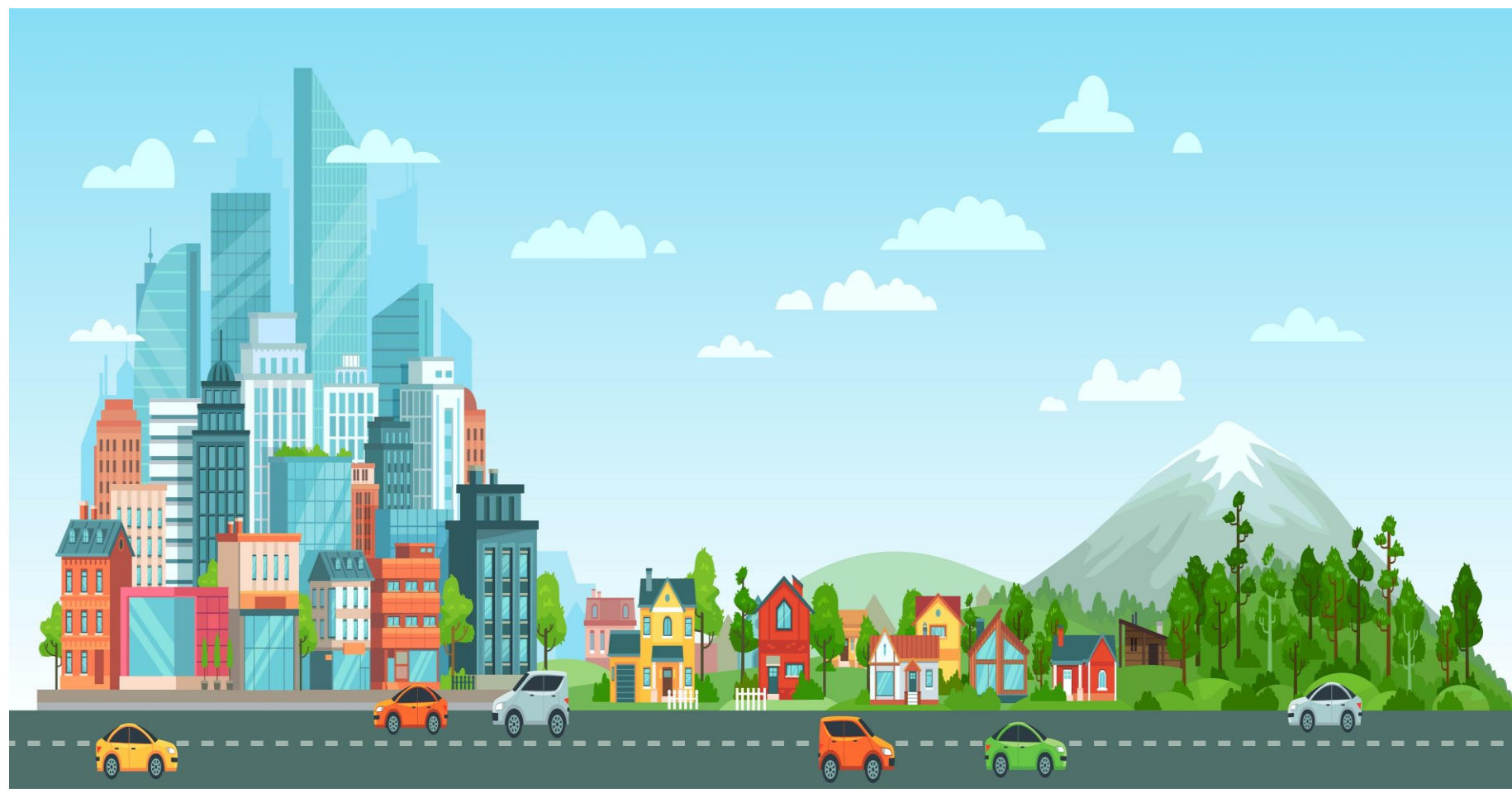


ENVIRONMENT

PROPOSED PLANNING STRATEGIES

Group Member:

Aatish Kumar
Harshit Panchal
Vemulakonda Poorna Venkata Manikanta



"A healthy and sustainable environment represents a balance between human activities and natural features and functions. In order to attain this balance, it is essential to manage development in a manner that recognizes the environment as the basis of a safe, caring and diverse community and a vibrant economy."

AIM

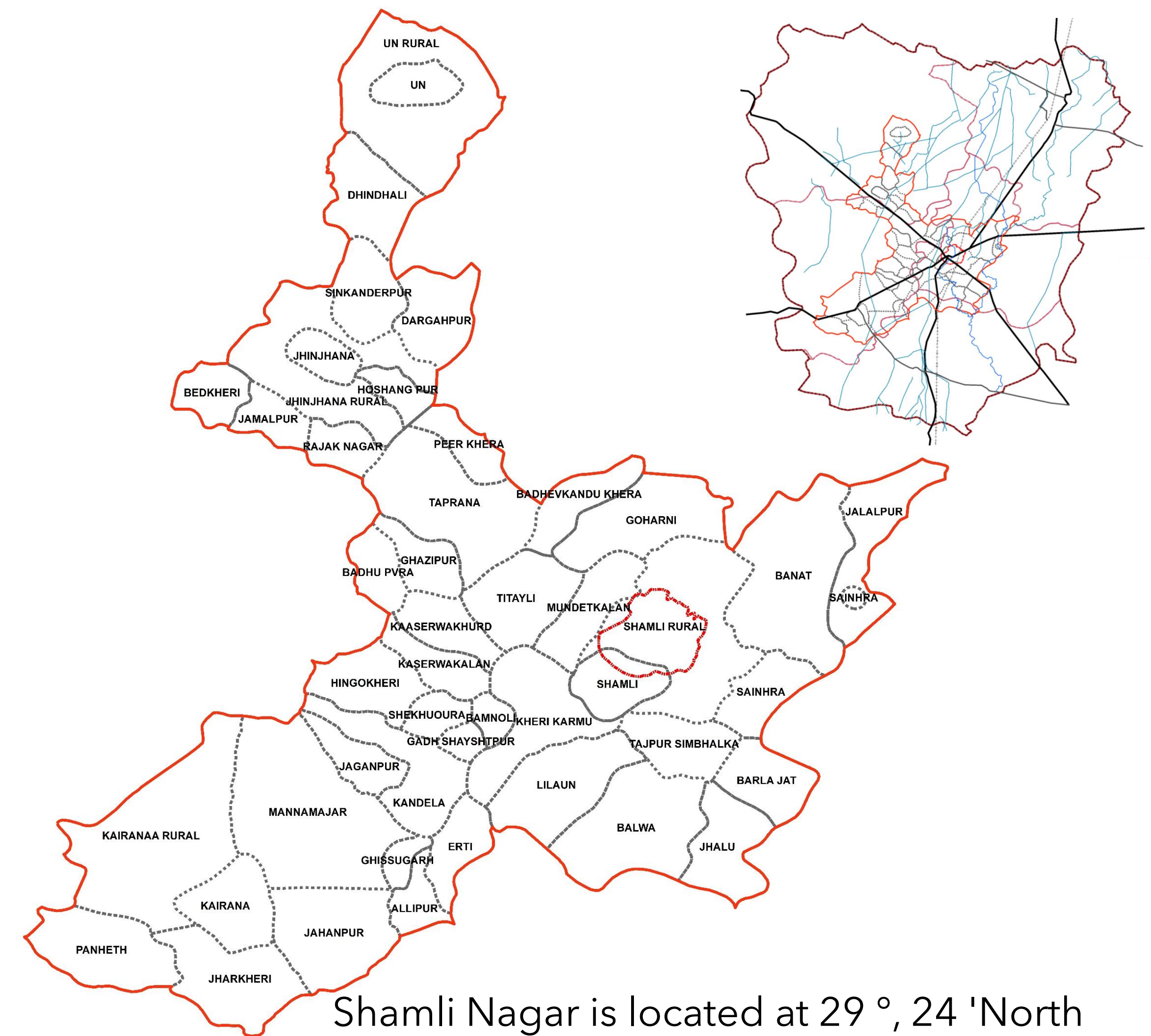
To analysis existing situation of aspects of environment of Shamli and accordingly give proposals and combat measures for a resilient future.

OBJECTIVES

To analyze environment condition of the city on the basis of trends and existing situation of varied aspects including water, soil, air and natural feature.

Identification and arrangement of opportunity and issues on the basis of environmental issues and concerns.

To give proposals on the basis of need of action and scale.



Shamli Nagar is located at 29 ° , 24 'North Latitude and 7 ° 19' East Longitude. To the west of this city, the Eastern Yamuna Canal flows near the city

