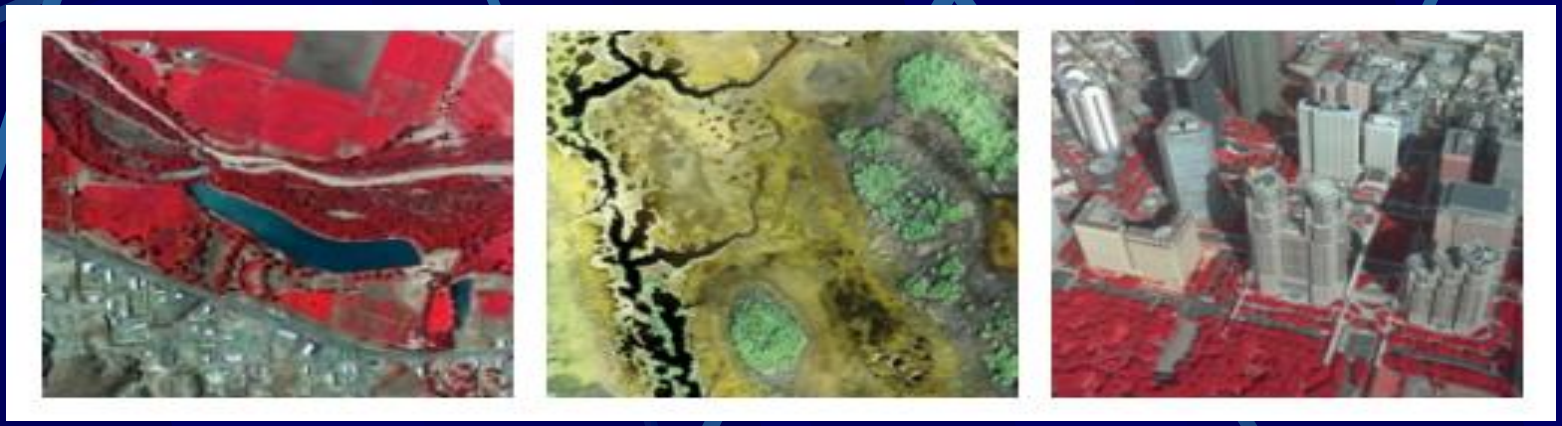
SMART SUSTAINABLE E-SOLUTIONS FOR IMPLEMENTATION AND ENFORCEMENT OF SMART CITIES IN INDIA



Dr. SANDEEP KUMAR RAUT

TOWN AND COUNTRY PLANNING ORGANISATION
Ministry of Urban Development
Government of India

And

PAPIYA BANDYOPADHYAY RAUT

SCHOOL OF PLANNING AND ARCHITECTURE
Ministry of Human Resource Development
Government of India

EXISTING REALITIES FOR SMART CITY

Indian towns and cities are expanding rapidly in spatial and demographic term

India is also gearing up for **transforming the urban community** to a smart and sustainable community through the **application of ICTs and GIS**.

In last ten years India has **launched NUIS** initiated by MOUD –TCPO and NNRMS by Dept of Space to take up effective decision making for **Smart Urban and Regional Planning**

In 25th June, 2015 MOUD has **launched the "Smart City Mission " for 100 cities** and **funds released for 20 cities**

SMART CITY SCHEME IN INDIA

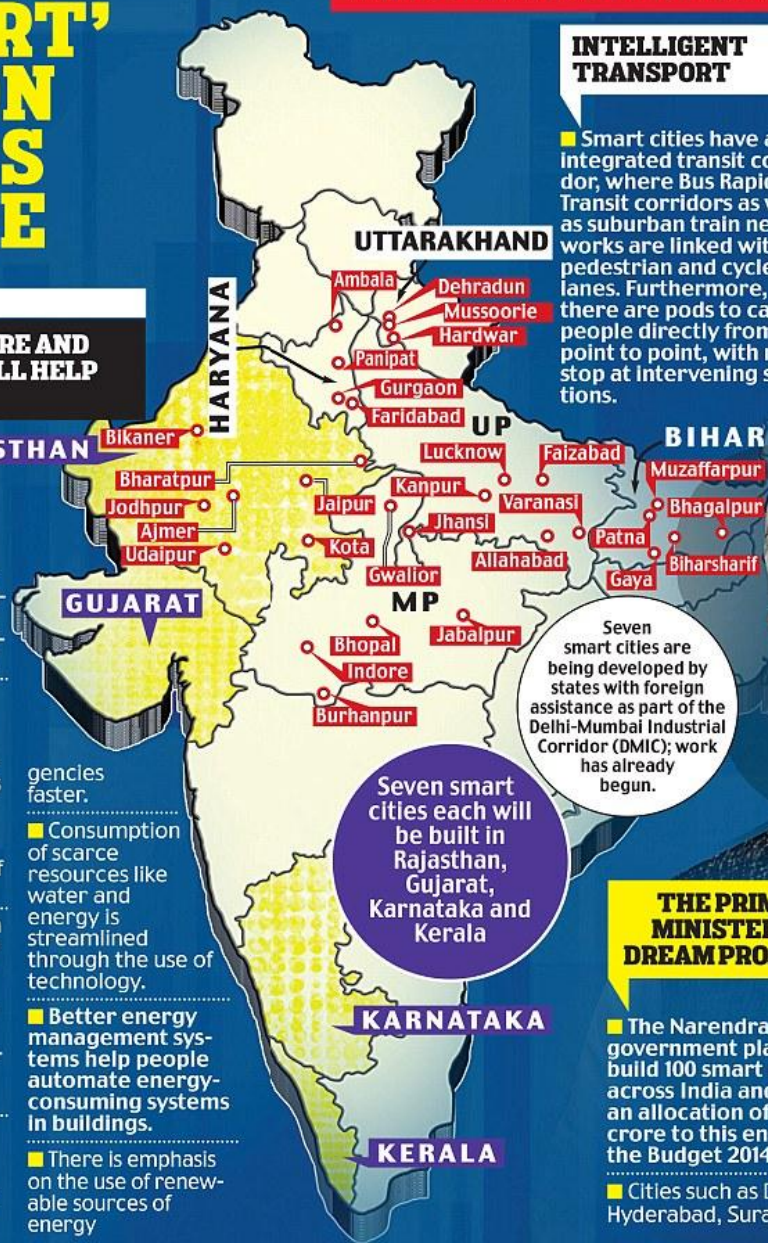
THE PRIME MINISTER'S DREAM PROJECT

- The Narendra Modi government plans to build 100 smart cities across India and made an allocation of ₹7,060 crore to this end in the Budget 2014-15.
- Cities such as Delhi, Hyderabad, Surat,

Seven smart cities are being developed by states with foreign assistance as part of the Delhi-Mumbai Industrial Corridor (DMIC); work has already begun.

MODI'S 'SMART' VISION TAKES SHAPE

The urban development ministry has identified almost all the places where the NDA's 100 smart cities will come up



SMART CITIES
WHAT THEY ARE AND HOW THEY WILL HELP

- Smart cities, in the most basic terms, are urban settlements that exploit technology to offer more structured and hospitable living conditions for residents.
- Information and Communication Technology (ICT) forms the backbone of smart cities and is the main tool to address common problems like congestion and waste of energy.
- Such cities have a centralised control system which provides real-time inputs on availability of water, electricity, public transport, healthcare and education.
- Intelligent communication tools enable administrators to manage and respond to emergencies faster.
- Consumption of scarce resources like water and energy is streamlined through the use of technology.
- Better energy management systems help people automate energy-consuming systems in buildings.
- There is emphasis on the use of renewable sources of energy

INTELLIGENT TRANSPORT

- Smart cities have an integrated transit corridor, where Bus Rapid Transit corridors as well as suburban train networks are linked with pedestrian and cycle lanes. Furthermore, there are pods to carry people directly from point to point, with no stop at intervening stations.
- Smart cards facilitate travel in multiple modes of public transport.
- Real-time transport displays can provide visibility and information on availability of public transport as well as the condition of traffic on routes.
- Digital parking meters send information to mobile phones when a space opens up.

Seven smart cities are being developed by states with foreign assistance as part of the Delhi-Mumbai Industrial Corridor (DMIC); work has already begun.

Seven smart cities each will be built in Rajasthan, Gujarat, Karnataka and Kerala

THE PRIME MINISTER'S DREAM PROJECT

- The Narendra Modi government plans to build 100 smart cities across India and made an allocation of ₹7,060 crore to this end in the Budget 2014-15.
- Cities such as Delhi, Hyderabad, Surat,

Coimbatore, Bangalore, Mangalore, Jamshedpur, Mumbai and Chennai have launched initiatives for deployment of advanced communications systems, Metro networks, traffic management frameworks, smart meters, GPRS for solid waste management, online water quality monitoring, online building plan approval schemes, etc

EXISTING REALITIES FOR SMART CITY

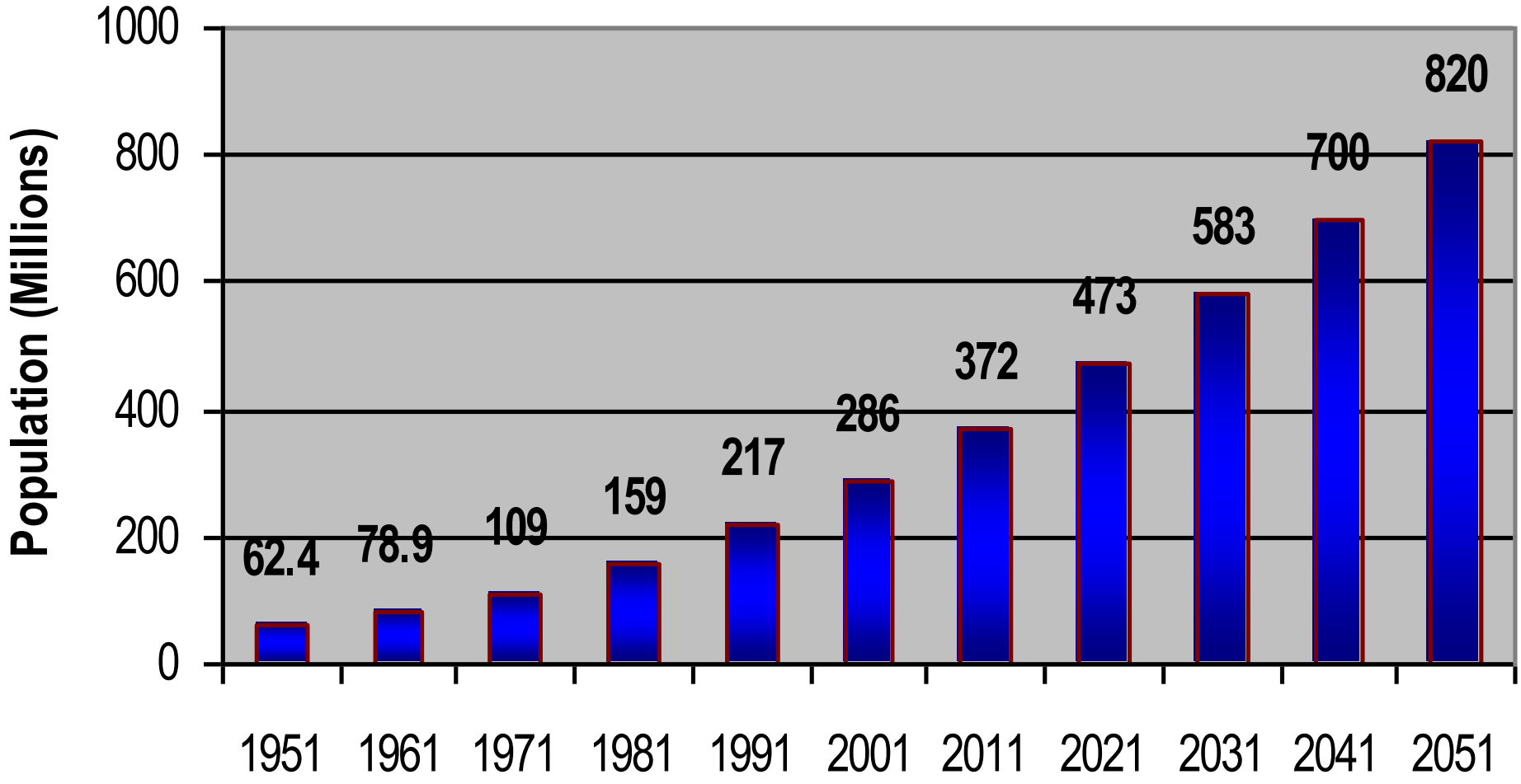
But Data generated at various level for urban planning and management through all these initiatives remains uncoordinated and redundant to support decision making

Spatial information are not correlated with complex urban integrated problem

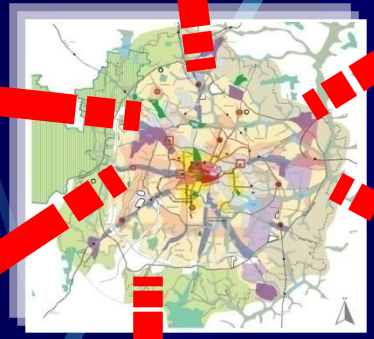
This leads to poor urban governance and timely implementation of Master plan

Basically all these approach lacks in “Smart Solutions or E-Solutions Model” for implementation and enforcement of Sustainable Development Plan .

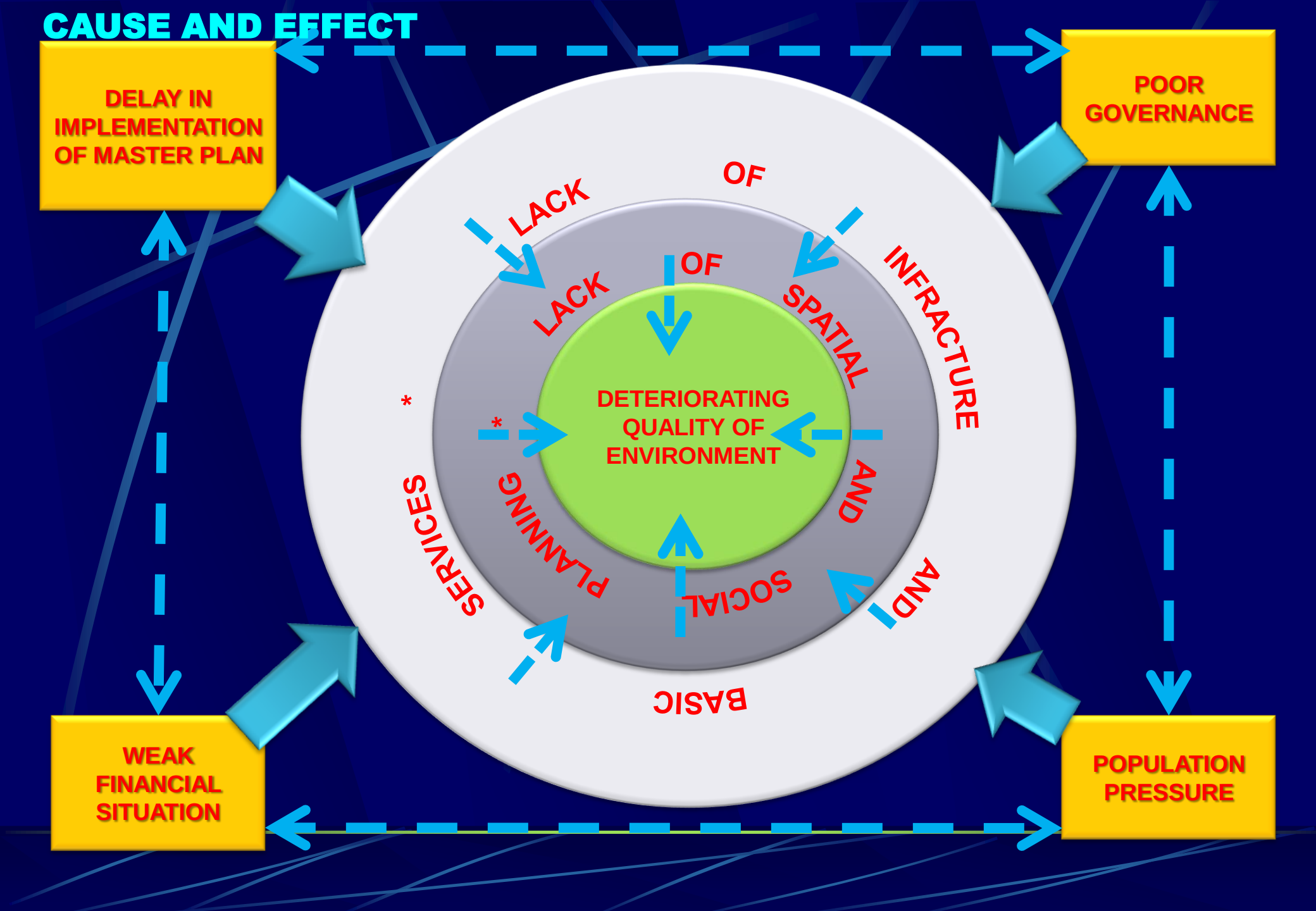
INDIA: PROJECTED URBAN POPULATION



URBAN REALITY



CAUSE AND EFFECT



WHAT IS SMART CITY

- **SMART ECONOMY**

Creative, PPP Model Economy	Create professional jobs, easy access to data and information	Jobs for whom?

- **SMART MOBILITY**

TOD, Sustainable transport	Walk to work, reduce motivation to use personal vehicles, bicycle path, solar/electric or hybrid cars, first and last miles connectivity	How to reduce travel time?

- **SMART ENVIRONMENT**

Eco Friendly Design/ Technologies	Carbon footprint/ credit, parks and open spaces, absence of population, use of renewable, conservation and recycling	Big question of affordability?

- **SMART PEOPLE**

Participatory approach (PRA Mapping), More vocal against corruption	Meaningful leaderships, social security and safety, rapid response to emergency calls.	Question of literacy and quick response in Judiciary

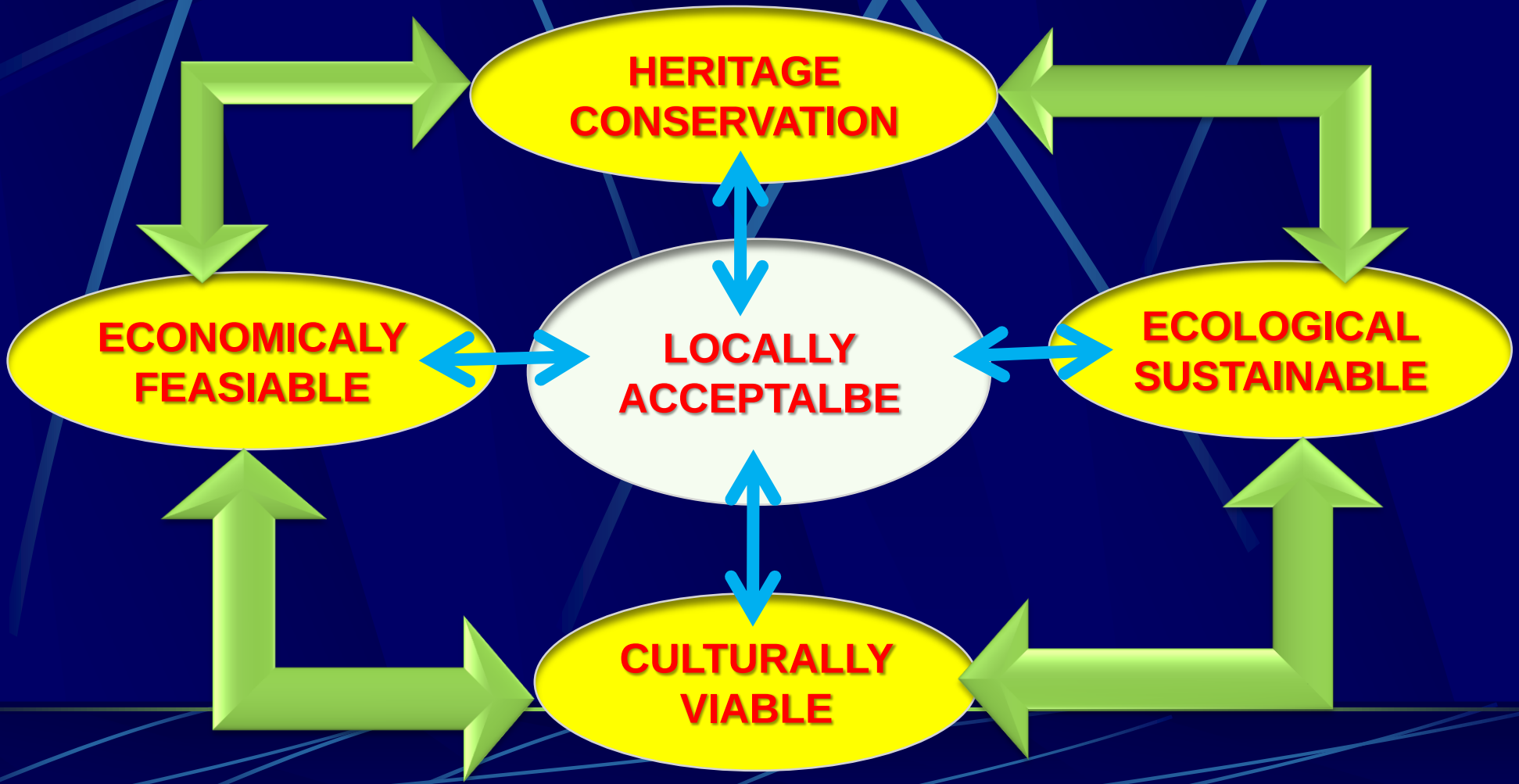
- **SMART LIVING**

Efficient Utilities	Smart Meters, recycling of waste, energy conservation and renewable	How to charge or include unauthorized areas/ slums?

