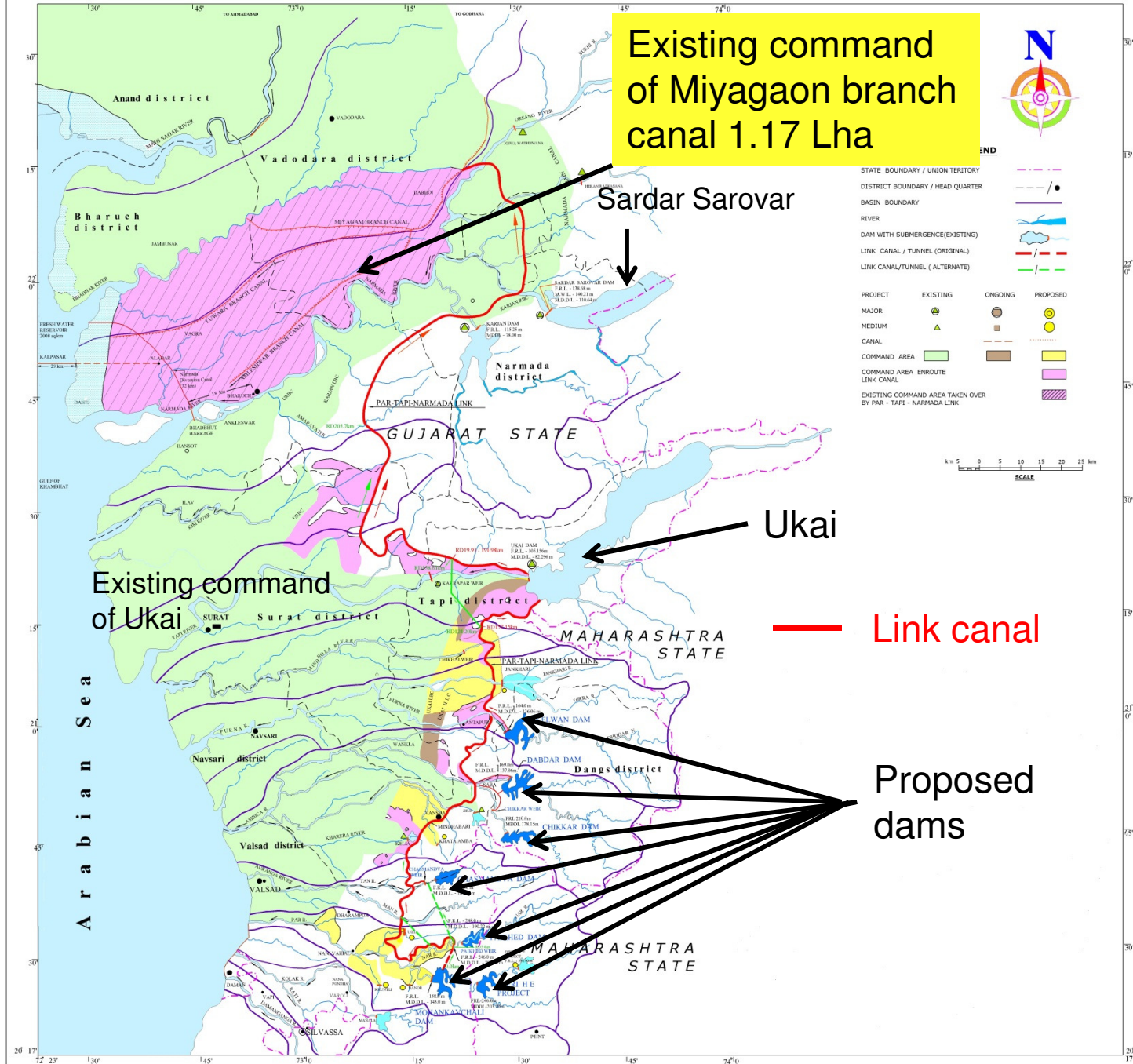
1. Mahanadi (Manibhadra) – Godavari (Dowlaiswaram)
2. Godavari (Inchampalli) – Krishna (Pulichintala)
3. Godavari (Inchampalli) – Krishna (Nagarjunasagar)
4. Godavari (Polavaram) – Krishna (Vijayawada)
5. Krishna (Almatti) – Pennar
6. Krishna (Srisailem) – Pennar
7. Krishna (Nagarjunasagar) – Pennar (Somasila)
8. Pennar (Somasila) – Cauvery (Grand Anicut)
9. Cauvery (Kattalai) – Vaigai – Gundar
10. Ken – Betwa
11. Parbati – Kalisindh – Chambal
12. Par – Tapi – Narmada
13. Damanganga – Pinjal
14. Bedti – Varda
15. Netravati – Hemavati
16. Pamba – Achankovil – Vaippar



# P-T-N link

- Par-Tapi-Narmada (P-T-N) link is one of the 30 links identified in National Perspective Plan
- Objective is to transfer surplus water available in west flowing rivers between Par and Tapi in Gujarat and Maharashtra for utilisation in drought prone Saurashtra and Kutch region by substitution
- Proposed to take over 1.17 lakh ha of command area of existing Miyagam branch canal and water thus saved will be used for domestic and irrigation requirements in Saurashtra and Kutch region

