COMPREHENDING LAND CAPABILITY

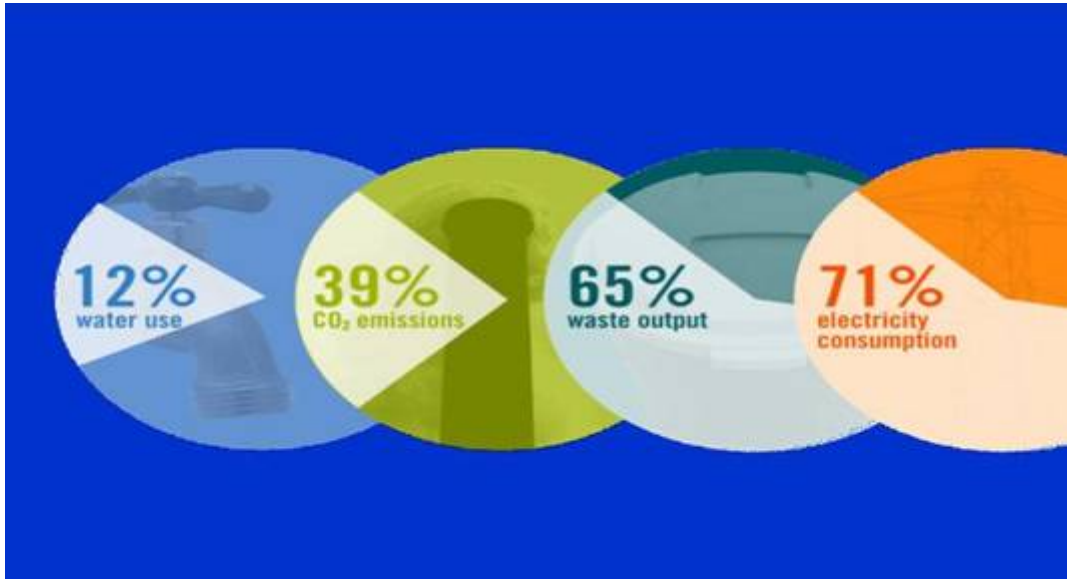
TOWARDS INTEGRATED ECO PRODUCTIVE LAND USE AND PLANNING

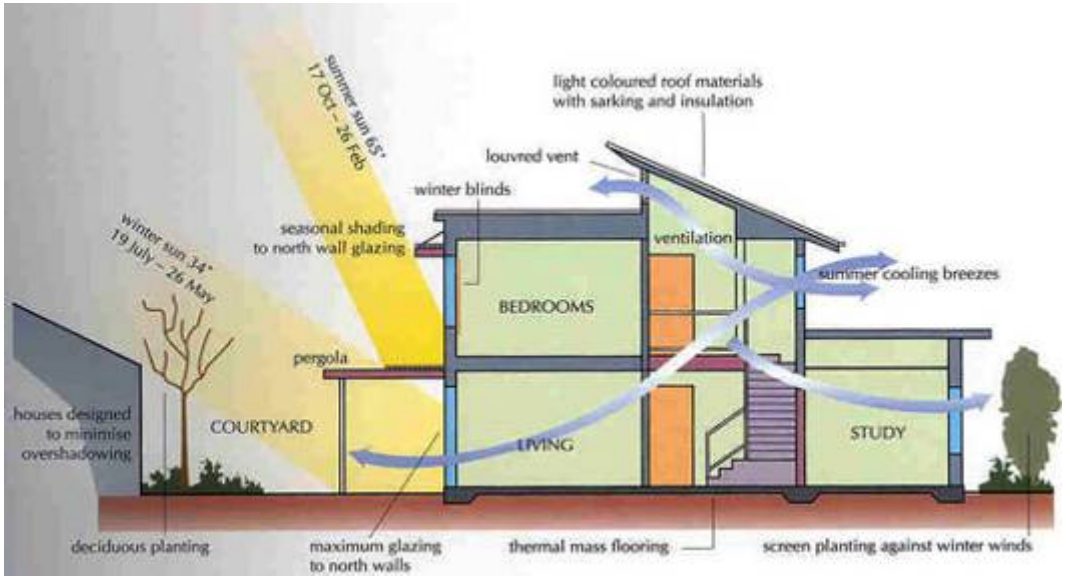
- CURRENT MODES OF PLANNING
- NOTION OF ‘SITE’ AS A ‘LAND’
- LAND CAPABILTIY AND PARMETERS
- INTEGRATED ECO PRODUCTIVE STRATEGIES