- **SMART GOVERNMENT**

IBM Smart City model Of ICT enabled govt.	Easily accessible across various communities	How when only 27% persons access to ITC/ internet in India?

FOR INDIA SMART CITY SHOULD BE...



WHAT SHOULD BE CONSIDERED FOR SMART CITY

ROURKELA PROJECT

ROURKELA COMPREHENSIVE DEVELOPMENT PLAN 2031

VISION

TOWN AND COUNRY PLANNING ORGANISATION
MINISTRYOF URBAN DEVELOPMENT
GOVERNMENT OF INDIA

CONCEPT

IDEA

Come

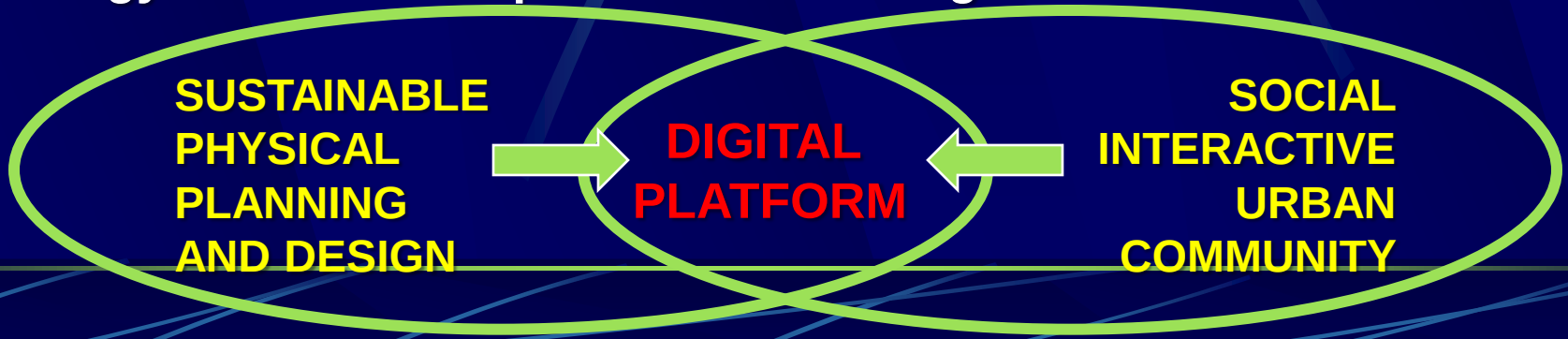
together

ROURKELA PROJECT

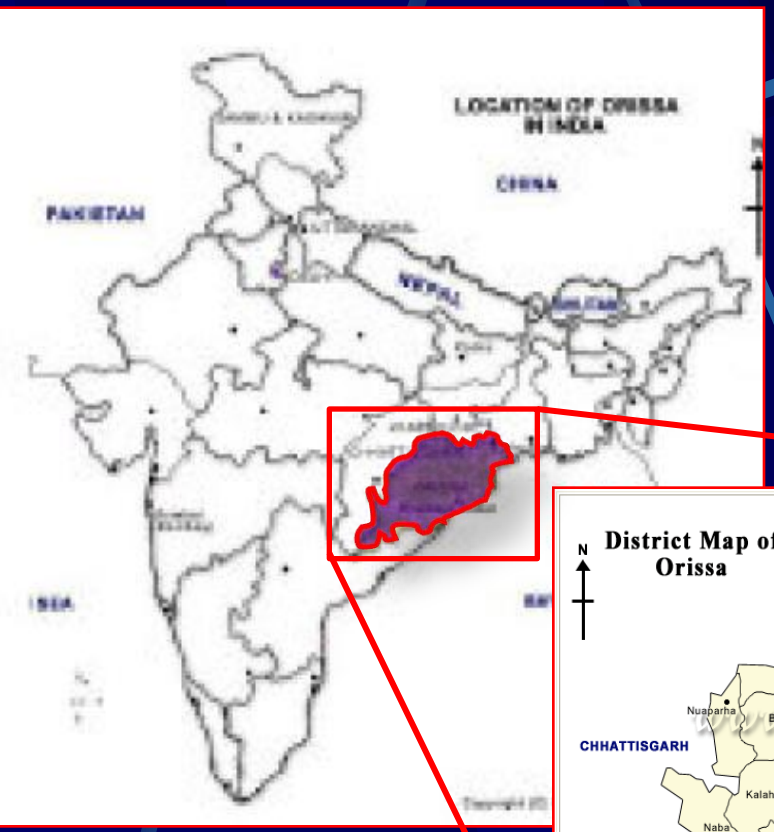
In present cyber era, development of web 2.0 technologies customized and entrepreneur GIS, 3D cadastral information are dramatically changing the urban and regional planning process.

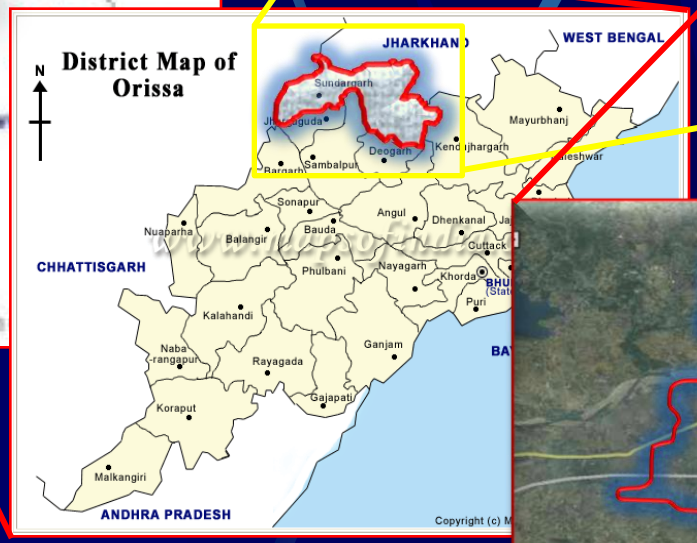
Rapid development of network technologies, establishment of GIS lab at 153 towns and cities through NUIS Scheme, launching of smart cities, development of Space Technologies and Blogs, Mashups, You Tube Flickr Google+ Myspace and all social networking sites like Facebook, twitter etc. provide a conducive environment to harness the virtual world technologies to design and find solution for complex urban problems in a smart way.

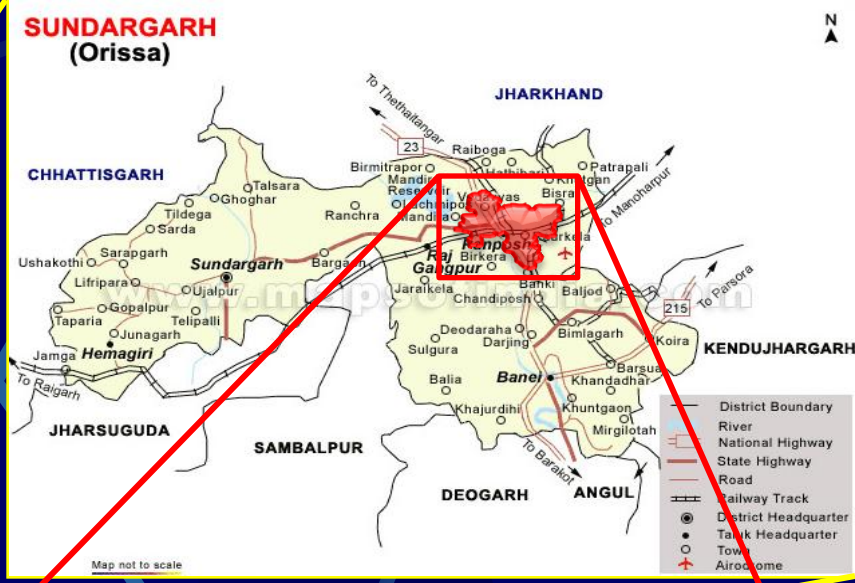
The present paper provide a Smart E- Solution Model using Web 2.0 technology towards a responsive and Intelligent Sustainable Rourkela city

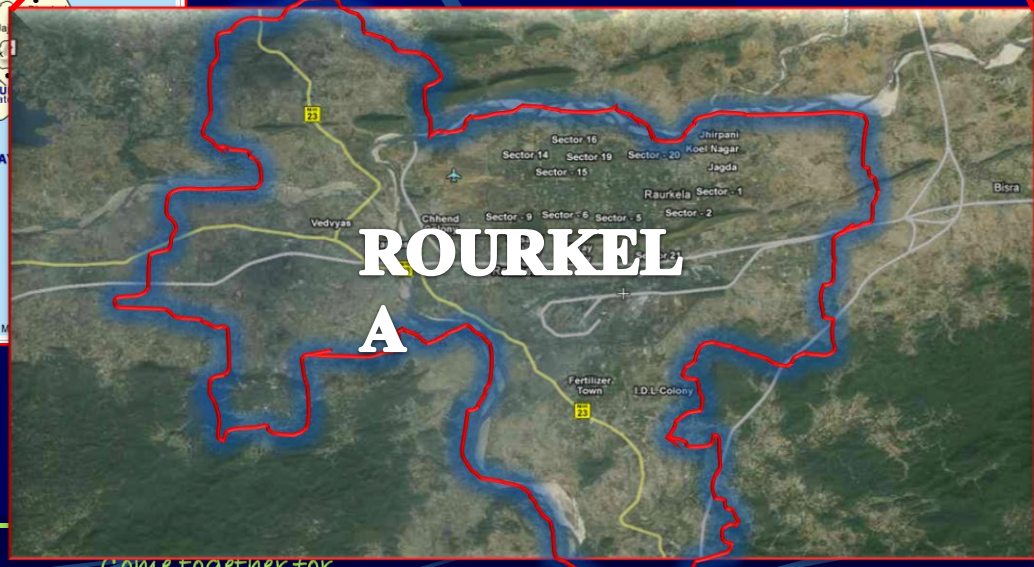


REGIONAL SETTING







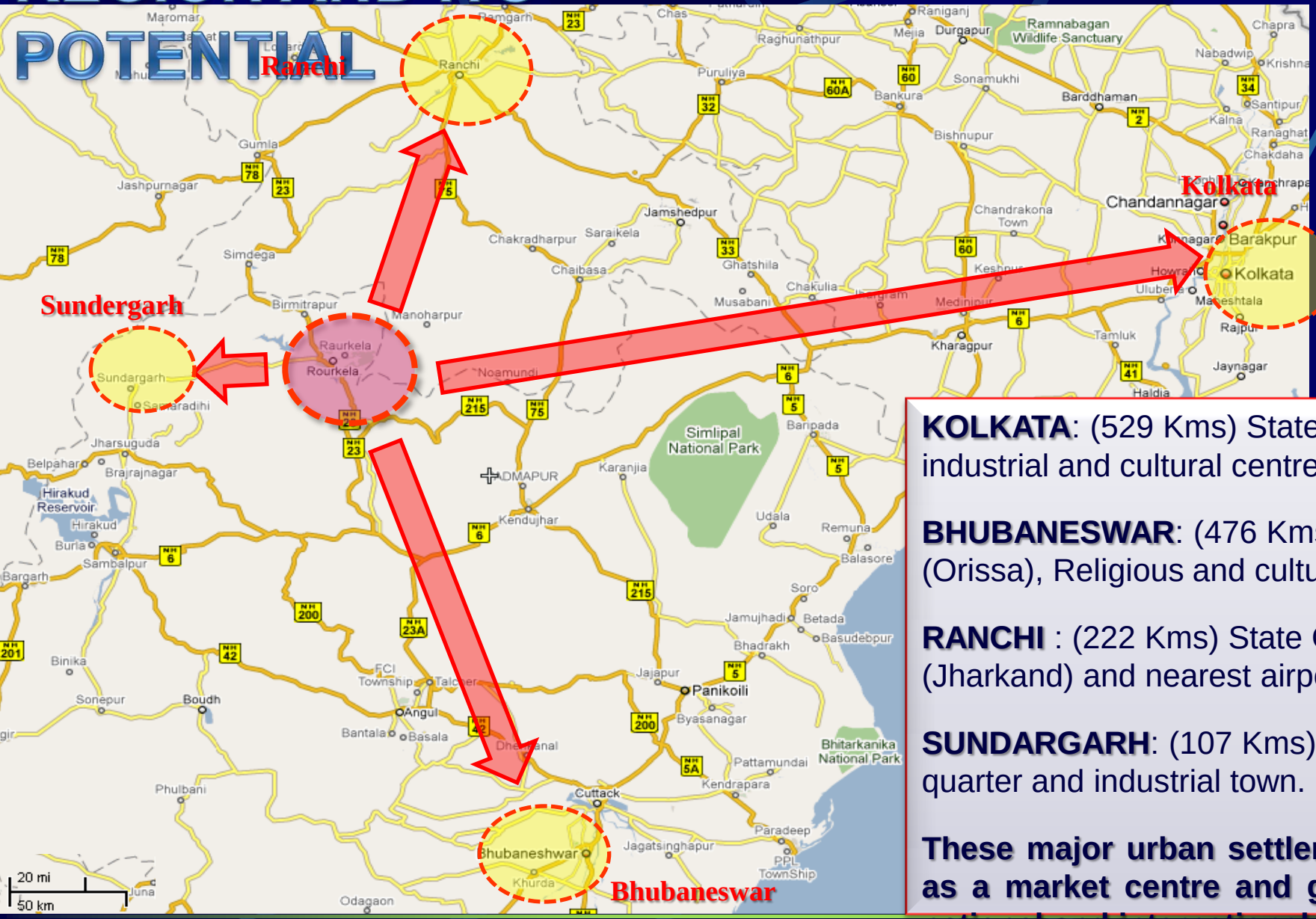


Come together for

TCPO

ROURKELA COMPREHENSIVE DEVELOPMENT PLAN

REGION AND ITS POTENTIAL



KOLKATA: (529 Kms) State capital (WB), industrial and cultural centre.

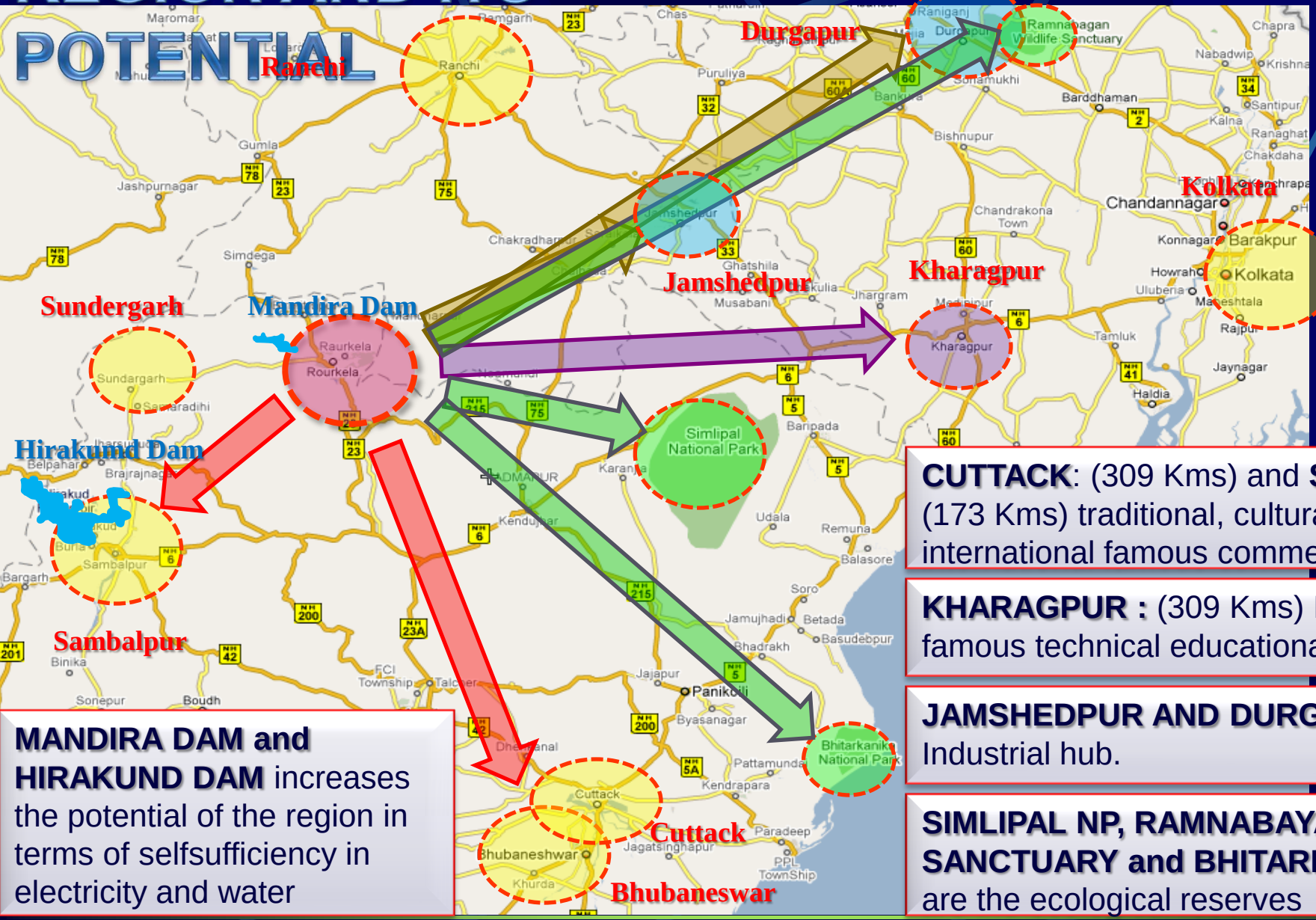
BHUBANESWAR: (476 Kms) State capital (Orissa), Religious and cultural centre.

RANCHI : (222 Kms) State Capital (Jharkand) and nearest airport.

SUNDARGARH: (107 Kms) District head quarter and industrial town.

These major urban settlements also act as a market centre and gateway to the national and international market.