# PAR - TAPI - NARMADA LINK PROJECT



Existing command of Miyagaon branch canal 1.17 Lha

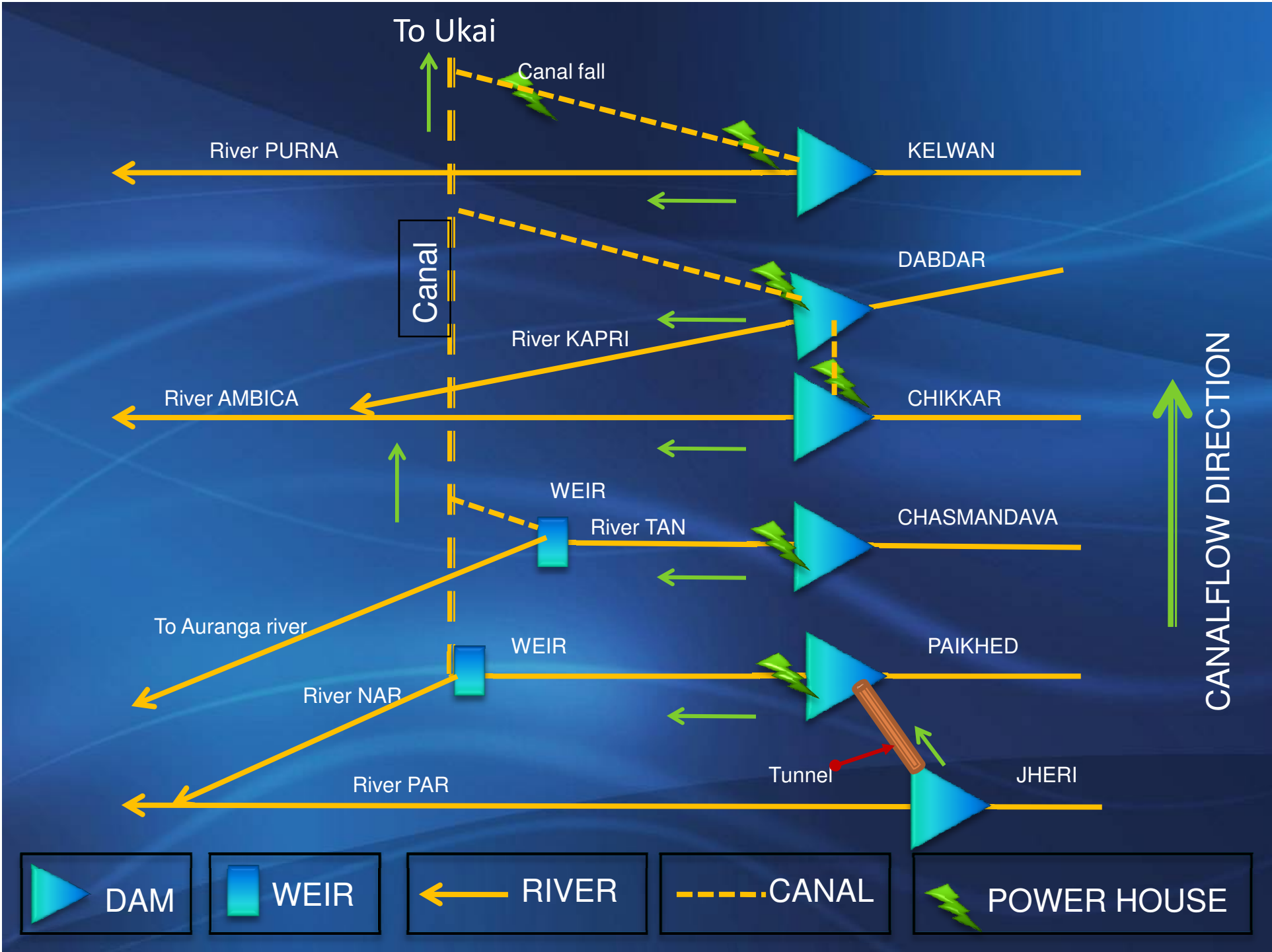
Sardar Sarovar

Ukai

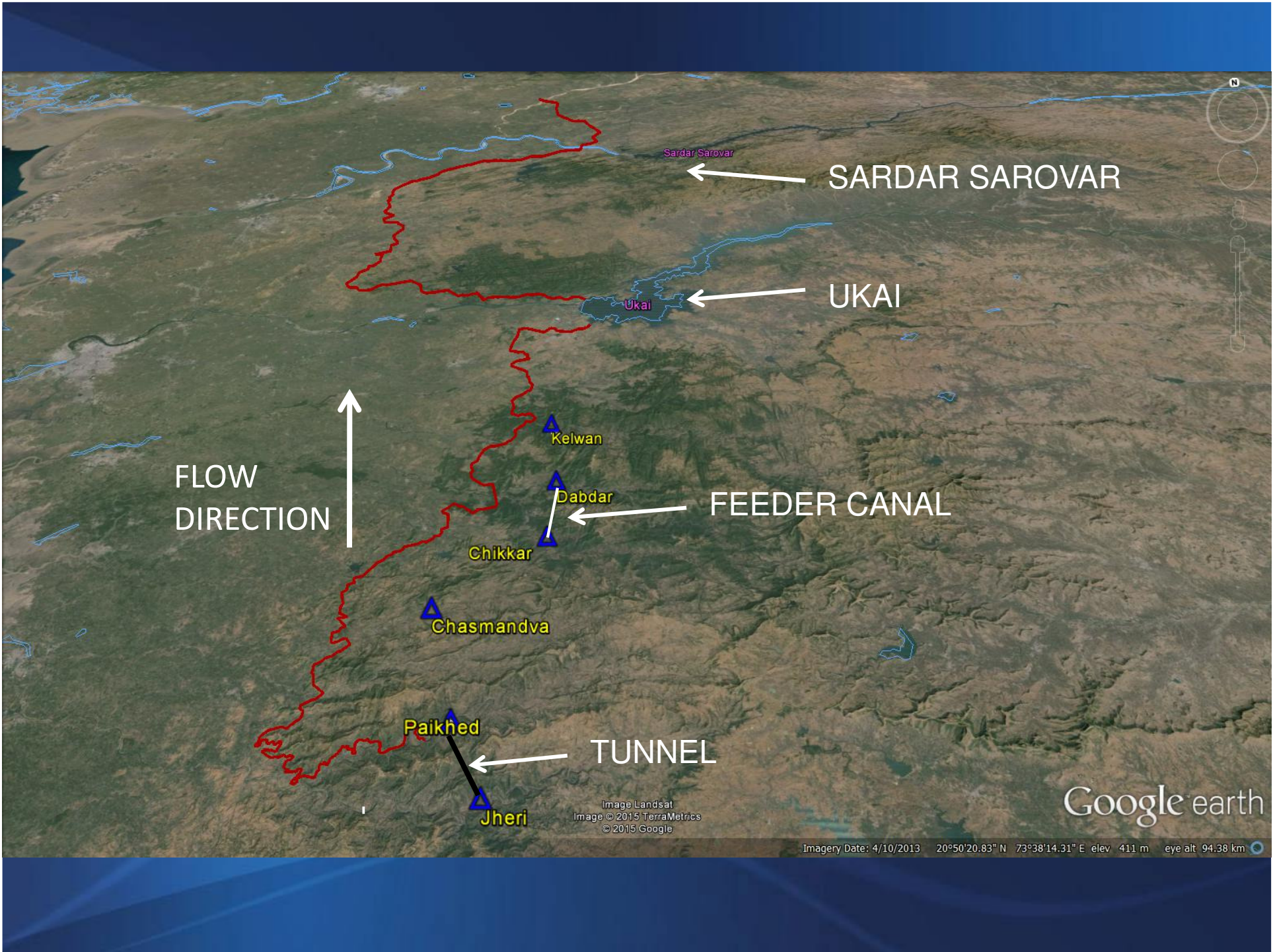
Existing command of Ukai

Link canal

Proposed dams







FLOW  
DIRECTION

SARDAR SAROVAR

UKAI

FEEDER CANAL

TUNNEL

Image Landsat  
Image © 2015 TerraMetrics  
© 2015 Google

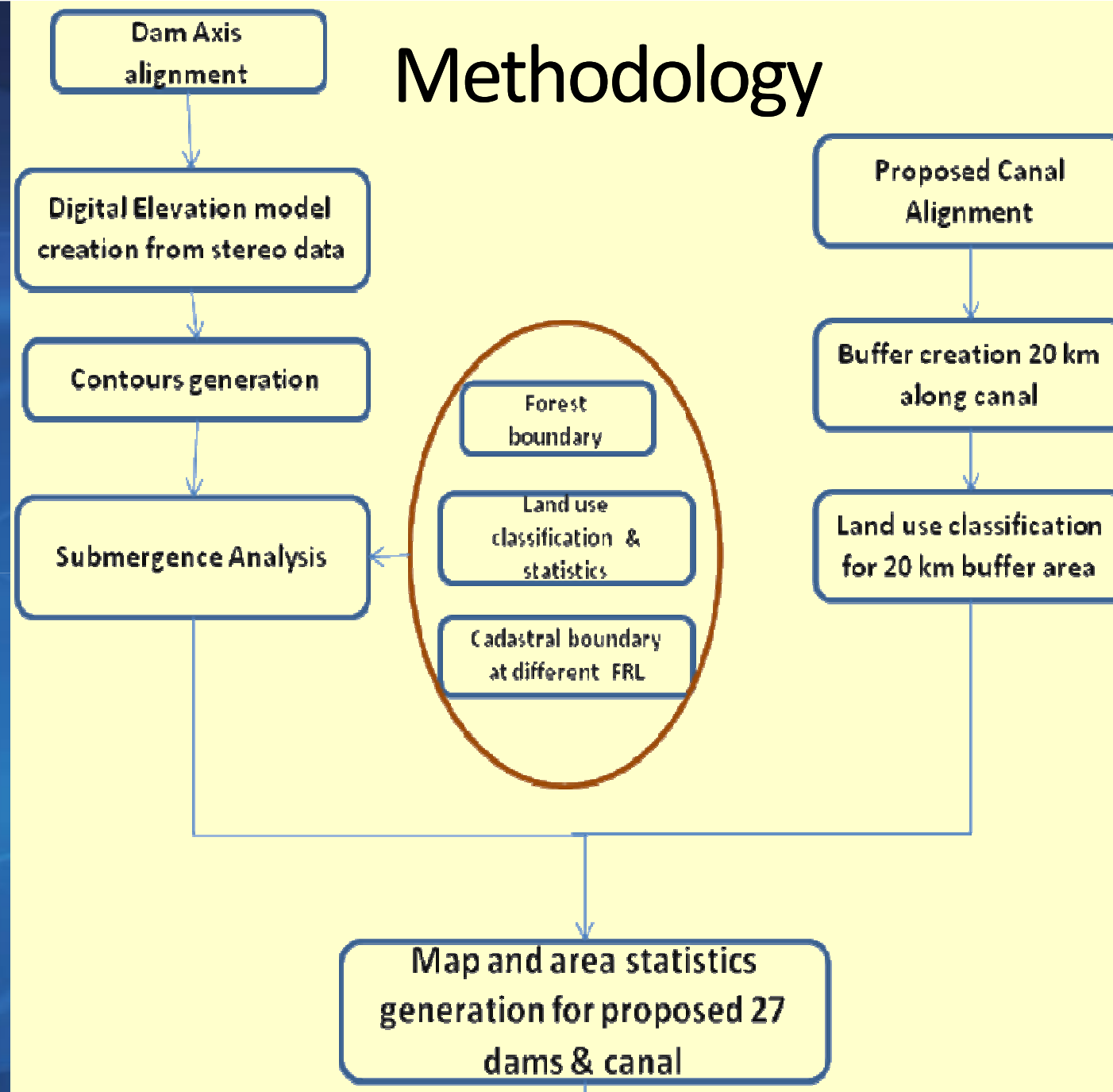
Google earth

Imagery Date: 4/10/2013 20°50'20.83" N 73°38'14.31" E elev 411 m eye alt 94.38 km

# Objectives

- Demarcation of proposed dam alignments and alternatives
- Submergence analysis for proposed dams at different reservoir levels
- Data generation for Infrastructure, Settlement, Land use and forest from high resolution satellite data.