Existing Condition Of The City

Analysis Of The Events

Issues Identified

Proposal Regarding Plan of Action

Climate



Water



Air



Soil



Vegetation



Eco - Sensitive

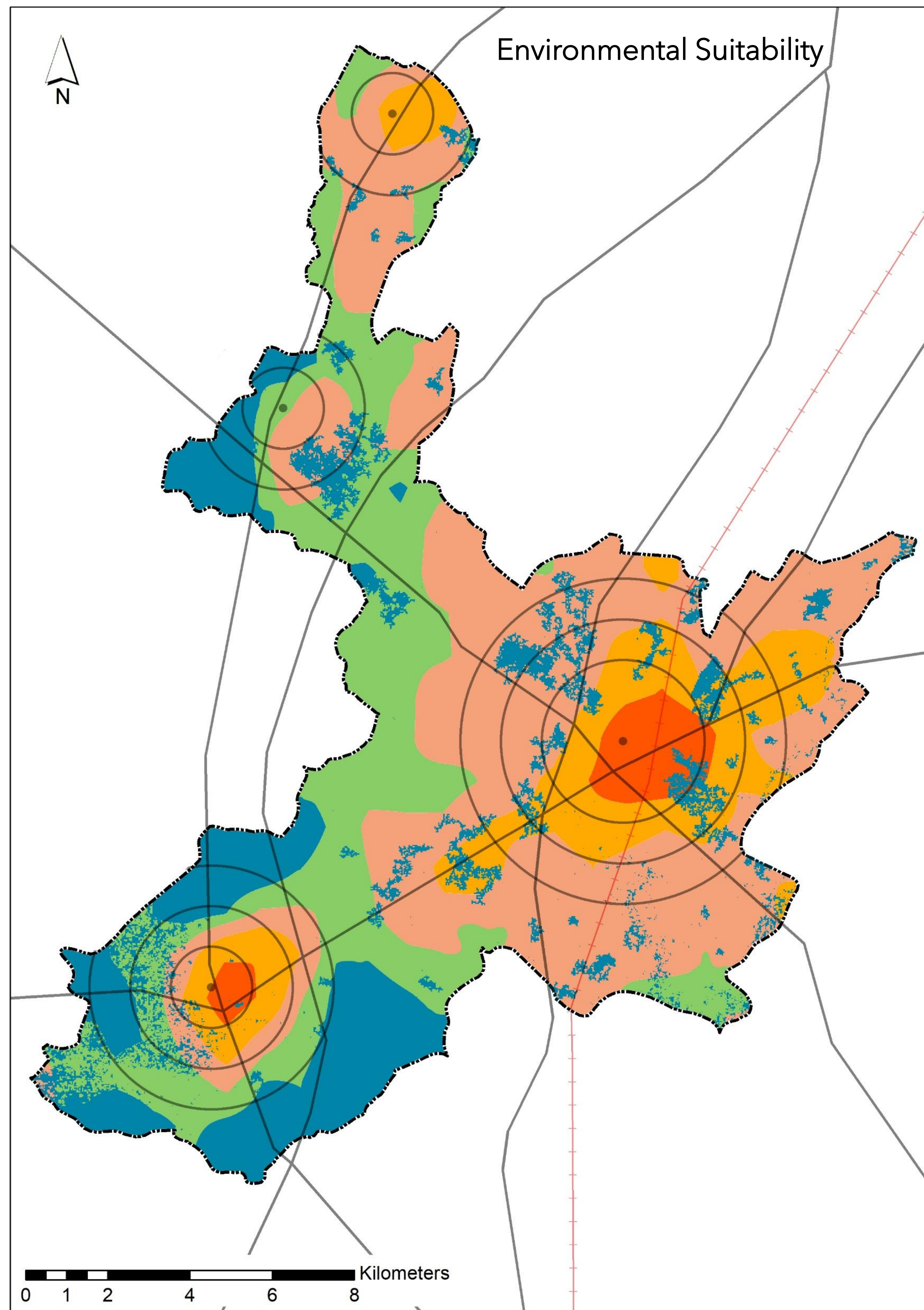


Built-up

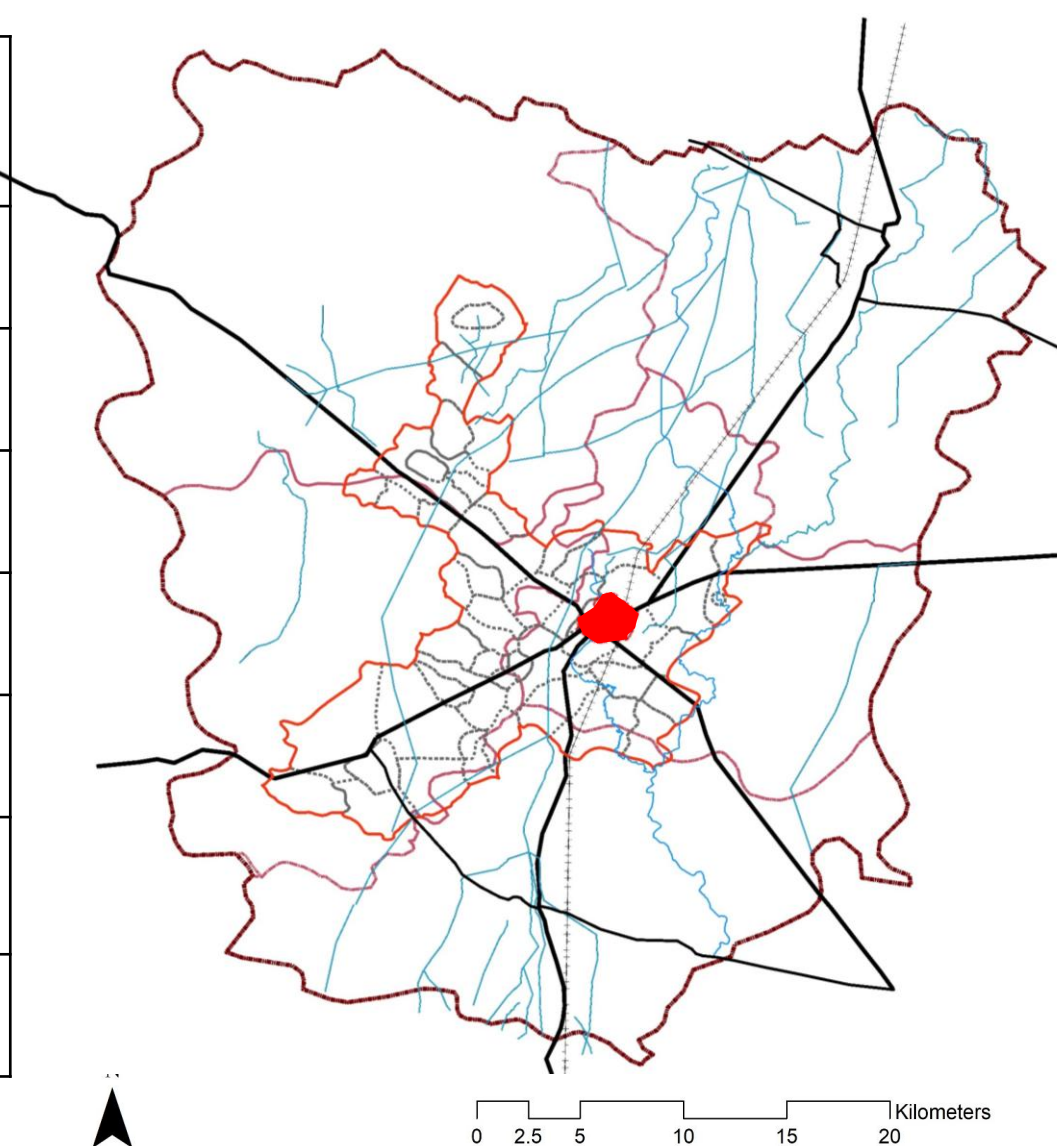


Strategic Study Direction

- Improve Air and Water Quality
- Create Healthy Communities
- Green Shamli City
- Resources Efficiency



Key map



Existing Planning Area		
Type	Area in ha	Percentage%
Agriculture	11059.51	51.5%
Vegetation	6988.14	32.5%
Built-up	3376.35	15.7%
Barren land	26.43	0.12%
Water Bodies	28.24	0.13%
Total Area	21478.67	

Suitability Index		
Code	Level of Natural Disturbance	Development Guide
1	Very Low	Suitable for future city expansion Suitable for future development, Development on Agriculture land (Development with conditions)
2	Low	
3	Moderate	
4	High	Can be developed as environmentally friendly (Development with conditions)
5	Very High	Suitable area for natural habitat (reserve land/Eco- Sensitive areas),

Land Capability considering Environmental factors	
Code	Capability
1	Intensive use possibilities Moderate use possibilities Limited use possibilities Very Limited use possibilities Suited for specified use
2	
3	
4	
5	

Remarks:

Code 4 and Code 5 has high potential to grow as environment friendly (Highly suitable for natural habitat)

Group members

Aatish Kumar
Harshit Panchal
V Poorna Venkata Manikanta

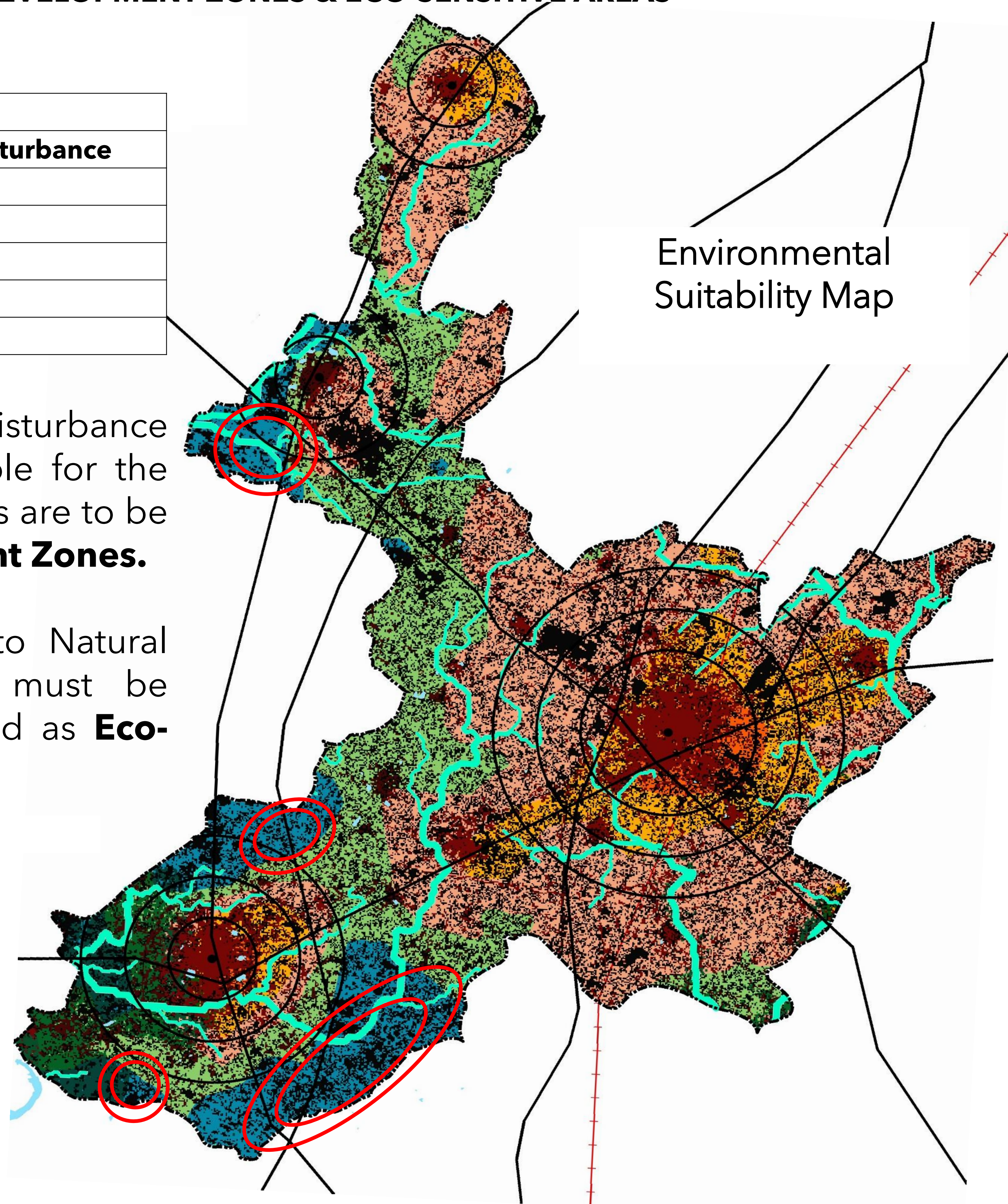
NO DEVELOPMENT ZONES & ECO-SENSITIVE AREAS

SUITABILITY INDEX	
Code	Level of Natural Disturbance
1	Very Low
2	Low
3	Moderate
4	High
5	Very High