REGION AND ITS POTENTIAL



CUTTACK: (309 Kms) and **SAMBALPUR** (173 Kms) traditional, cultural and international famous commercial hub

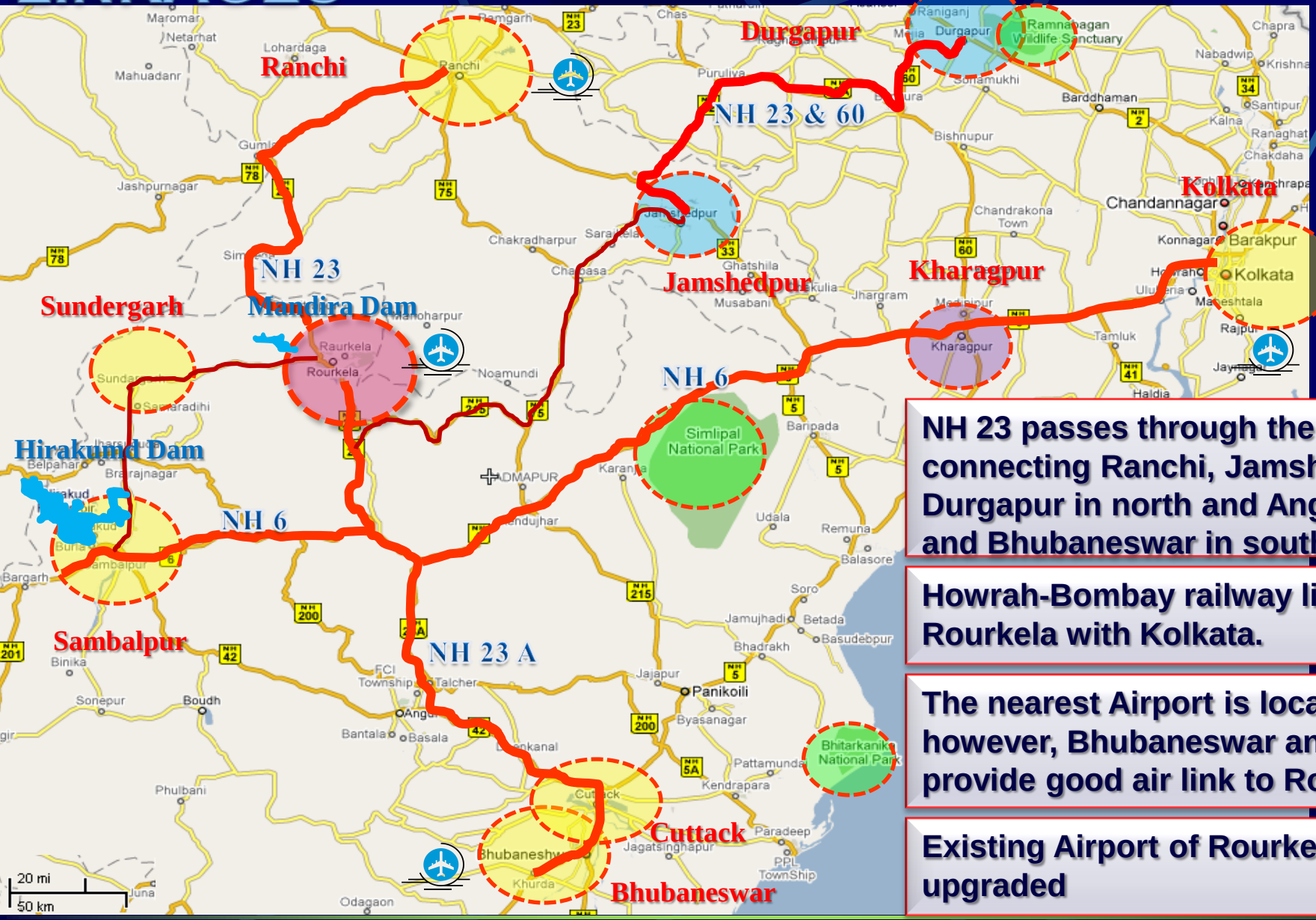
KHARAGPUR : (309 Kms) International famous technical educational centre.

JAMSHEDPUR AND DURGAPUR Industrial hub.

SIMLIPAL NP, RAMNABAYAN SANCTUARY and BHITARKANIKA NP are the ecological reserves

MANDIRA DAM and HIRAKUND DAM increases the potential of the region in terms of selfsufficiency in electricity and water

LINKAGES



NH 23 passes through the city connecting Ranchi, Jamshedpur and Durgapur in north and Angul, Cuttack and Bhubaneswar in south

Howrah-Bombay railway link connects Rourkela with Kolkata.

The nearest Airport is located at Ranchi, however, Bhubaneswar and Kolkata also provide good air link to Rourkela

Existing Airport of Rourkela needs to be upgraded

PAST PLANNING

1952: Decision to construct Steel plant taken by then Hon. Prime Minister Pt. Jawaharlal Nehru

1954: After completion of survey work the process of land acquisition were stated

Steel Town ship

Civil township

Steel Plant

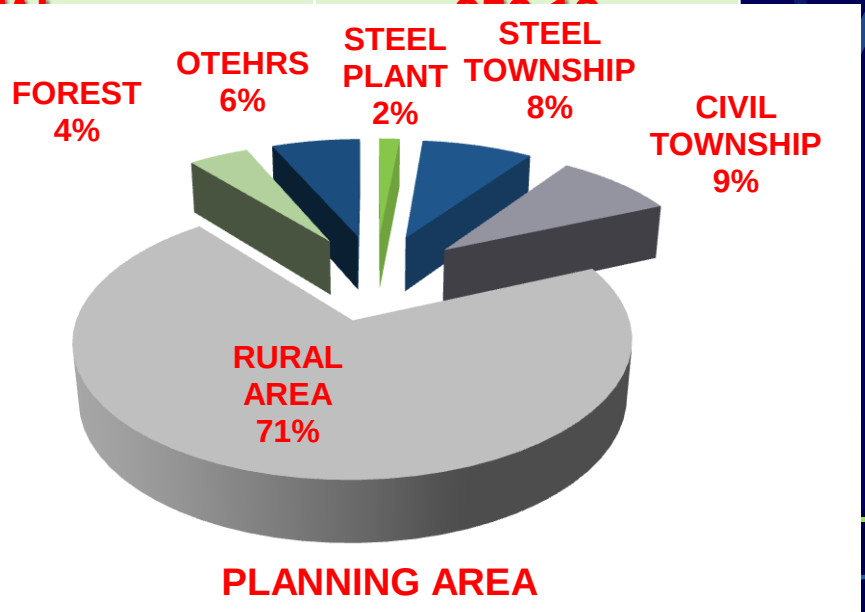
1959: First Blast Furnace of Rourkela Steel Plant inaugurated

1961: Construction activities completed

1982: Master Plan for Civil Township prepared

ROURKELA PROJECT PLANNING AREA

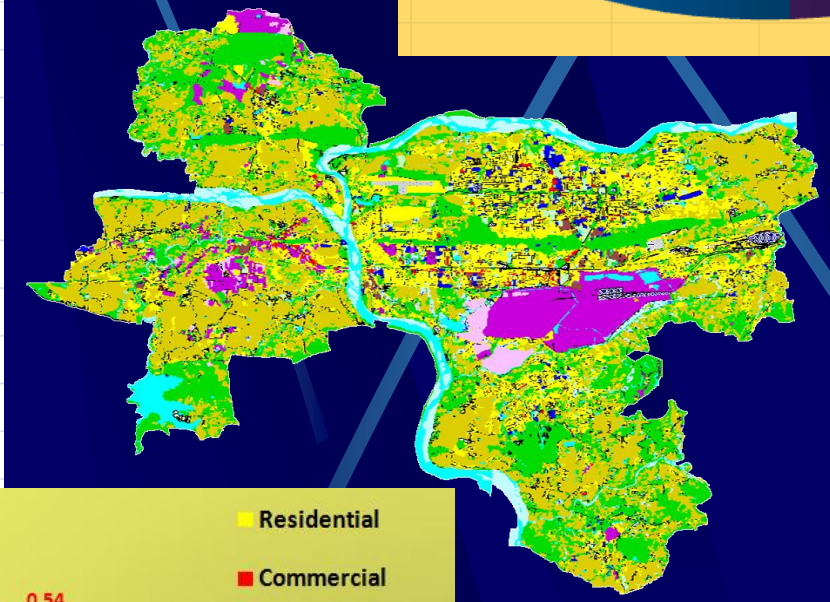
PLANNING AREA	AREA IN Sq.km
Steel Plant	3.89
Steel Township	20.98
Civil Township	22.73
Rural Areas	183.49
Reserved Forest	11.37
Others	16.72

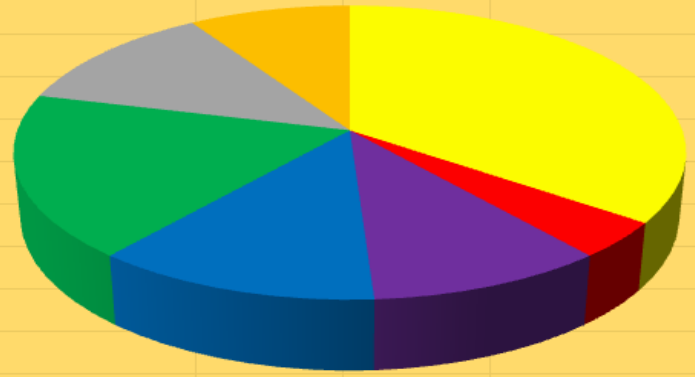


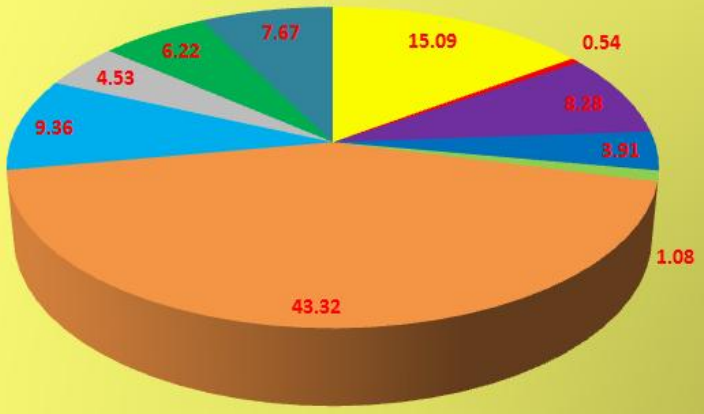
Total Planning Area
Mouzas : 104
• Area: 259.18

EXISTING LAND USES

LAND USES	AREA (in %)
Residential	15.09
Commercial	0.54
Industrial	8.28
Public and Semi Public	3.91
Recreational	1.08
Agricultural	43.32
Water Bodies	9.36
Transportation	4.53
Forest	6.22
Others	7.67
TOTAL	100.00

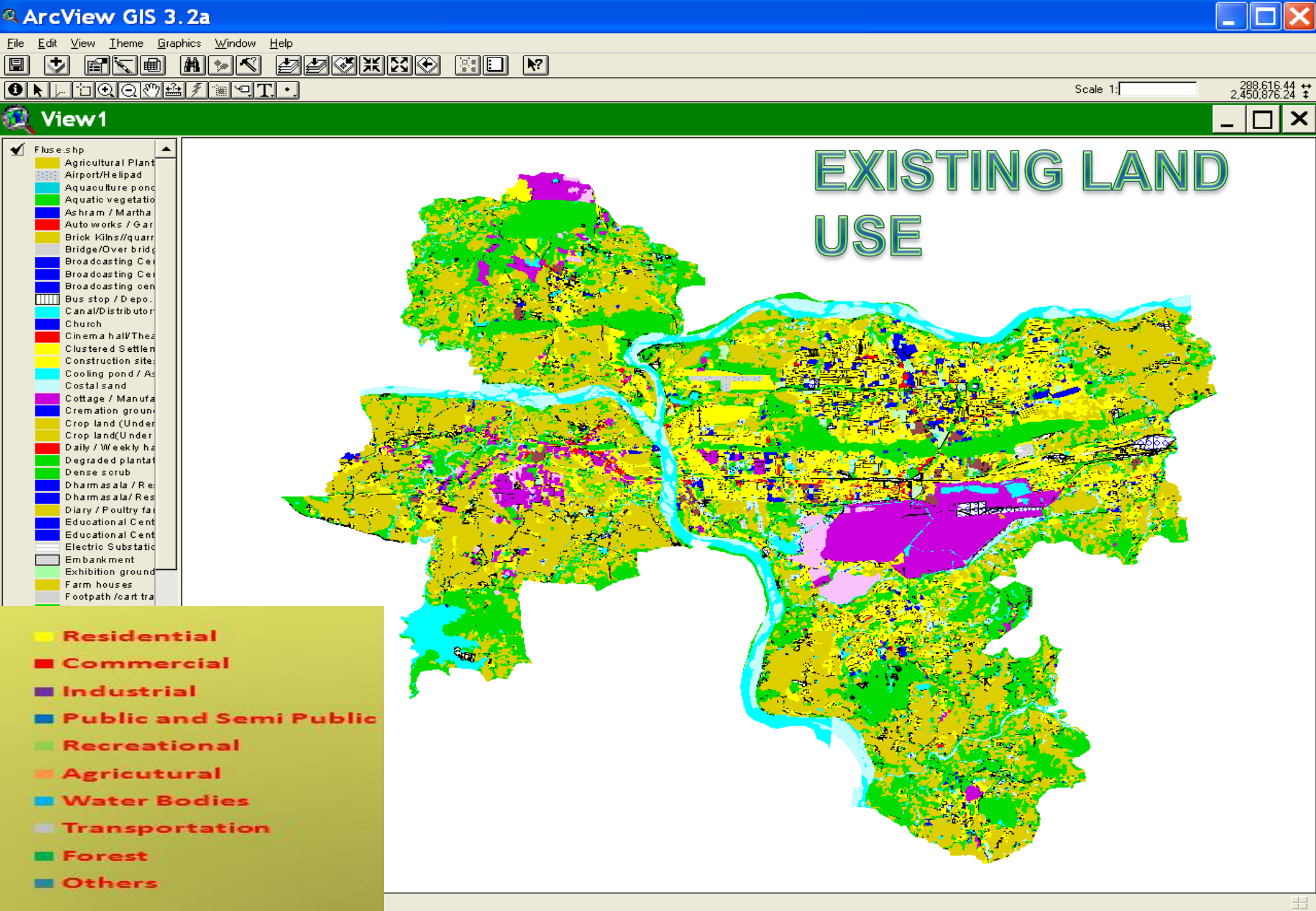






AS PER UDPFI GUIDELINES

LAND USES	AREA (in %)
Residential	35.00
Commercial	4.00
Industrial	10.00
Public and Semi Public	12.00
Recreational	18.00
Transportation	12.00
Agricultural, Water Bodies and Forest	9.00
TOTAL	100.00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Airport/Helipad
Aquaculture pond
Aquatic vegetatio
Ashram / Martha
Auto works / Gar
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Bus stop / Depo.
Canal/Distributor
Church
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EXISTING LAND USE
Residential
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Water Bodies
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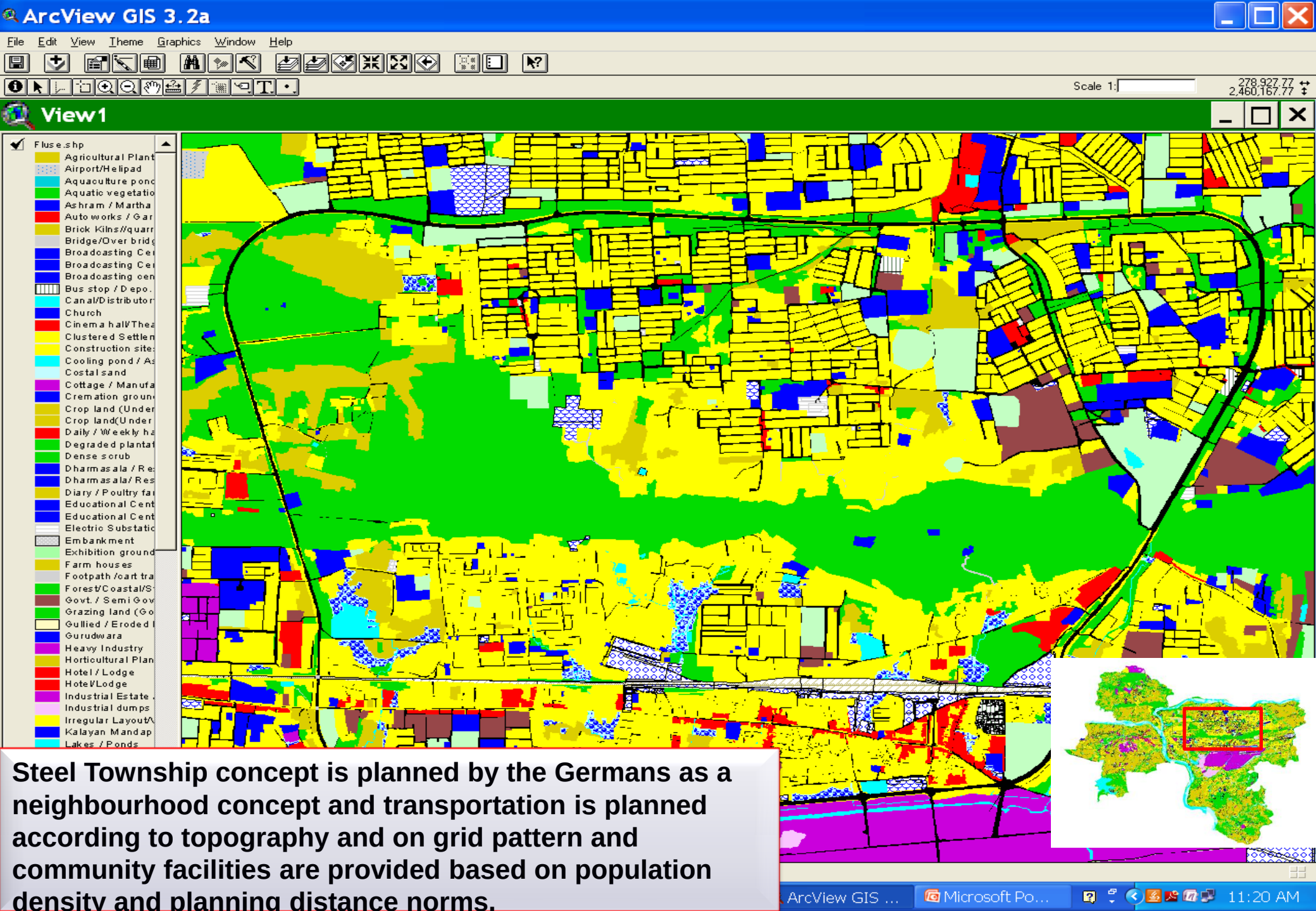
Others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Exhibition ground
Farm houses
Footpath /cart tra
Forest/Coastal/S
Govt. / Semi Gov
Grazing land (Go
Gullied / Eroded
Gurudwara
Heavy Industry
Horticultural Plan
Hotel / Lodge
Hotel/Lodge
Industrial Estate
Industrial dumps
Irregular Layout/
Kalayan Mandap
Lakes / Ponds
Steel Township concept is planned by the Germans as a neighbourhood concept and transportation is planned according to topography and on grid pattern and community facilities are provided based on population density and planning distance norms.
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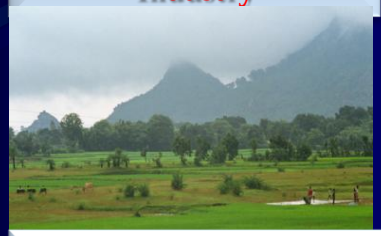
S-W-O-T ANALYSIS