- Area Statistics of Land use/ Land cover at different levels of submergence
- Submergence analysis at cadastral level i.e. survey number wise for different FRLs
- Land use generation for 20 km surrounding area of proposed canal and its area statistics

# Methodology

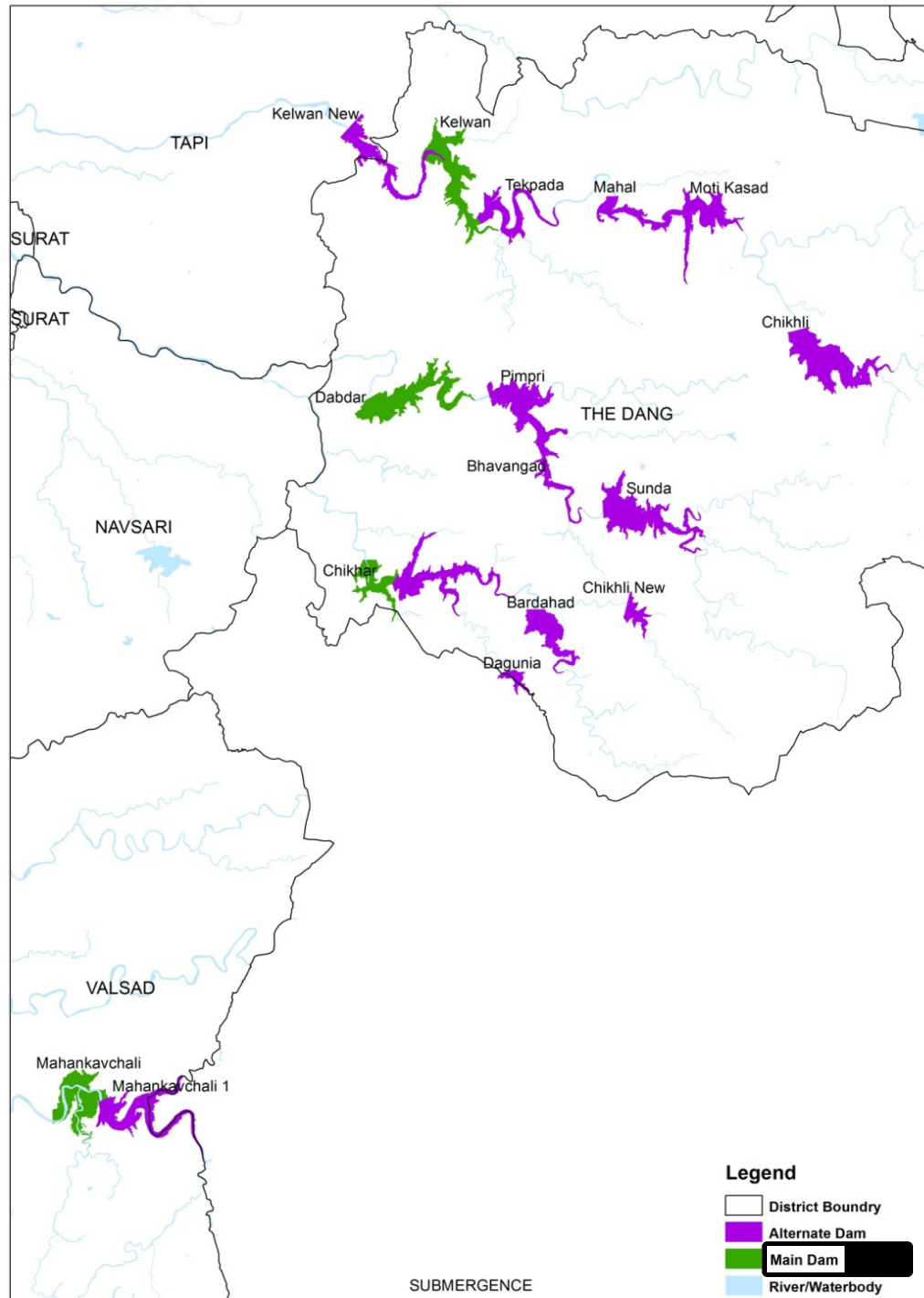




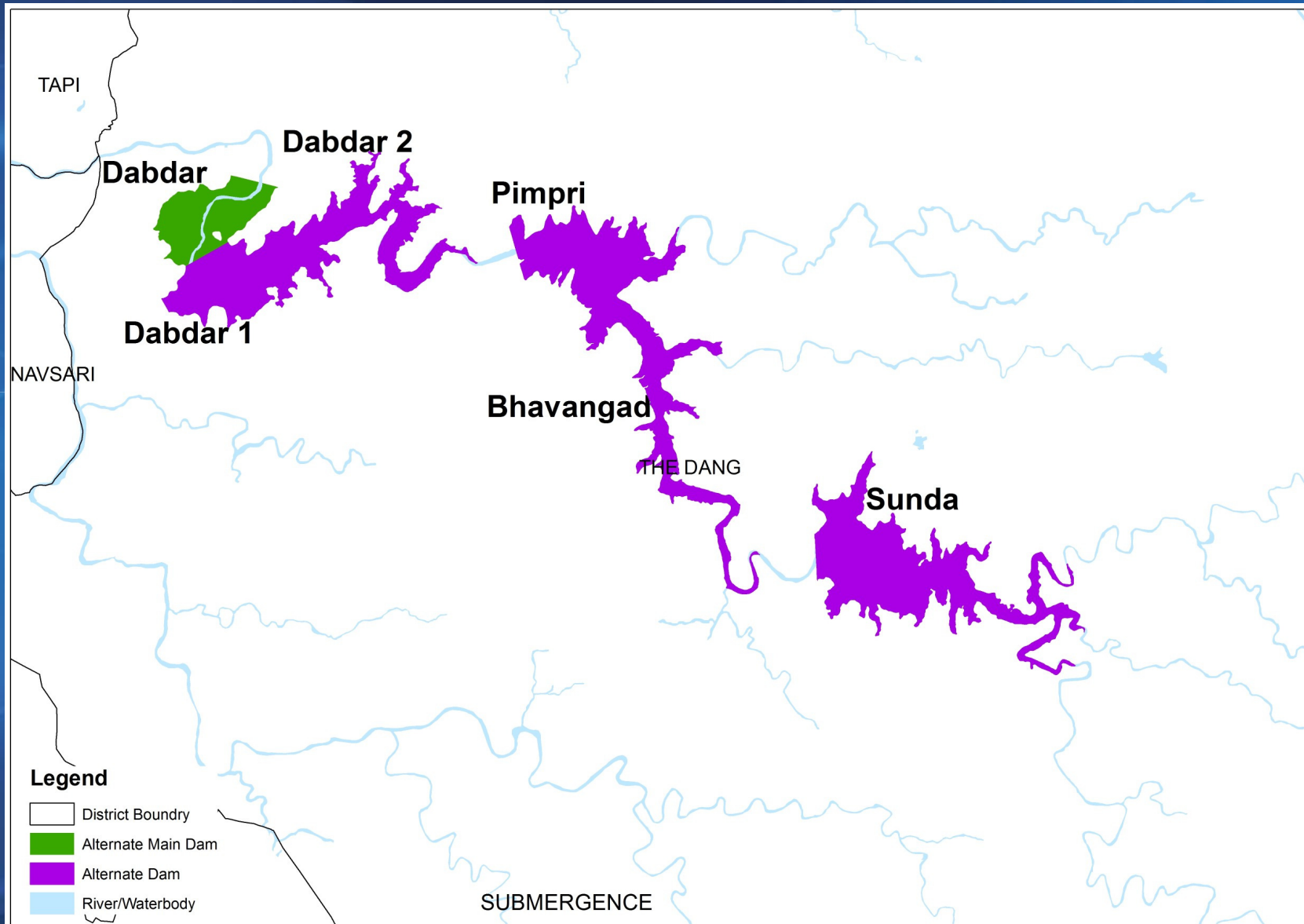
# Data Analysis

- A total of 27 dam locations
- Generation of DEM using CARTOSAT data
- Generation of contours at various intervals
- Preparation of Thematic maps using LISS-IV data
  - Landuse/landcover
  - Forest
  - Agricultural land
  - Settlements
  - Infrastructure
- Computation of area statistics under various land use classes at different FRLs