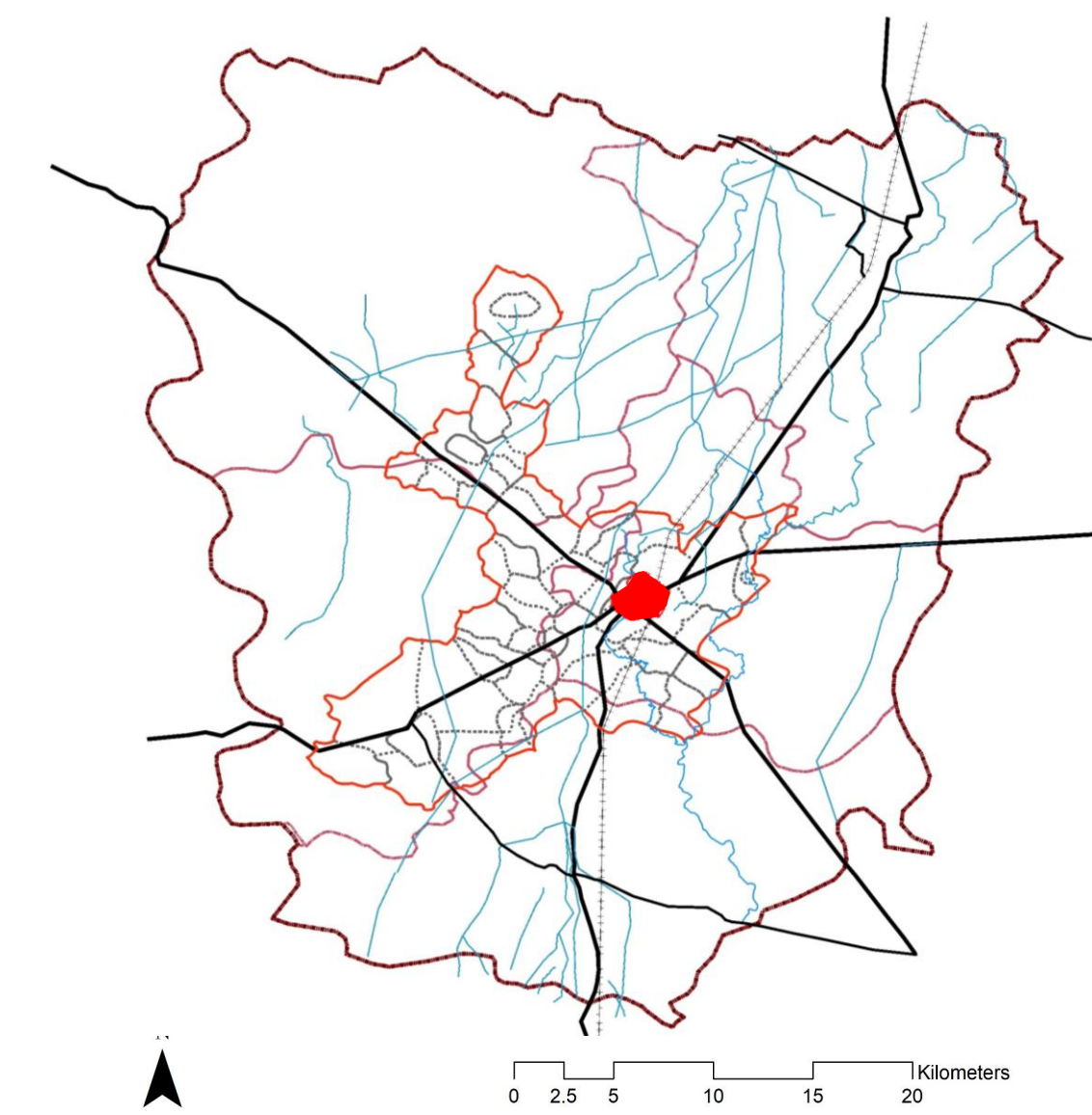
Very High level of Natural disturbance occurring area is not suitable for the development. So, these areas are to be declared as **No Development Zones**.

These Zones are suitable to Natural Habitats, so these lands must be reserved and to be declared as **Eco-sensitive areas**

2,537 ha area is coming under Very High level of Natural disturbance occurring areas which means nearly **12%** of planning area is **No development zones** and are to be **Eco-sensitive areas**



Key map

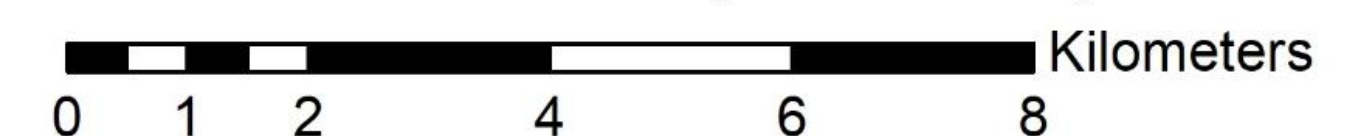


Legend

- Planning Area Boundary
- Roads
- +— Railway line
- Natural Canal

- Built-up
- Vegetation
- Low surface elevation
- Proposed Eco-sensitive areas

Scale



Source & Note

ENVIRONMENT

Proposals for No Development Zones

Group members

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3rd Year 6th Semester
Bachelor of Planning



Grey Infrastructure

Traditional human-engineered measures that perform infrastructure functions such as water and wastewater treatment plants or protective infrastructure such as dykes and seawalls



Green Infrastructure

Planned networks of natural and semi-natural areas with other environmental features designed and managed to deliver different ecosystem services



Blue-Green Infrastructure

Planned interconnected networks of natural and semi-natural areas, including water bodies and, green and open spaces, that provide different ecosystem services



Blue-Green Infrastructure: The Concept

- Green and blue-green infrastructure, include natural features that deliver 'ecosystem' services, thereby fulfilling their multiple purposes.
- Interconnected network of areas and measures. These networks allow water to flow, biodiversity to move or migrate and even people to recreate or transport.

A well-functioning blue infrastructure requires an integrated approach to create a network that prevents floods and droughts, natural phenomena and has a good water quality. This is essential because water is a dynamic substance which flows, evaporates, runs off the surface and leaches. The urban environment in which people live, work and play affects their health.

Characteristics of a healthy and sustainable environment include:

- A clean and safe environment;
- Sufficient green space, nature and water;
- Healthy and sustainable homes;
- Attractive and varied public spaces;
- Wide range of public services (housing, schools, shopping, culture, business, physical activity, health).

Natural green spaces with suitable land form

Extensive and dense vegetation close to noise source

The more urban green, the better the environment

Whether dispersed or concentrated the more urban green the better preferably on windward side

Green within close proximity (1-2km)

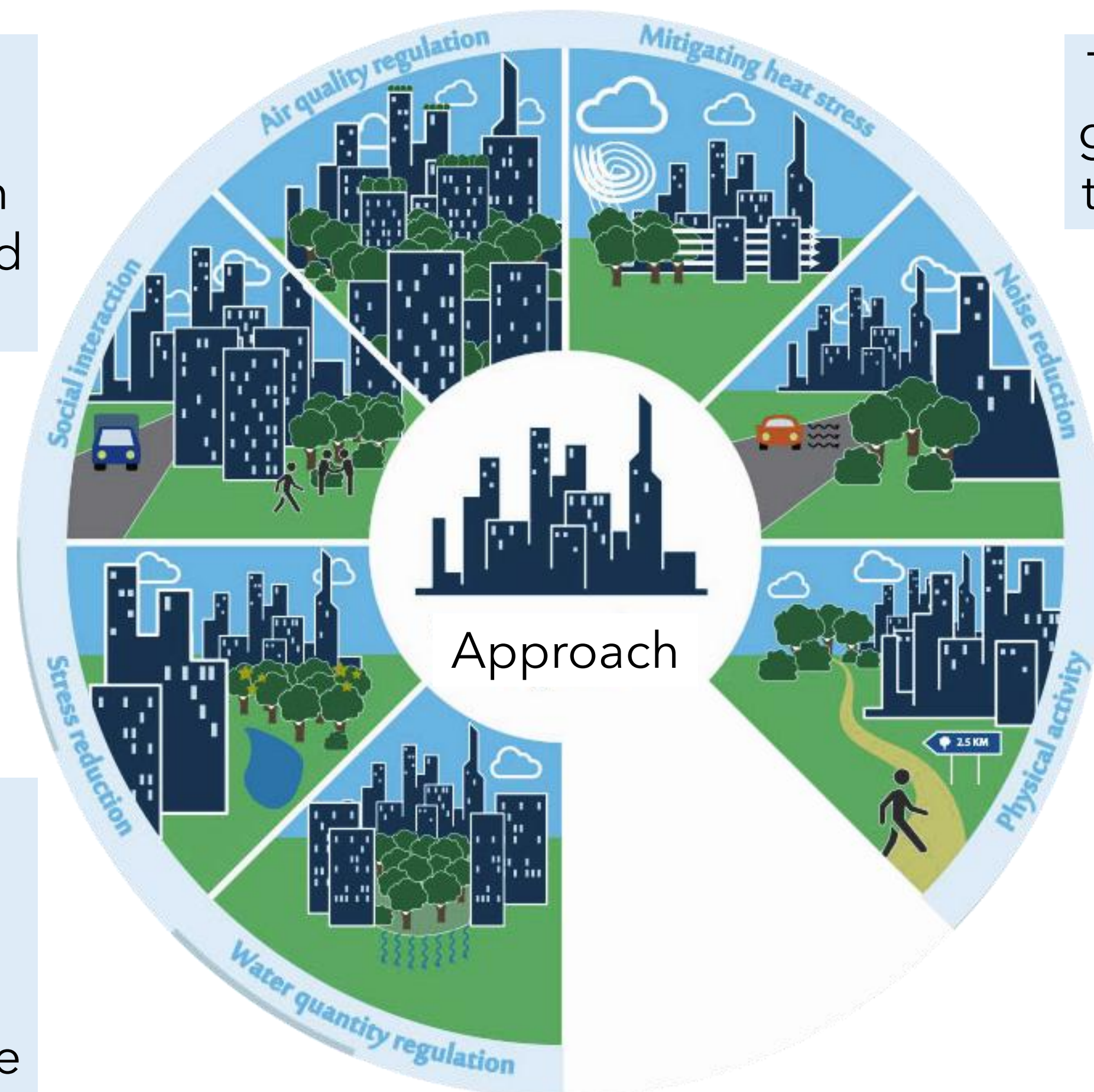


Image Source: United Nation Environment Programme (UNEP)

Principles

Principles are basic building blocks of the city public space. They provide the most basic elements in design that have a meaning in themselves.

- The principles are additions/changes to the physical city making use of water, green elements, etc.
- Aim is to have building blocks to have a positive effect on human health.
- They either influence health directly (for example air quality regulation) or through incentives for healthy behavior (like social interaction, physical activity).
- The functionality is dependent on flow and quality of the blue/green and human network.

Group members

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12

	ASPECT	PROPOSALS
1	Climate	- Supporting Blue-Green Infrastructure - Green belts - Urban forest - Conservation of existing eco - sensitive area and the areas with dense tree cover.
2	Soil	- Mining will not exceed beyond the extraction depth. - No foreign material like polythene bags, jute bags, sachets, pouches and useless articles should be allowed to remain/spill on the land - Use of eco-friendly and recycleable material
3	Land - Surface and Vegetation	- In existing development - Prevent citywide hot spots by spreading parks, greens and increasing the overall tree canopy area - In new Development- Create pocket parks spread throughout the city in order to reduce temperature extremes, limit the amount of impervious surface and provide shade where it is needed. - Implementation of Green Infrastructure for in new development
4	Water	- Water Treatment Plants, Using of DWAT - Surface storm water management that is using storm water for rainwater harvesting and to recharge the ground water instead of draining all storm water into sewer system. - Using of natural pesticides to avoid water pollution from runoffs. - Installation of Combined Effluent Treatment Plant. - Installation of Fecal Sludge Management Plant. - Setting up Waste to Energy plant in the planning area.
5	Air Quality	- Sprinkling of water before sweeping of roads. - Providing the green strip along the new roads proposed of more than 24m ROW. - Regular inspection for Pollution check for every vehicle in the city. - Installation of latest machines to destroy pollutants at the source - Installation of Ambient Air Quality monitoring station.
6	Greens and Opens Spaces	Green Buffer areas along with natural canal, Integrated parks and open spaces

PROPOSALS FOR MANAGEMENT OF AIR QUALITY

1. Stop the dust pollution arising out of roads.

- Sprinkling of water before sweeping of roads
- Use of mechanical sweeping machines
- Dust suppression system/ water spraying would be adopted at mine working and loading points.
- Mineral carrying trucks will be effectively covered by tarpaulin to avoid escape of fine dust to atmosphere.
- Excavation operations to be suspended during very strong wind conditions to avoid the dust pollution arising to winds effecting the air quality.