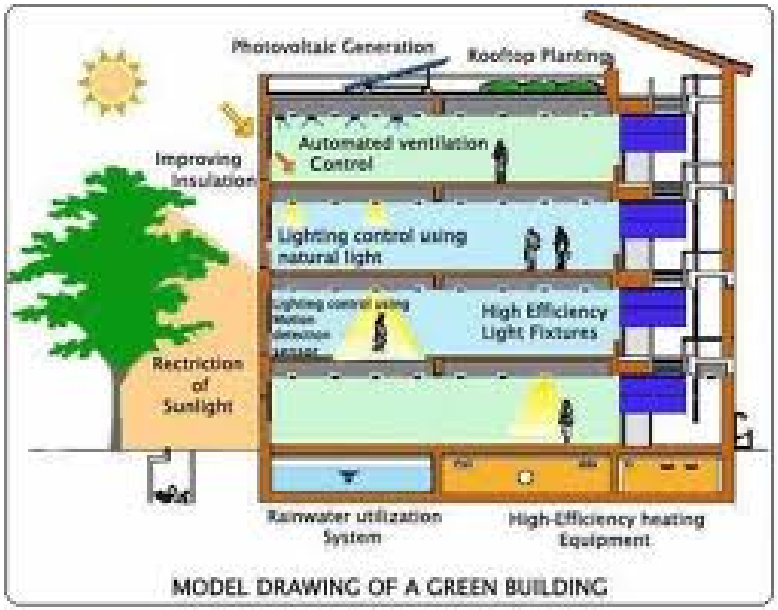
MASTER PLANNING AS RESULTANT OF OVERARCHING FORM DRIVEN ARTISTIC EXPRESSION

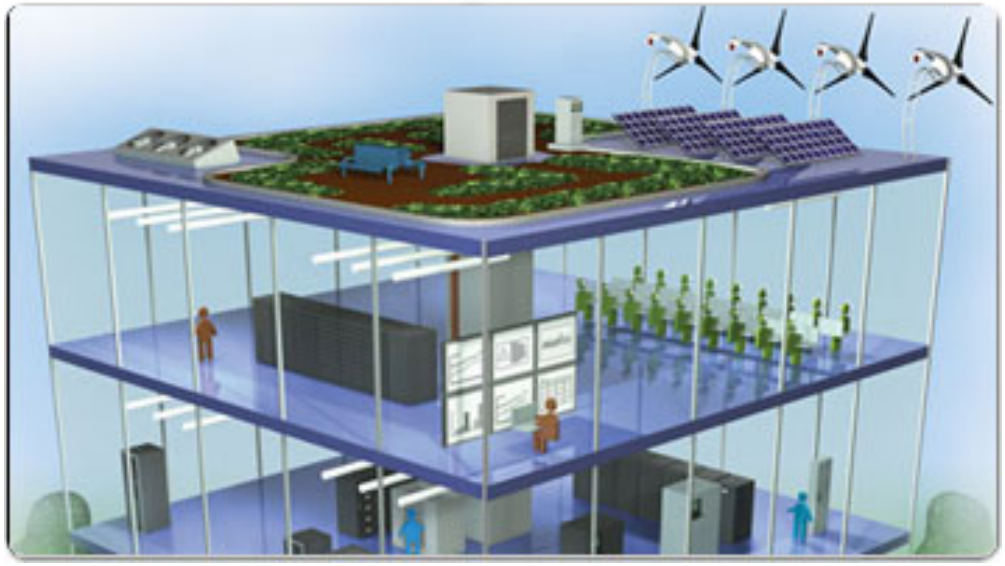
DEFINITION OF BOTH BUILT AND OPEN SPACE A COUNTER PRODUCT OF THE ROAD INFRASTRUCTURE.

OPEN SPACE LAND USE A BY PRODUCT OF LEFT OVER SPACES IN THE DEVLOPMENT TO ACCOMMODATE RECREATION









SUSTAINABILITY CONCERNS ONLY AT THE BUILDING AND RELATED SERVICES SCALE INCORPORATED.