# Proposed Alternative Dams

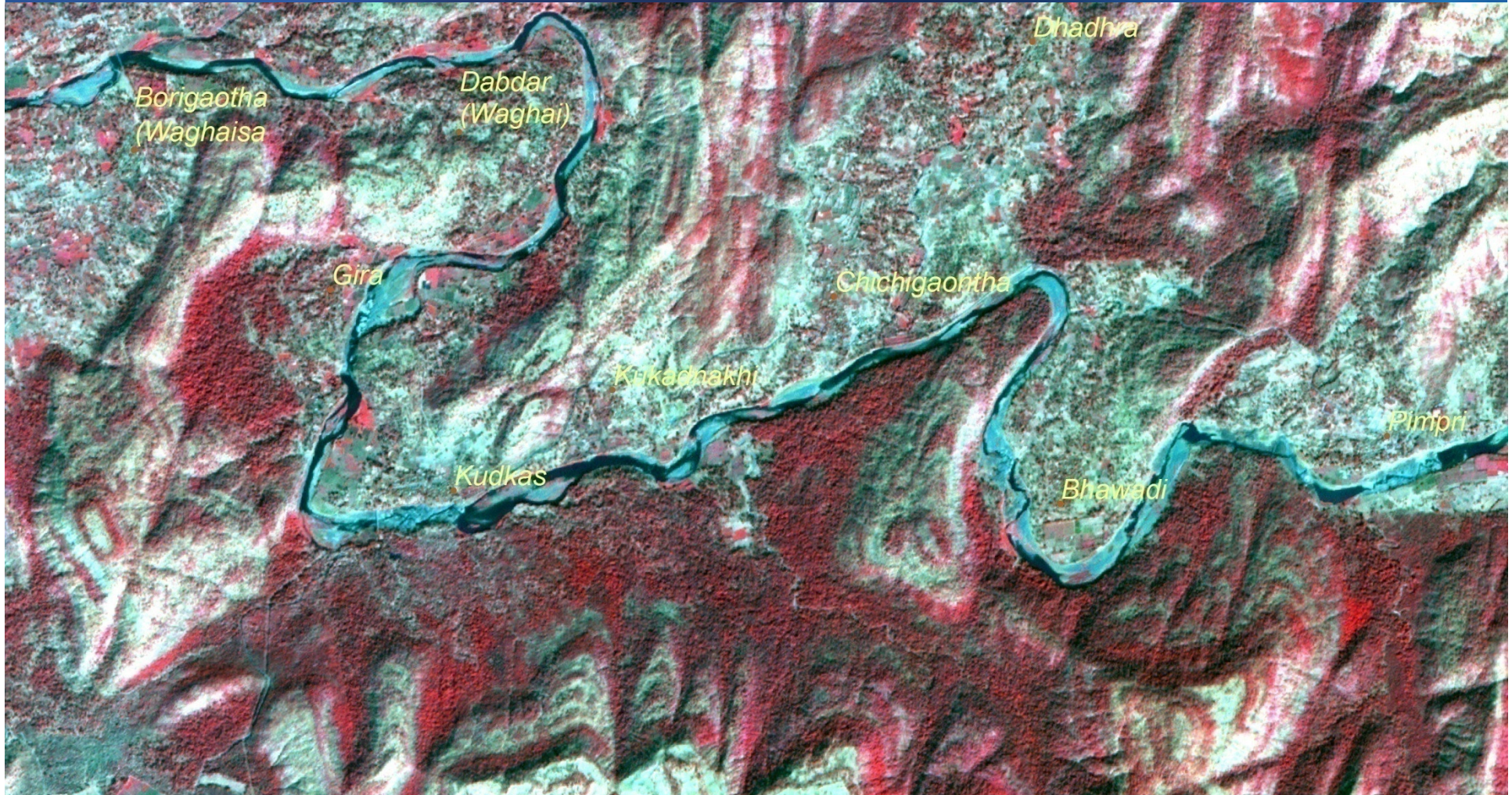


# Alternatives to Dabdar Dam





# Image of proposed area for Dabdar dam





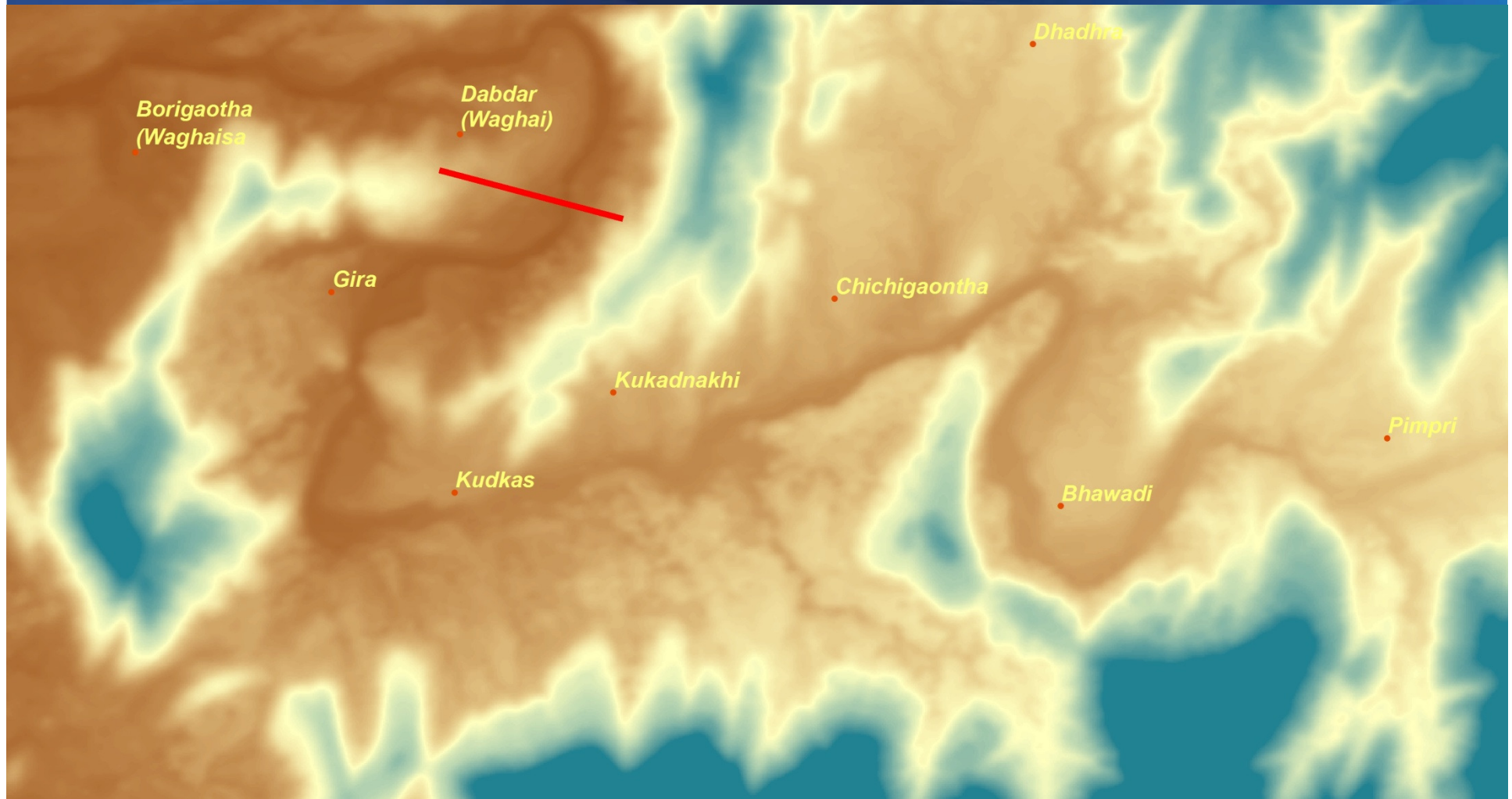
# Proposed Dabdar dam location

Dam axis





# Digital Elevation Model

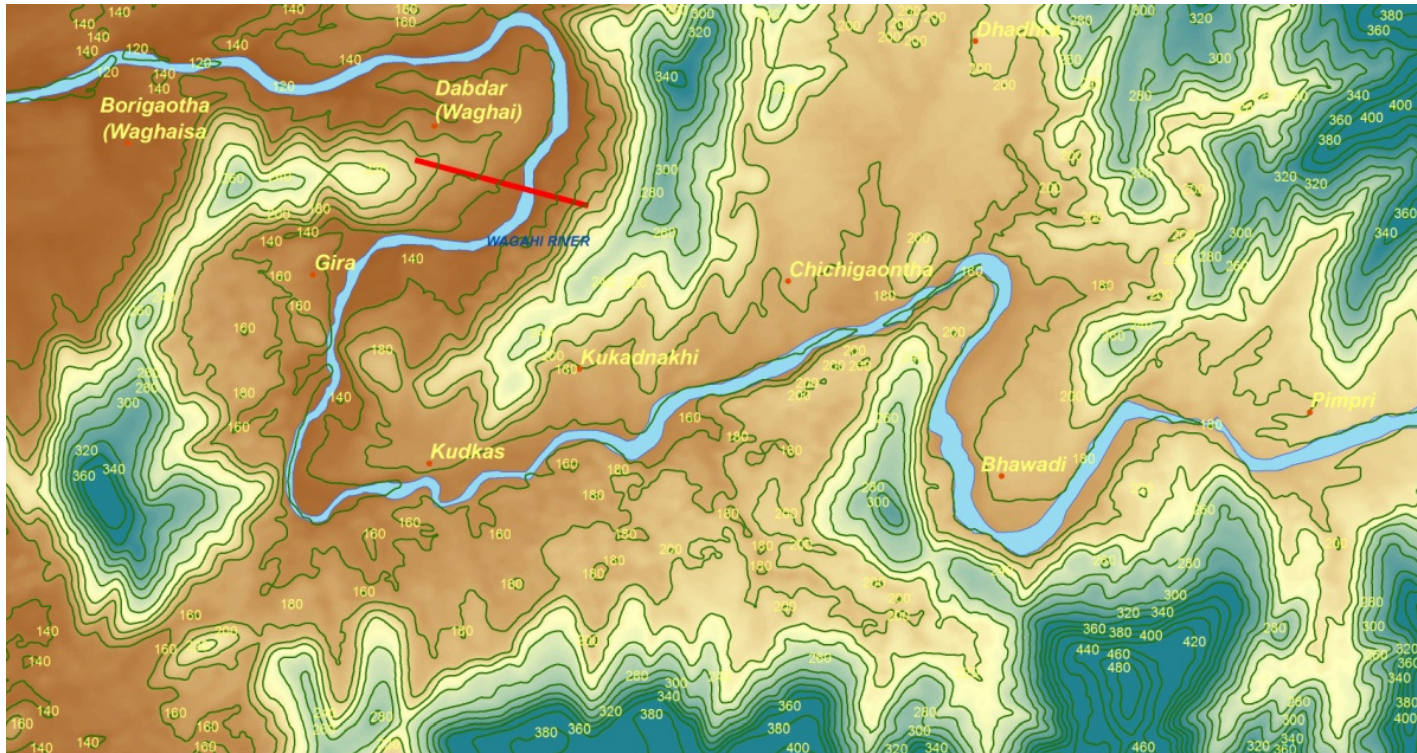