2. Providing the green strip along the both sides of newly proposed roads:

- Plantation with wide canopy trees along approach road will help in dust suppression.

ROW	GREEN STRIP
24M	1.8M
30M	2M
45M	3M
60M	4M

3. Installation of Ambient Air Quality monitoring station.

- Air quality will be regularly monitored in the area.

4. Regular inspection for Pollution check of vehicles.

- Controlling of NO₂ level The source of NO_x is due to vehicular emission. This can be controlled by proper maintenance and servicing of vehicles.
- Only P.U.C. certificated vehicles will be permitted.

5. Installation of latest machines to destroy pollutants at the source

- Carbon Recycling Platforms in the industries.
- Regenerative thermal oxidizers (RTOs)
- Rotary concentrators
- Catalytic oxidizers

6. Industries having major boilers to air pollution control measures in form of ESP [electro static precipitators], Bag Filters.



Proposals for Supporting Blue-Green Infrastructure

Impact of Green Infrastructure on air and surface temperature

Urban vegetation can reduce heat in the built environment by providing shade and evaporative cooling. In addition, green elements have a significant positive influence on the human perception of temperature. For instance, that within parks, also relatively small ones, air temperature can be up to approximately 3°C lower than in the surroundings.

Mechanisms behind temperature regulation

Reduction of solar radiation by providing shadow Tree crowns provide shade and can thus reduce the effect of solar radiation on thermal comfort. Also, shading of the surface and other objects lowers the temperature of these objects and therefore their emission of infrared radiation.

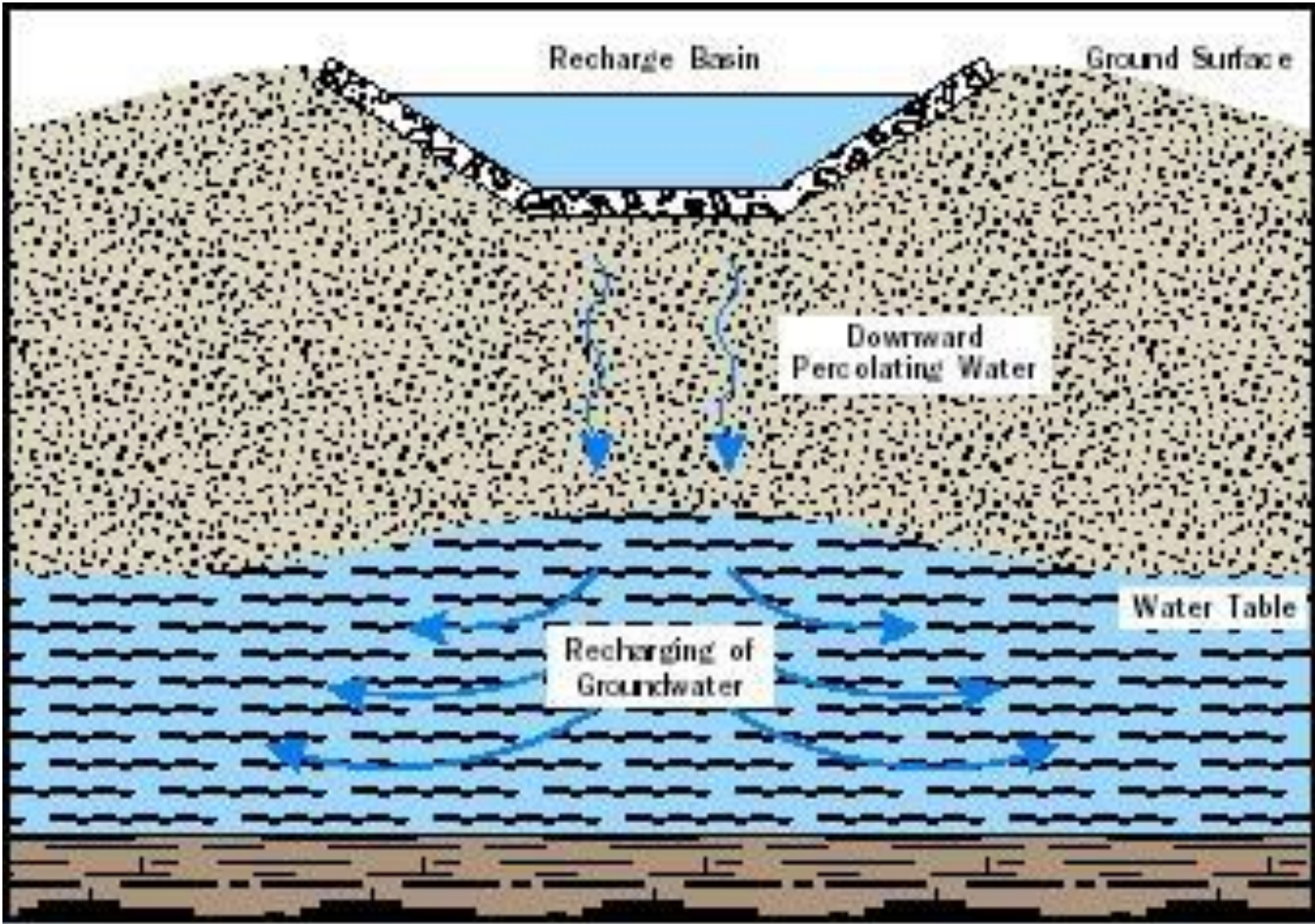
The vegetation on the windward side (the side where the wind comes from) lowers the air temperature in parks during the day and at night.

Placing trees along the side of the street improves local human thermal comfort on hot days, in particular via reduction of the mean radiant temperature. Add trees with large crowns in streets, parks or squares with a lot of solar radiation

Clean Air Action Plan		
Cause	Action	Responsibility
Vehicles	• Restriction on plying and phasing out of old diesel/ petrol driven vehicles (policy) • Introduction of cleaner fuel (CNG) for commercial vehicles (Implementation) • Promotion and operationalization of E-vehicle • Establishment of adequate number of pollution checking centers to issue PUC (Regulatory) • Support Public Transport	Transport Department
Road Dust	• Increase tree canopy, shrubs along the roads • Daily cleaning of Road dust • Water Spraying on road • Construction of semi permeable pavement • Proposals of green belt	Nagar Palika
Biomass and Garbage	• Restriction on open burring of municipal solid waste • Promotion of waste to energy concept	Nagar Palika
Industrial Emissions	• Adoption of cleaner fuel in the industries • Installation and operation of advance air pollution control systems and continuous Ambient Air Quality Monitoring system in Industrial area • Proposals for CETP	
Agriculture	• Prevention of open burning of Agriculture Residue • Use of Agriculture Residue into bio pesticides	Agriculture Department

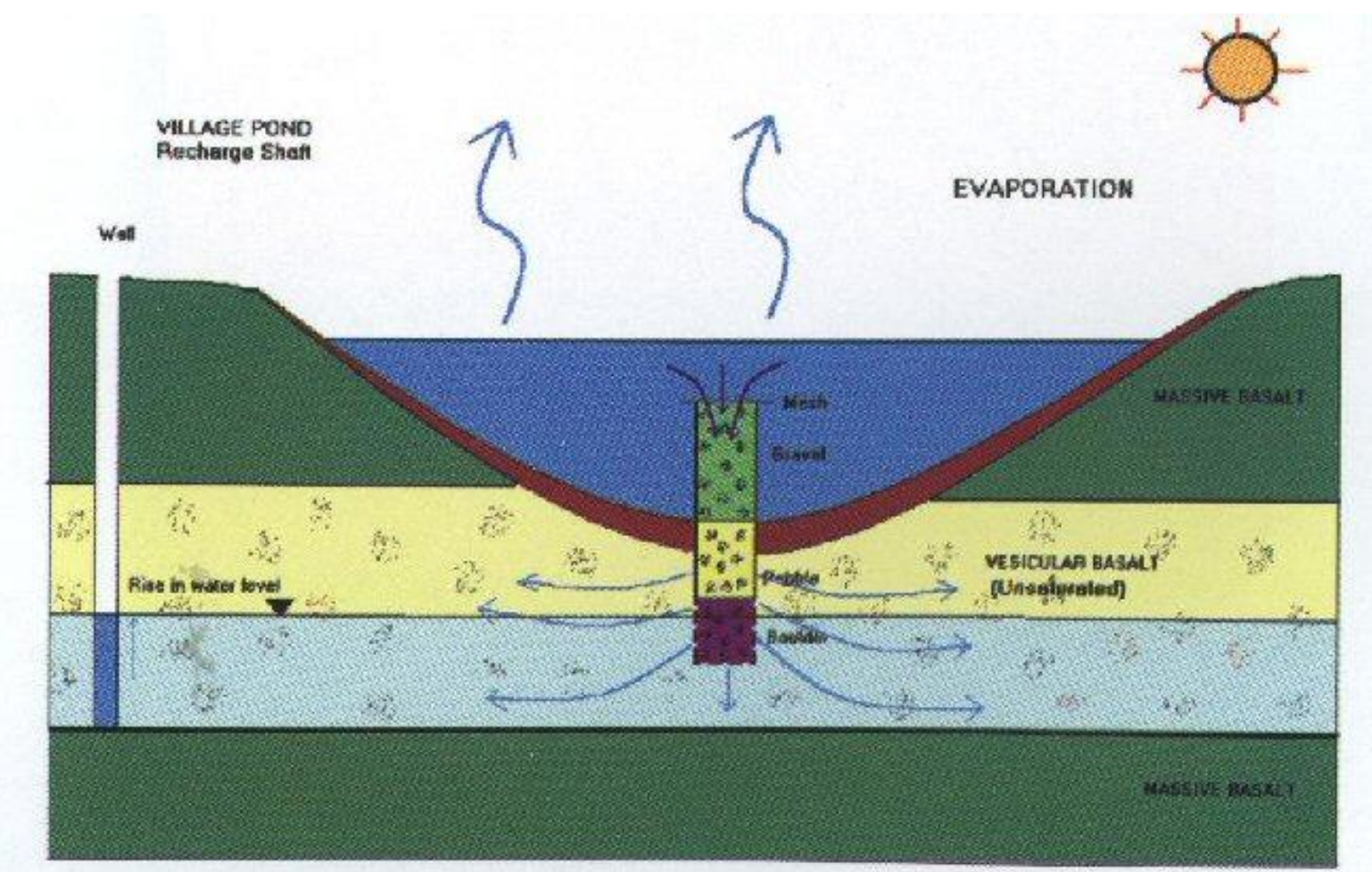
Artificial recharge requires some form of man-made structure. Surface spreading techniques involve keeping water at the surface in areas where the water can percolate down to a shallow, unconfined aquifer. Spreading basins, check dams in stream channels, furrows, trenches, and ditches are common AR examples.

Injection techniques use wells to accomplish AR. Injection wells usually place water directly into a deep, confined aquifer where surface spreading would usually not work. Injection wells also require maintenance to remove particles, microbial growth, and chemical precipitates (solid substances).