STRENGTHS

Industry



Natural resources

Temples

Handicrafts

WEAKNESS

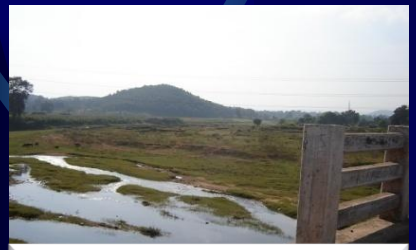
Poor rural

Lack of rural infrastructure

Lack of drainage system

Lack of integration

OPPORTUNITIES



River front development

Local tourism

Cottage &Light Industry

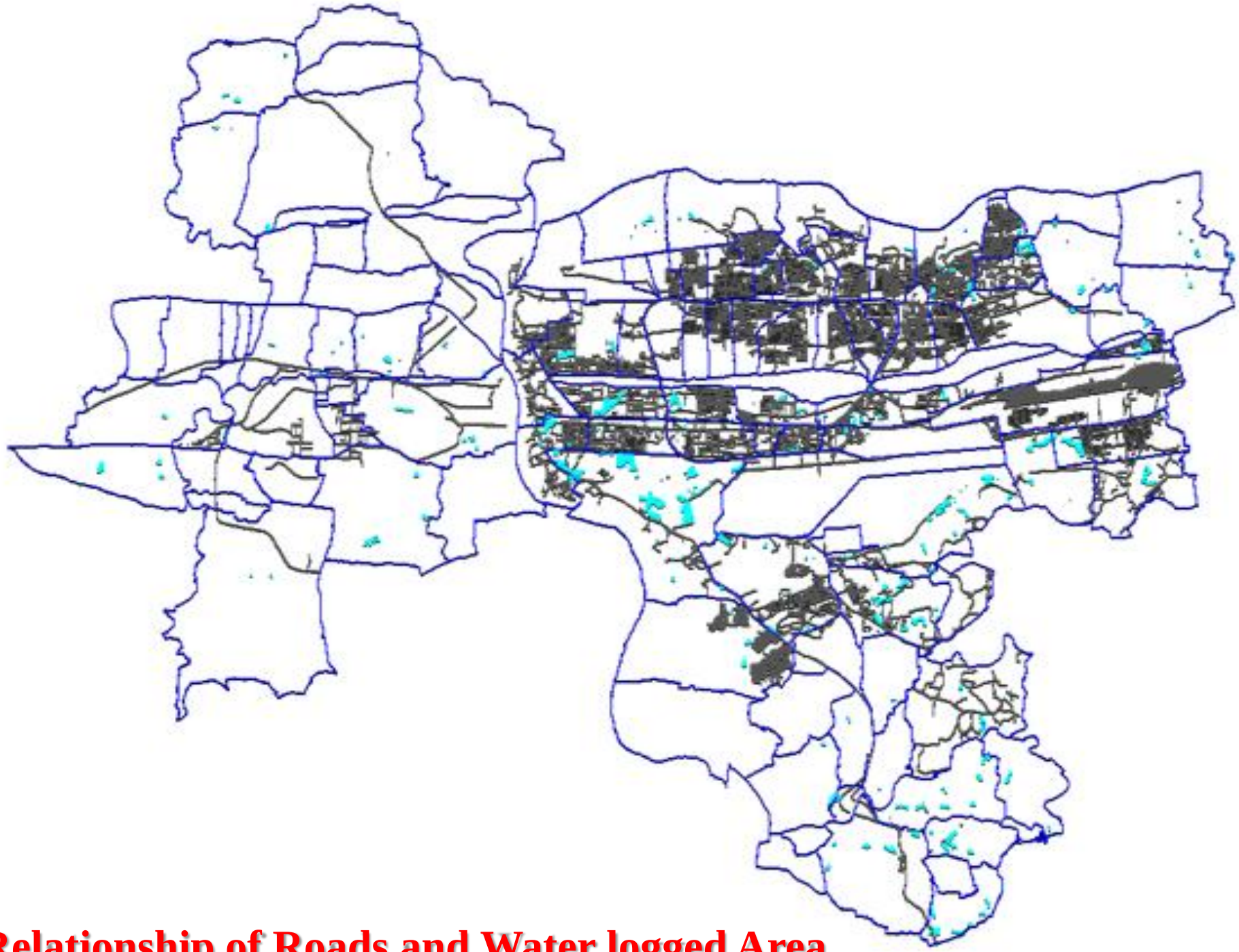
Craft Bazaar

THREATS

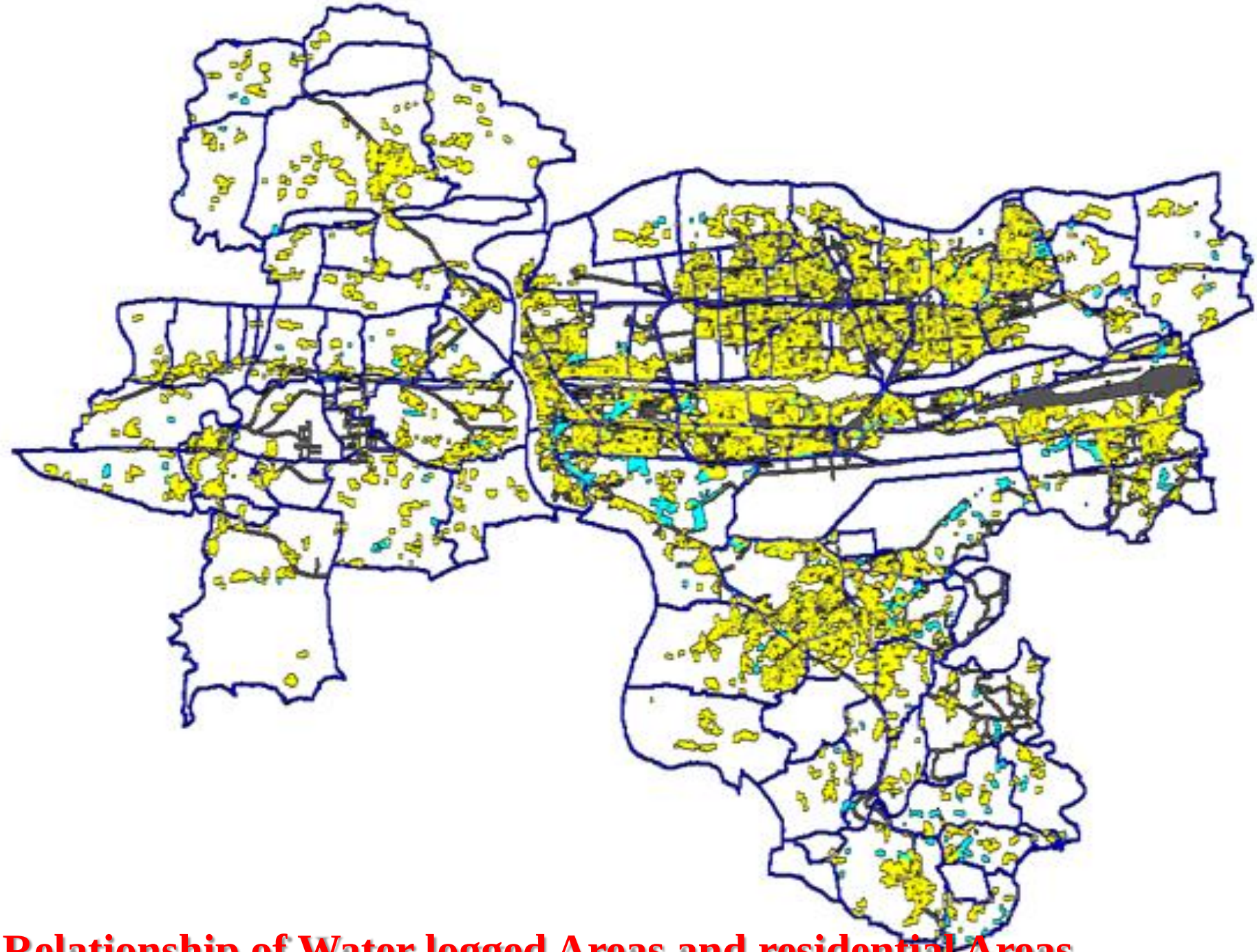
Floods & cyclones

Degradation of soil

Contamination of water



Relationship of Roads and Water logged Area



Relationship of Water logged Areas and residential Areas

FUTURE OF ROURKELA

- Base on existing trends A high growth rate is anticipated, of about 6.9 to 10 percent annually.
- Community and Environmental consideration will increase and this is the challenges to plan Rourkela in a sustainable manner.
- It is expected that the town's role as an Industrial centre will continue to influence community, region and economic growth.
- An increase in migrating population will have a heavy impact on the provision of housing and community services.
- Majority of tribal population is backward this will lead to increase focus on issues like poverty alleviation, tribal land-use right, mitigation of the impacts of Industrial

CHALLENGES

BALANCING DEVELOPMENT

The Town has expressed a desire to balance residential growth with other forms of development, to enable it to be as self-sustaining as possible. One of the main challenges for Rourkela will be to accomplish this goal within the context of a potentially high residential growth rate.

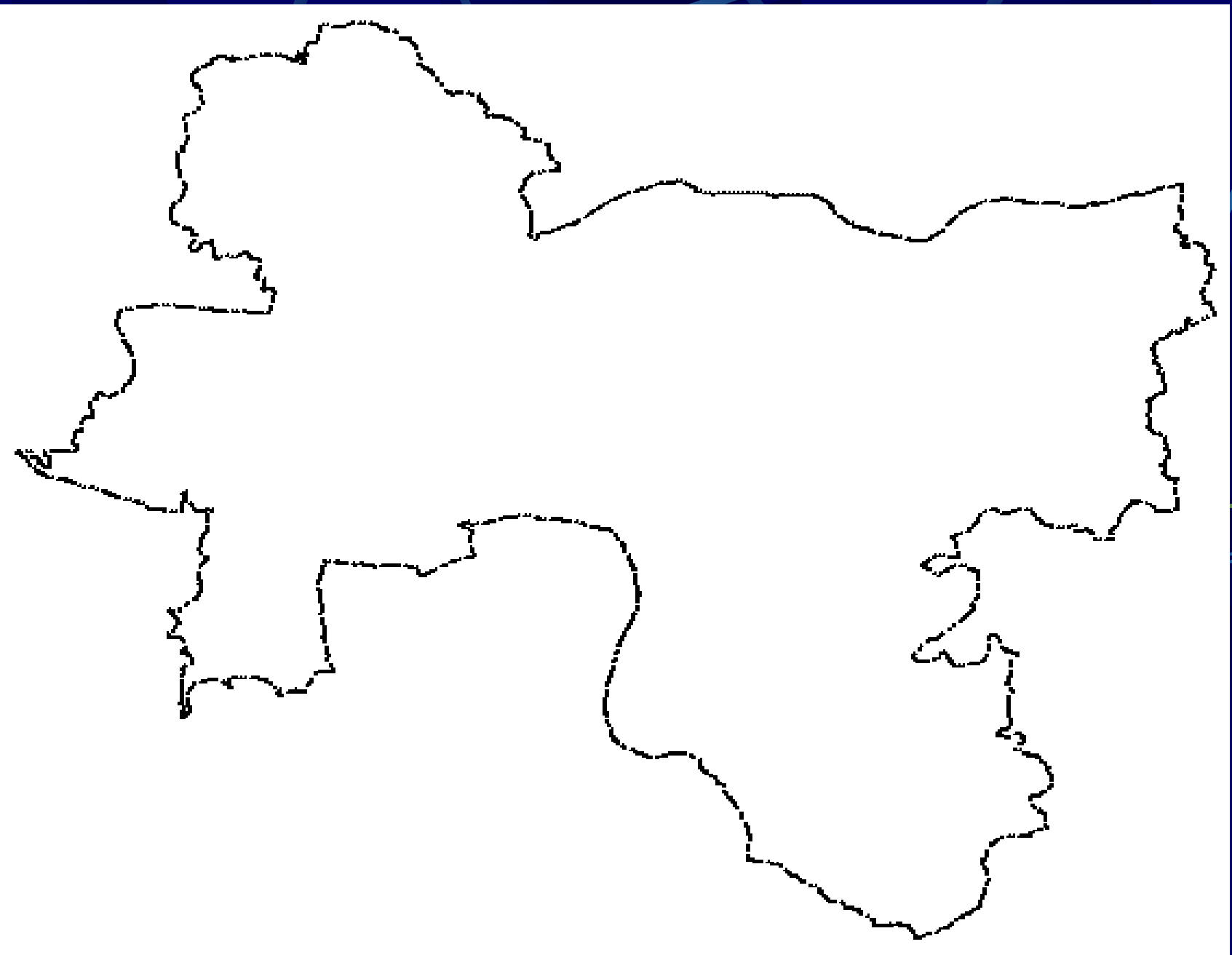
UNITING COMMUNITY MEMBERS

The Town is striving to build a united community, integrating migrated professionals, Industrial worker and tribal communities.

