



Master Plan शामली - 2041

Aspect:

ENVIRONMENT

(Proposal)

Group members:

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ASPECT	OBSERVATIONS	ISSUES
Climate	The climate is sub humid and it is characterized by general dryness except in the brief monsoon season, a hot summer and pleasant cold season.	Annual minimum temperature is rising
Soil	- Soil Is fertile - Sand mining - Clay mining is the process of scooping of brick clay that actively supports the agricultural activities of an area.	- The removal of naturally formed soil from clay particles is really a loss forever of this fertile natural medium. - Use of fertilizer causing the decrease of soil fertility.
Land - Surface and Vegetation	- Area under normal level of vegetation - Urban areas are significantly warmer than rural area - Modification of land surface	Urban Heat Island effect and land degradation
Water	- Large quantity of untreated waste water from Industries and households are drained into the water bodies. 7% of groundwater samples are not fit for drinking purposes and 1% is not suitable for any purposes. - Pesticides like organochlorine and organophosphorus have been identified in groundwater. - No Effluent Treatment Plant present in the area to treat the industrial effluents. - Industries and distilleries are using groundwater through borewells & tube wells	- Discharge of untreated waste water into water bodies effecting water ecosystem and decrease in water quality. - Excessive use of fertilizers and pesticides in agriculture effecting the groundwater quality and the runoffs are polluting water bodies. - Excess use of ground water by industries and in housing causing Ground Water depletion - No Water Quality monitoring station is installed in District Shamli.
Air Quality	- Fugitive dust arising during the excavation and transportation. - Smoke generating from firing and baking of the clay bricks. - Burning of waste and crop residue in open. - The current Air Quality Index shows that the condition is severe in Shamli. It may cause respiratory impact even on healthy people, and serious health impacts on people with lung/ heart disease.	- Poor air quality in the region. - Emission of pollutants from industries. - Emission of fossil fuels from vehicles. - No Ambient Air Quality monitoring station in Shamli to monitor the air quality in the hotspots like industrial areas.
Greens and Opens Spaces	- Only 2% of land coverage in NPP is parks and open spaces. 237.78ha land is Orchards and 4461.1Ha land is agriculture.	- Very less percentage of land coverage as parks and open spaces in shamli. - Use of agriculture land for city development which implies decrease in green areas in shamli NPP.

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.

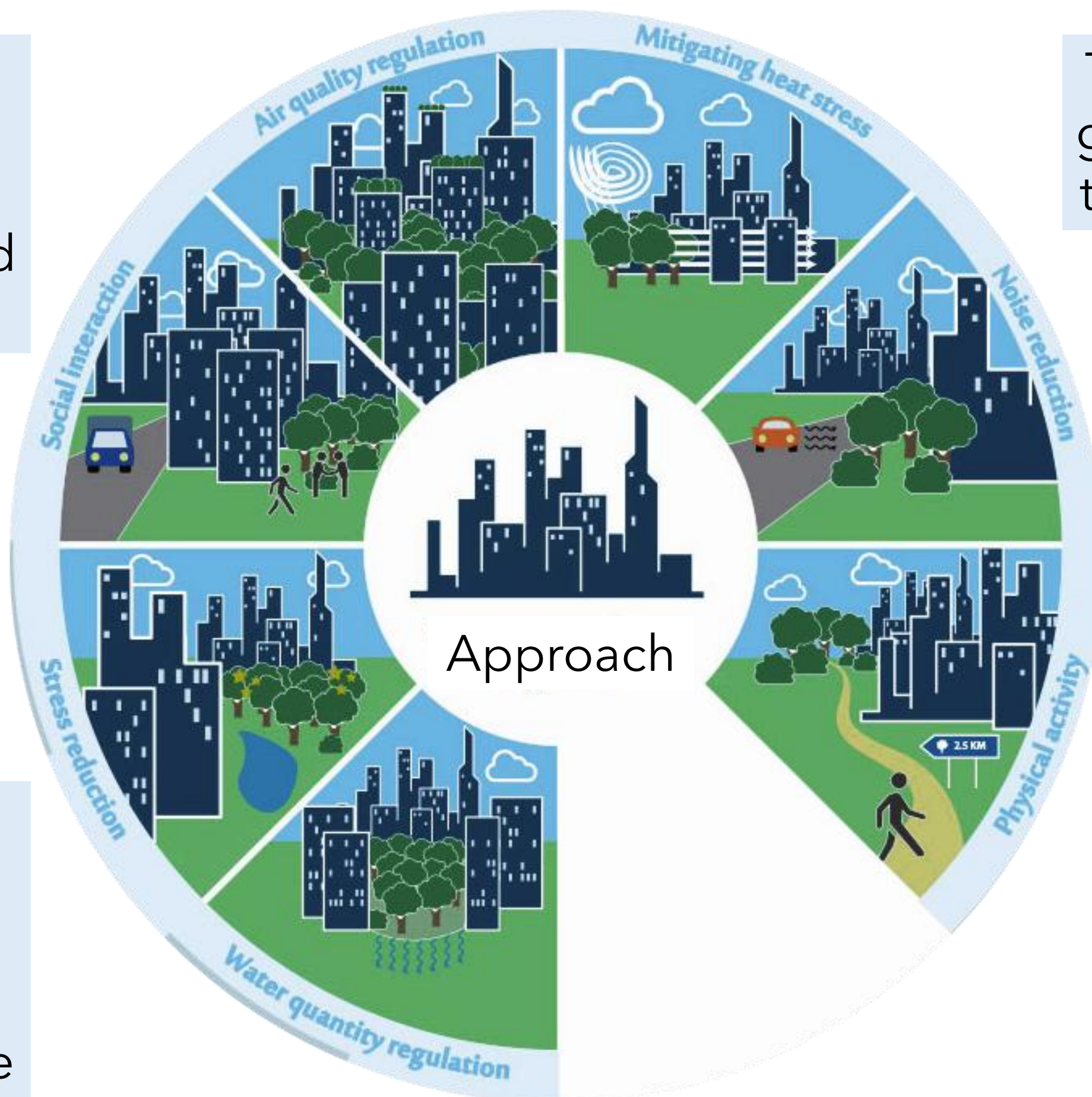
A well-functioning blue infrastructure requires an integrated approach to create a network that prevents floods and droughts, natural phenomena and has a good water quality. This is essential because water is a dynamic substance which flows, evaporates, runs off the surface and leaches. The urban environment 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.
- The functionality is dependent on flow and quality of the blue/green and human network.

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2

PROPOSALS FOR MANAGEMENT OF AIR QUALITY

We can reduce dust pollution from roadways by sprinkling water on them before sweeping them and utilizing mechanical sweeping devices, as well as employing dust suppression systems such as water spraying at mine working and loading areas. Excavation activities should be halted during very high wind conditions in order to reduce dust pollution.

We can also minimize the dust pollution by Providing the green strip along the both sides of newly proposed roads with Plantation of wide canopy trees

So we will be providing green strips according to road width

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

Installation of Ambient Air Quality monitoring station. And also by Regular inspection for Pollution check of vehicles.

- Controlling of NO₂ level by proper maintenance and servicing of vehicles. And Only P.U.C. certificated vehicles will be permitted.

Installation of latest machines to destroy pollutants at the source

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

Industries with large boilers are required to use air pollution control methods such as ESP [electrostatic precipitators] and 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.