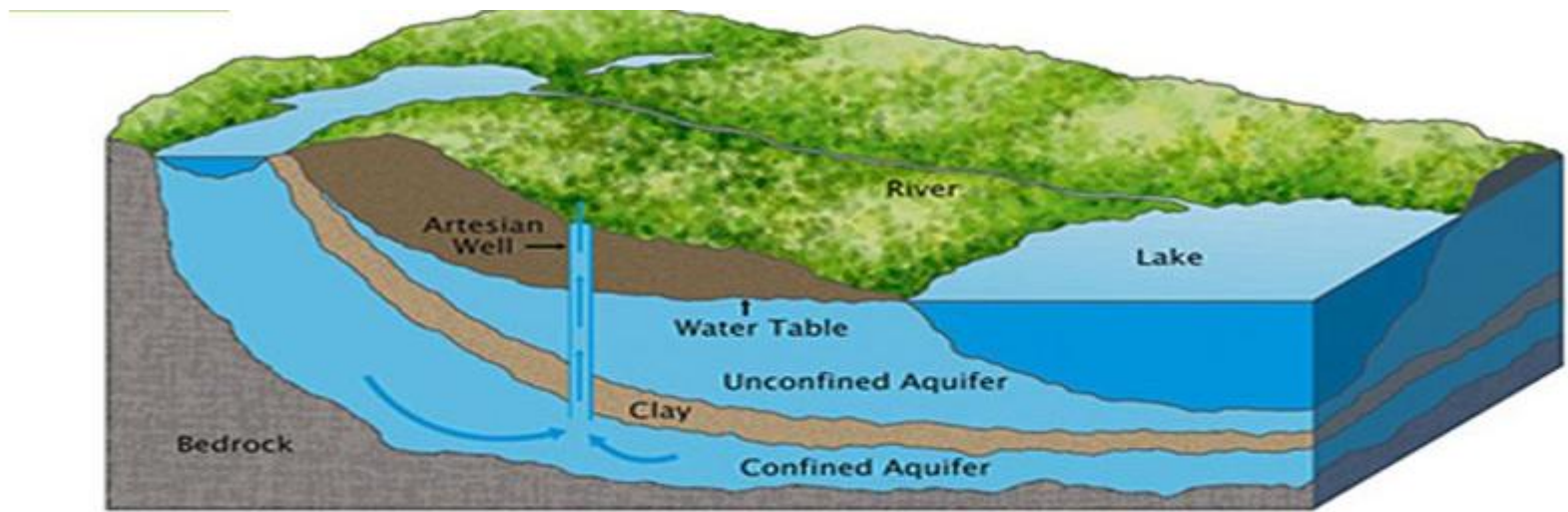
Artificial recharge techniques

Recharge Shaft



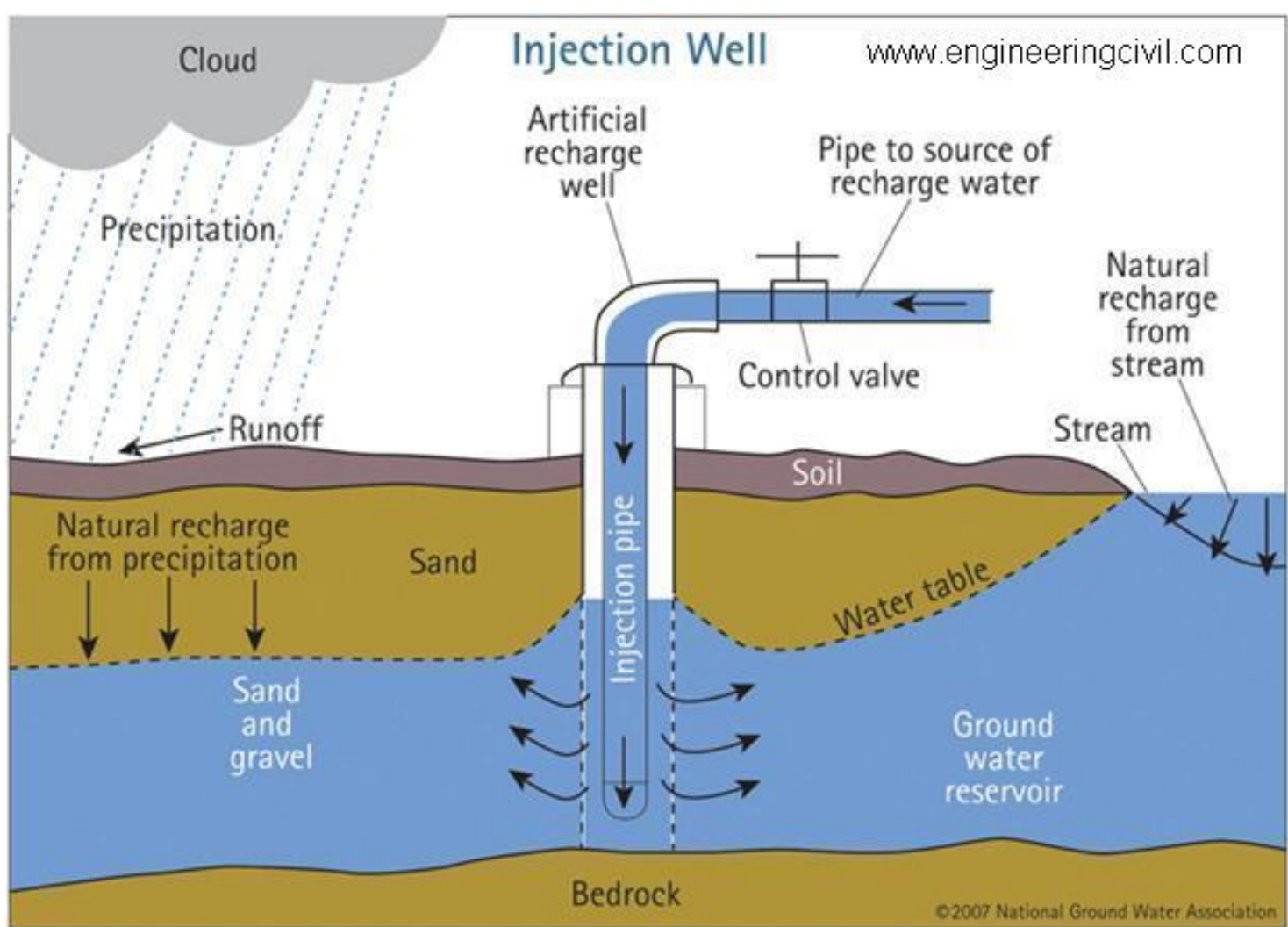
These are the most efficient and cost effective structures to recharge the aquifer directly. In the areas where source of water is available either for some time or perennially e.g. base flow, springs etc. the recharge shaft can be constructed.

Dug Well



In alluvial as well as hard rock areas, there are thousands of dug wells which have either gone dry or the water levels have declined considerably. These dug wells can be used as structures to recharge . The ground water reservoir, storm water, tank water, canal water etc. can be diverted into these structures to directly recharge the dried aquifer.

Injection Well



Injection wells are structures similar to a tube well but with the purpose of augmenting the groundwater storage of a confined aquifer by pumping in treated surface water under pressure. The injection wells are advantageous when land is scarce. These wells can be used as pumping wells during summers.

PROPOSALS OF GREEN BUFFERS

1. Providing RIPARIAN BUFFER along the canals or stream lines

Riparian buffers are strips of vegetation (trees, shrubs or grass) planted next to streams or other waterbodies. By planting vegetation along streams, space is created between the water and upland land uses, which helps protect the water quality and stream habitat.

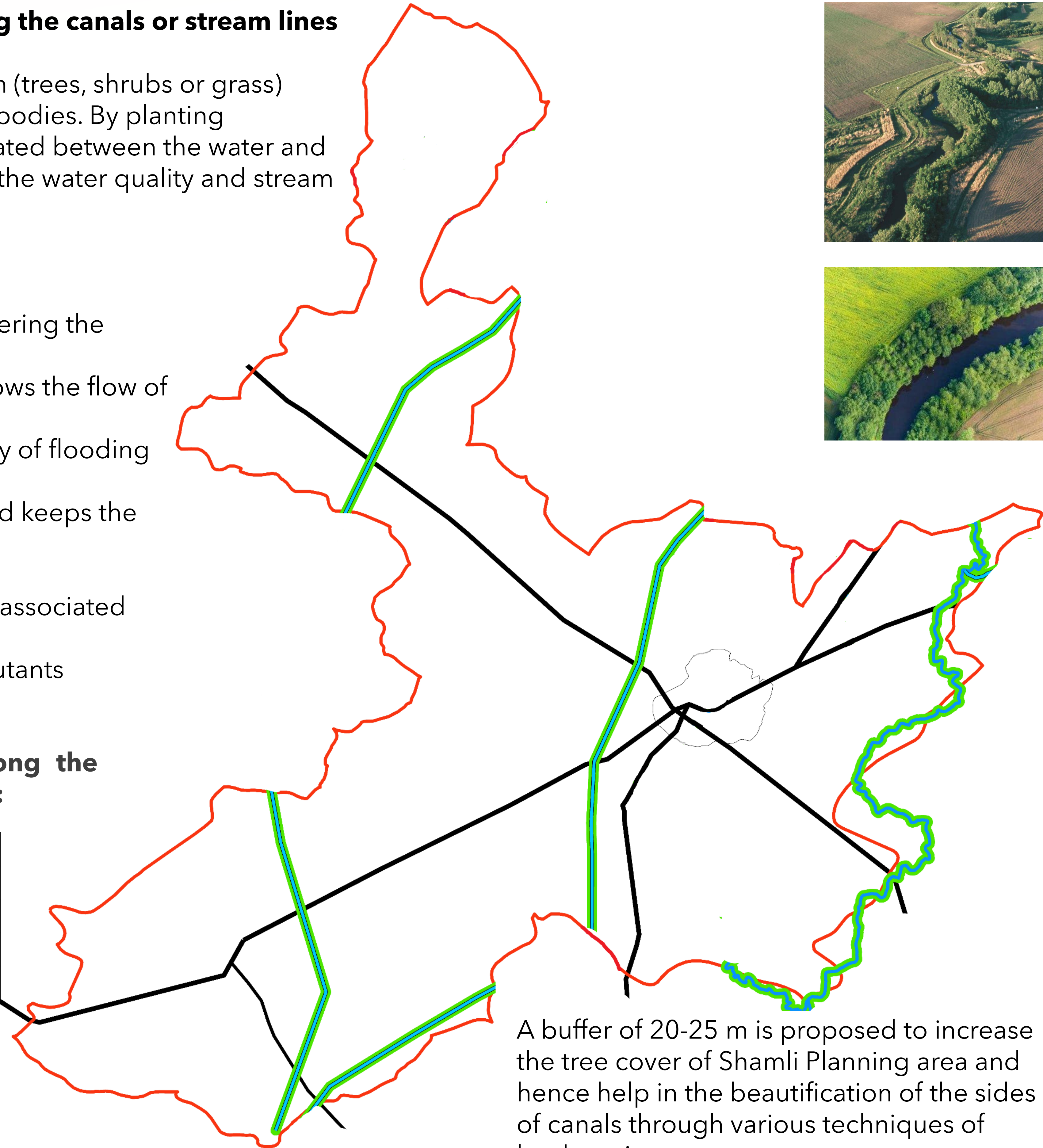
Benefits from the proposal:

- Reduce the amount of sediment entering the canals from storm water drainage.
- Prevents soil erosion, as the roots slows the flow of surface water.
- Decrease the frequency and intensity of flooding and low stream flows.
- Increases the overall green cover and keeps the temperature low
- Provide food and habitat for wildlife
- Replenish groundwater and protect associated wetlands
- Filtration of nutrients and other pollutants
- Shade for streams