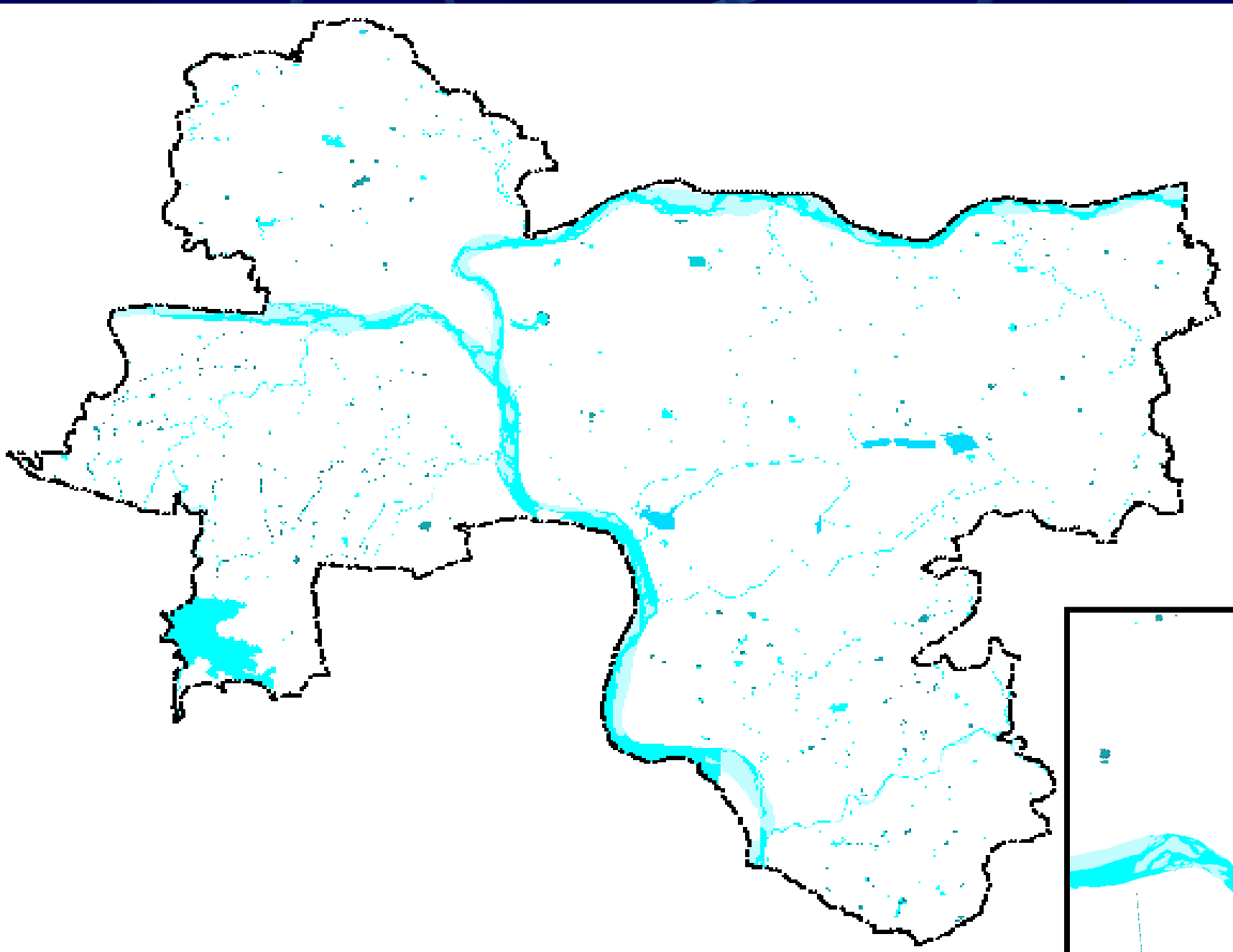
PROVIDING COMMUNITY SERVICES

Another challenge for the CDP is to provide the level of

PROJECT PROPOSALS

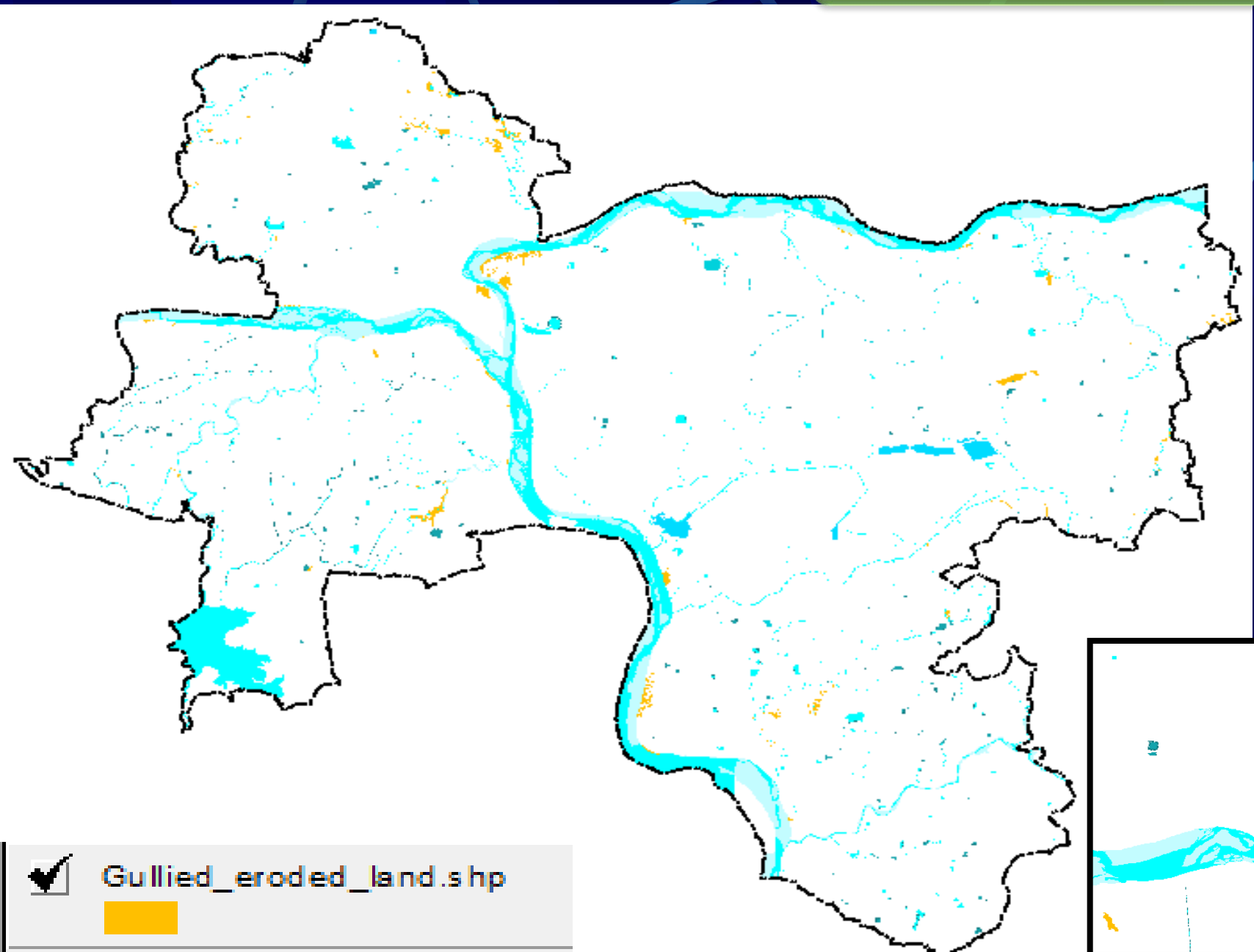


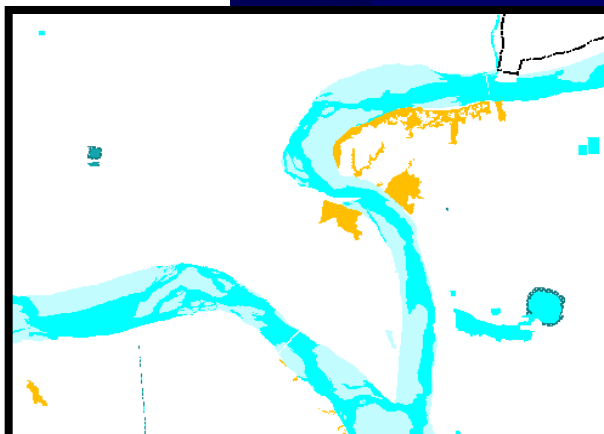
PROJECT PROPOSALS



PROJECT PROPOSALS

Gullied and eroded land is along the river or water channels

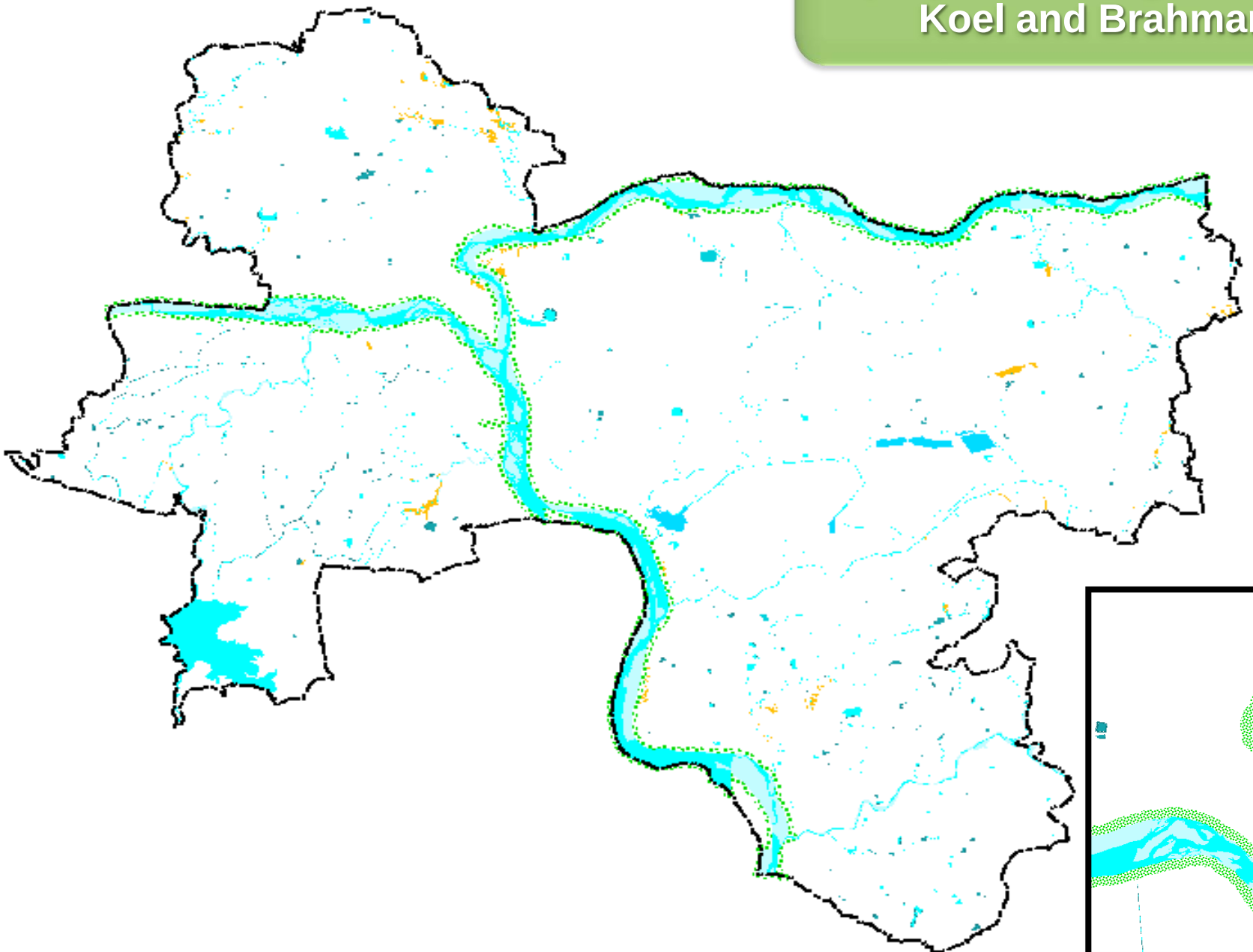




Gullied_eroded_land.shp

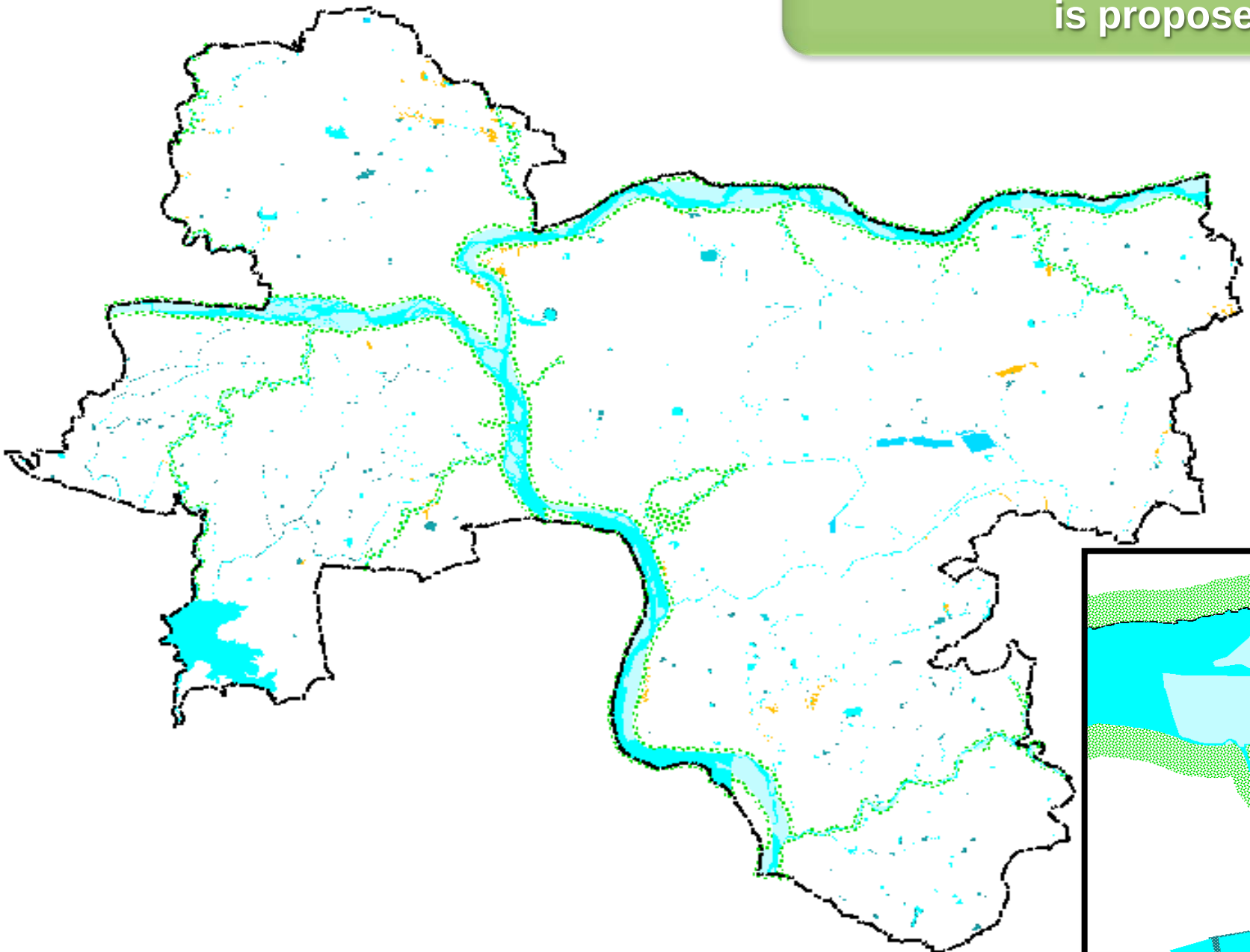
PROJECT PROPOSALS

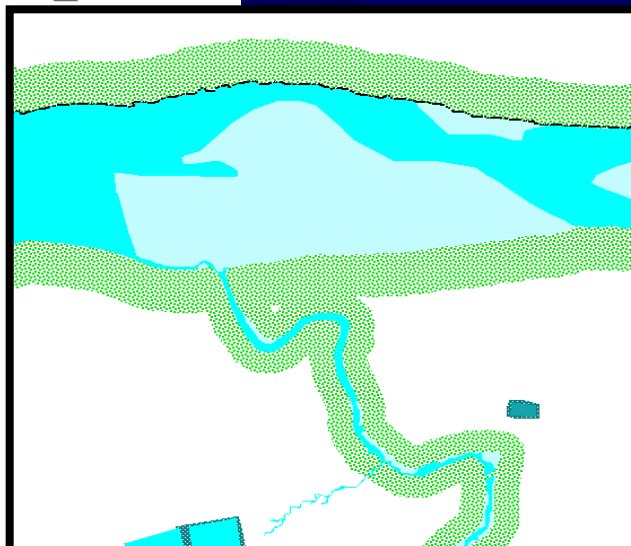
Hence, 100 mt. green buffer zone is proposed along the Sankha and Koel and Brahmani Rivers



PROJECT PROPOSALS

And those rivulet connecting theses major river 50 mt. green buffer zone is proposed

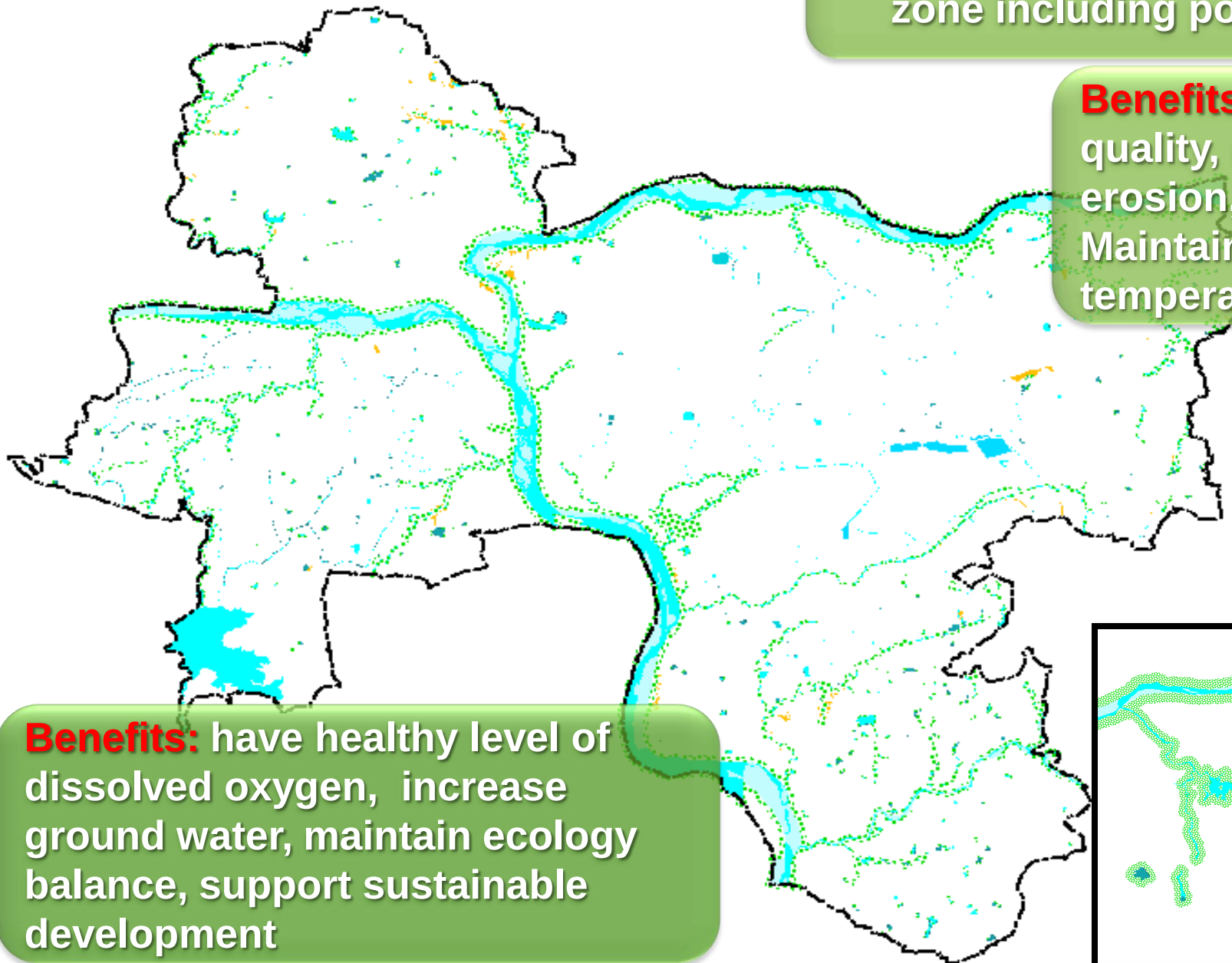


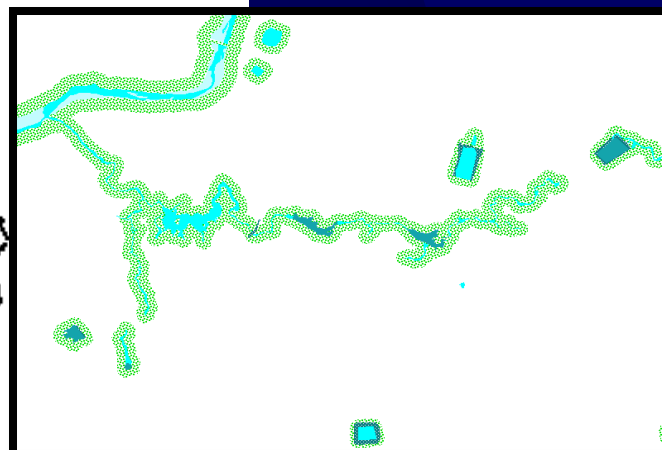


PROJECT PROPOSALS

And rest all other water bodies are conserved with 30 mt. green buffer zone including ponds and lakes

Benefits: Maintain water quality, reduce soil erosion, control floods Maintain cooler water temperature

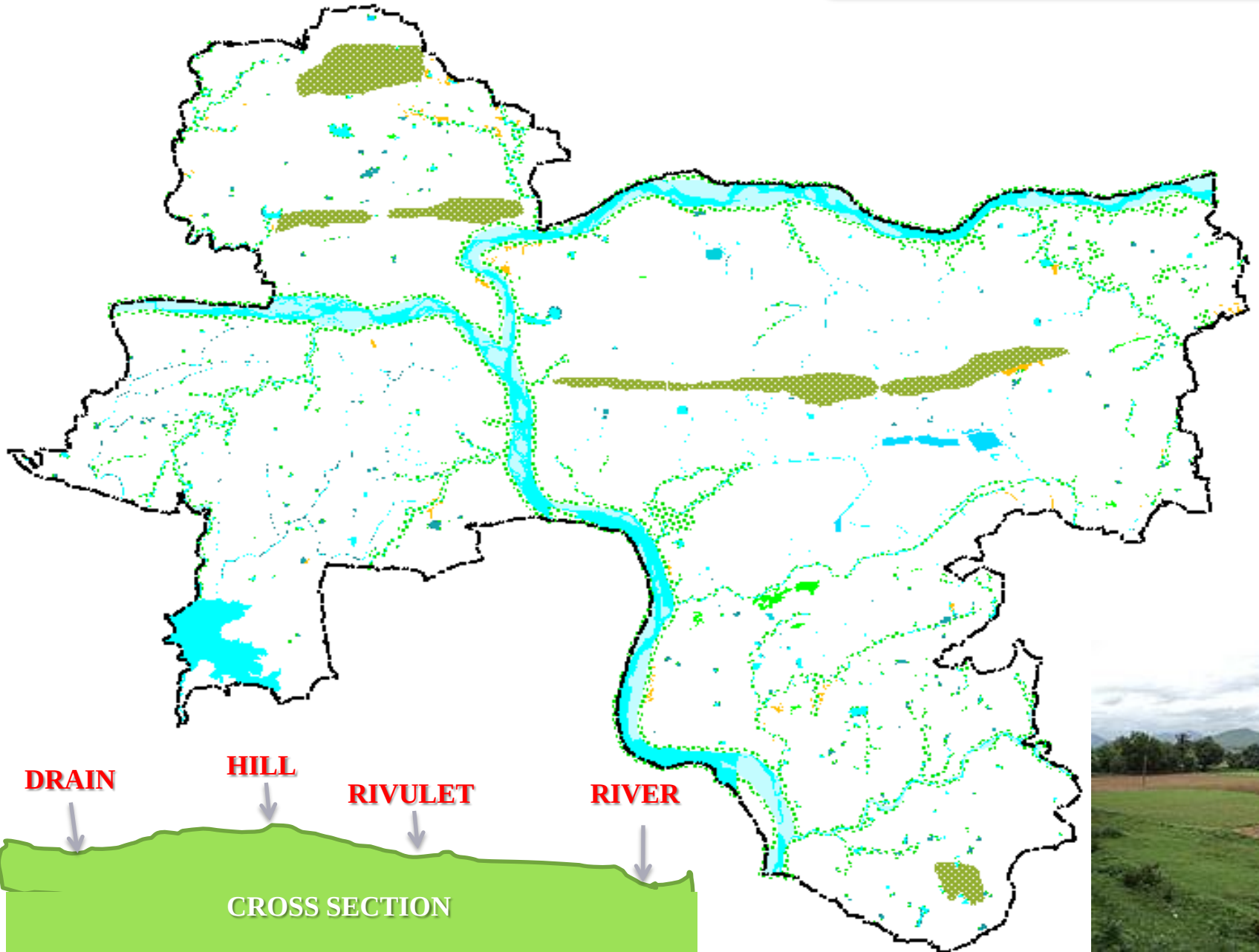




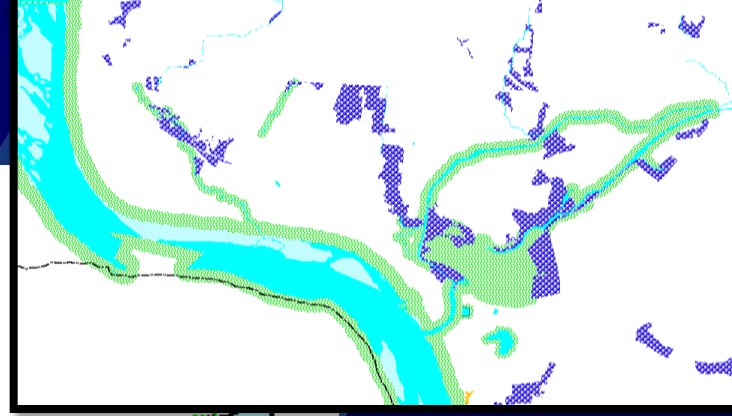
Benefits: have healthy level of dissolved oxygen, increase ground water, maintain ecology balance, support sustainable development

PROJECT PROPOSALS

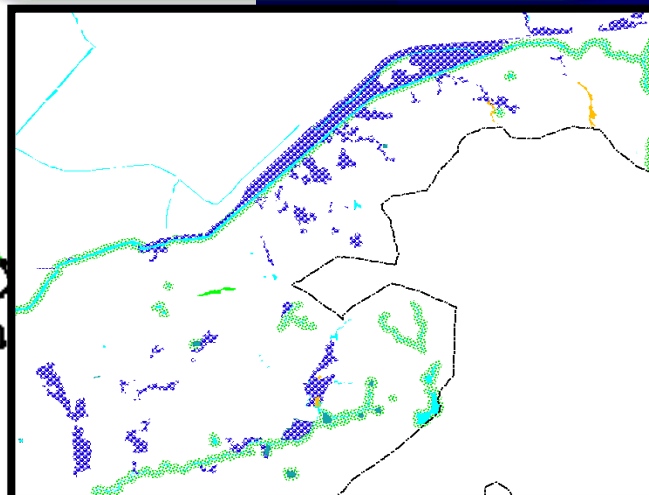
Rourkela is undulating topography



NATURAL WATER CHANNELS

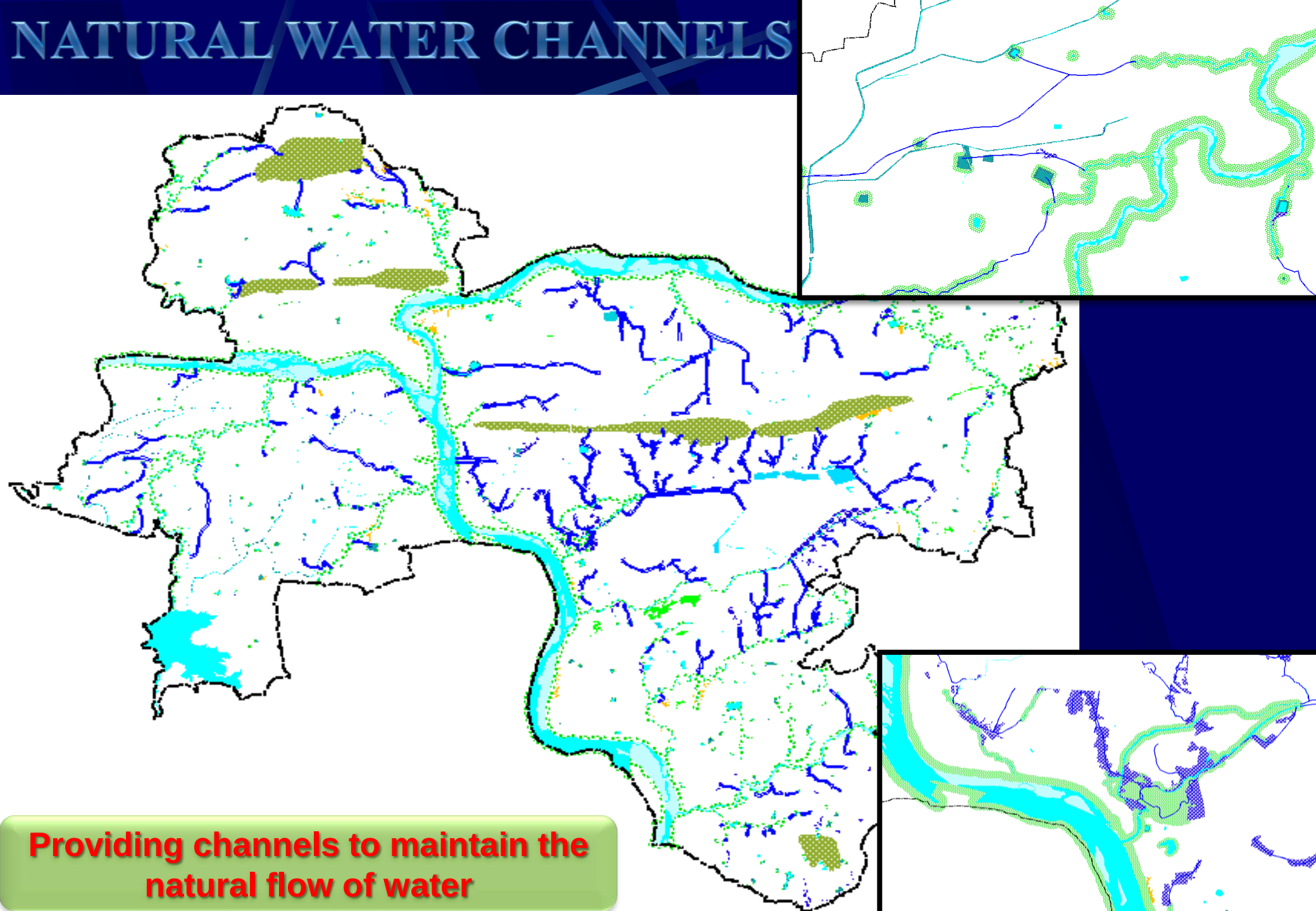


Problems :
Disturbance of natural flow of water, over cultivation, soil erosion, increase chances of floods, property loss, spreading of disease