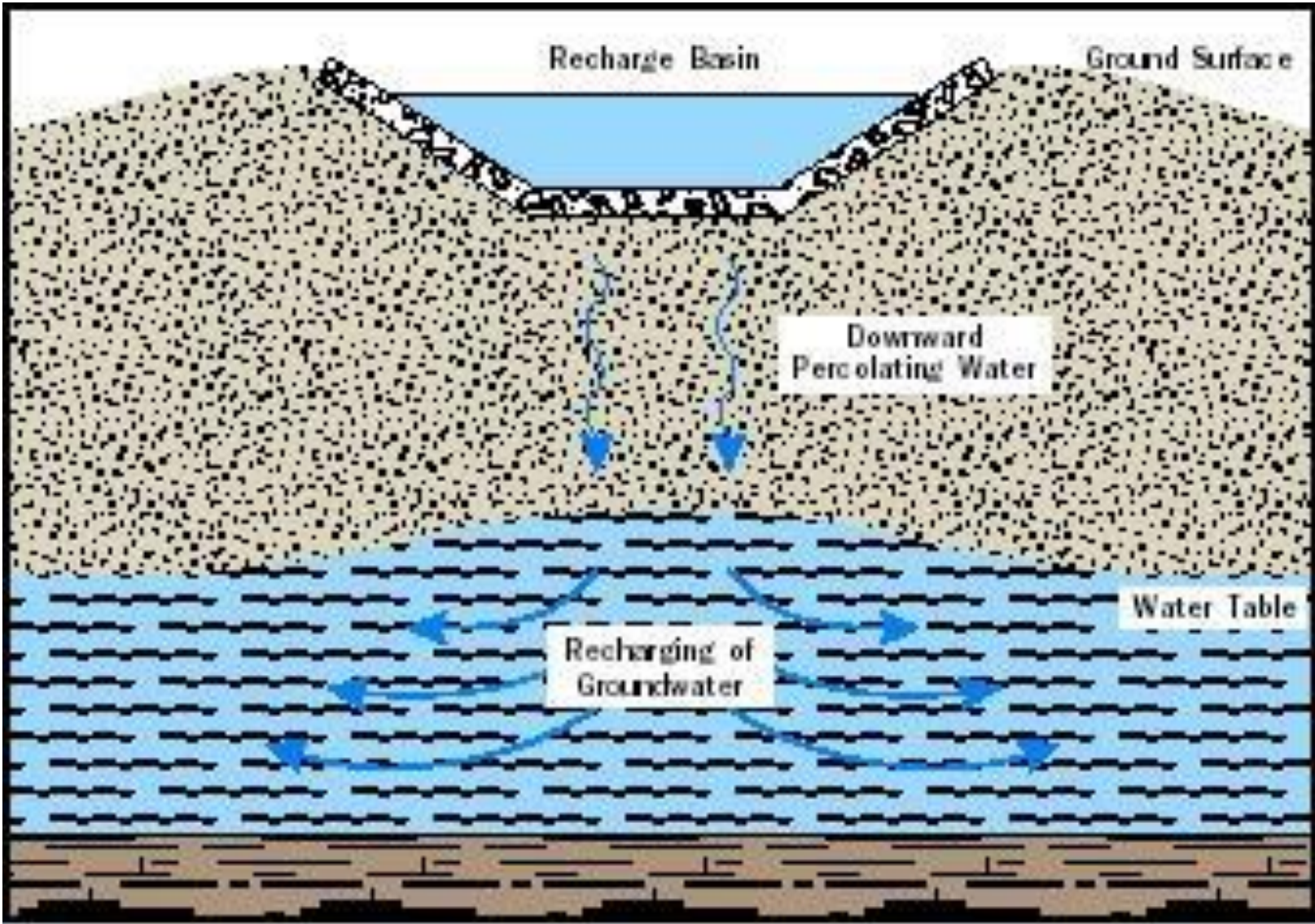
The vegetation on the windward side (the side where the wind comes from) lowers the air temperature in parks during the day and at night.

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

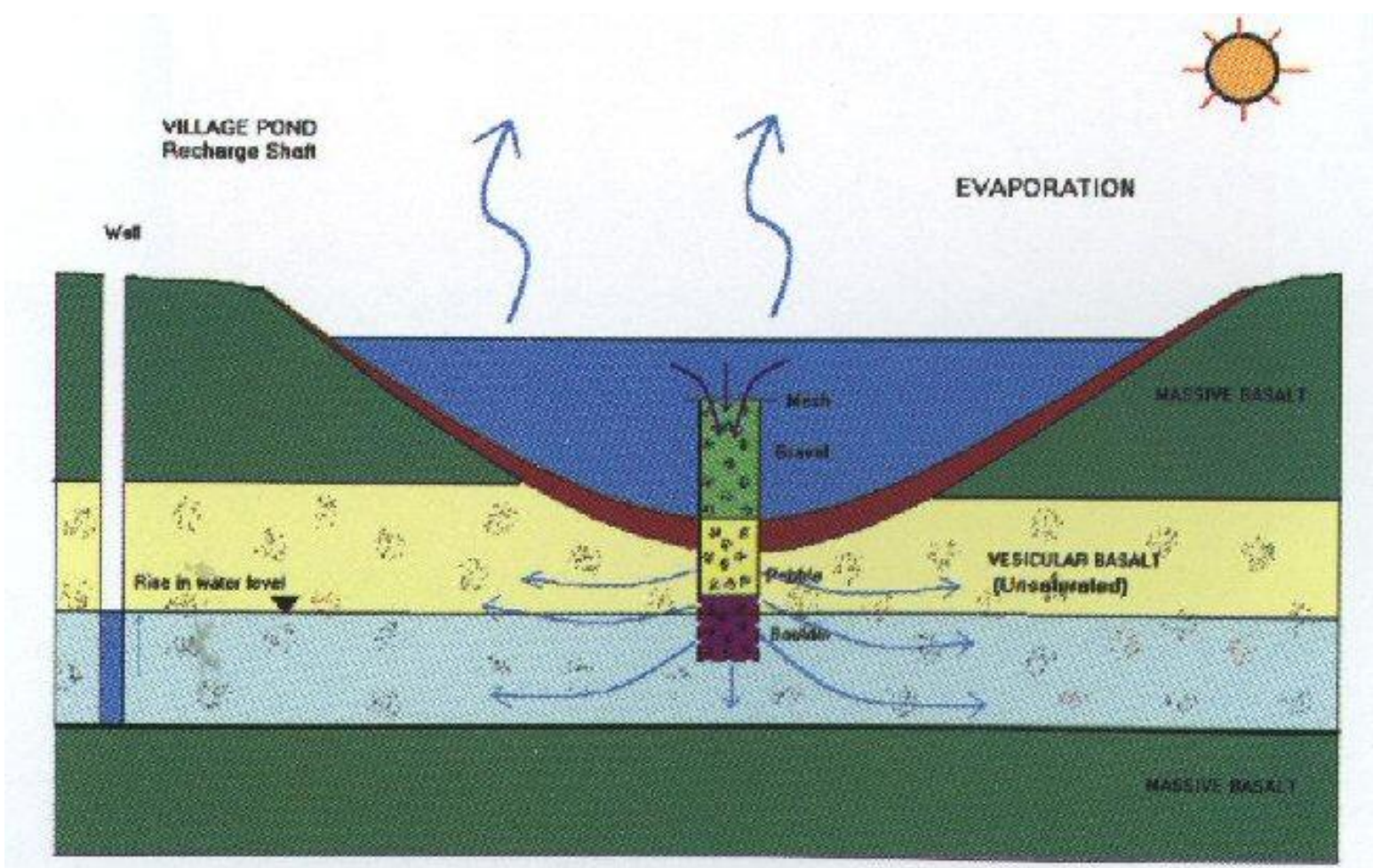
Artificial recharge requires some form of man-made structure. Surface spreading techniques involve keeping water at the surface in areas where the water can percolate down to a shallow, unconfined aquifer. Spreading basins, check dams in stream channels, furrows, trenches, and ditches are common AR examples.

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).