# Digital Elevation Model with local benchmarks



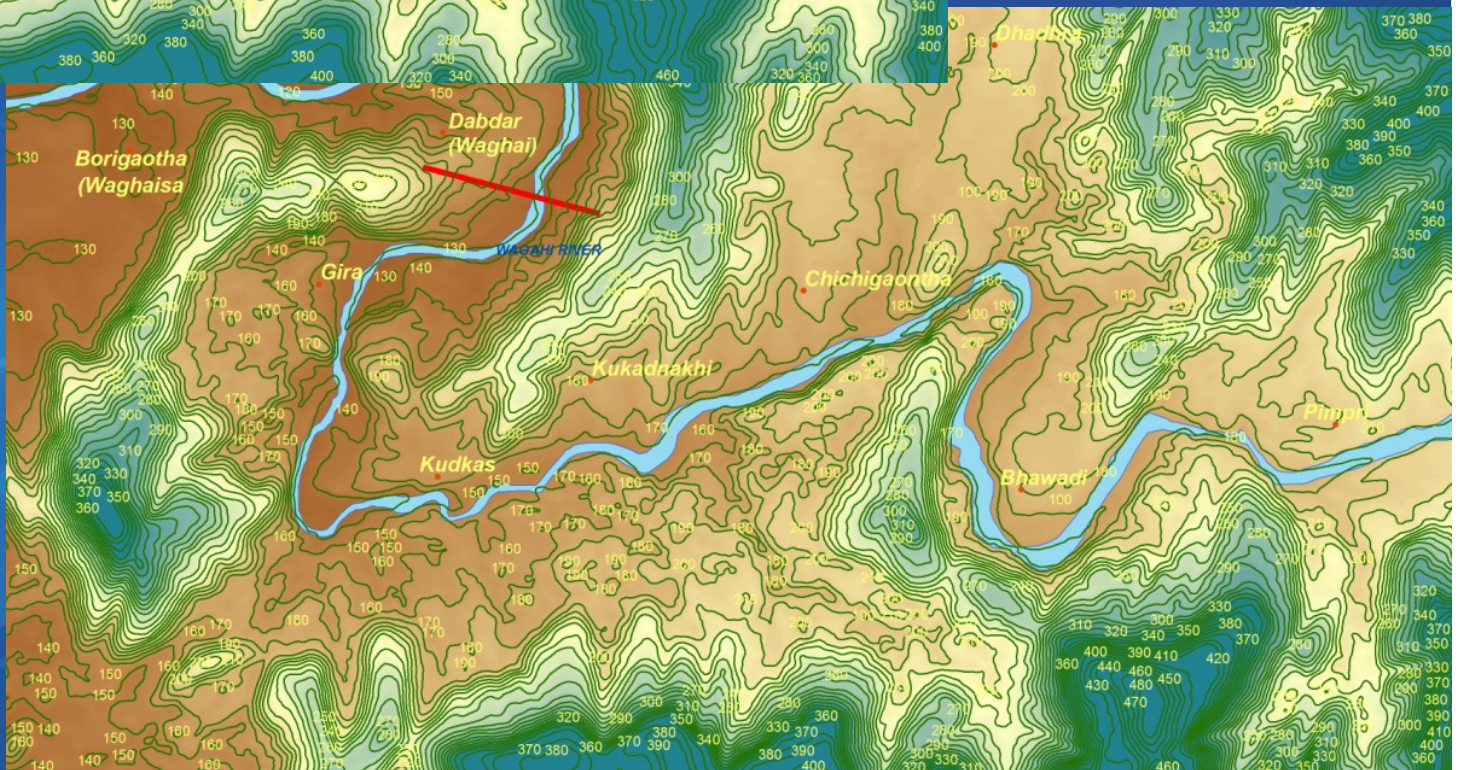




20 m  
contours

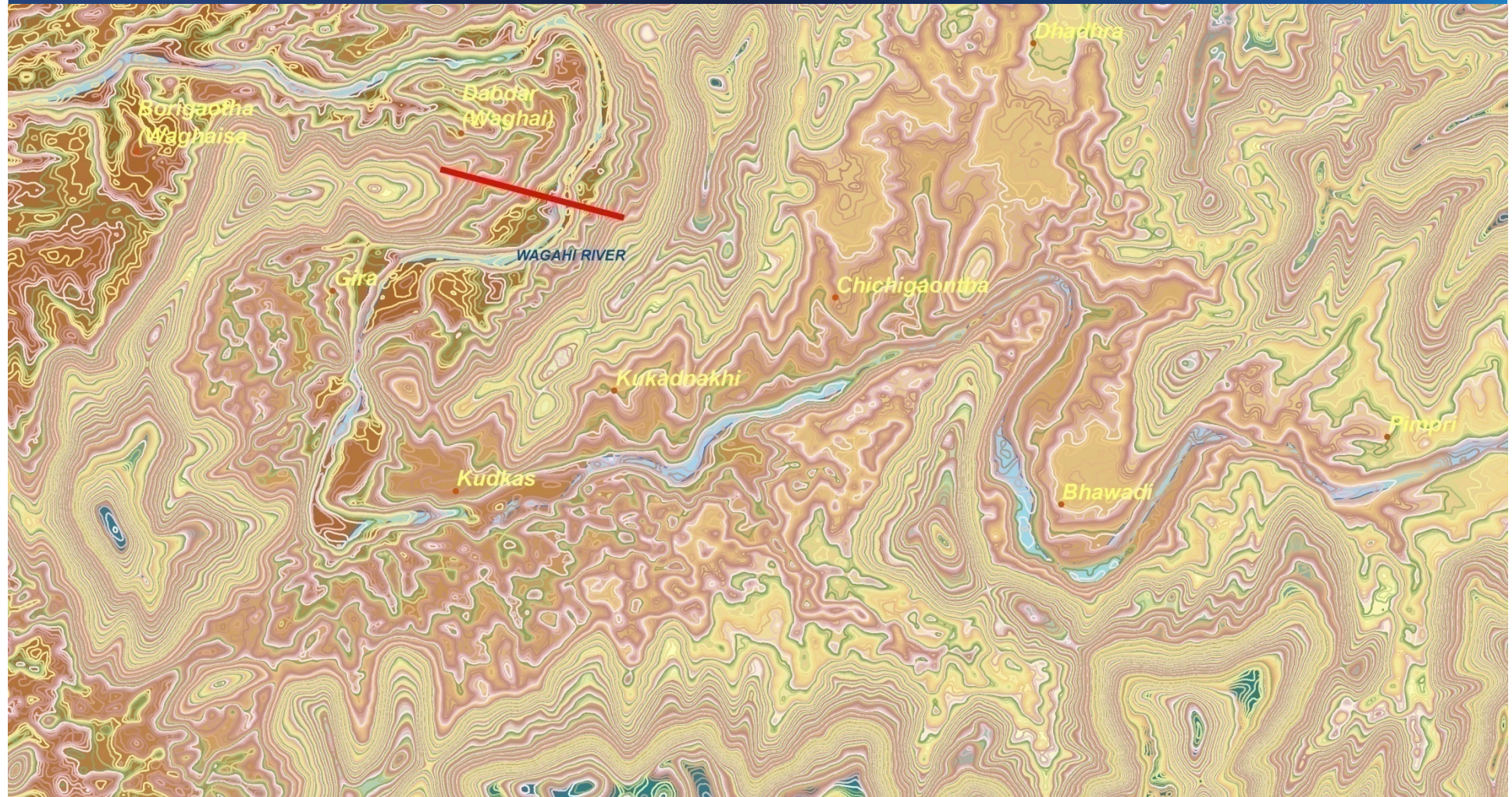


10 m  
contours



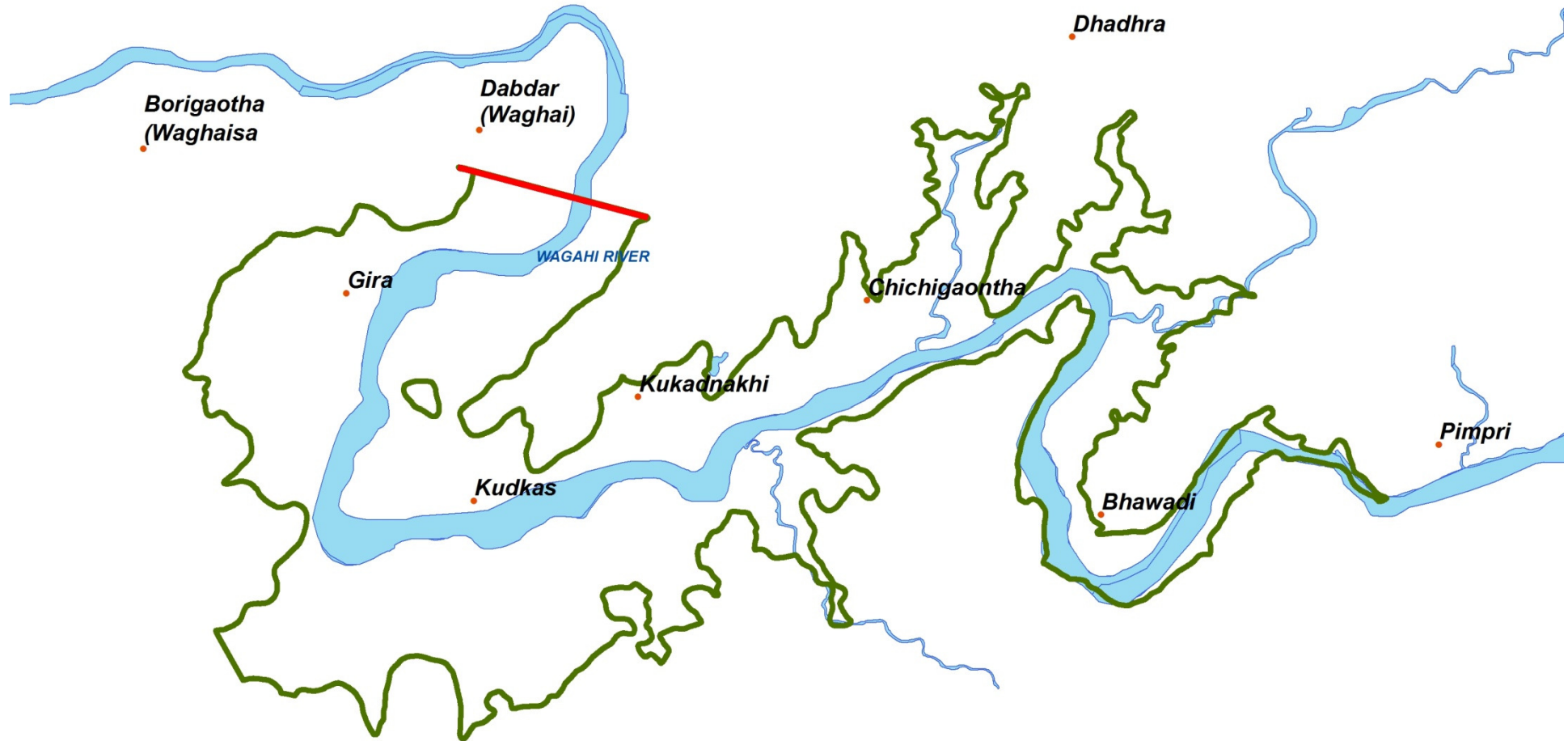


# 1 m contours

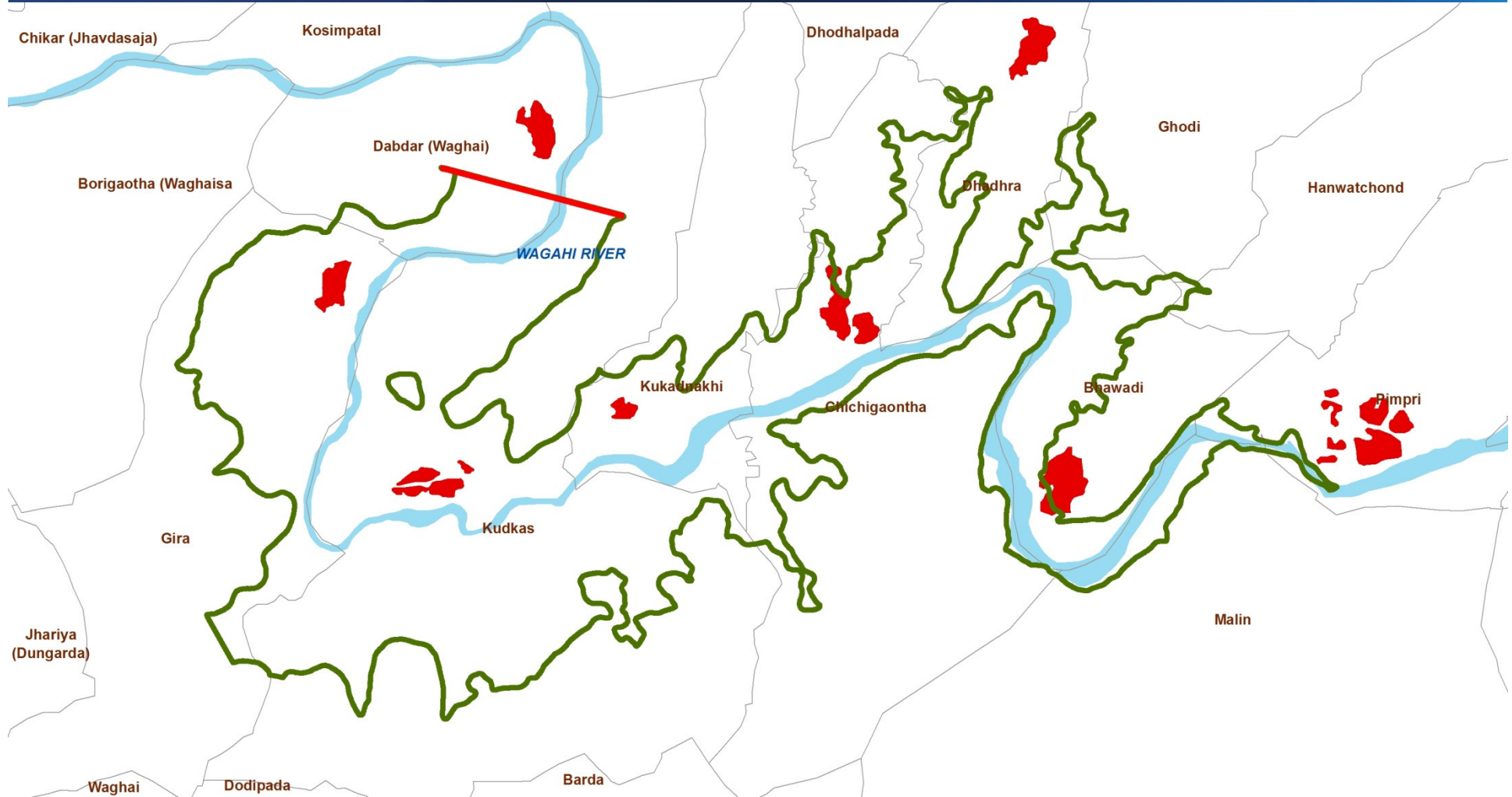




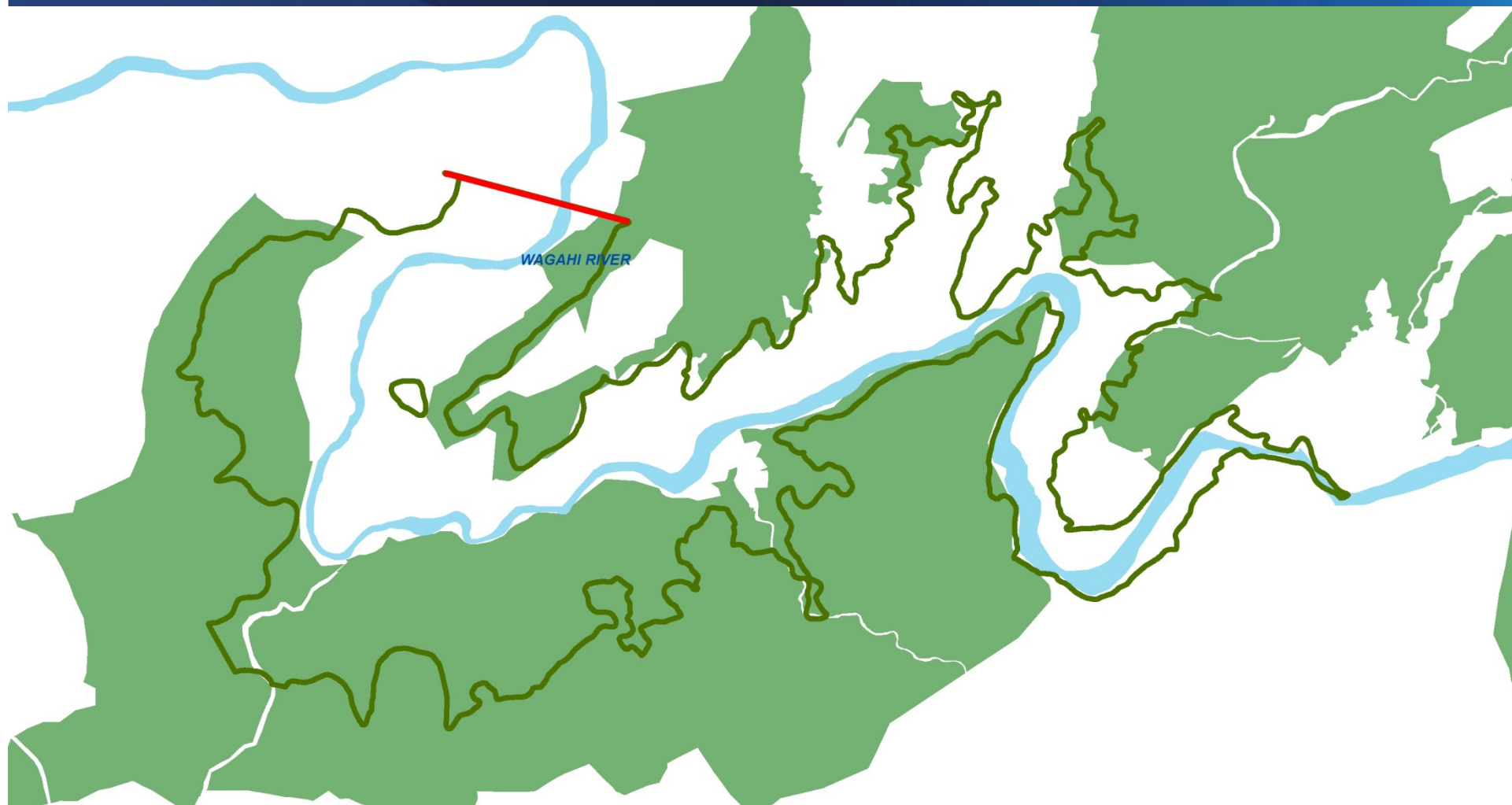
# Submergence at FRL (169m)