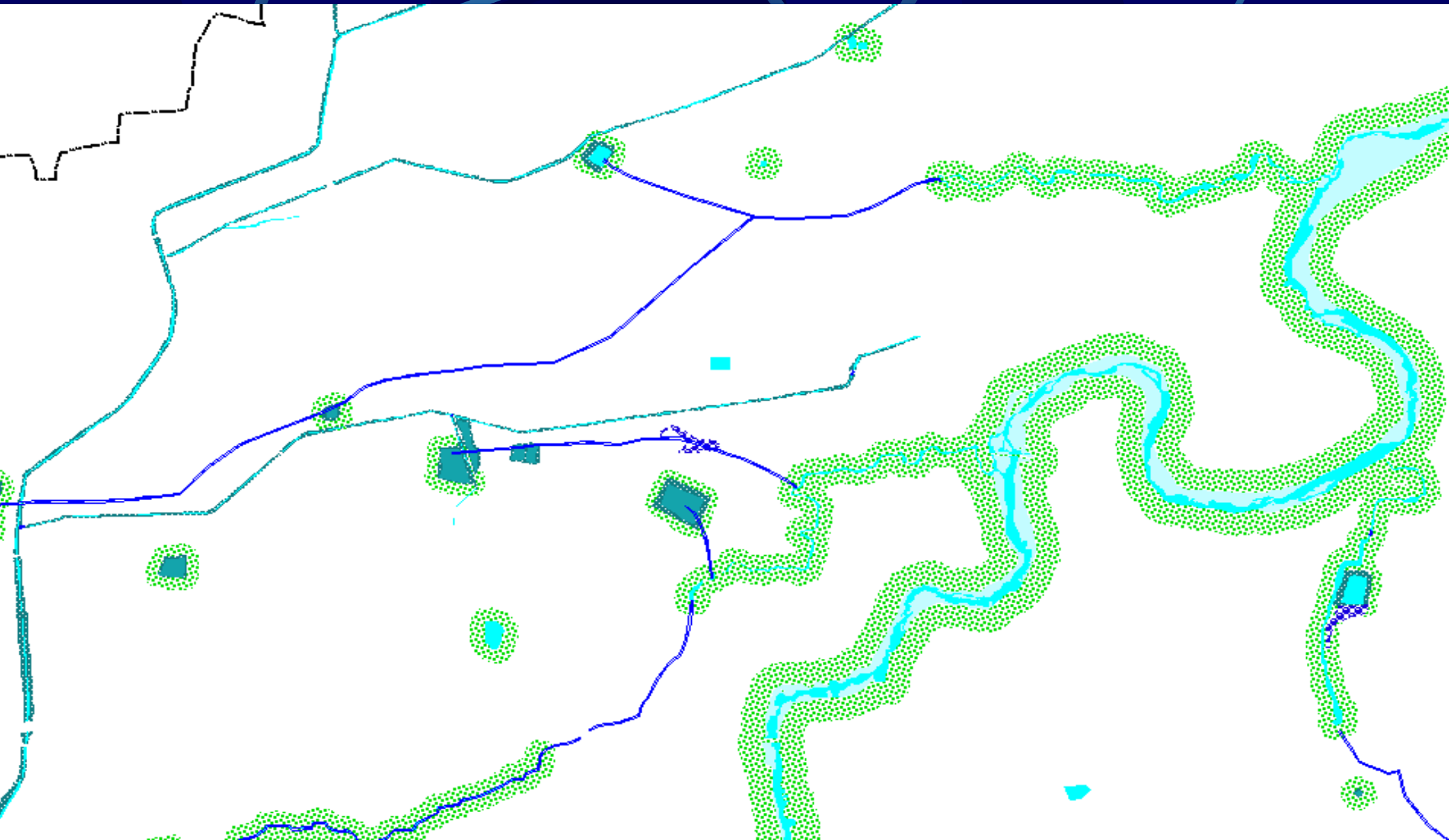
Problems of floods and water logging is predominant in developed area as natural drainage was blocked or not maintained the contours and drainage pattern

NATURAL WATER CHANNELS



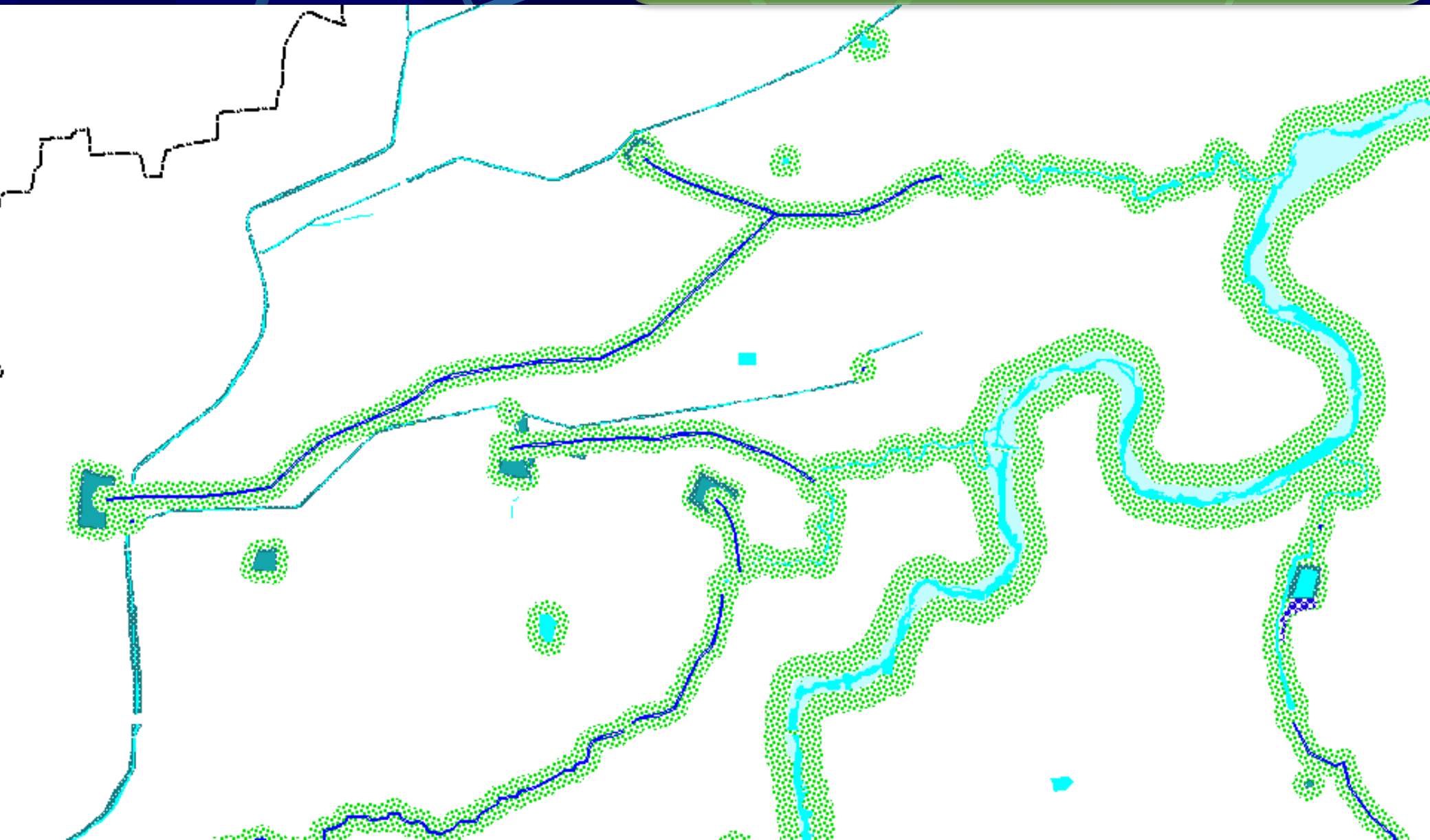
Providing channels to maintain the natural flow of water

NATURAL WATER CHANNELS

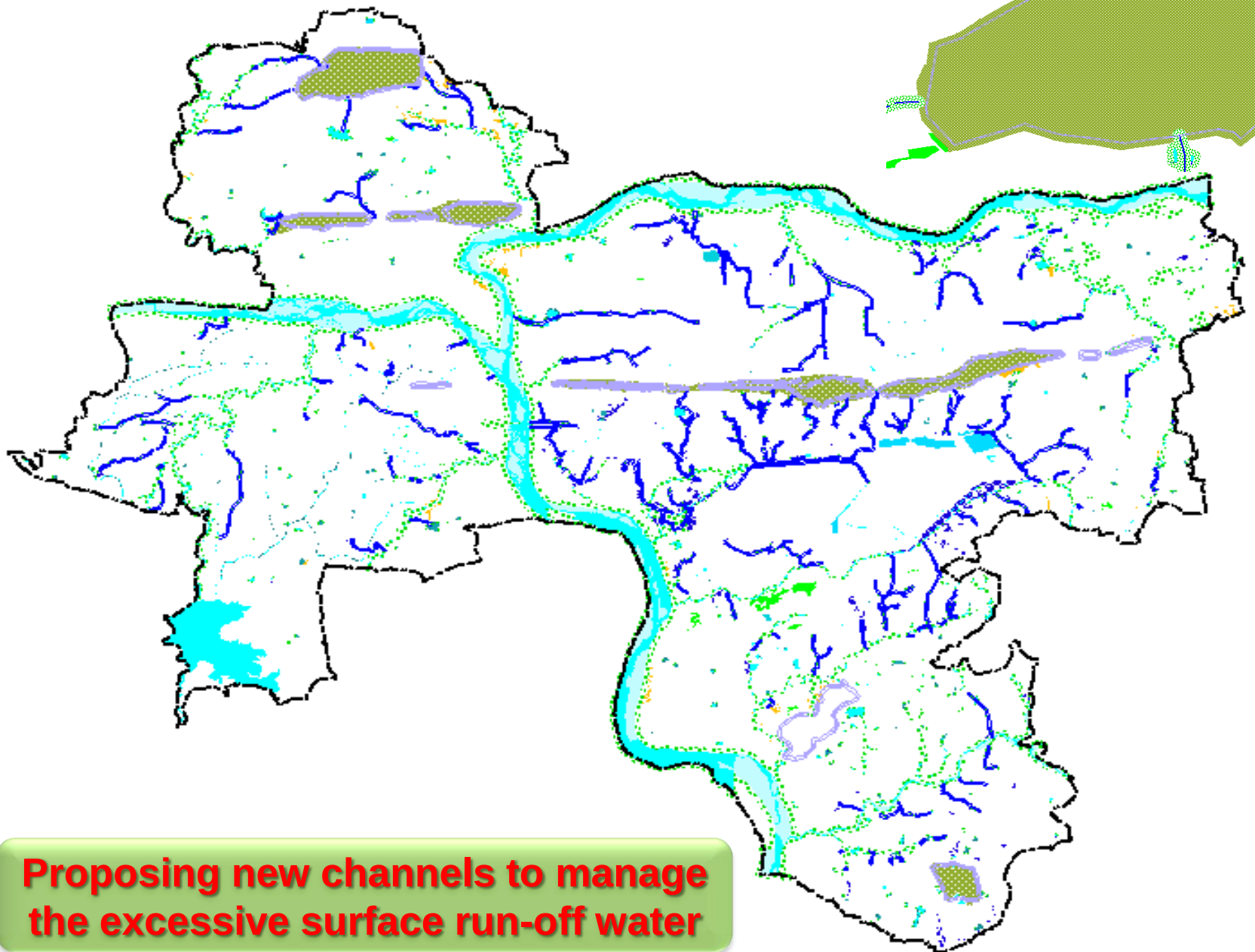


NATURAL WATER CHANNELS

Proposed natural channels are also recommended 30 mt. green buffer zone



NEW WATER CHANNELS

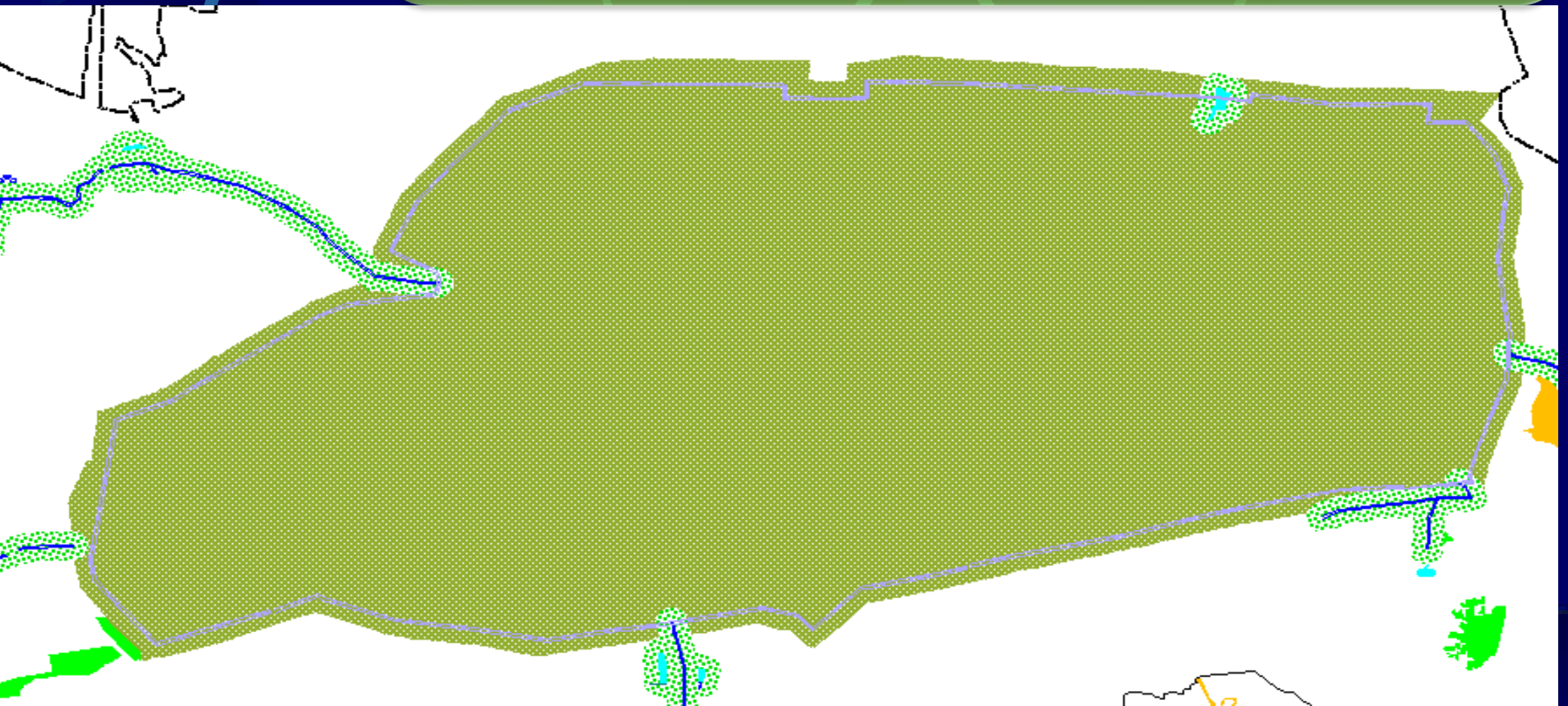


Proposing new channels to manage the excessive surface run-off water

NEW WATER CHANNELS

At the foot of all the reserved forest hills new channels are being proposed so that the water from the high altitude can be incorporated in these channels.

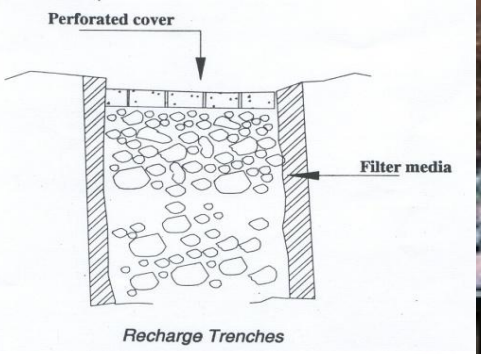
At the same time, it allows for the water to flow in a regulated manner rather than entering the inhabitable area.