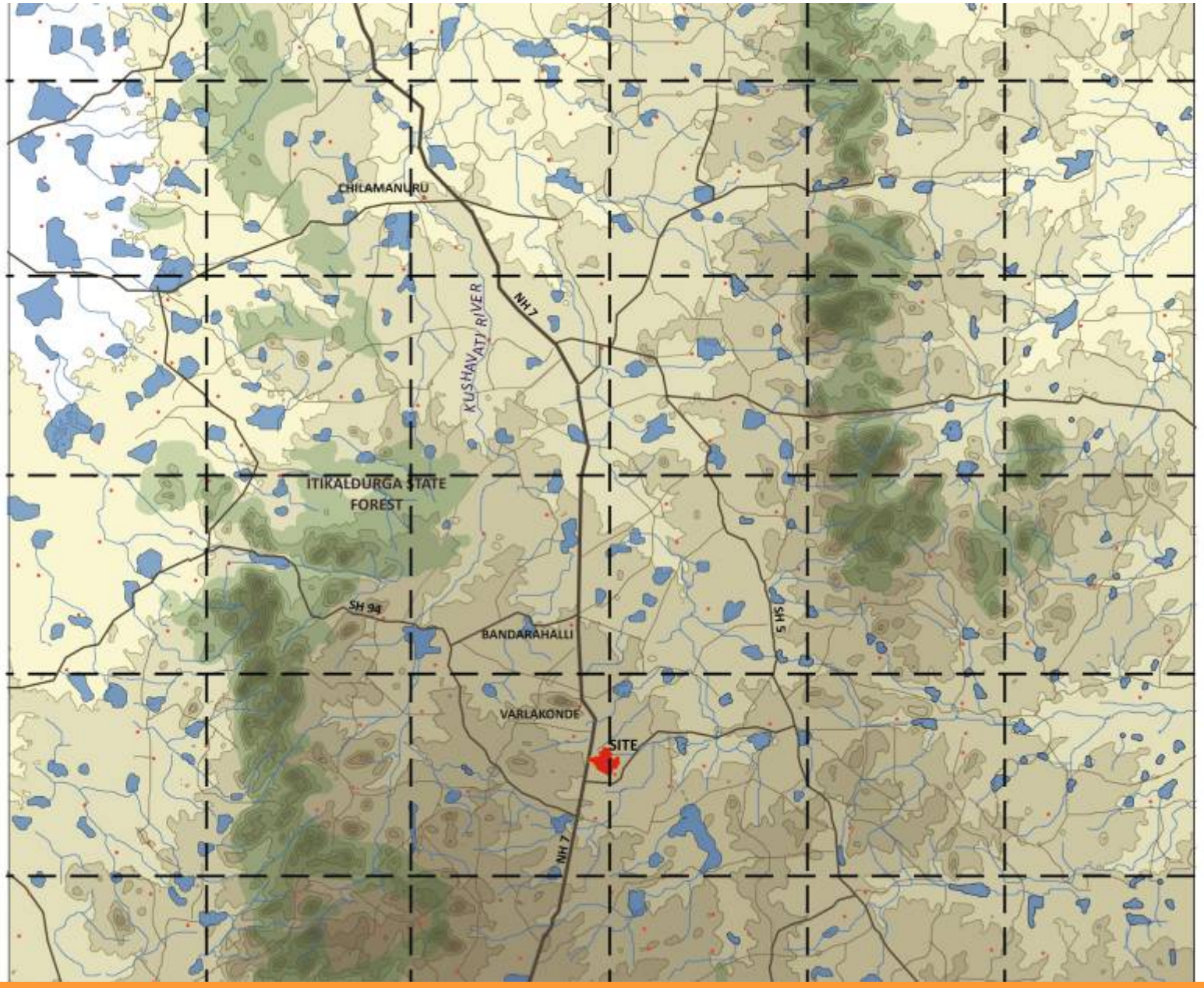
10% COVERAGE

90 % OPEN LAND

IT OUGHT TO BE UNDERSTOOD THAT THE BUILT OCCUPIES ONLY FRACTION OF A SPACE ESPECIALLY FOR LARGE SCALE DEVELOPMENT

THIS RESULTS IN MOST OF THE SITE NOT BEING STRATEGICALLY DEVLOPED TOWARDS A PERFORMATIVE LANDSCAPE AND ECOLOGY

The critical departure in addressing sustainability for large-scale projects is to first comprehend that the parcel allocated for development and earmarked as a Site is technically a LAND