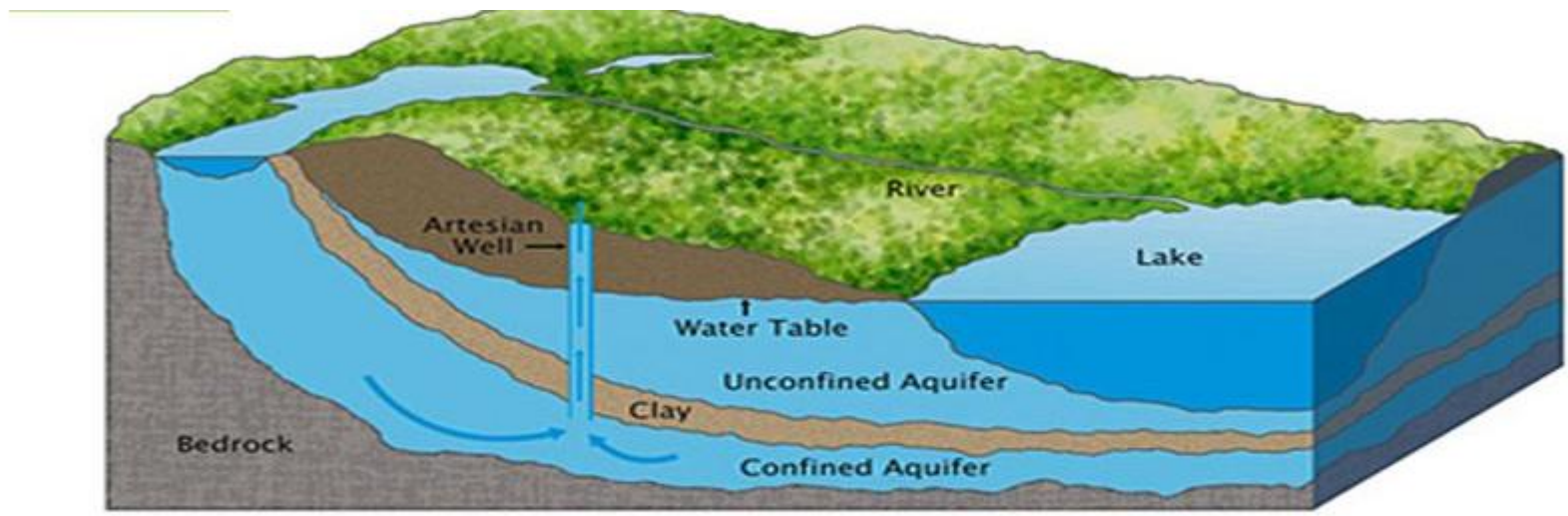
Artificial recharge techniques

Recharge Shaft



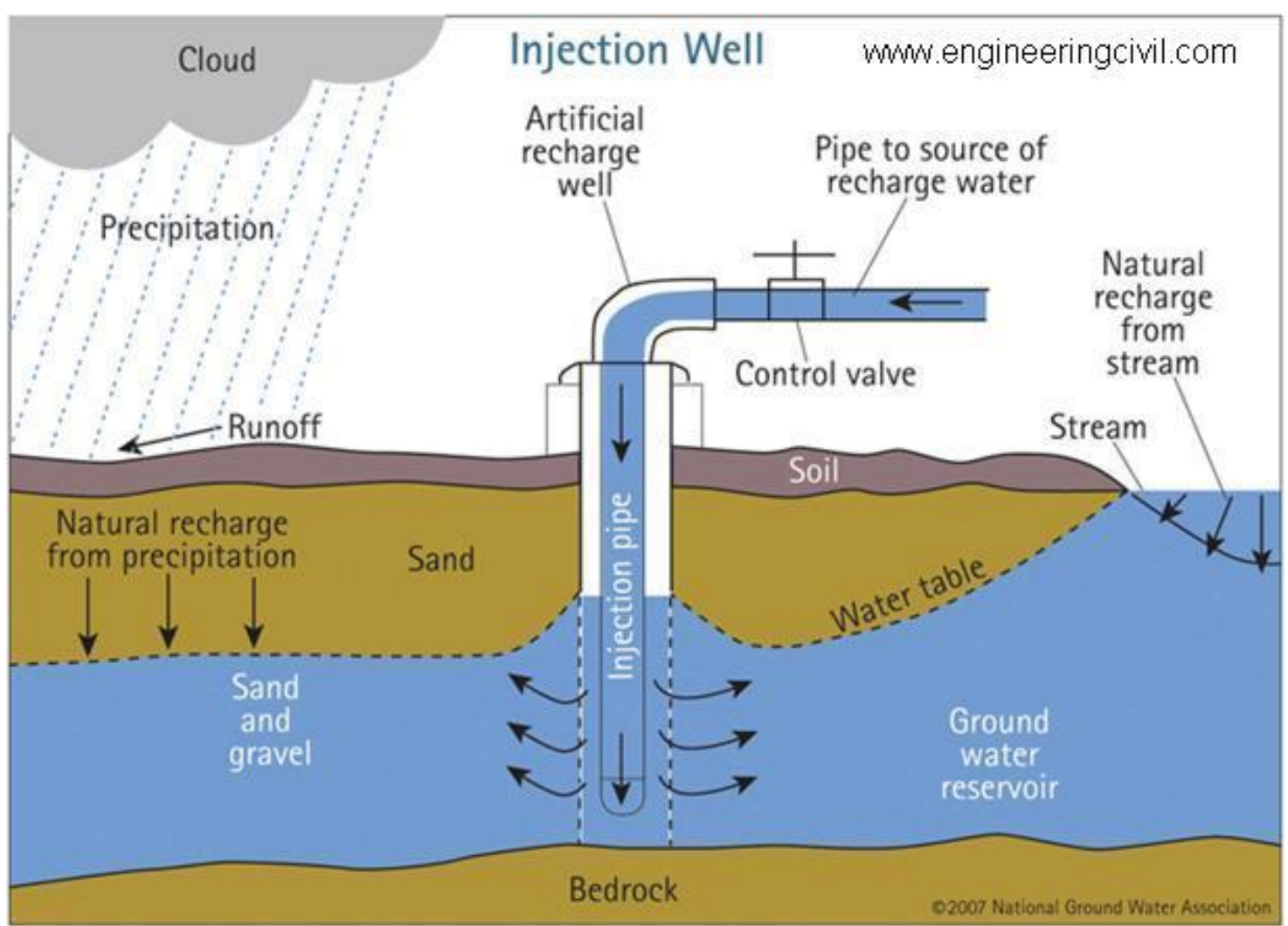
These are the most efficient and cost effective structures to recharge the aquifer directly. In the areas where source of water is available either for some time or perennially e.g. base flow, springs etc. the recharge shaft can be constructed.

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.

Green Buffer Development Plan

Selection of Plant species for Green buffer 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.

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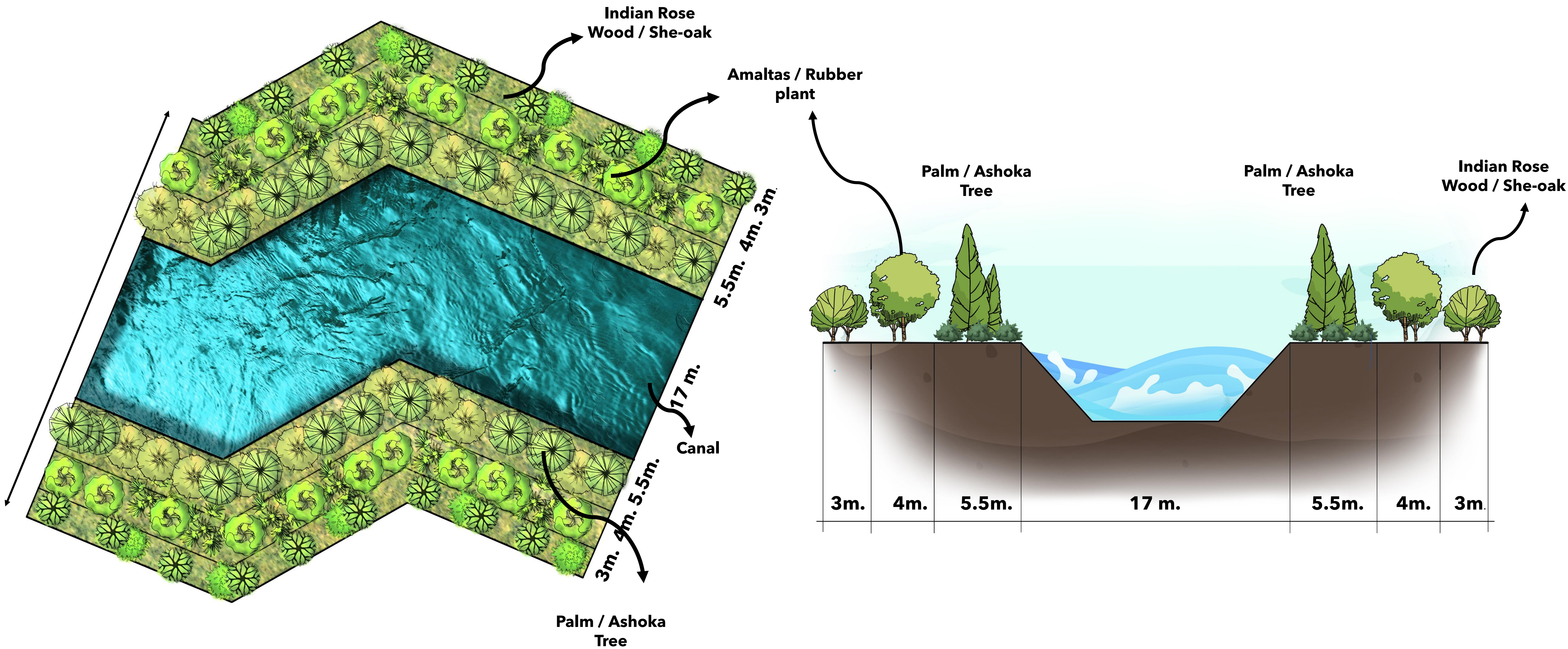
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PROPOSALS OF GREEN BUFFERS

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.