# Settlements

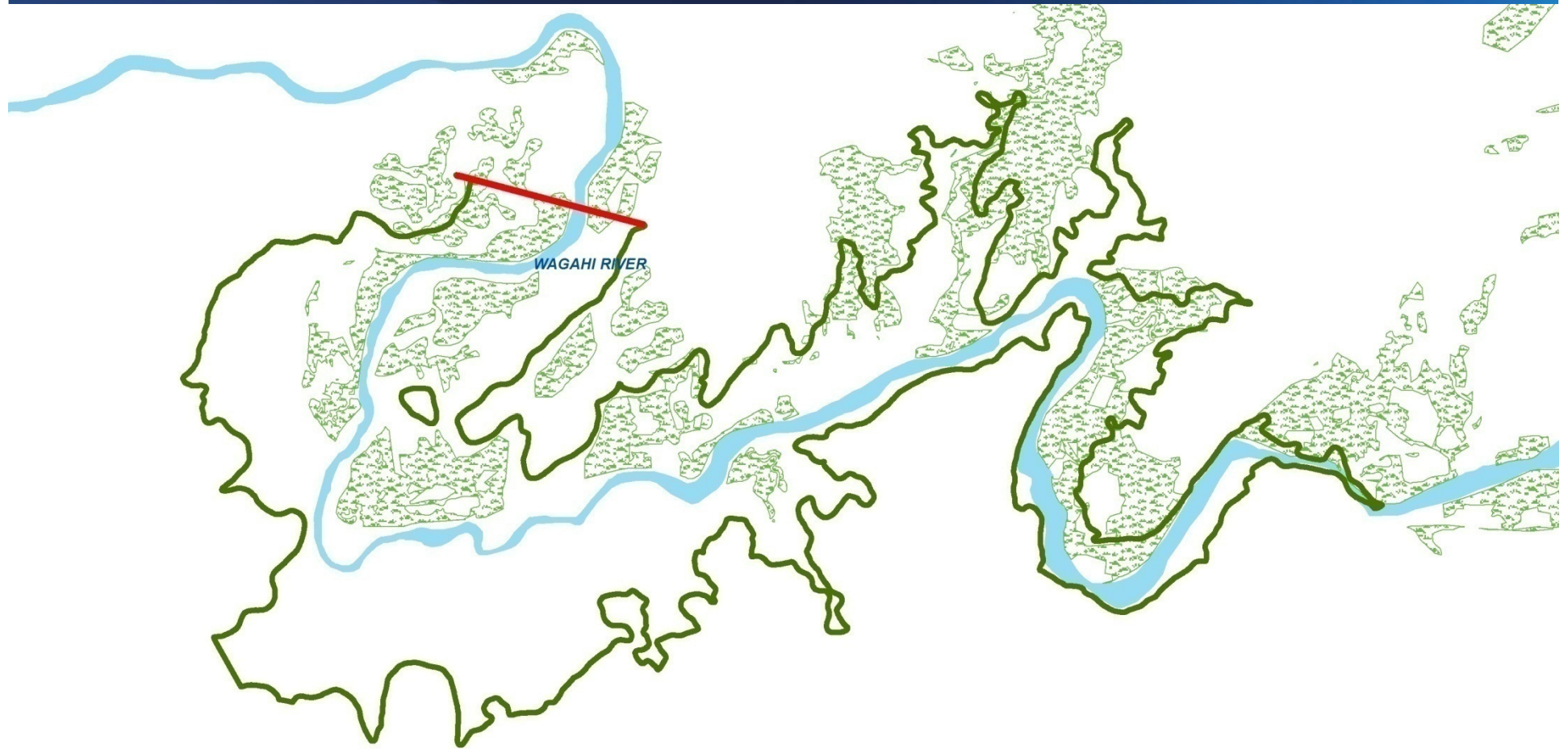


# Forest Area

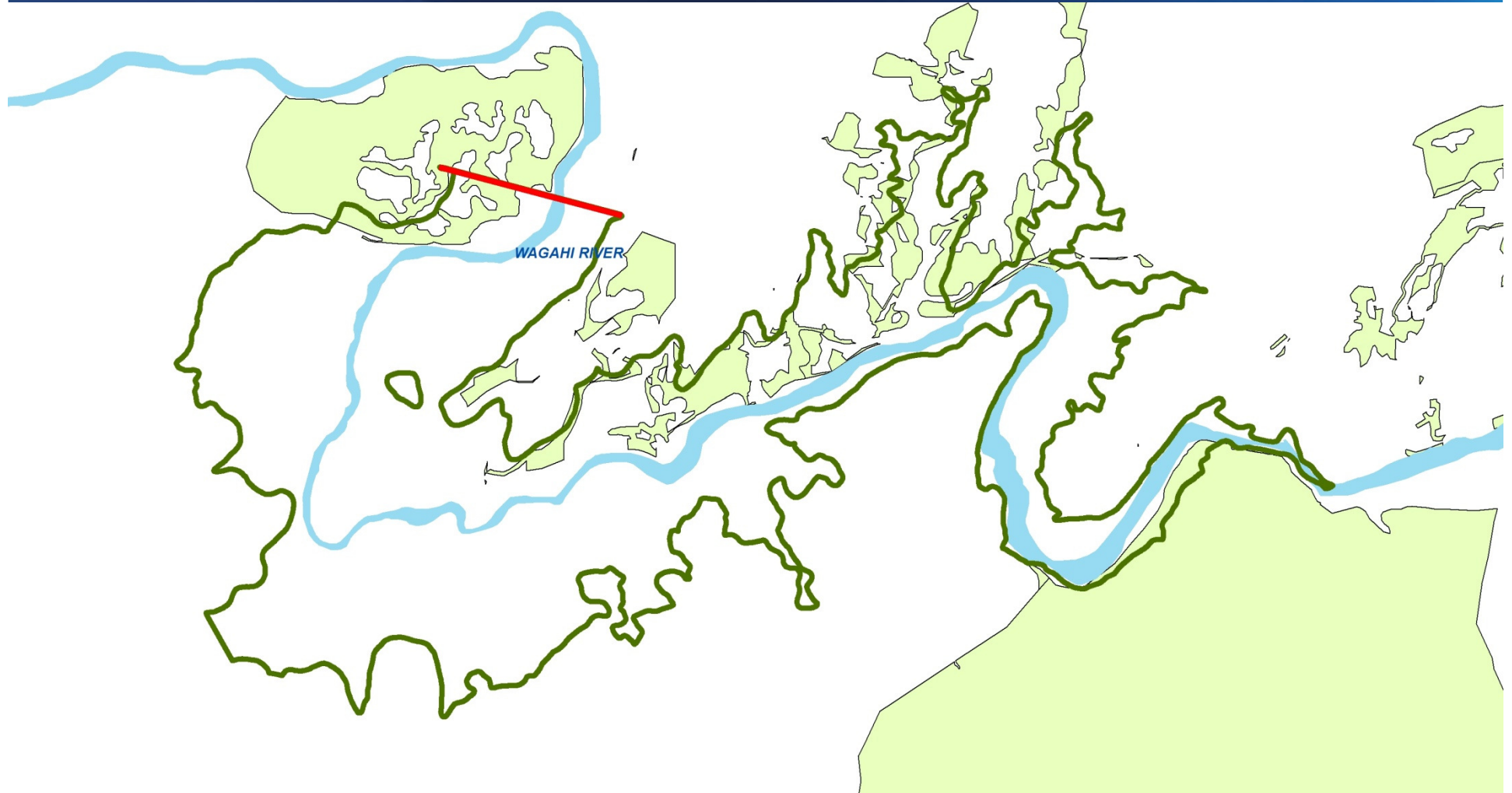




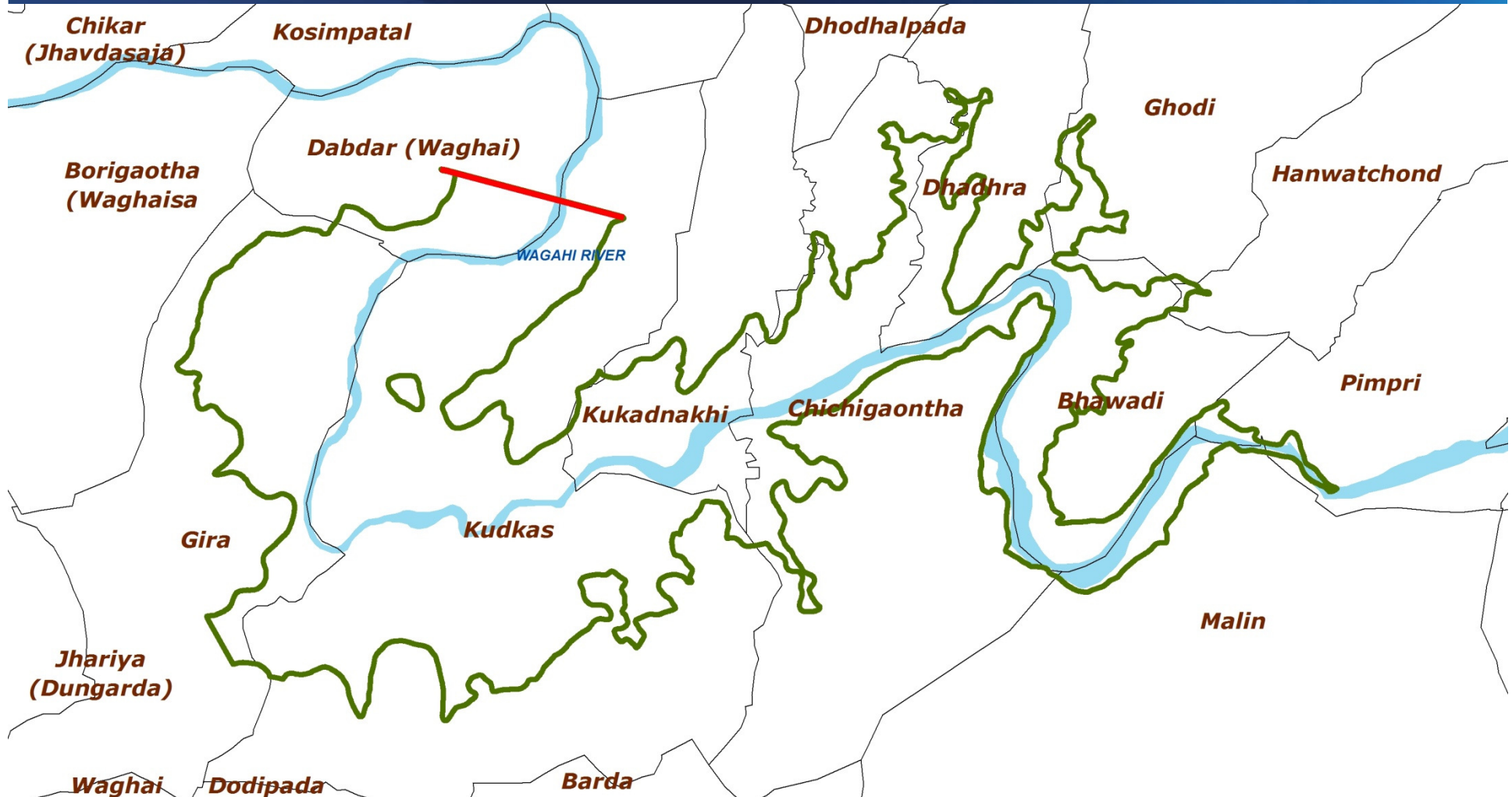
# Agriculture



# Plantation

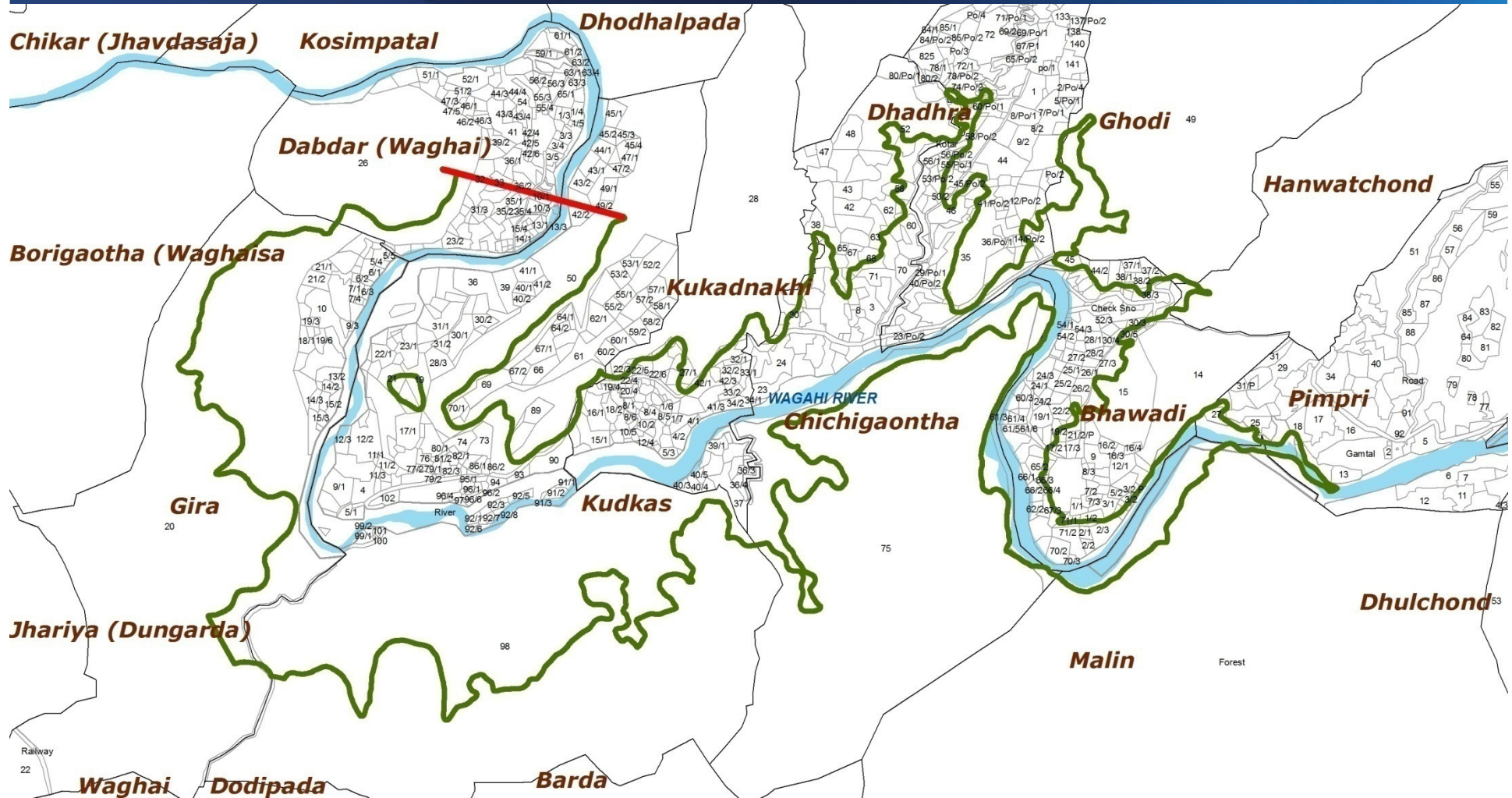


# Village boundaries

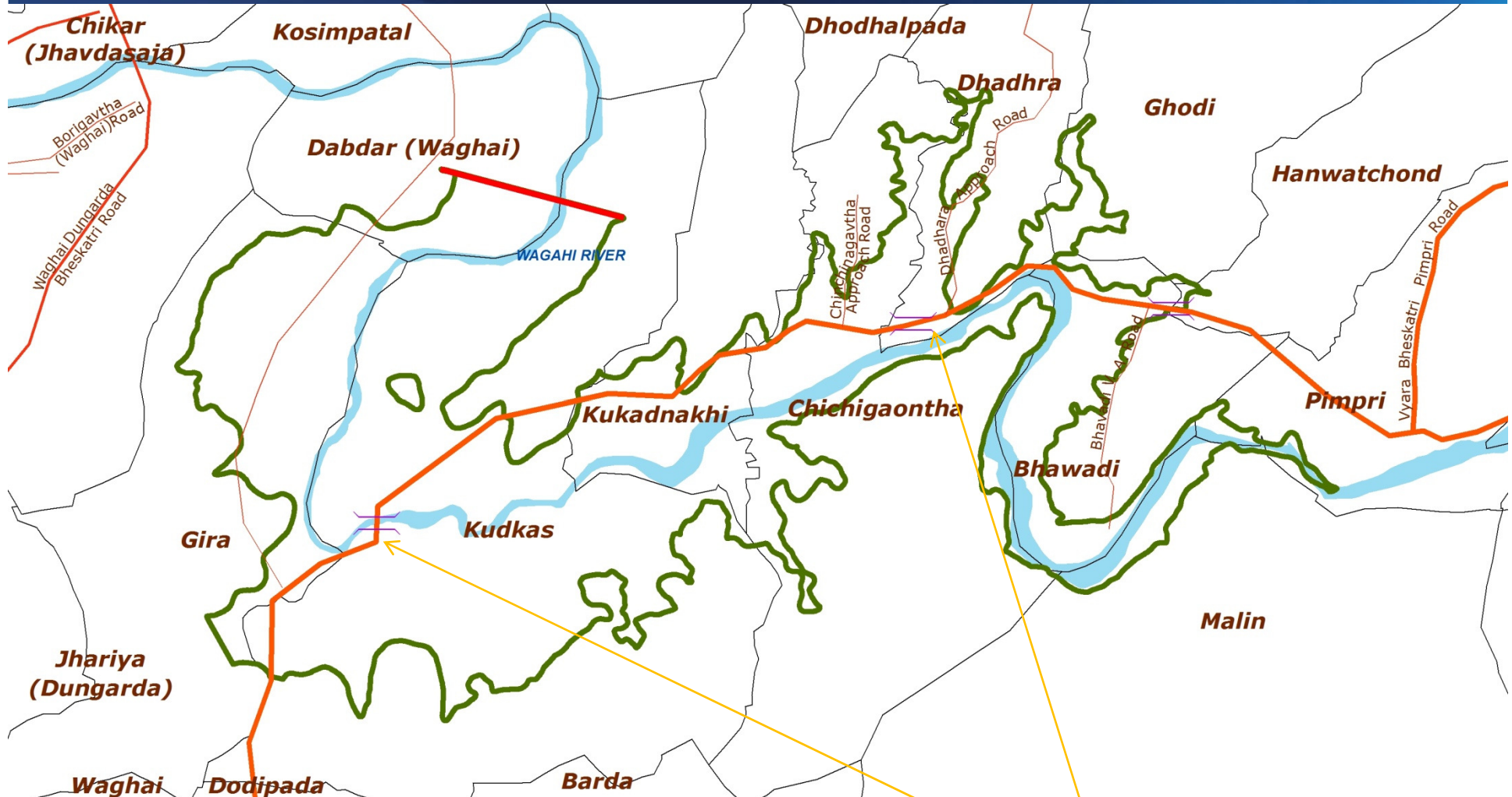




# Cadastral boundaries

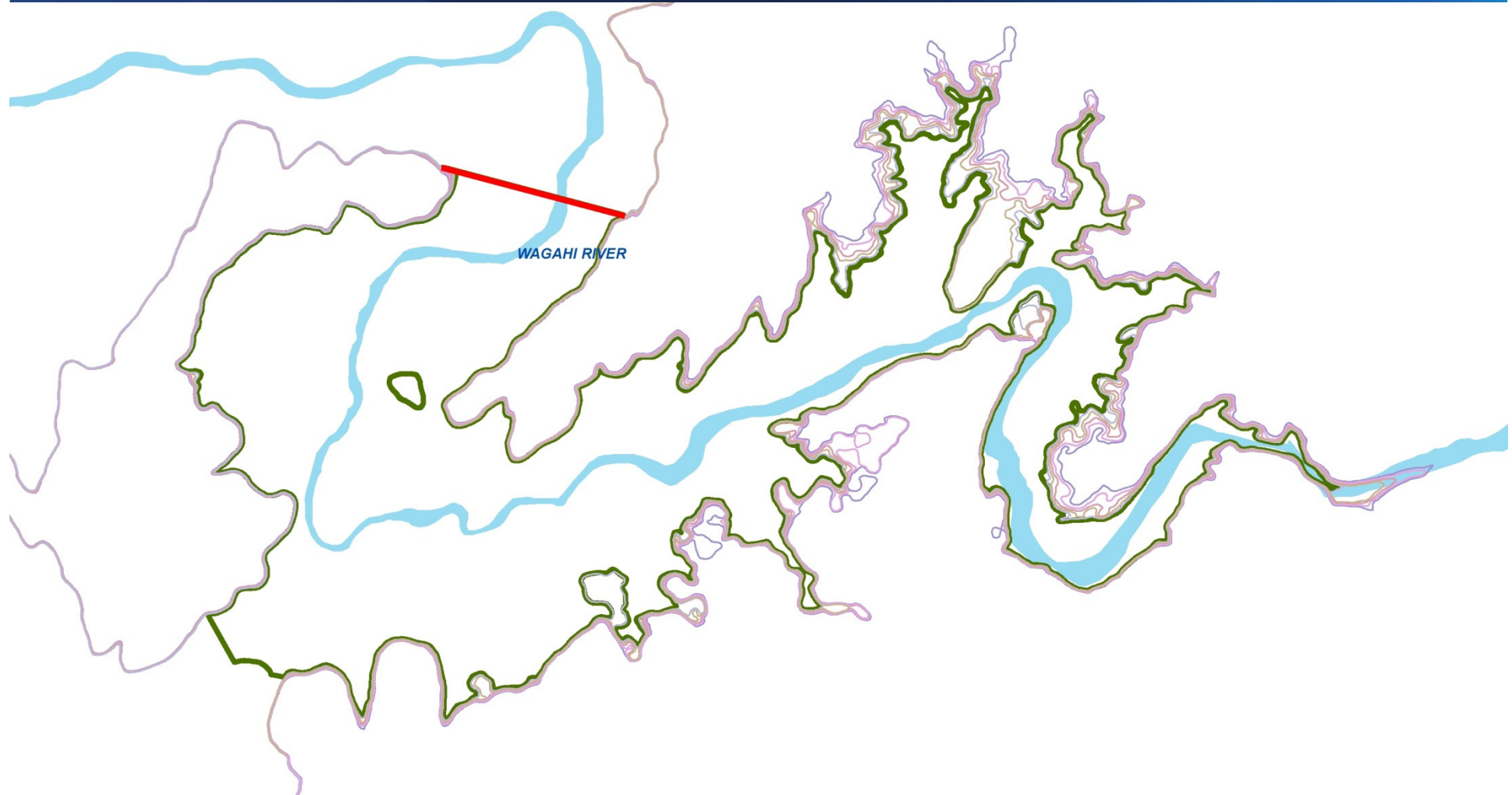


# Roads and Bridges



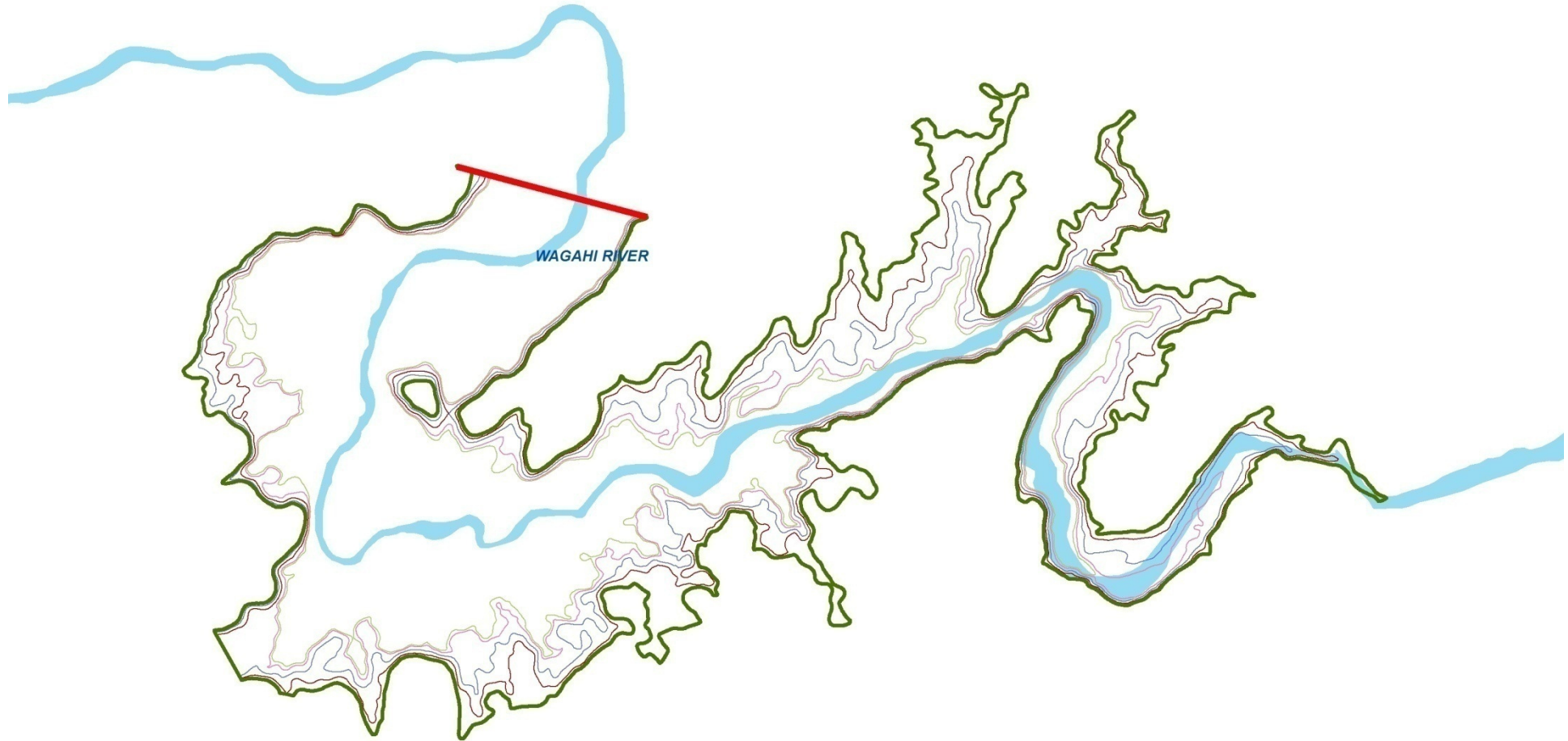
Bridges

# Contours above FRL upto 5 m

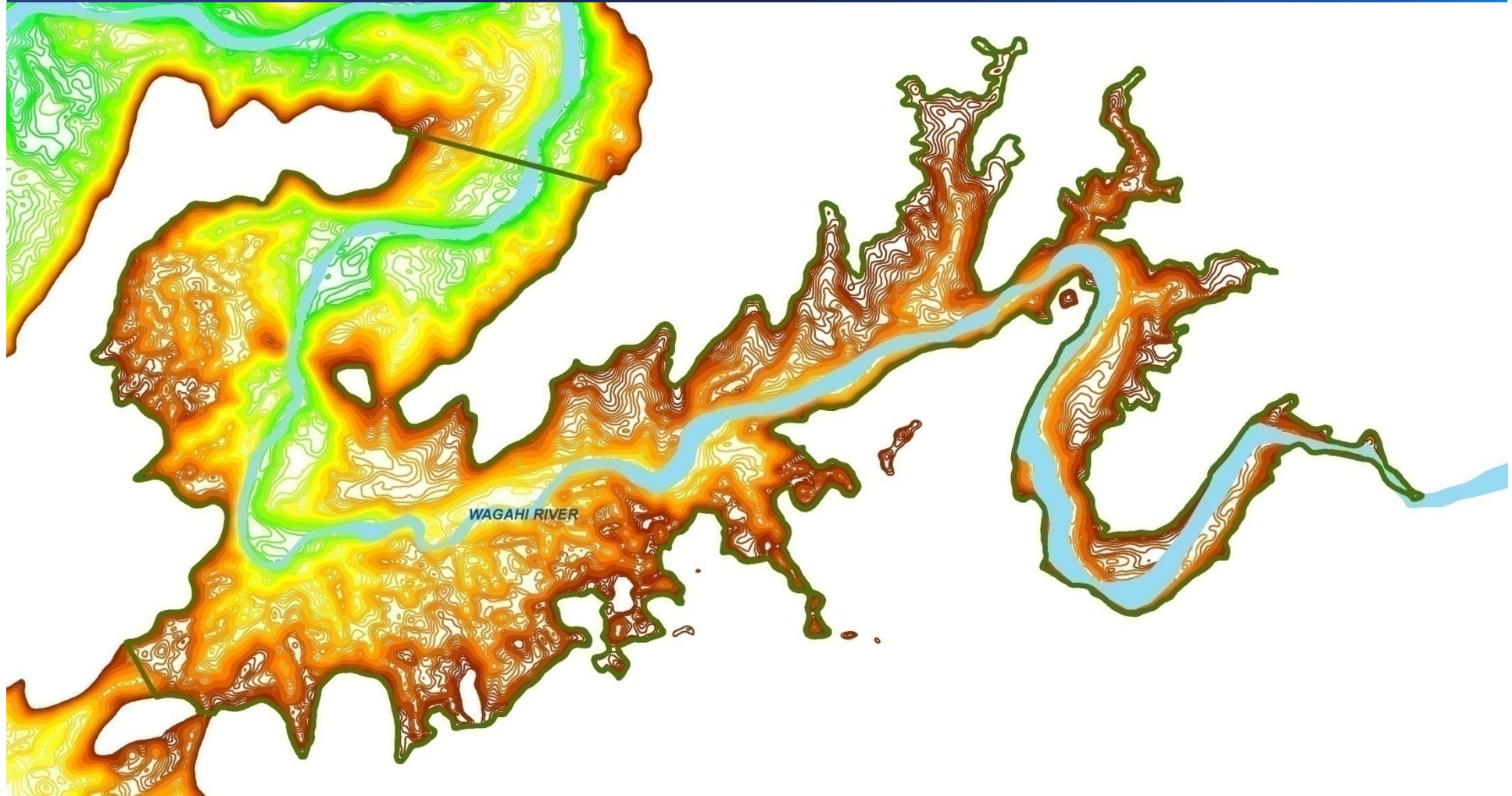




# Contours at 5 m interval



# Contours at 1 m interval upto the river



# Land use statistics at different levels

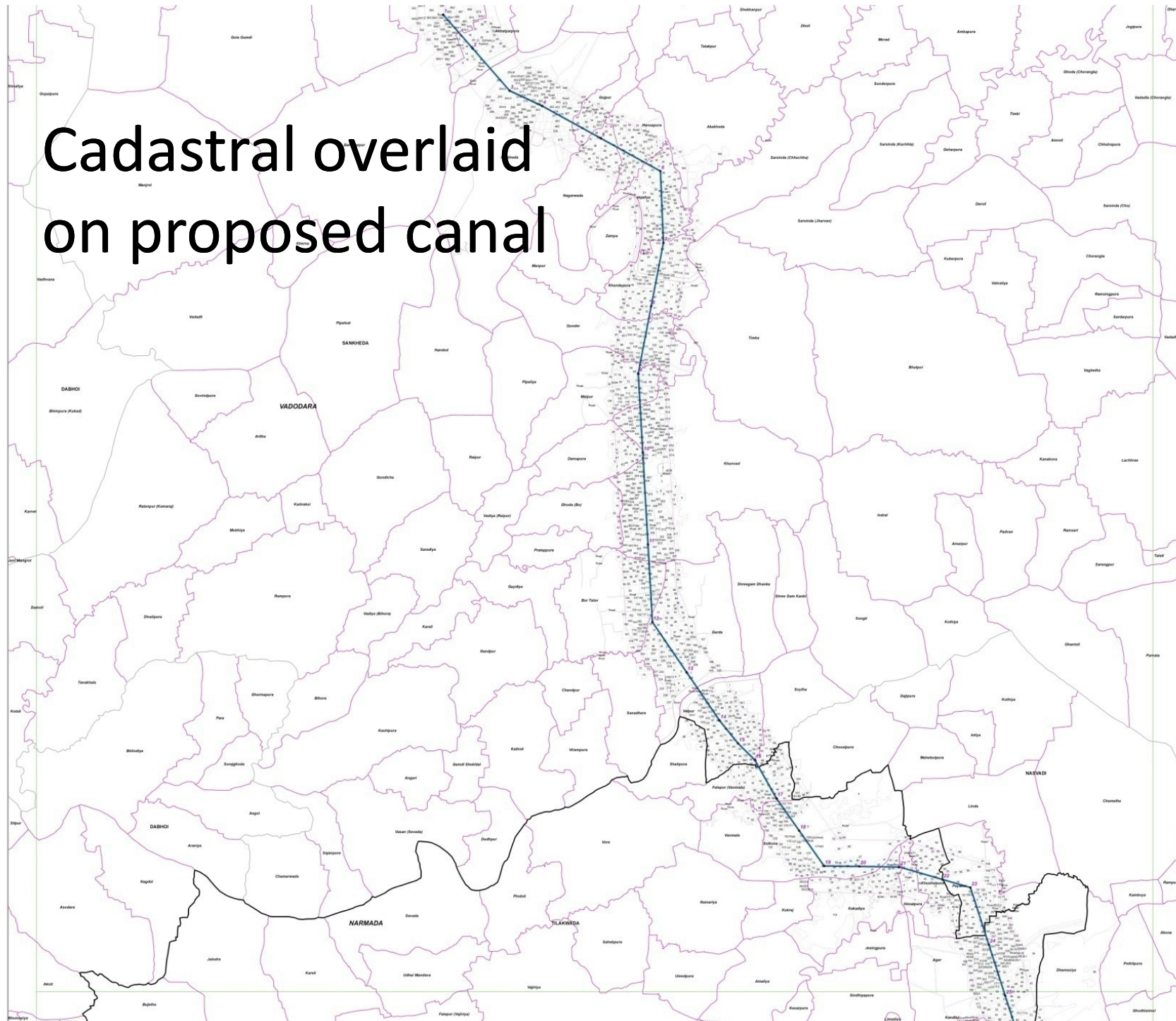
Name of Dam	Full Reservoir Level (m)	Area (ha)					Total
		Agriculture	Forest	Plantation	River	Settlements	
Dabdar	169	252	577	169	202	22	<b>1222</b>
	164	212	455	140	193	19	<b>1019</b>
	159	187	391	121	184	15	<b>898</b>
	154	160	281	91	167	12	<b>710</b>
	149	148	250	82	155	12	<b>646</b>

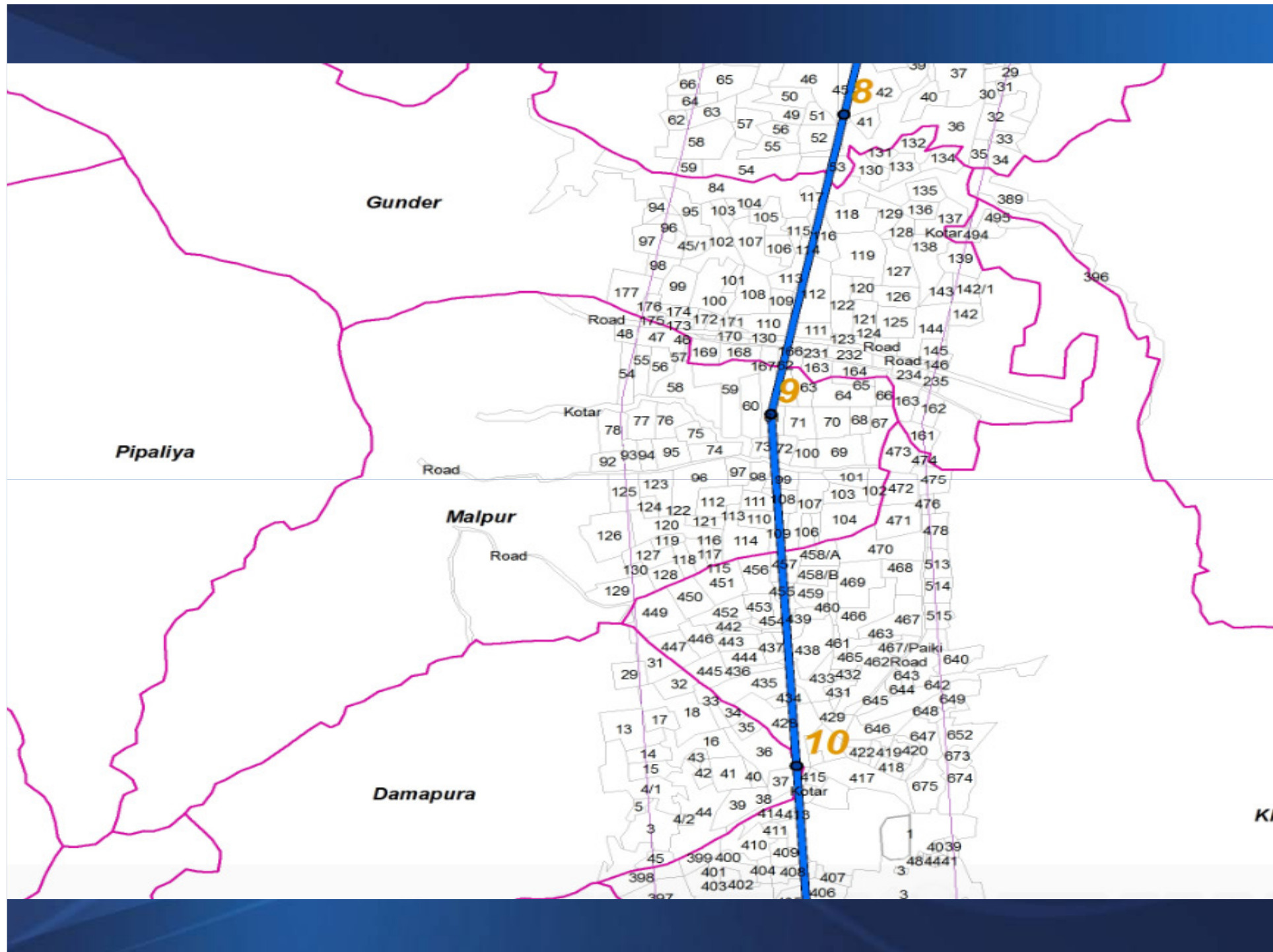