NEW WATER CHANNELS

Proposed new channels are also recommended 30 mt. green buffer zone

SOKE PITS

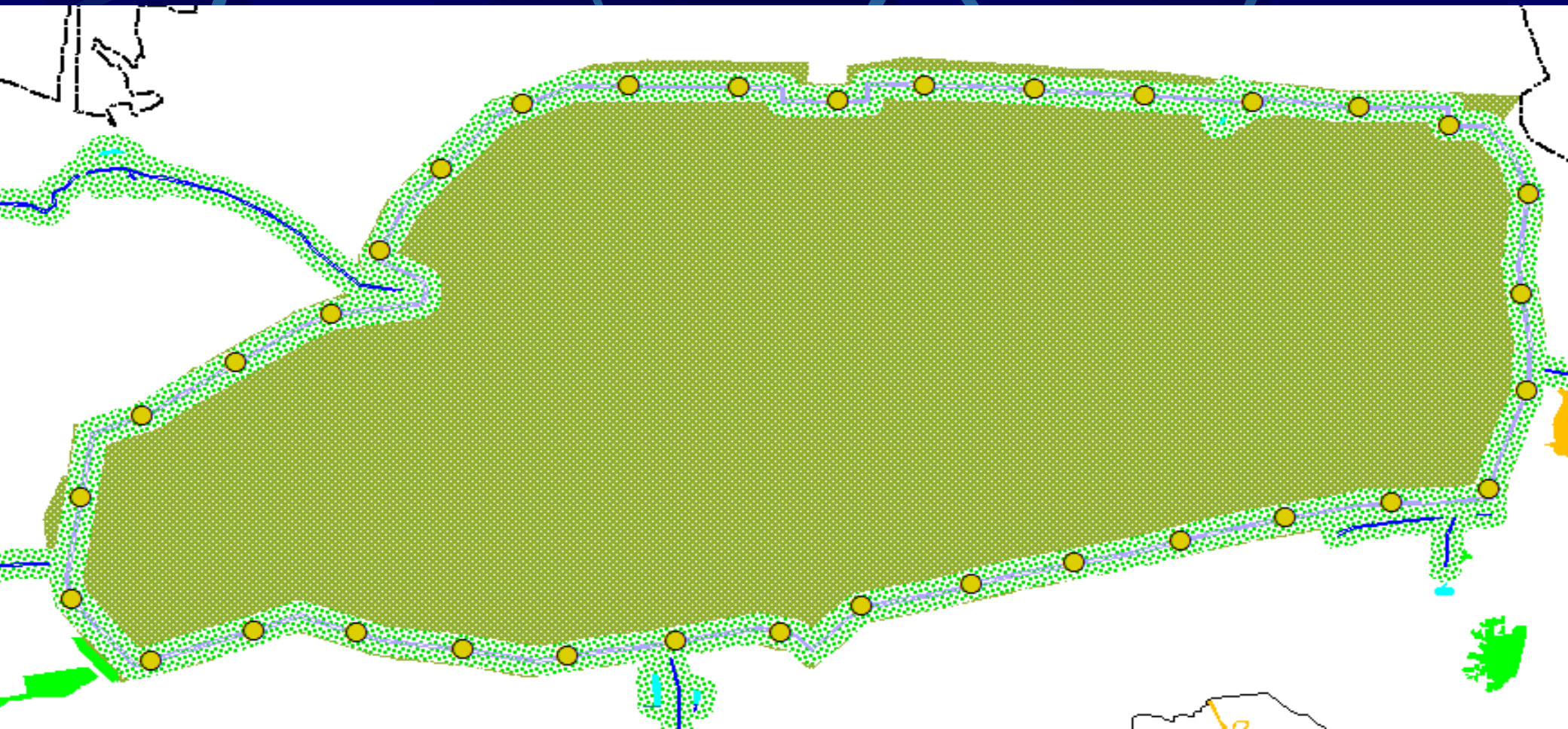


- Planboundary.shp
- Soak_pits.shp
- Proposed_channels.shp
- Buffer 1 of Proposed_channels.shp
- Maintaining_natural_channelt.shp
- Buffer 1 of Maintaining_natural_channelt.s
- Waterlogging.shp
- River_stream.shp
- River_bed___sand___alluvium.shp
- R1buffer.shp
- Organised_water_bodies.shp
- R2buffer1.shp
- Sewerage_drain_stp.shp
- Reservoir.shp
- Coastal_sand.shp
- Cooling_pond_ash_pond.shp
- Aquaculture_ponds.shp
- Canal.shp
- Lakes_ponds.shp
- Tanks_whs.shp
- Embankment.shp
- R3buff1.shp
- Proposed_greent.shp
- Pro nodevelopmentzone.shp
- Rocky_stony_waste.shp
- Open_forest.shp
- Gullied_eroded_land.shp

soak pits at a regular interval of 200 mt .

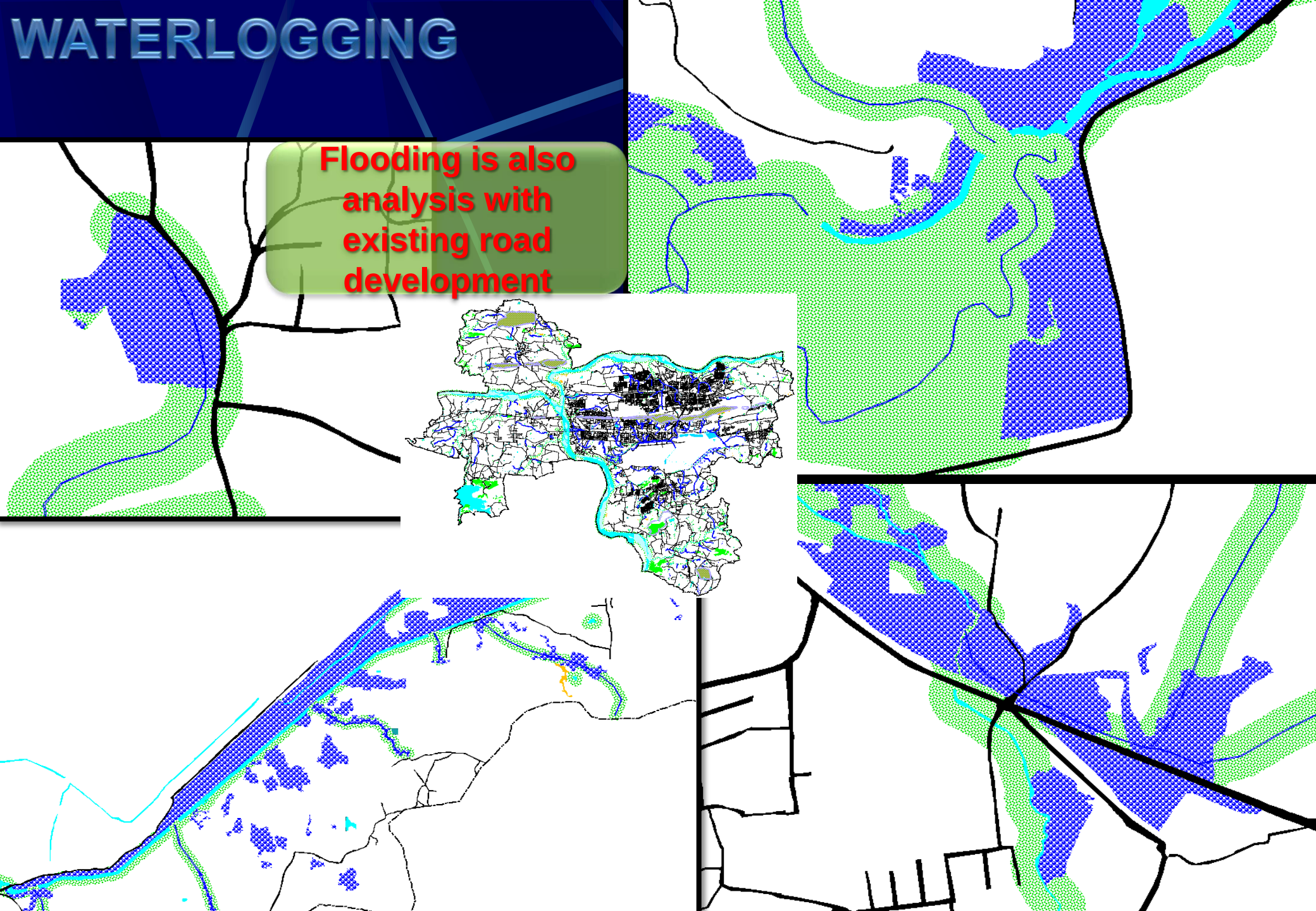
SOAK PITS

These new channels shall be equipped with soak pits at a regular interval of 200 mt. So as to allow the water to percolated down to the ground and enhance the groundwater table.

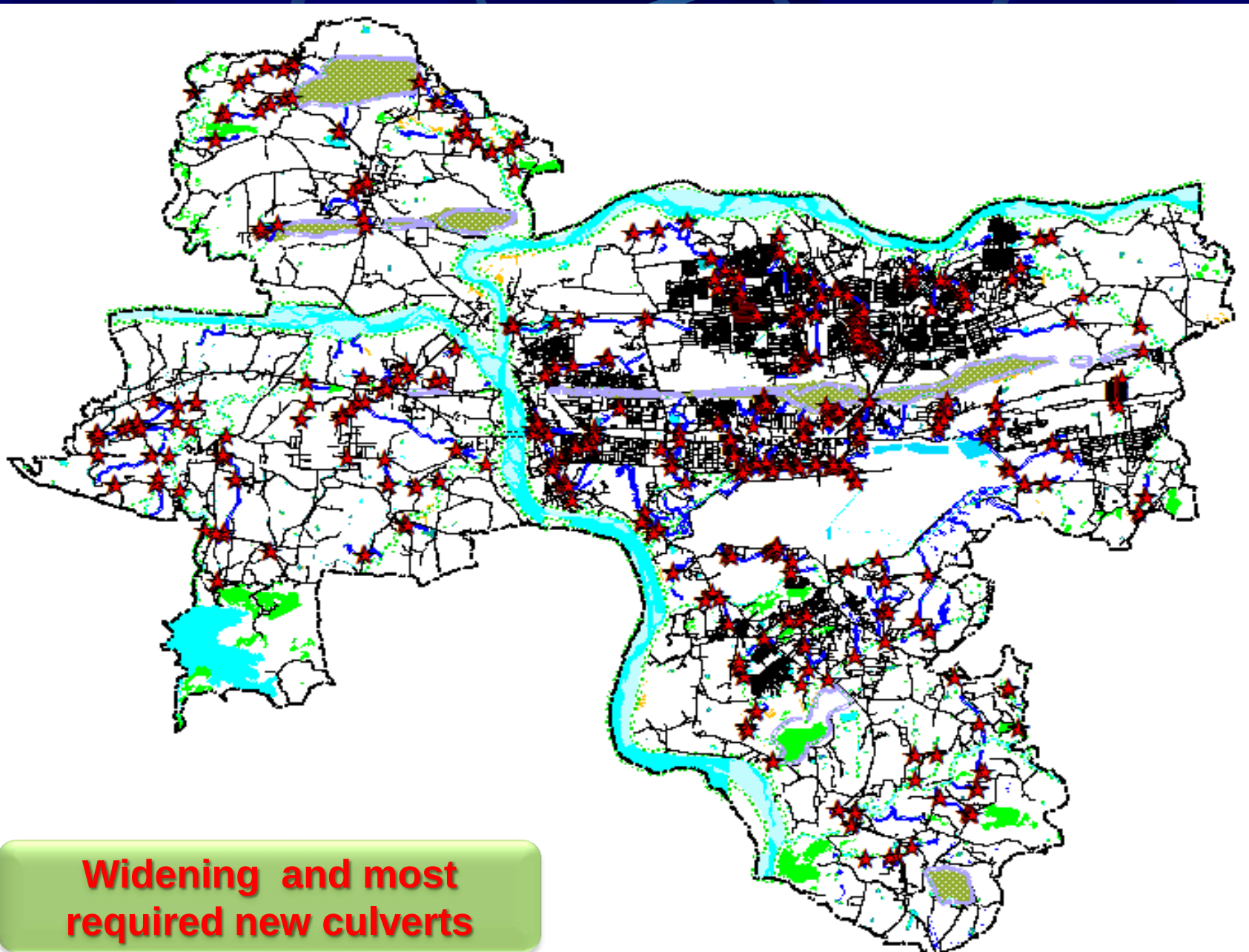


WATERLOGGING

Flooding is also analysis with existing road development



CULVERTS

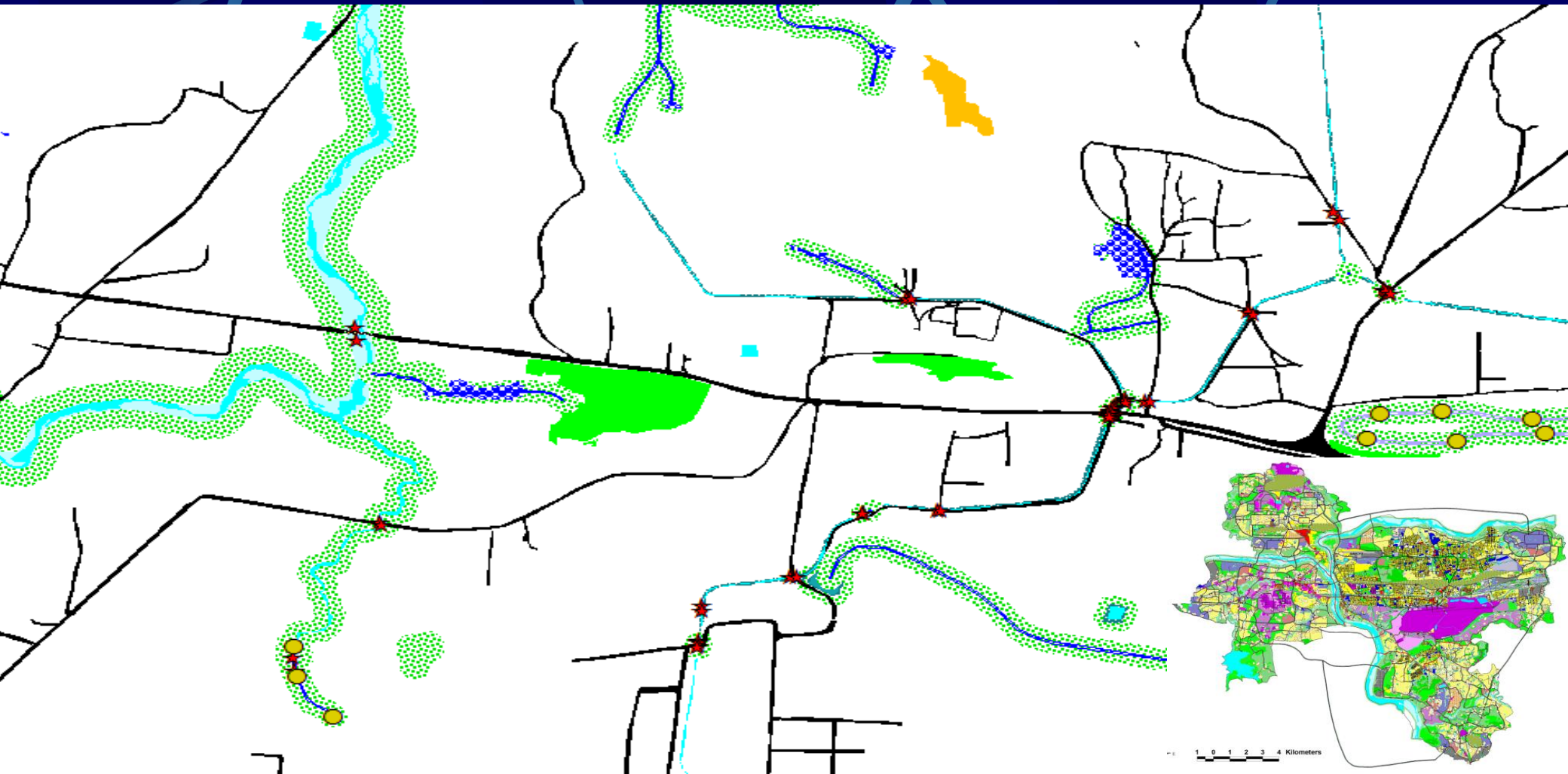


Widening and most required new culverts

CULVERTS

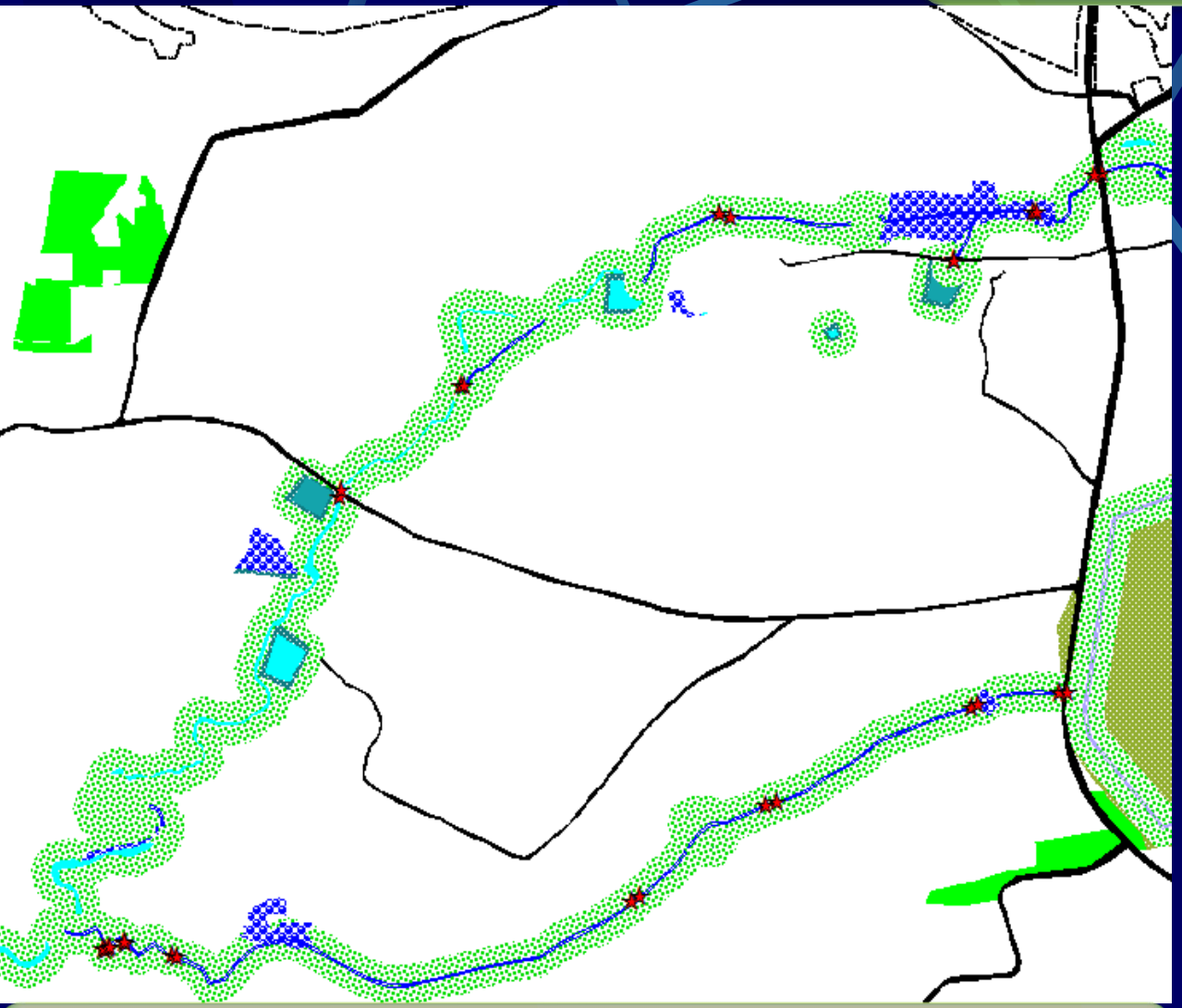
Culverts and their width need to be checked at all places wherever they are provided in order to ensure smooth flow of water.

Also, some new culverts have been proposed either in accordance with the proposed new channel or to maintain the natural flow

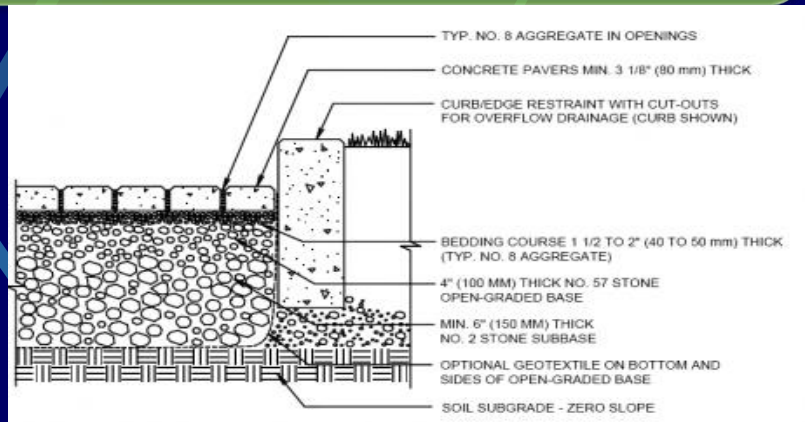


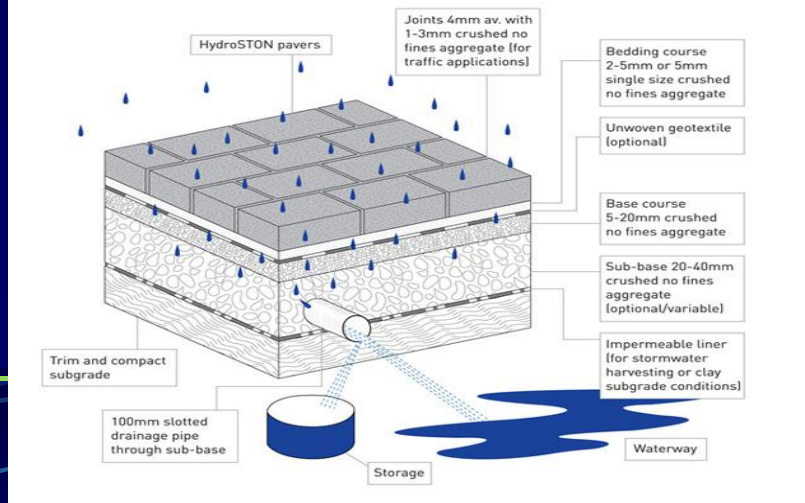
PERMEABLE PAVEMENTS

Reduce runoff by providing permeable pavements for footpaths and parking areas.