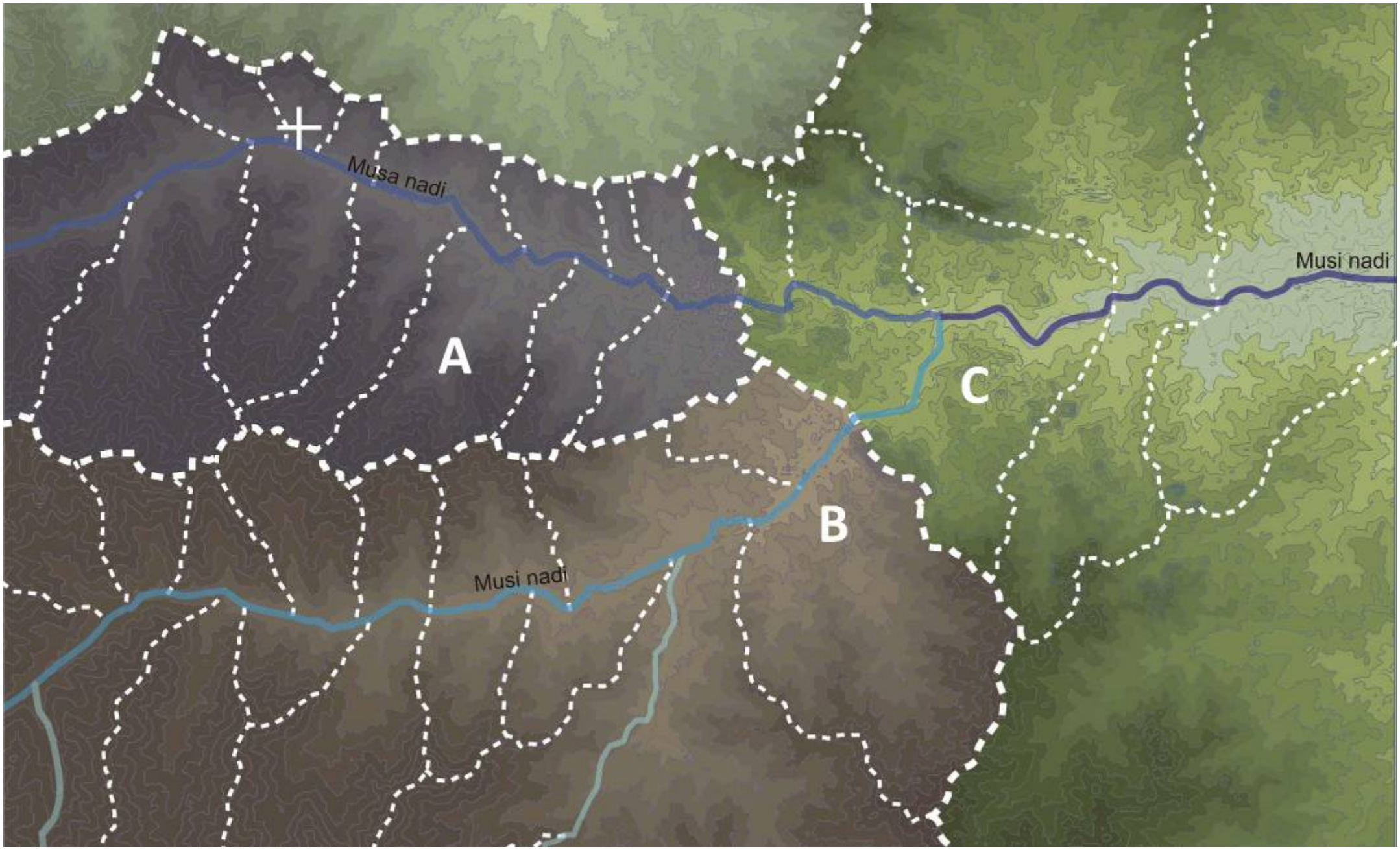
1150 M
1050 M
950 M
850 M
750 M
650 M

GRID 10000M X 10000M

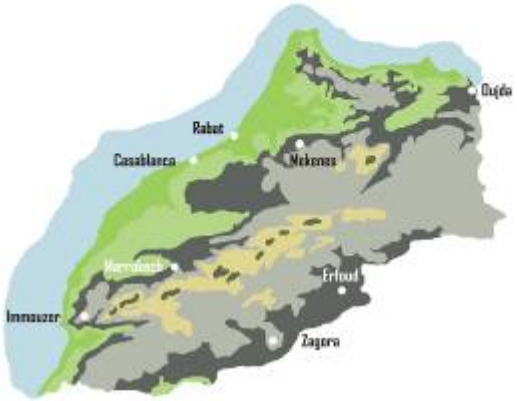
REGIONAL SETTING

The site sits amidst a rich agricultural belt with a rich tradition of horticulture. Numerous lakes dot the landscape constructed over centuries to cater to both irrigation and domestic needs; the general slope of the land is northward and the lakes form a inter connected network through a an intricate system of valleys and channels

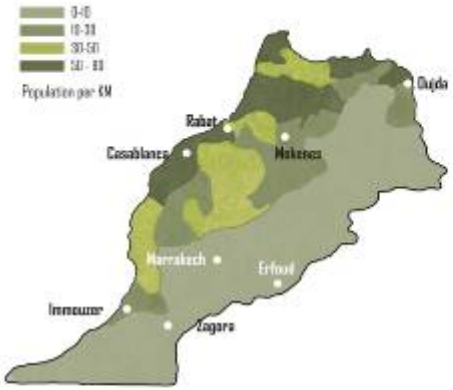