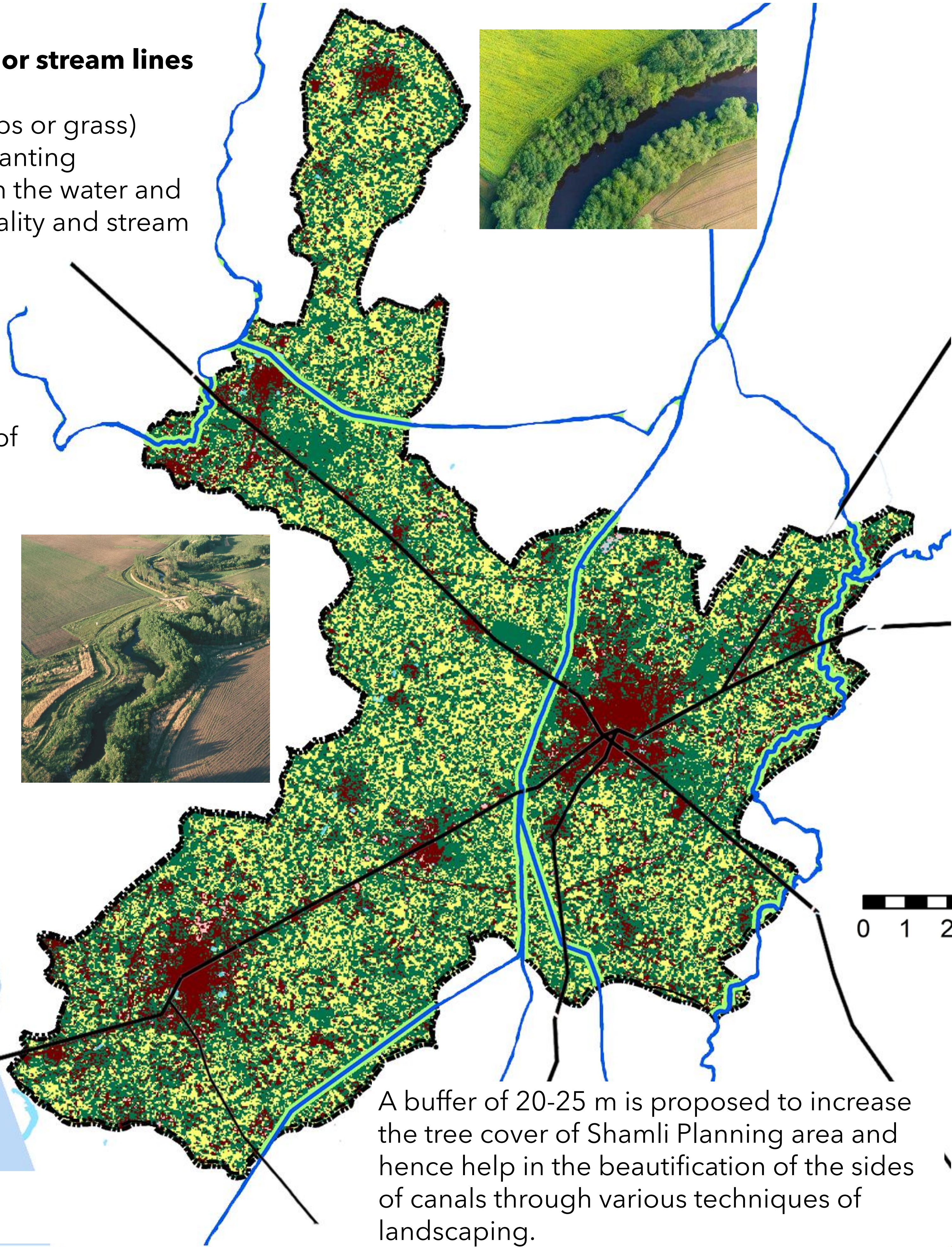
Benefits from the proposal:

- 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

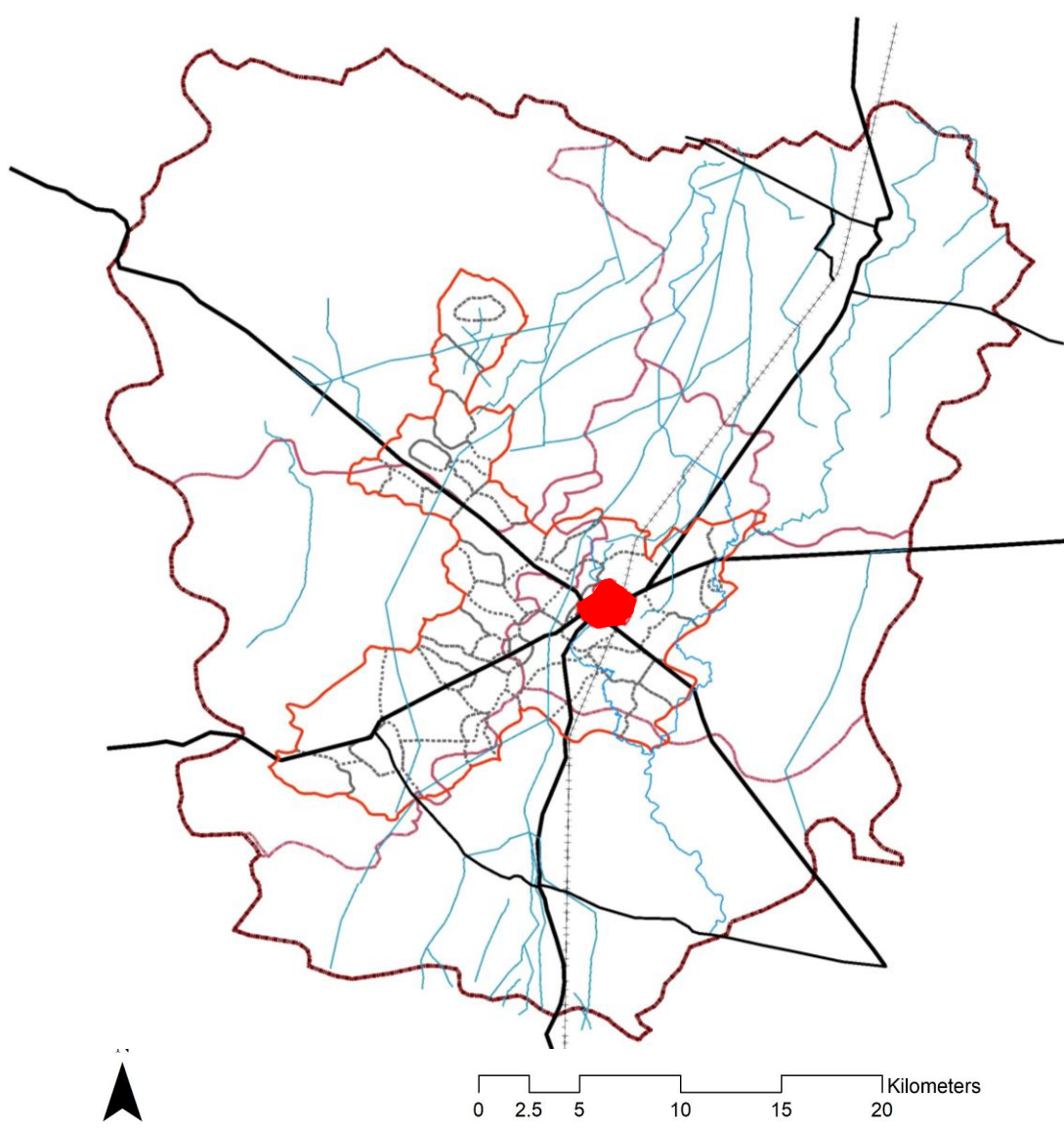
2. Providing the GREEN STRIP along the both sides of newly proposed roads:

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



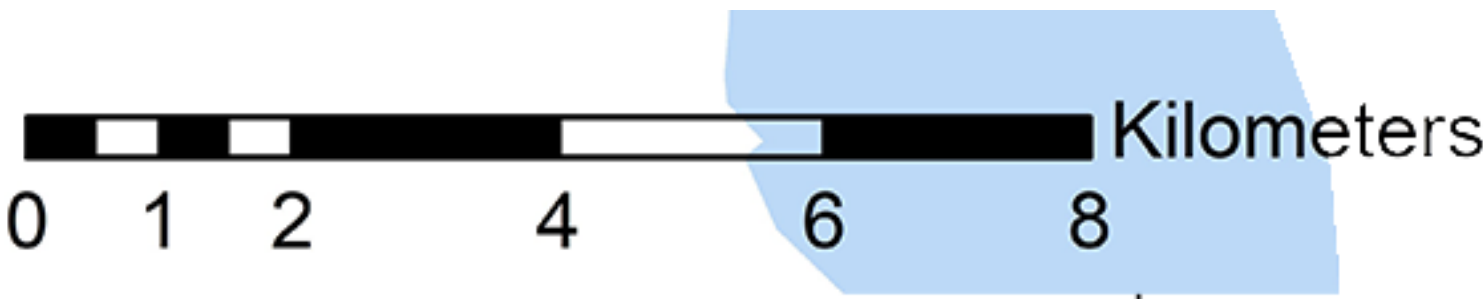
Key map



Legend

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

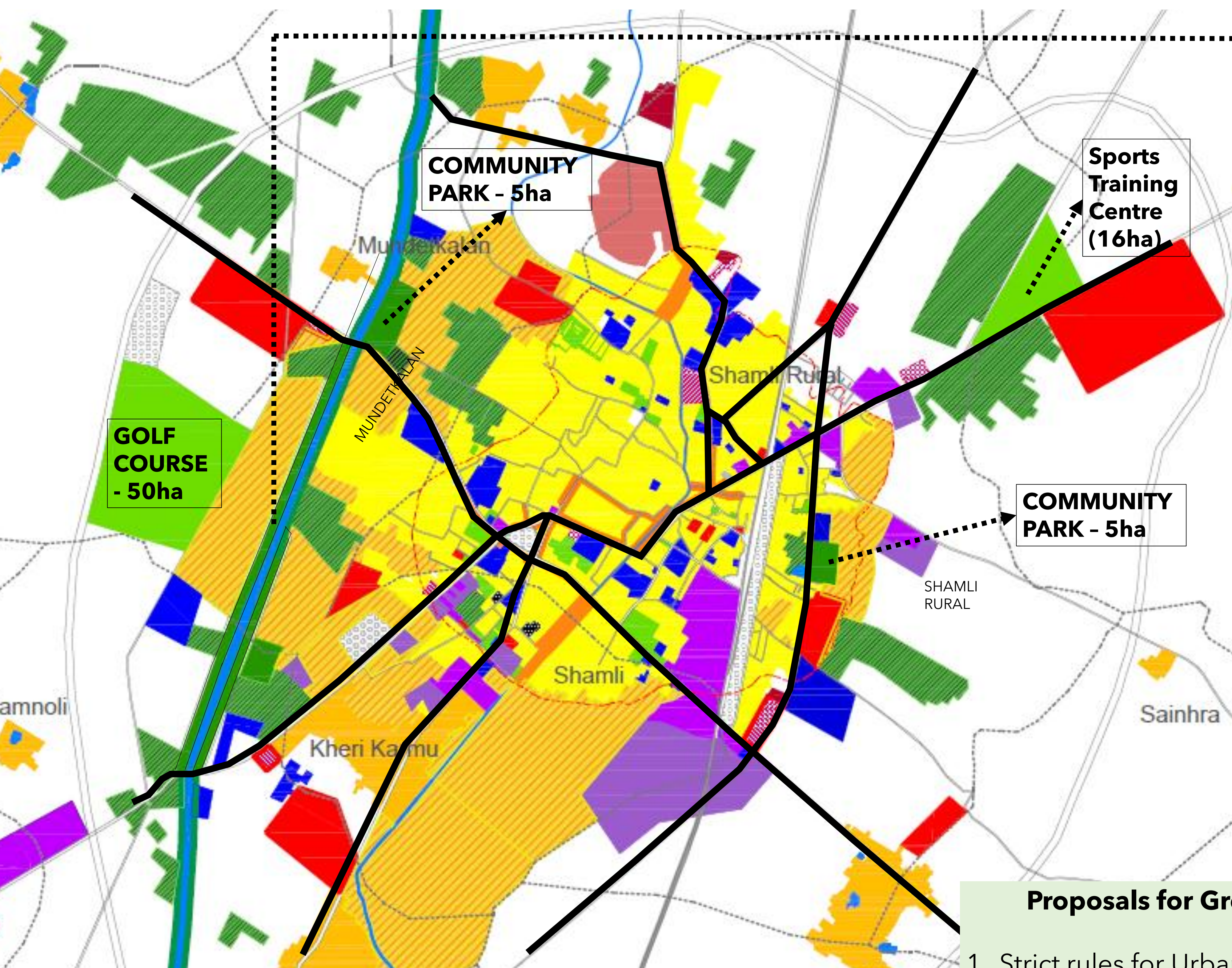
Scale



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.

PROPOSALS FOR GREEN AREAS

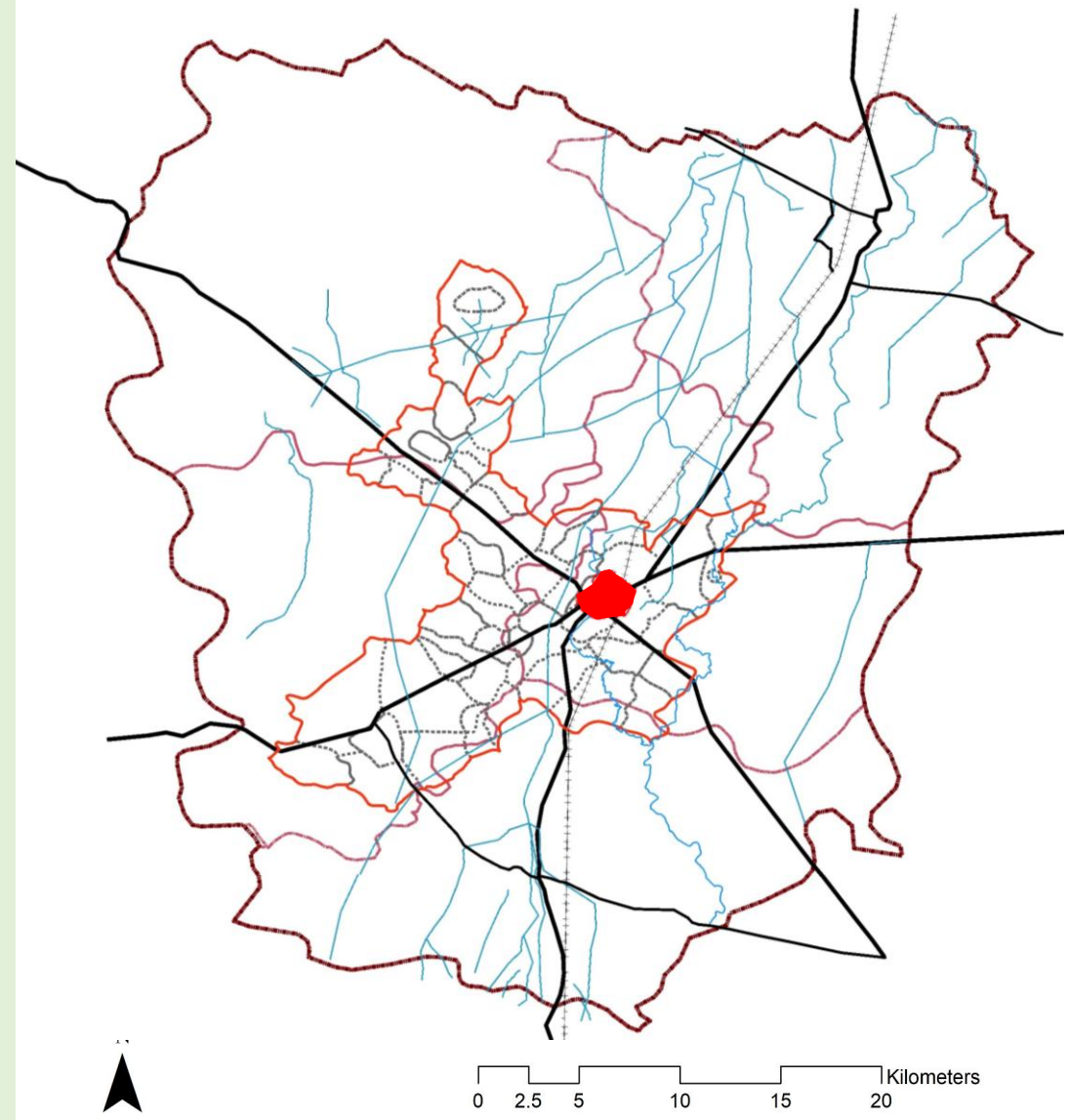


Green Belt of 1.5km and 2.5km along the canal with an offset of 45m from the canal can consist of Pedestrian pathways, Cycle tracks , Sitting areas, Kiosks, children play area which increases the City's Recreational cover

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

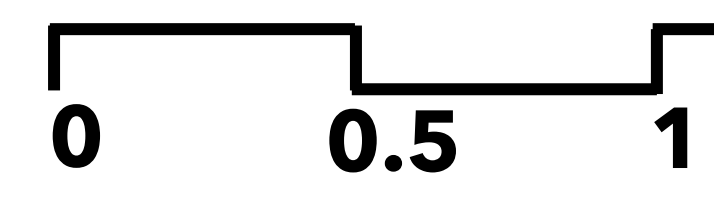
Key map



Legend

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

Scale



Proposals for Green Area Plan of Action

1. Strict rules for Urban forestation
2. Plantation along the median of the roads.
3. Develop Mango Orchard
4. Develop Town Level Park
5. Parks (both creation and revival)
6. Landscaping of important locations
7. Improvement in Non-Motorised Transport (NMT)
8. Adopt Green Building Concept

Land use category	Existing Area (Ha)	Percentage %	Proposed Area (Ha)	Total (Ha)
Park and Open Space	20.17	1.53%	94.5	114.7
Orchards	237.78	18.03%	0	237.78
Agriculture	4461.1		-709.8	3751.3

Source & Note



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



The industrial waste management hierarchy according to the Pollution Prevention act

Set up of an industrial wastewater treatment plant.

- **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.