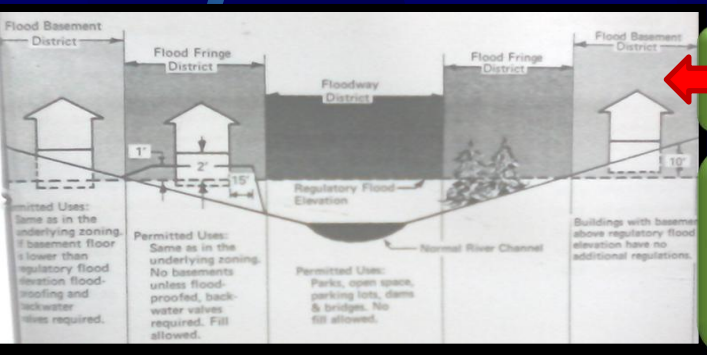


Interconnecting ponds in the path of natural drainable system



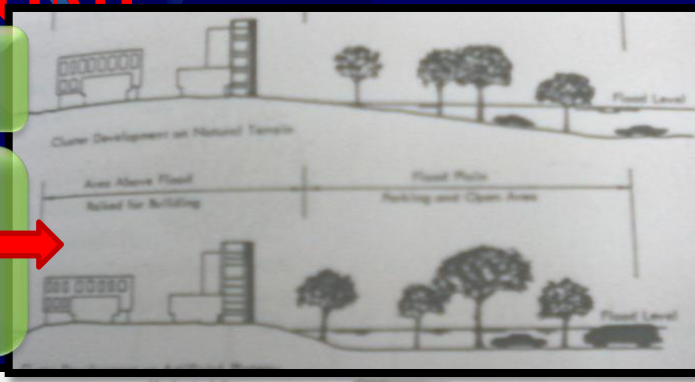


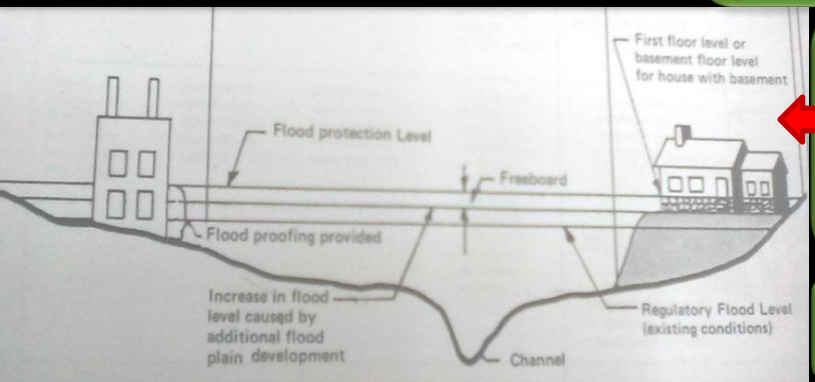
SUSTAINABLE LANDUSE CONCEPT



Identification of flood zone

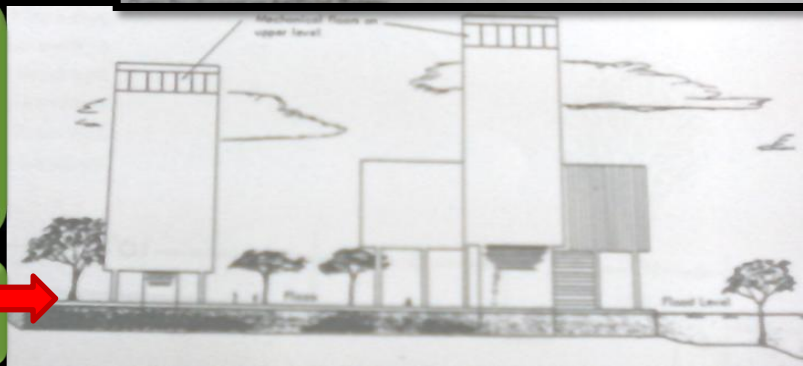
Raised built-up area and lower area used for parking and forest





Raised ground level or building use

Raised buildings



DEVELOPMENT CONCEPT

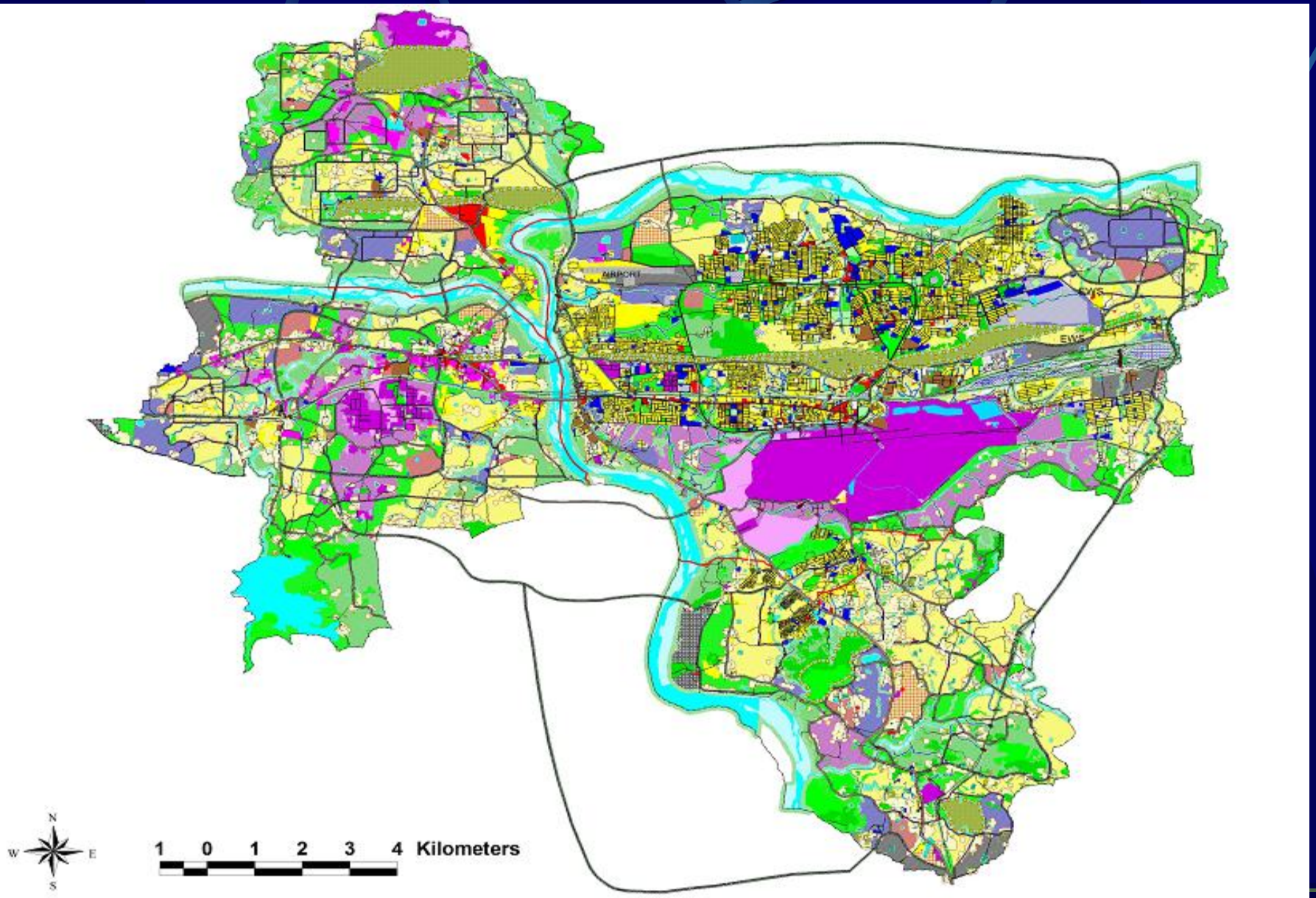
Knowledge core:
Spiritual, technical, e nvironmental, conne ctivity

Rest middle:
connects knowledge core and working periphery

Working Periphery:
Places of work

Leading outward movement of places of work and inward movement for place of rest and leisure

PROPOSED LANDUSE



ROURKELA COMPREHENSIVE DEVELOPMENT PLAN 2031

E-SOLUTIONS FOR ROURKELA

Basically Rourkela is facing more urban challenges to making a success of the application of smart and sophisticated technologies in social terms because:

- International competitiveness of business community
- the reaction and aspiration of local tribal community

E-SOLUTION MODEL for Rourkela city ICT enabled Smart e-governance will improve the efficiency of RDA for service delivery, leadership, process alignment, availability of right skills, designing, planning and enforcing sustainable land-uses, establishing a high end state of art computer lab and a participatory responsive local community.

With a strong tribal community, a single and understandable" Smart E-governance Model" will not serve the purpose of socializing the Rourkela Urban Community

Social boundaries go beyond the smart physical planning process and web 2.0 technologies.

Therefore a "Smart E- Solution Model" needs to be framed through collective intelligence, social intelligence and wisdom of local urban community.

Crowd wisdom –a collective intelligence system will be evolved out through Web 2.0 technologies and RDA Planning perspective E-solution Platform

.

Interactive applications will be evolved through web 2.0 technologies in RDA planning perspective E-Solution Platforms.

The E-solution Model will be presented to the aspirants industrialists and the local tribal community by service delivery, smart traffic management system, smart planning process, smart approval by Government authorities and smart people participation.

It has three components: Innovative technologies (hard and soft); second: local community
(leadership, responsive, intelligent and creative thoughts) third, government policy, rules, governance, political will etc.

Basically integrating a social system with physical

The digital platform will act as Rourkella city system for the entire city complemented by sub systems like smart transportation system, smart e-governance system, smart water management system, smart infrastructure system, smart creative community development

Rourkella city system will be based on input output model for measurement of sustainable development and quality of life

In the subsequent year after the installation of this system, the success can be measured and it will be transform, repair and redesign on the basis of collective intelligence through the acting players.

The physical planning concept of Comprehensive Development Plan is reflected in three interlinked layers

First the knowledge core layer , Second the resting Middle layer, Third Working periphery layer which will be designed for the growth of the economy whereas inward movement of traffic will lead to enhancement of social connectivity an inner peace.

Therefore, in the physical planning process the design of CDP the town will provide a social ad knowledge sharing space for local community participation and inclusions and to react in digitally created platforms

E-solution model will incorporate crowd sourcing model and the wisdom of crowds will provide effective solution for collective decision making and implementation process.

SUPPORTIVE TECHNOLOGIES FOR SMART SOLUTION MODEL

Web 2.0 technology through participatory web application over the digital platform does disseminate information, social inclusion of the local community, provide transparency to the governance system through interoperability of the urban planning.

Moreover all unconventional data, irrespective of its source which are geo located can be used for planning system

CROWD SOURCING WEB 2.0 TECHNOLOGIES FOR SMART E-SOLUTION MODEL

Lead to collective intelligence at all stages of the planning and thereafter creating web based solution to comply urban problems

- Identification of Problems
- Defining goals
- Collection of data
- Analysis of data
- Designing solution
- Implementation of the plan
- Monitoring of plan
- Evaluation of plan

Identification of Problems : Local community will communicate the problems over digital format and give the responsibility to disseminate the knowledge for different perspective of problems.

Defining goals: Creating a collective response over defining a goal and recording local community ideas to translate into the future design of the city by solving the problems and giving direction to the city development.

Collection of data : the process of data first compounded through unconventional sources through identification of the intelligent crowdsourcing and creating crowdsourcing information platforms. Mobile and internet alert applications software should be put in place for reporting and collection of data.

Analysis of data: Collective resources information generated by the Crowdsourcing information platforms should be connected with the different analysis computer models and translating the results for crowd computing. Local community should be mobilized to analyse the solutions of the problems and concluding the solutions over technical controlled but transparent platform.

Designing solution: Crowdsourcing should be encouraged to create designing solutions over online mapping and defining the content of the plan for creation of virtual plan.

Implementation of the plan: Implementing virtual plan over real space will give pride and social satisfaction to the local community and even come forward with innovative ideas for fund raising.

Monitoring of plan: Crowdsourcing Monitoring platform will provide easy access to the monitoring information and recording online efficiency of the concerned agencies.

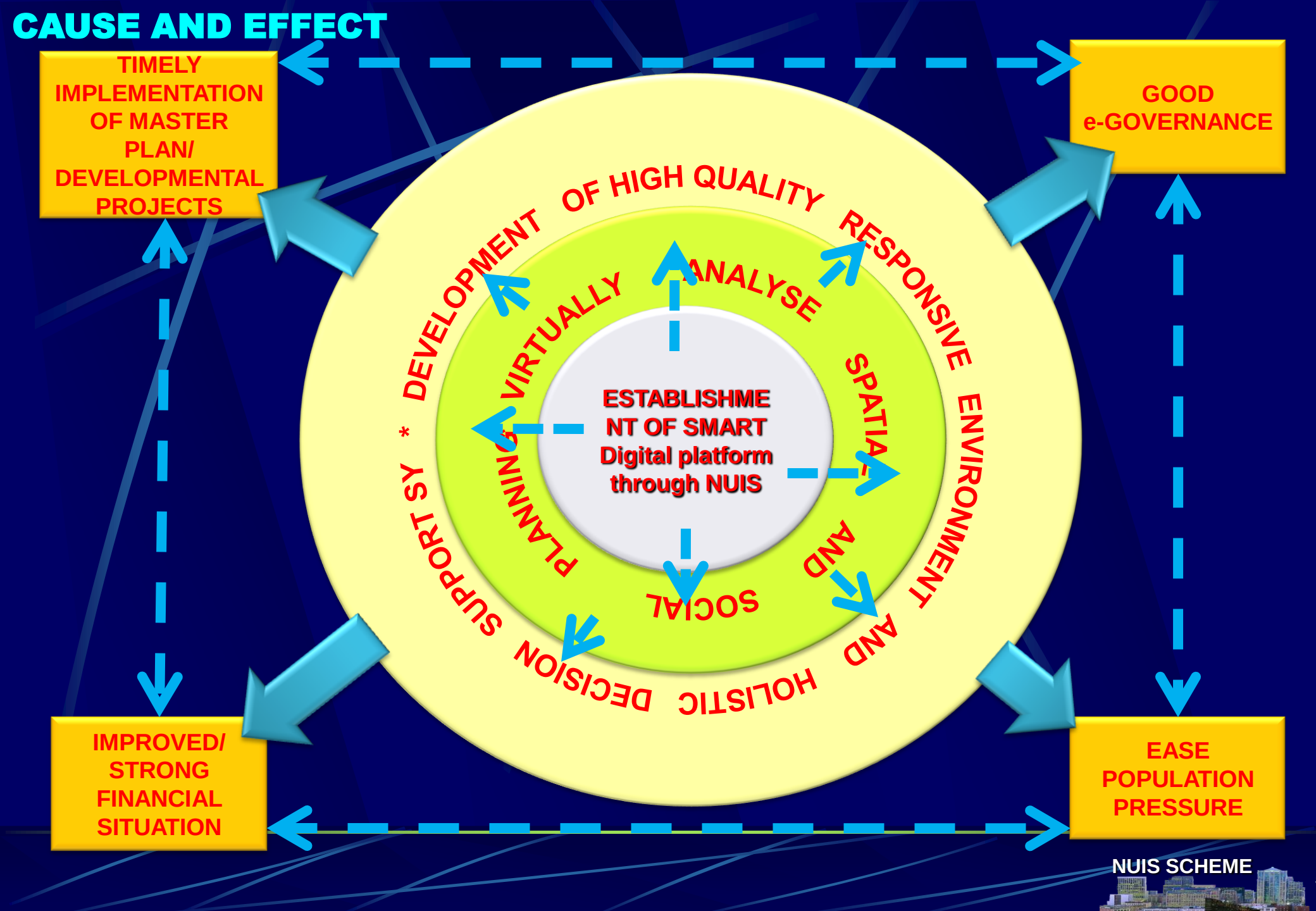
Evaluation of plan: Evaluating Performa in relation with the plan should be displayed on the Authority web site for public reaction to the plan.

Overall designing a Smart E- Solution Model for Urban and Regional Planning will reduce planners dependency on time and space and over a period of time will transform the traditional planning process over virtual planning process for defining smart sustainable solutions for participatory, transparent Urban Planning

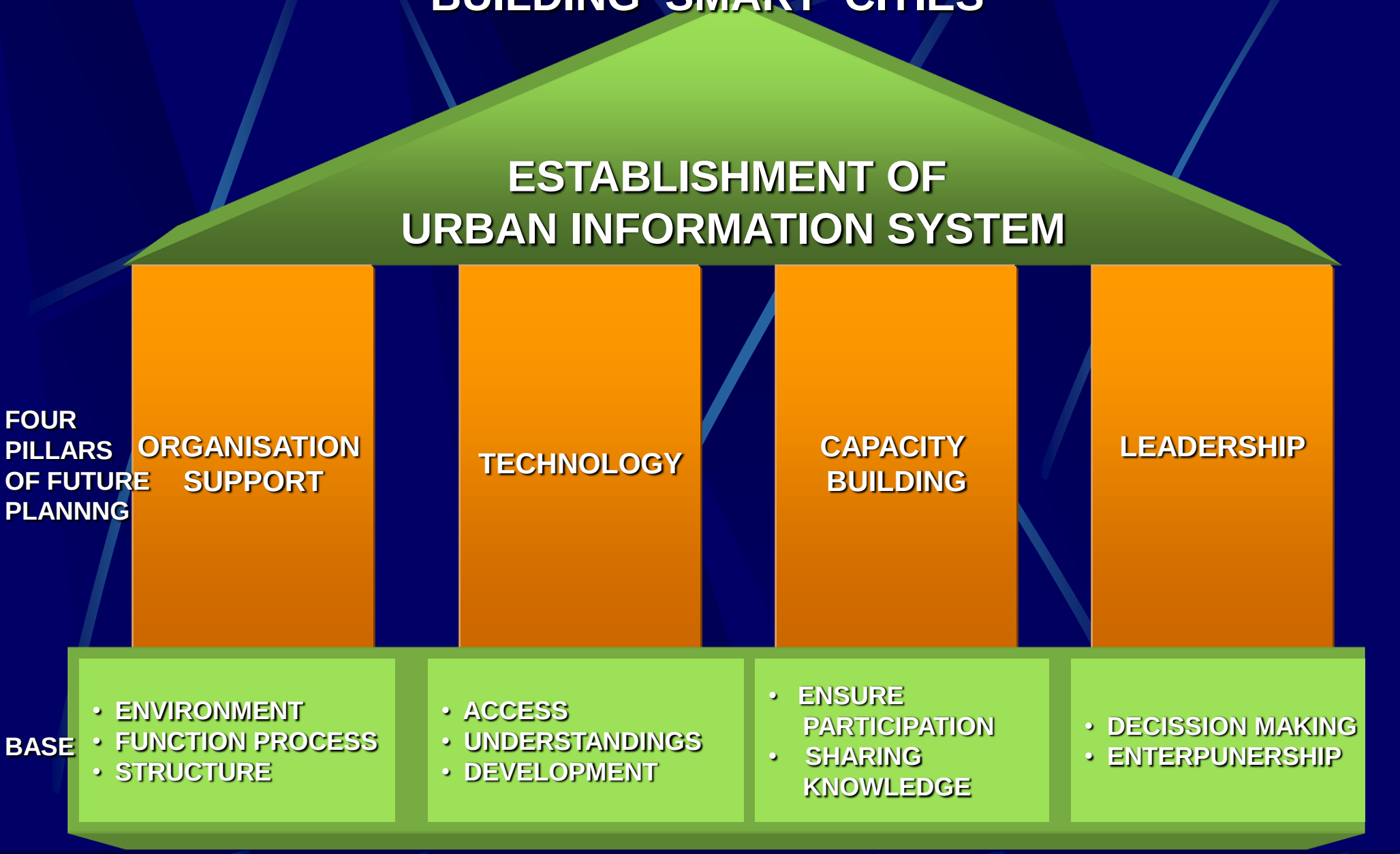
It will ease out new challenges and opportunities for urban planners and managers to design the valuable dreams, ideas and hope to urban communities and translate into the spatial terms.

This paper will thread common ground to address problems and issues in the right perspective and produce high quality responsive environment and demonstrate successful sustainable urban solution for implementation of Smart Comprehensive Plan through Smart E-Solution Model.

CAUSE AND EFFECT



BUILDING SMART CITIES



THANK YOU