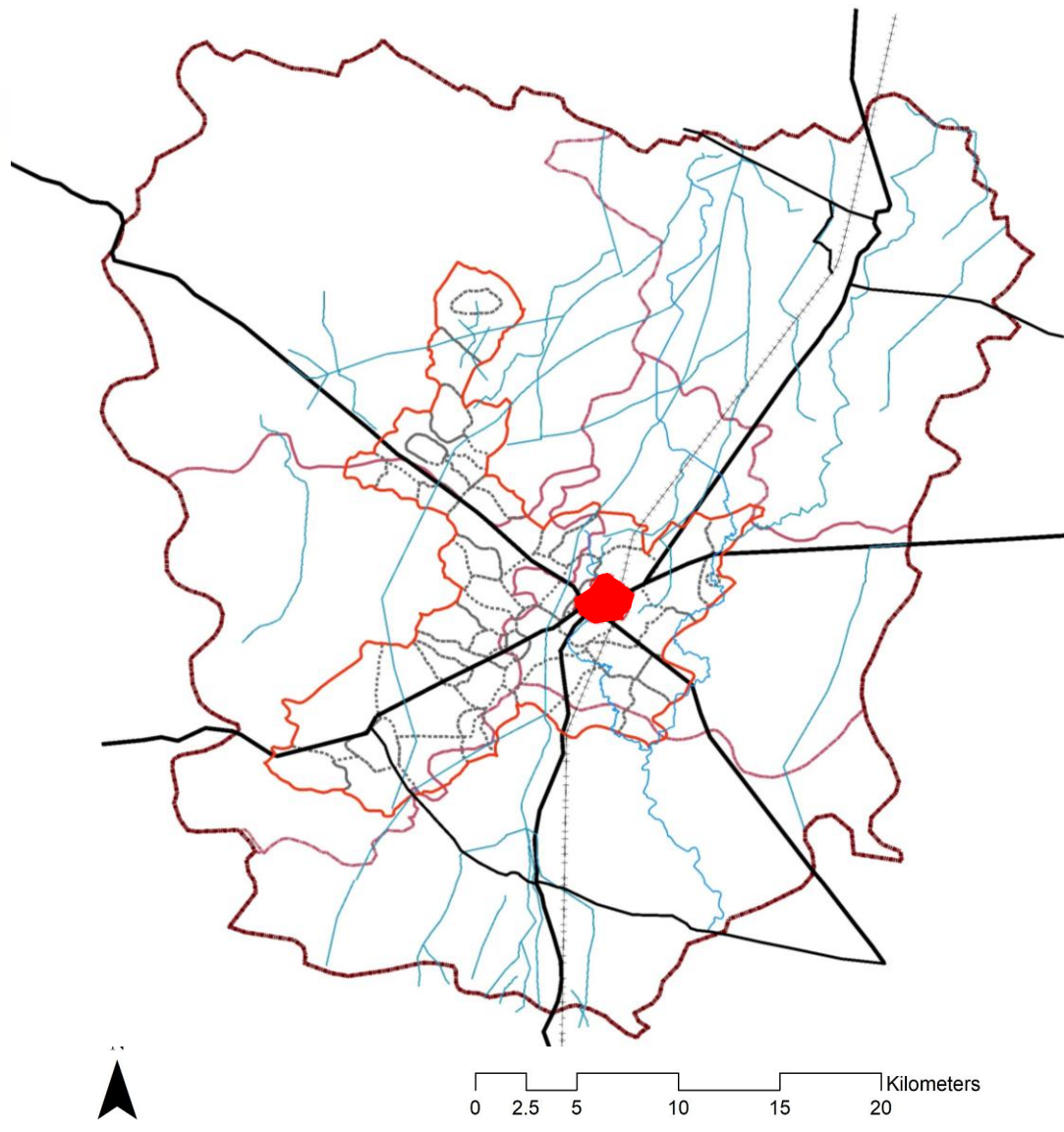
2. Providing the GREEN STRIP along the both sides of newly proposed roads:

ROW	GREEN STRIP
24M	1.8M
30M	2M
45M	3M
60M	4M

Plants and Trees serve as a sink for pollutants, settle dust on leaf lamina and reduce noise pollution.



Key map



Legend

- Canal
- Planning area Boundary
- Major Roads
- Proposed Green Belt

Scale



Source & Note

A buffer of 20-25 m is proposed to increase the tree cover of Shamli Planning area and hence help in the beautification of the sides of canals through various techniques of landscaping.

Green Belt Development Plan

Selection of Plant species for Green belt development

The selection of plant species for the development depends on various factors such as climate, elevation and soil. The list of plant species, which can be suitably planted, and having significant importance are provided in Table. The plants should exhibit the following desirable characteristic in order to be selected for plantation.

1. The species should be fast growing and providing optimum penetrability.
2. The species should be wind-firm and deep rooted.
3. Nesting trees like Peepal (Ficus religiosa), Bergad (F. bengahlnesis), Pakad(Ficus virens), Gular (F. glomerata,)Fig (Ficus eariea) should be planted.
4. The species should form a dense canopy.
5. As far as possible, the species should be indigenous and locally available
6. Species tolerance to air pollutants like SPM, SO2 and NOx should be preferred.
7. The species should be permeable to help and create air turbulence and mixing within the belt.
8. There should be no large gaps for the air to spill through
9. Trees with high foliage density, leaves with larger leaf area and hairy on both the surfaces, are generally preferred.
10. Ability to withstand conditions like inundation and drought.
11. Soil improving plants (Nitrogen fixing, rapidly decomposable leaf litter).
12. Attractive appearance with good flowering and fruit bearing.
13. Bird and insect attracting tree species.
14. Sustainable green cover with minimal maintenance
15. Act as noise barrier.

Increasing vegetation in the form of green area is one of the preferred methods to mitigate air pollution. Plants serve as a sink for pollutants, settle dust on leaf lamina and reduce noise pollution.

Teak, Shisham, Palash, Neem, Amaltas, Kachnar, Subabul, Mohua, Aam, Karanj, Imli, Baheda, Harda, and Jamun are air pollution abatement plants and Neem, Mahaneem, Palash, Amaltas and Kaner plants are used for dust absorber.

Greenbelt Development: The following species can be used in a greenbelt to serve as noise breakers:

- Tectona grandis (Teak),
- Butea monosperma (Palash)
- Leucana leucocephala (Subabul),
- Mangifera indica (Aam)
- Dalbergia Sissoo (Shisham),
- Saraca Indica (Asoka)

For the purpose of pollution attenuation, the green belt shall be developed in three tiers as stated below:

First Tier - Shrub species having good levels of air pollution tolerance which is referred to as Tolerance zone.

1. *Broken or interrupted*: The branching pattern and canopy formation is not uniform. e.g. palm varieties. In between the shrub species at regular intervals in the first tier

2. *Dropping canopy*: The branches and leaves droop downwards e.g. Ashoka. In between the shrubs in the first tier.

Second Tier - Trees having fast growth potential with conical canopy called as dispersion zone

1. *Rotund type*: The shape of the crown is more or less rounded; branches and leaves are closely arranged eg. Rubber Plant. Suitable for second and third tier.

2. *Flat topped canopy*: The branches of the crown uniformly given flat-topped crown and the spread of the crown is wide to cover a wide area e.g. Amaltas. Suitable for second and third tire.

Third Tier - Trees having hairy leaves with thick and round canopy called as absorption zone.

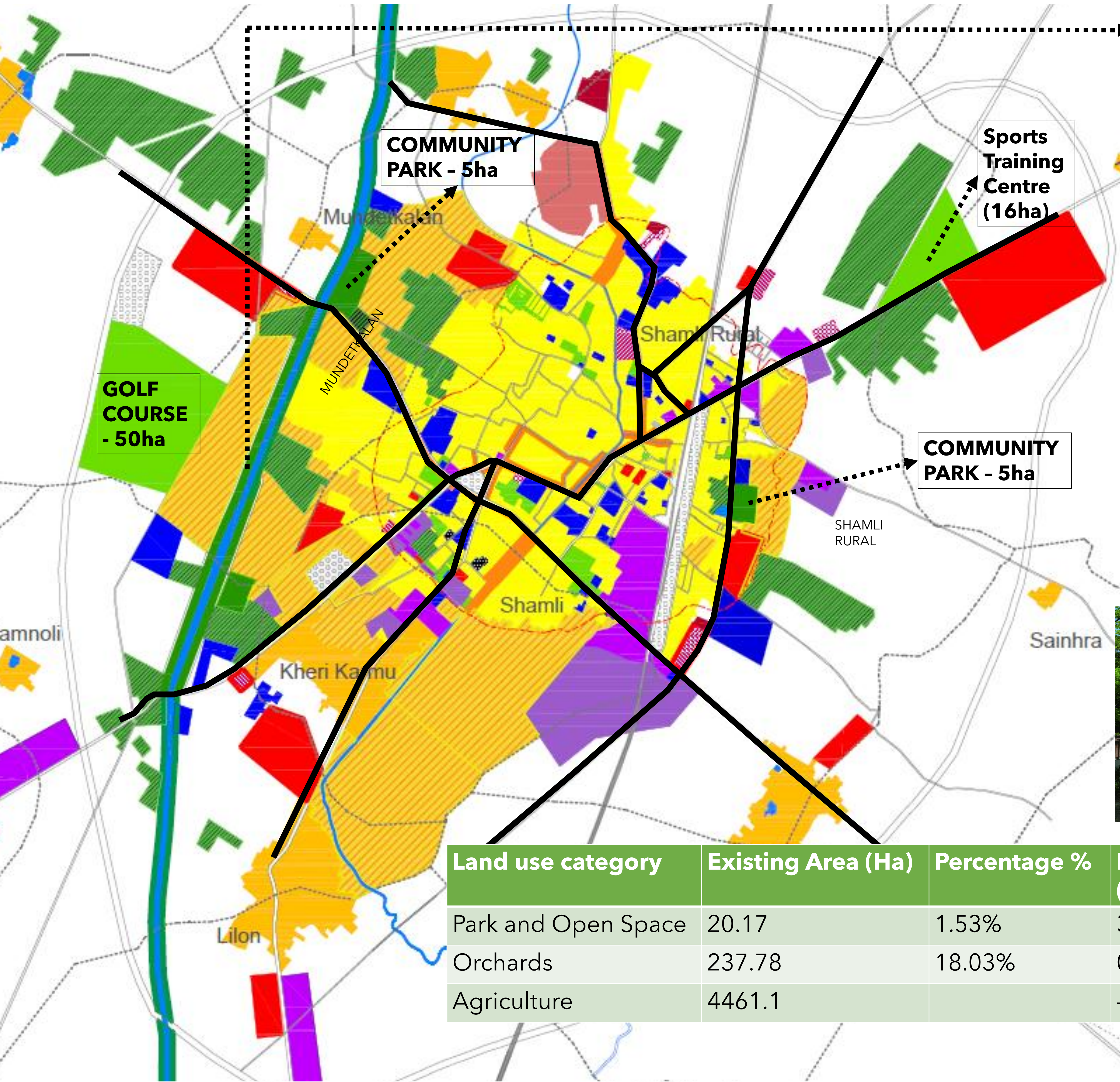
1. *Cylindrical type*: The branches and leaves form a close network and give the longitudinal spread eg. Indian Rose wood. In between the trees in the third tier.