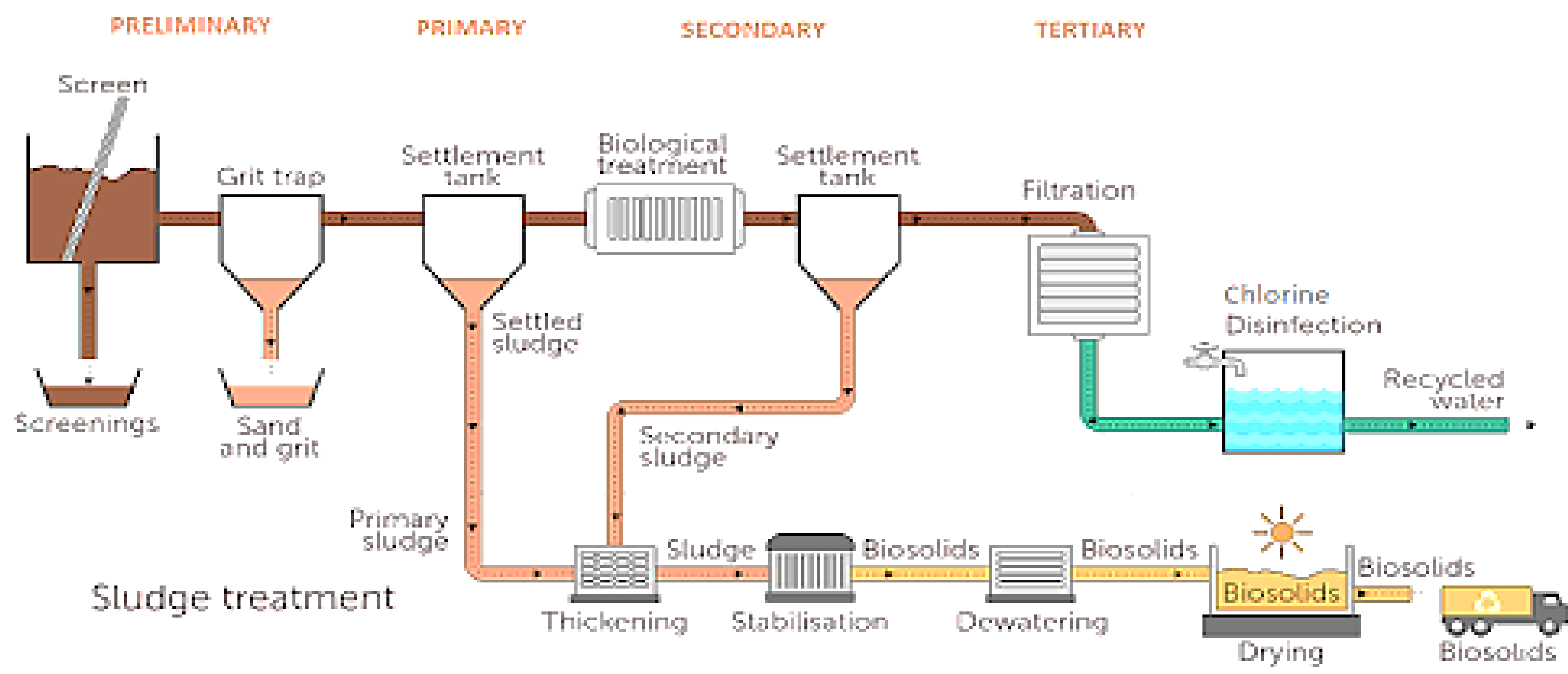
Industrial wastewater treatment

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

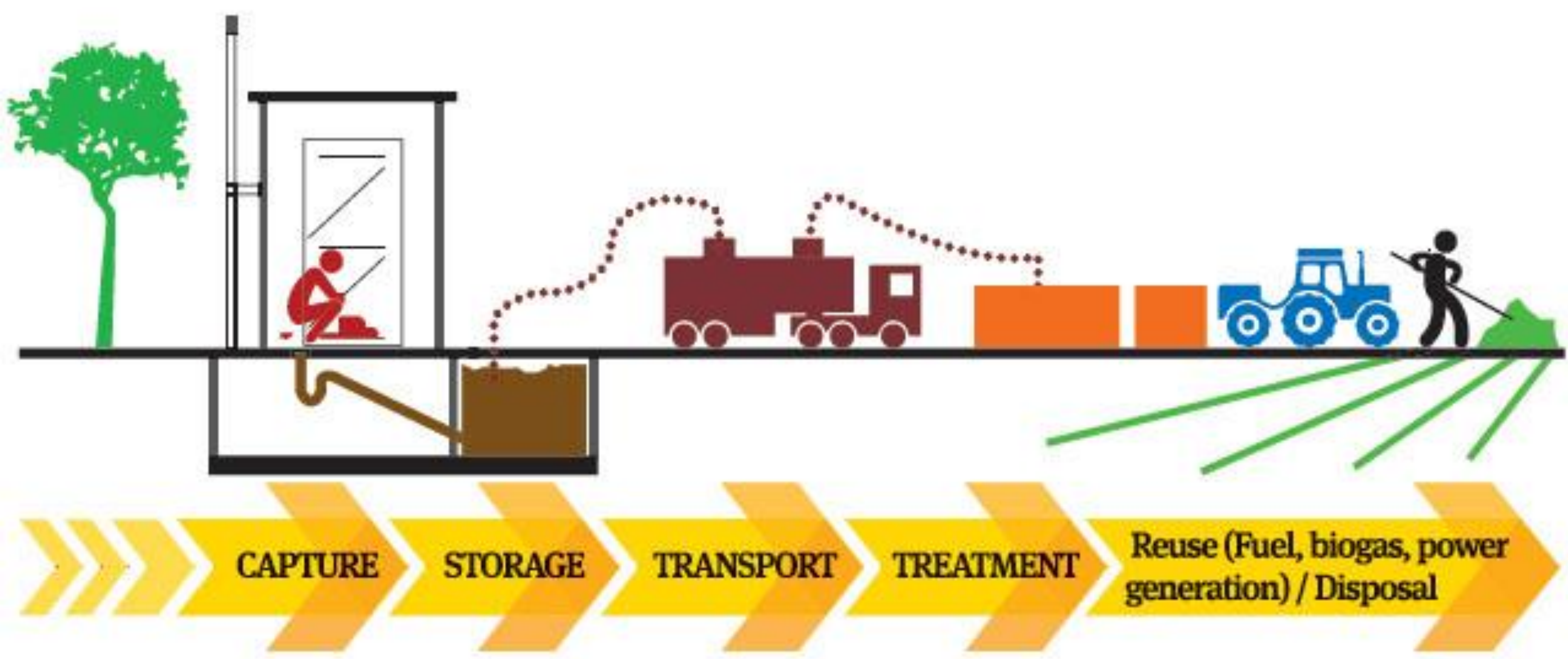
• INDUSTRIAL WASTE MANAGEMENT

RECOMMENDATION OF TREATMENT PLANTS

Setting up of COMMON EFFLUENT TREATMENT PLANTS

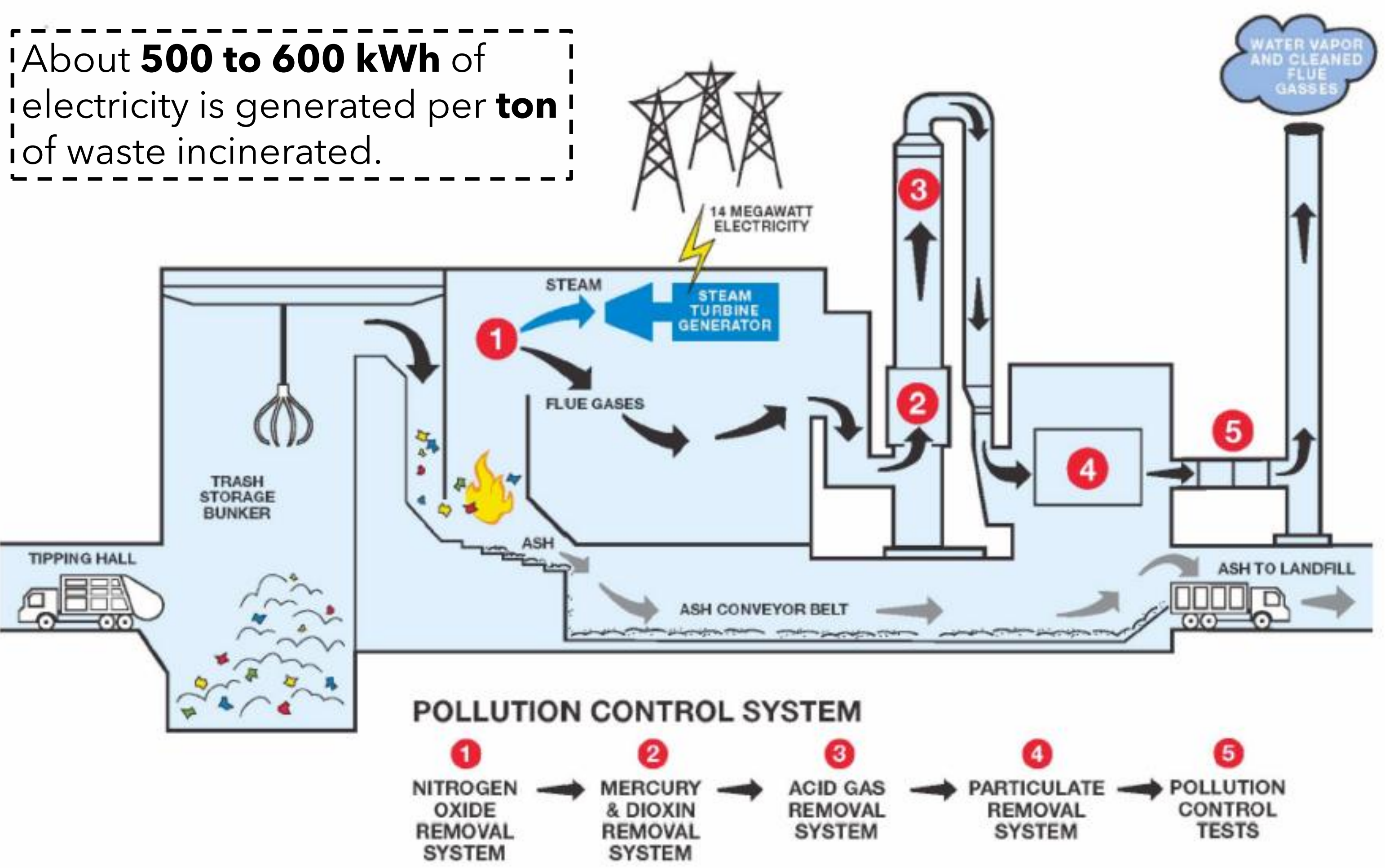


Setting up of FAECAL SLUDGE MANAGEMENT PLANT