# % settlements getting submerged at different levels

Dam	FRL	Villages getting submerged at different FRL
Dabdar	169	Gira(100%),Dabdar (Waghai)(5%),Kudkas(100%),Kukadnakhi(100%),Chichigaontha(100%),Bhawadi(30%)
	164	Gira(100%),Dabdar (Waghai)(5%),Kudkas(100%),Kukadnakhi(100%),Chichigaontha(10%),Bhawadi(20%)
	159	Gira(100%),Dabdar (Waghai)(5%),Kudkas(100%),Kukadnakhi(5%),Chichigaontha(5%),Bhawadi(10%)
	154	Gira(100%),Dabdar (Waghai)(5%),Kudkas(100%)
	149	Gira(100%),Dabdar (Waghai)(5%),Kudkas(100%)



# Cadastral overlaid on proposed canal





# Components of P-T-N link

- Six dams (5 in Gujarat and 1 in Maharashtra)
  - Jheri (Maharashtra), Paikhed, Chasmandava, Chikkar, Dabdar, Kelwan (in Gujarat)
- Two diversion weirs
  - d/s of Paikhed and Chasmandava Dams
- Six power houses
  - 4 dam toe (Paikhed, Chasmandava Dabdar & Kelwan)
  - One in feeder canal from Chikkar to Dabdar
  - One at canal fall from Kelwan dam
- 400 km long canal
- One tunnel about 9.5km long



# P-T-N link features

- About 1600 MCum of water to be transferred
- Total Irrigation 1.69 Lakh ha
  - 1.17 Lakh ha of Miyagaon Branch canal of the Narmada canal system
  - Plus 0.52 Lha new command area enroute the canal system
- Annual power production is 93Mkwh
- Domestic water supply to villages in the command area
- About 5 lakh tons of food grain production

# Submergence

Sl	Reservoir	Submergence area in hectares				Villages affected		Households affected
		Forest	Culturable	River bed	Total	Fully	Partially	
1	Jheri	408	256	172	836	-	7	140
2	Paikhed	392	320	165	877	2	7	363
3	Chasmandva	83	338	144	565	-	7	206
4	Chikkar	284	303	164	751	2	7	174
5	Dabdar	577	421	224	1222	4	7	331
6	Kelwan	669	633	341	1643	11	6	610
	<b>Total</b>	<b>2413</b>	<b>2271</b>	<b>1210</b>	<b>5894</b>	<b>19</b>	<b>41</b>	<b>1824</b>

Ratio of Submerged area to Culturable Command Area (CCA) works out to 0.031



Study done by NWDA in  
association with BISAG



**Bhaskaracharya Institute  
for Space Applications and  
Geo-informatics**



**National Water  
Development  
Agency**

**Thank you**