2. *Chimney type*: The branches give the appearance of long chimney e.g. Eucalyptus, outer rows of the third tier.

3. *Conical type*: The growth of main stem and horizontal branches appear in the form of a cone. eg. She-oak. Peripheral rows of the third tier.

PROPOSALS FOR GREEN AREAS

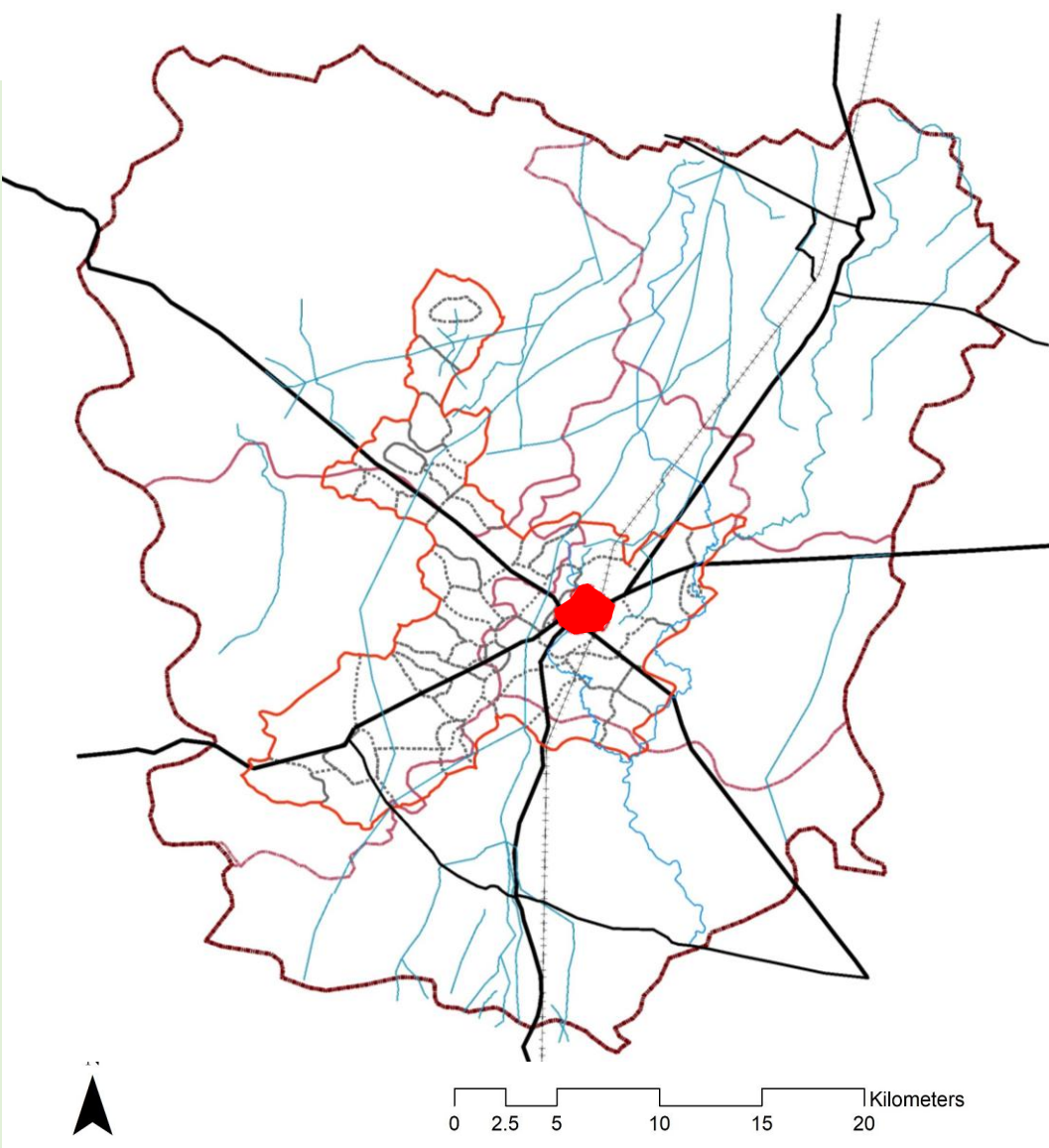
Key map



Green Belt of 1.5km and 2.5km along the canal with an offset of 45m from the canal can consist of Pedestrian pathways, Cycle tracks , Sitting areas, Kiosks, children play area which increases the City's Recreational cover

BENEFITS:

- Increases green space in the city.
- Increases Land Value
- Provides space to enjoy clean air and view
- Lowers temperature and Presence of large trees shades

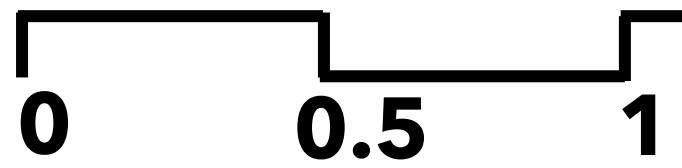


Legend

- Drain
- Canal
- NPP Boundary
- Village Boundary
- Major Roads
- Proposed Recreational areas
- Existing Recreational areas



Scale



Land use category	Existing Area (Ha)	Percentage %	Proposed Area (Ha)	Total (Ha)
Park and Open Space	20.17	1.53%	32	52.17
Orchards	237.78	18.03%	0	237.78
Agriculture	4461.1		-709.8	3751.3

Source & Note



At the Planning Area level the main stretches taken up are-

- A Forest area in 500 Acres of land out of 1252 acre can be developed at windward side
- A minimum of 15% of Institutional/ Incidental Green in each individual unit coming up in Shamli.
- Wetlands to be developed to enhance the biological diversity of the area.
- The concept of inter-linked green spaces is a predominant feature in the city structure.
- Existing Water bodies (28.24 ha) to be clean and promote as Blue-Green Infrastructure.

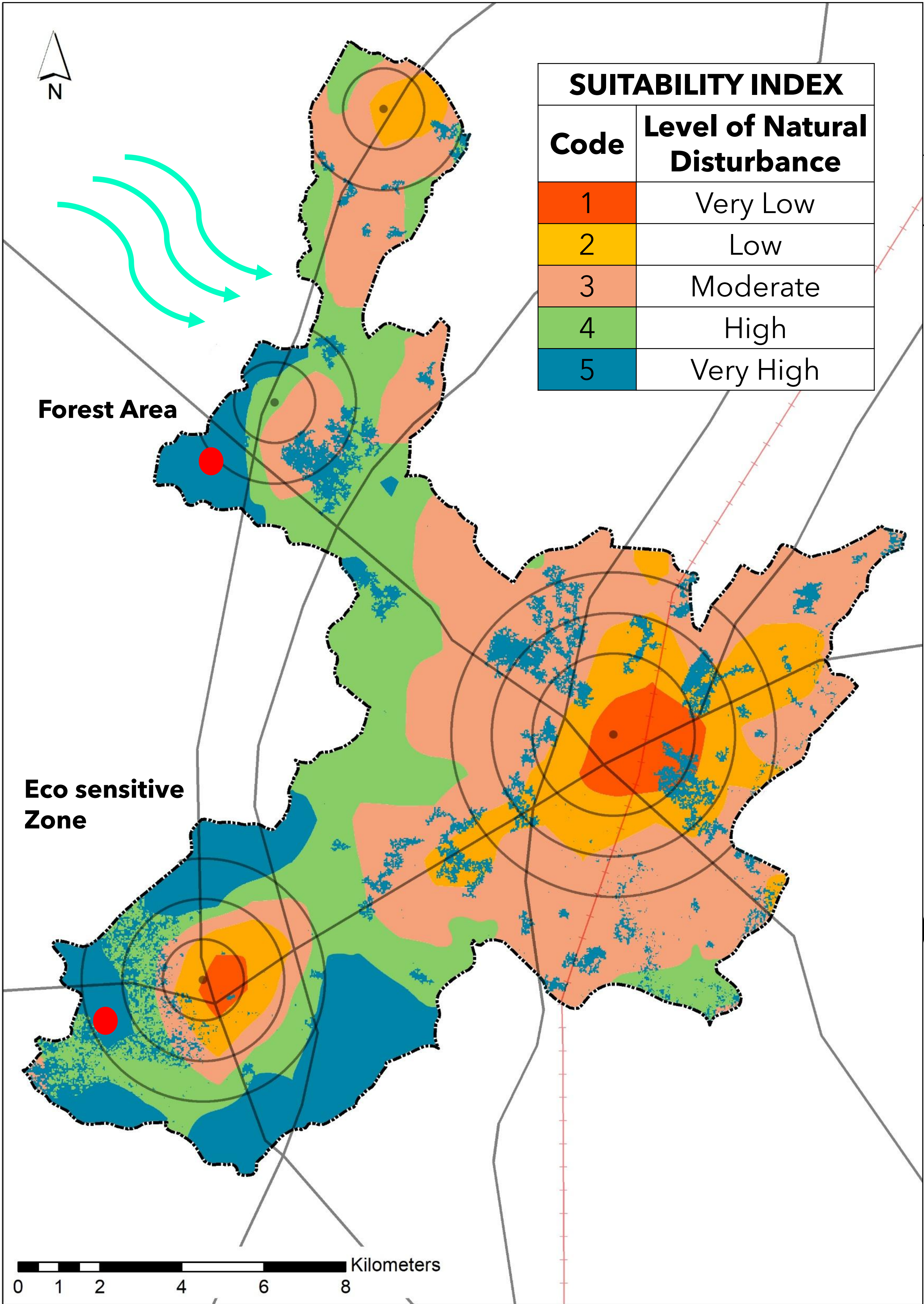
The design and nature of greens will vary according to the place and the type of industry. Some of the factors which influence the design of green belts are-

- Climatic factors such as wind velocity, temperature, rainfall, sunlight, humidity etc.
- Assimilation capacity of the ecosystem,
- Height and canopy of trees,
- Topography,
- Size of land available
- Distance from source
- Soil and Water quality
- Nature and extents of pollutants

Policy for Industrial Greens

The industries must care about the surrounding environment and minimize the adverse impacts of industrial operations in the immediate neighborhood as well as distant places.

1. Land acquired shall be sufficiently large to provide space for appropriate treatment of waste water still left for treatment after maximum possible reuse and recycle. Reclaimed (treated) wastewater shall be used to raise green belt and to create water body for aesthetics, recreation and if possible for aquaculture.
2. Total green area including landscaping area will be at least 1/3rd (About 33%) of the area.



PROPOSALS FOR MANAGEMENT OF INDUSTRIAL WASTE

The three elements in relation to industrial waste management include **source reduction, recycling, and waste treatment**.

Technological modification such as upgrading equipment is an effective way of reduction.

Reformulating and redesigning your required materials. For instance, using alternate materials with lower risk waste is a way to ensure that less waste is generated

Set up of an industrial wastewater treatment plant.



The industrial waste management hierarchy according to the Pollution Prevention a

- **Physical treatment** changes the physical properties (size, shape, or state) of the waste but does not affect the chemical properties.
- **Chemical treatment** alters the chemical composition of the waste by treating it with different chemicals that cause various reactions.
- **Biological treatment** is when the waste is exposed to organisms that can decompose organic components into simpler organic products and biomass. The organisms can break down the waste in the presence or absence of oxygen, aerobic, or anaerobic, respectively.