Setting up of WASTE-TO-ENERGY PLANTS

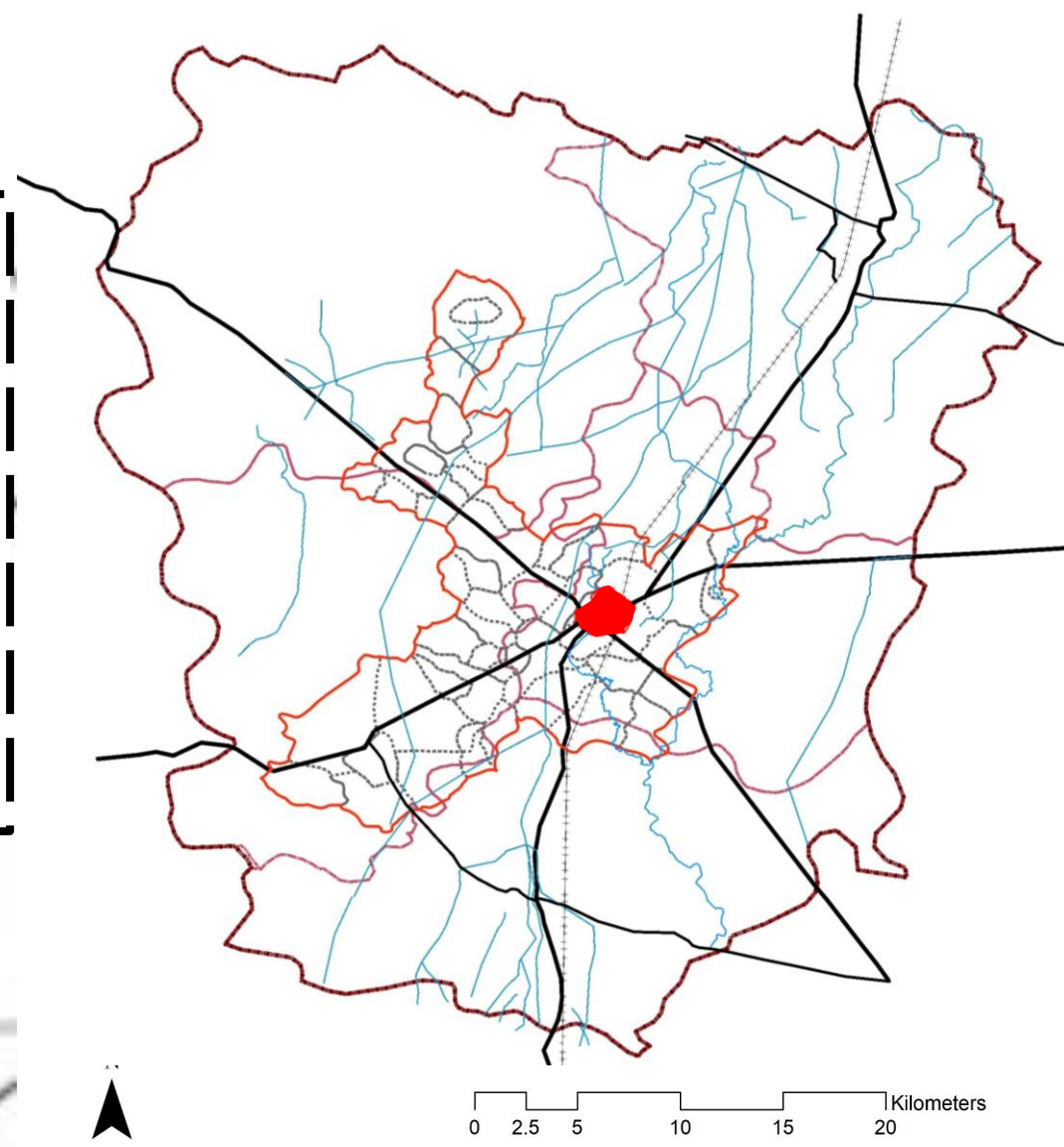
About **500 to 600 kWh** of electricity is generated per **ton** of waste incinerated.



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

RECOMMENDED LOCATION FOR TREATMENT PLANTS

Key map



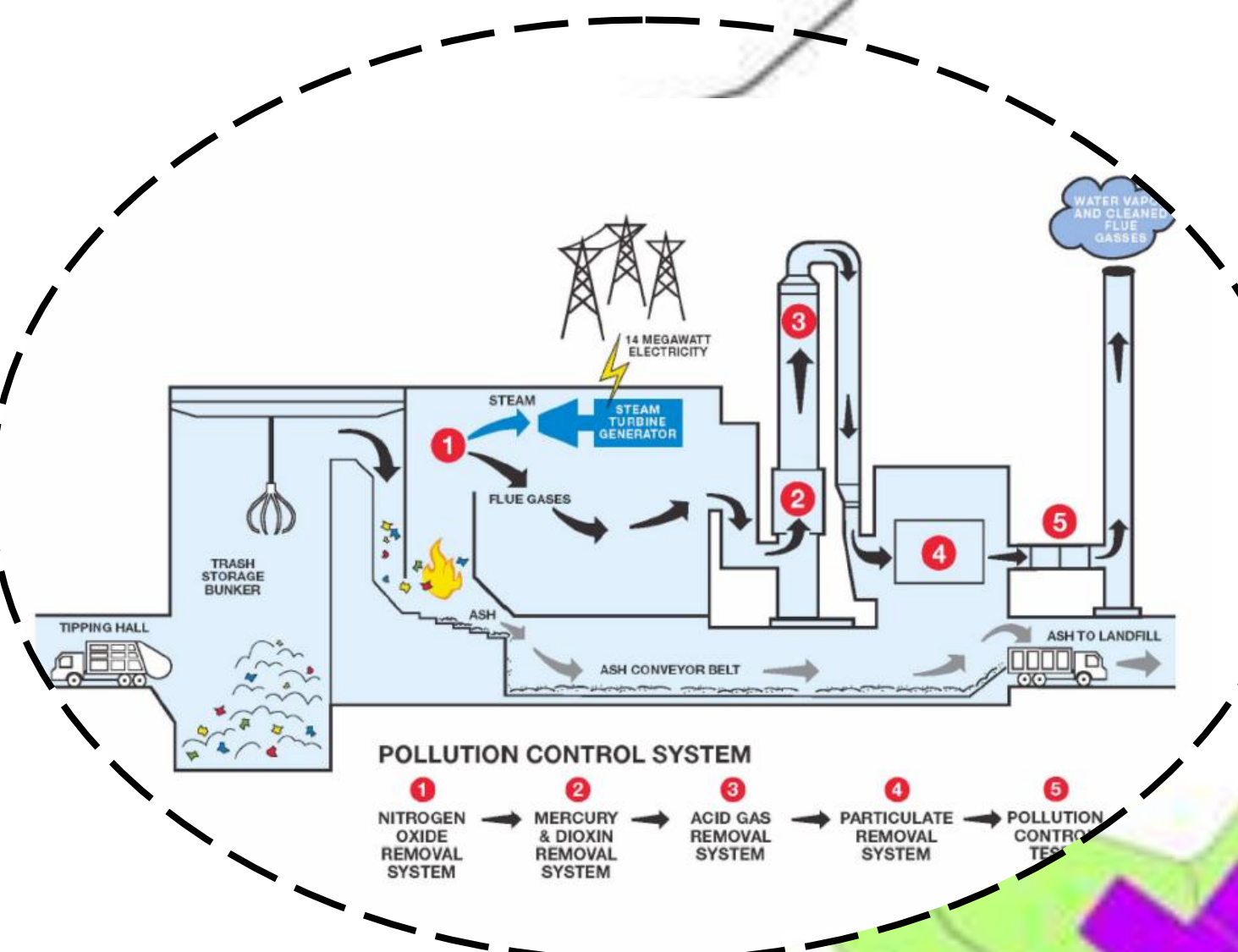
1, 2 and 3 are the proposed locations of **Solid Waster Management facilities**.