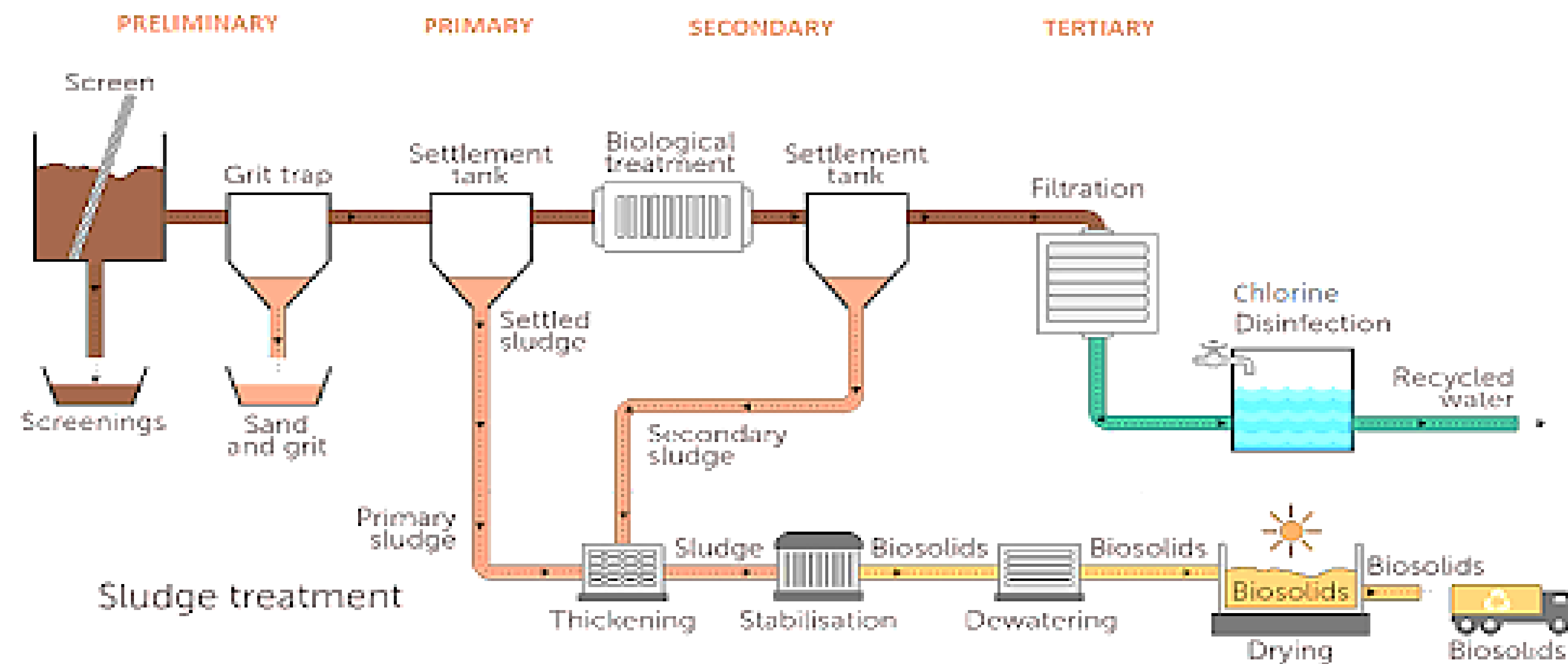
Industrial wastewater treatment

- API oil-water separators-
- Biofilters-
- Dissolved air flotation (DAF)
- Powdered activated carbon
- Ultrafiltration

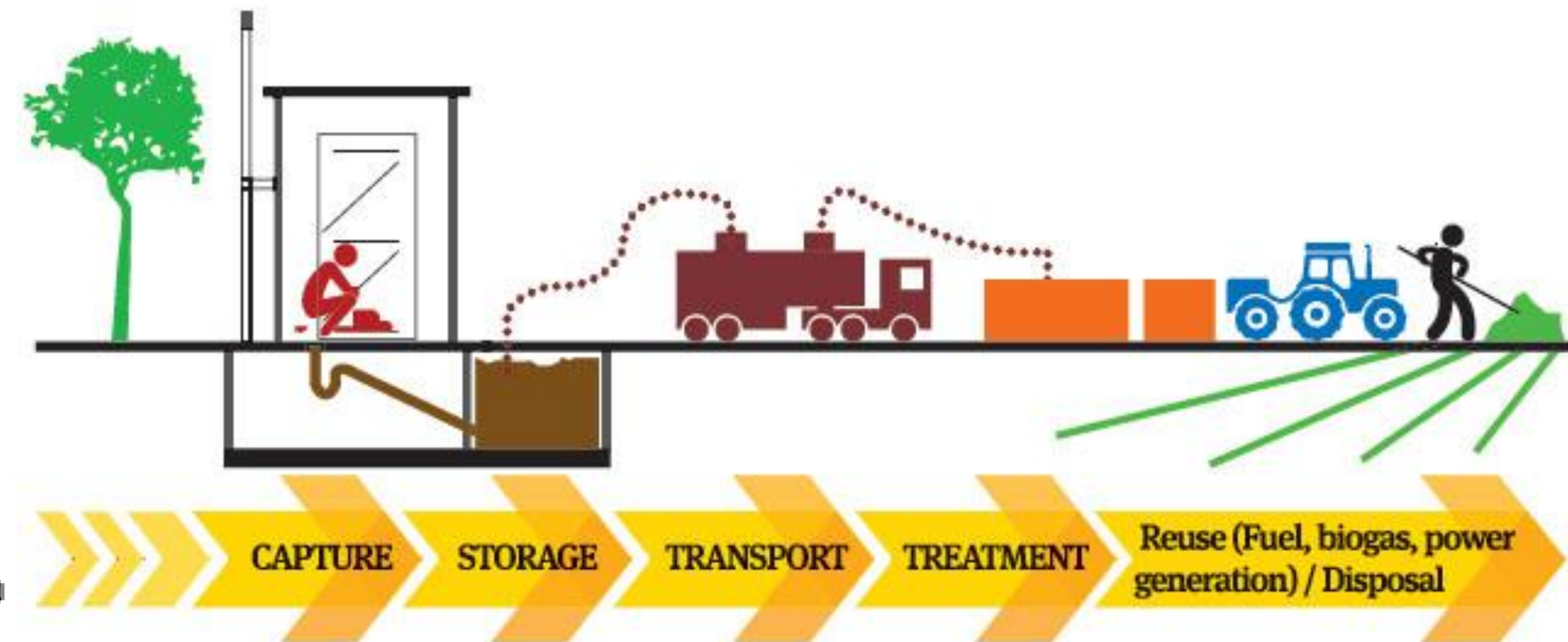
• **INDUSTRIAL WASTE MANAGEMENT**

PROPOSALS OF TREATMENT PLANTS

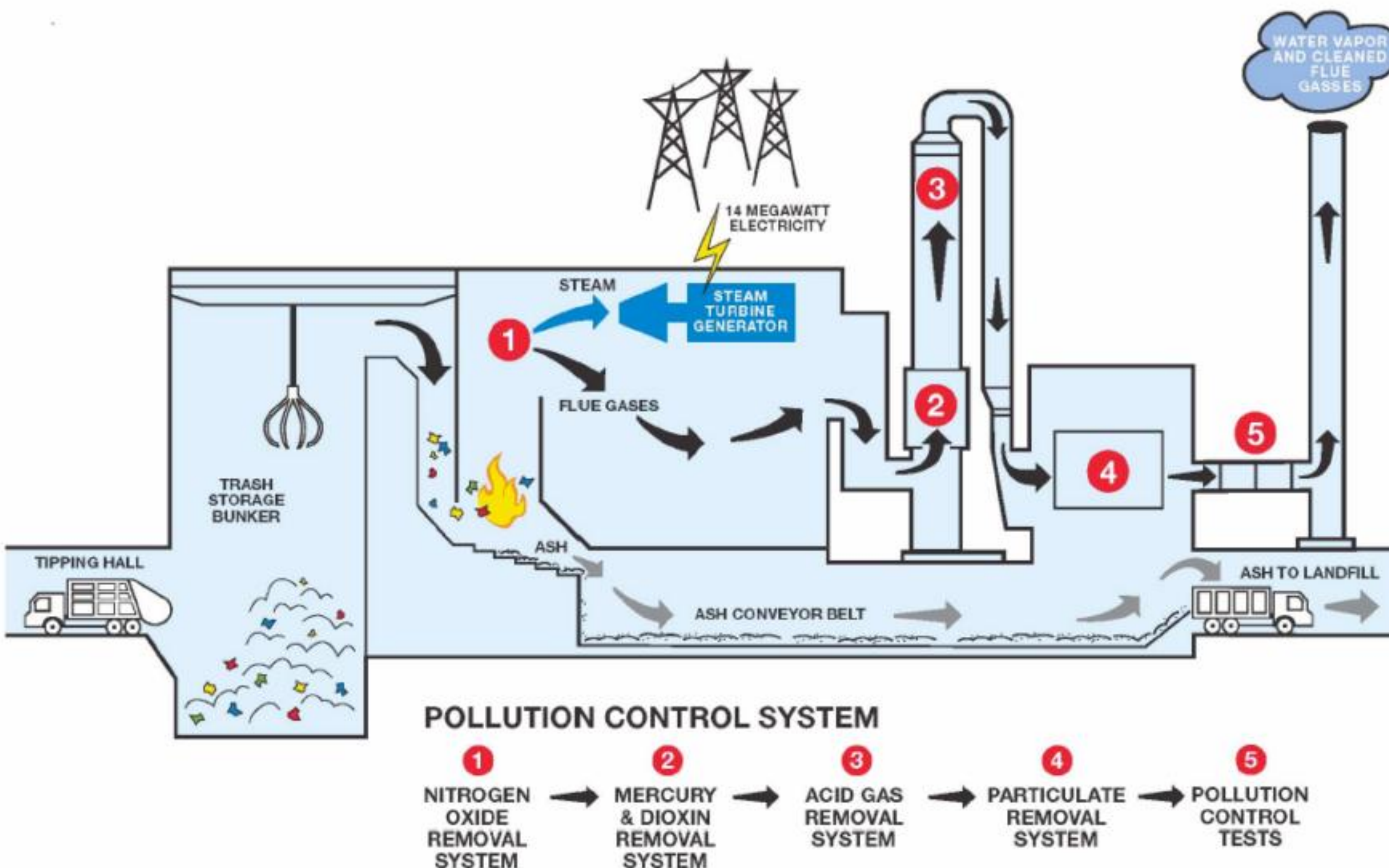
Setting up of **COMMON EFFLUENT TREATMENT PLANTS**



Setting up of **FAECAL SLUDGE MANAGEMENT PLANT**



Setting up of **WASTE-TO-ENERGY PLANTS**



PROPOSALS	BENEFITS
COMMON EFFLUENT TREATMENT PLANTS	- Cleans the effluents from the industries and treated water can be reused for utilization purposes. - Disposal of treated wastewater & sludge becomes more organized. - Helps to avoid contamination of streams and lakes.
FAECAL SLUDGE MANAGEMENT PLANT	- AREA: 1acre; capacity: 6 KLD - Reuse of solid waste as fertilizers by selling to the farmers. - These natural fertilizers helps in increase in fertility. - Avoids any kind of pollution causing by use of chemical fertilizers.
WASTE-TO-ENERGY PLANTS	90% reduction of trash volume - Power Generation - Pollution Control