- Location 1 - 10 ha (proposed)
- Location 2 - 3.4 ha (existing)
- Location 3 - 10 ha (proposed)

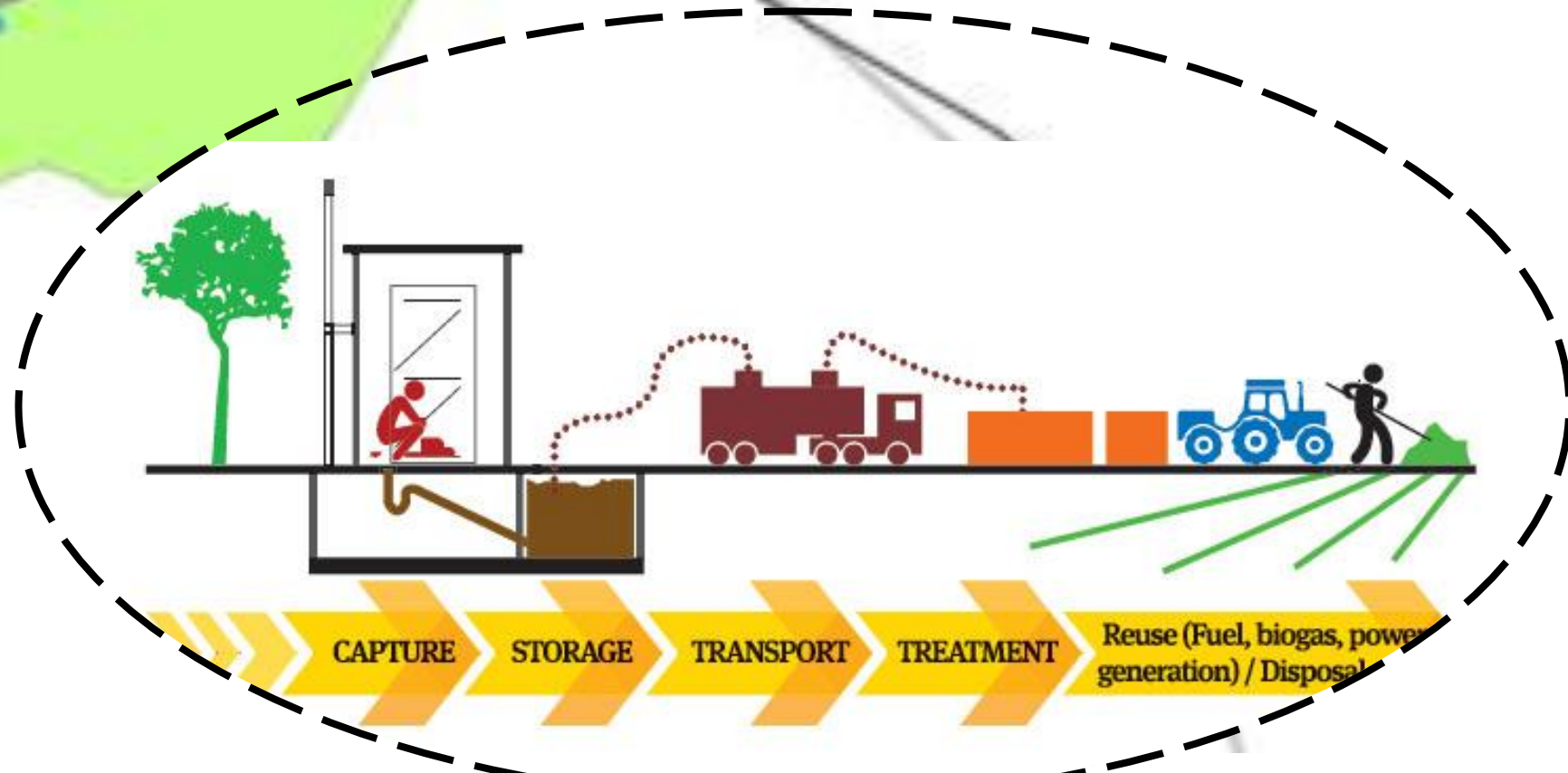
a, b, c and d are the proposed locations of **Sewerage Treatment Plants**.

- Location a, b and c - 1 ha
- Location d - 1.5 ha

Recommended location for installation of **WASTE-TO-ENERGY PLANTS**



Recommended location for installation of **FAECAL SLUDGE MANAGEMENT PLANT**



Legend

- Residential
- Village abadi
- Commercial
- Mixed Land Use
- Wholesale
- Industry
- Warehouse
- PSP
- Graveyard and Cemetery
- Parks and Open Spaces
- Orchards
- Agriculture
- Utility Undertaking
- Waterbody and Canal
- Bus Depot
- Railway track
- Roads
- Planning area boundary
- Village Boundary
- Shamli NPP
- Shamli Railway Station

Scale

0 200 400 600 800 1000m
1:20000



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.

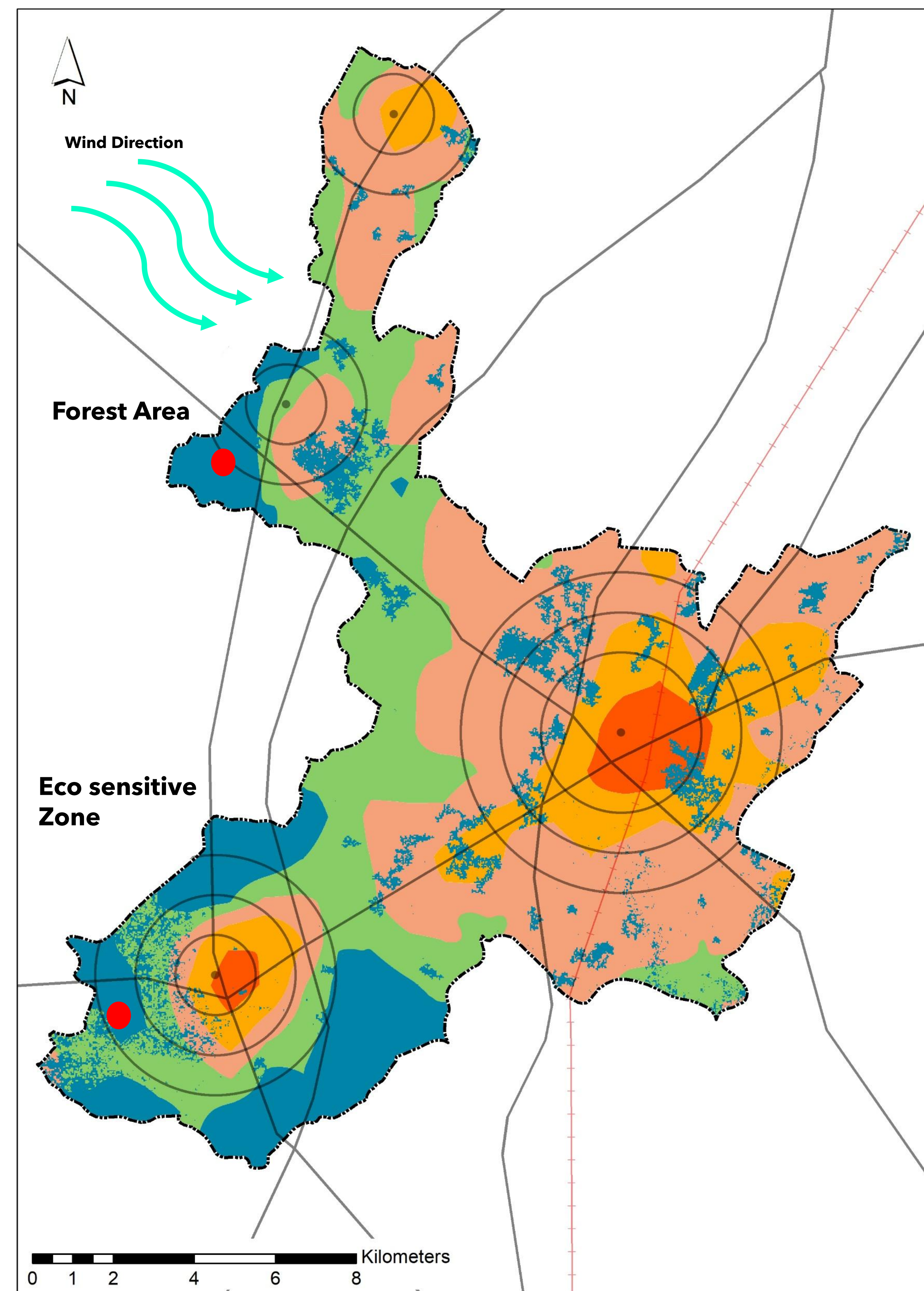
The design and nature of greens will vary according to the place and the type of industry. Some of the factors which influence the design of green belts are-

- 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.



ASPECT	PROPOSALS
Climate	- Supporting Blue-Green Infrastructure - Conservation of existing eco - sensitive area and the areas with dense tree cover.
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
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
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. - Initiate Artificial recharge techniques to recharge ground water - Installation of Fecal Sludge Management Plant and using the treated fecal waste as fertilizer instead of chemical fertilizers. - Using of natural pesticides. - Installation of Combined Effluent Treatment Plant to treat effluents from industries and reusing the water for industrial purpose, it helps to avoid contamination of water bodies.
Air Quality	- Sprinkling of water before sweeping of roads. - Providing the green strip along the newly proposed roads. - Regular inspection for Pollution check for every vehicle in the city. - Installation of latest technology machines to destroy pollutants at the source - Installation of Ambient Air Quality monitoring station. - Restriction on open burning of municipal solid waste - Promotion of waste to energy concept (Setting up of Waste to Energy plant) - Use of Agriculture Residue into bio pesticides. - Promote Public transportation and use of CNG
Greens and Opens Spaces	- Conservation of existing eco - sensitive area and the areas with dense tree cover. Strict rules for Urban forestation - Green Buffer areas of 25m width along the both sides of natural canal, Integrated parks and open spaces. - Plantation along the roads. - Parks (both creation and revival) Landscaping of important locations

THANK YOU