***SITE* IS TECHNICALLY A *LAND* WITH INHERENT POTENTIALS LINKED TO THE LARGER ECOSYSTEM OF WHICH IT IS A PART. ITS PHYSICAL DEMARCATION IS TO BE UNDERSTOOD AS A BOUNDARY FOR THE PHYSICAL EXTENT OF DEVELOPMENT AND NOT A DEFINITION OF FACTORS THAT INFLUENCE IT**



REGIONAL POSTIONING OF THE LAND WITH RESPECT TO PHYSICAL AND NATURAL CONDITIONS

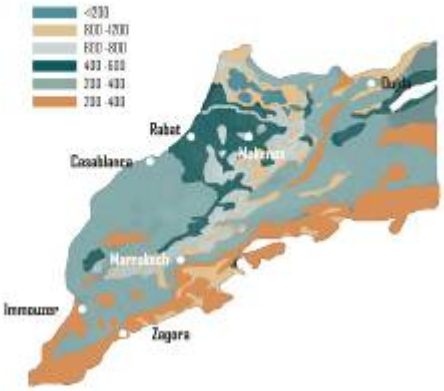


Regional TERRAIN DISTRIBUTION



Regional POPULATION DENSITY

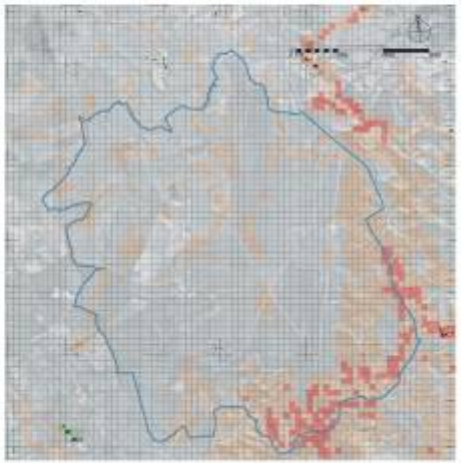
Regional ECONOMY



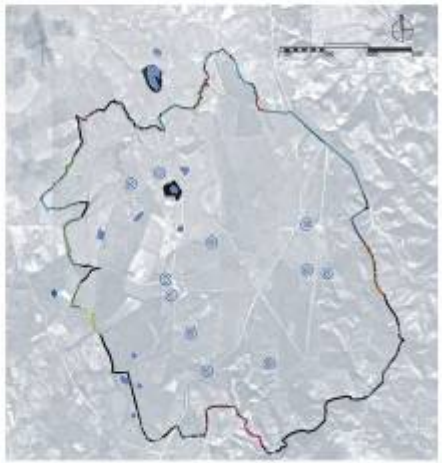
Regional RAINFALL DISTRIBUTION

BAB ZAERS, Site Perimeter

BAB ZAERS, Geological Conditions

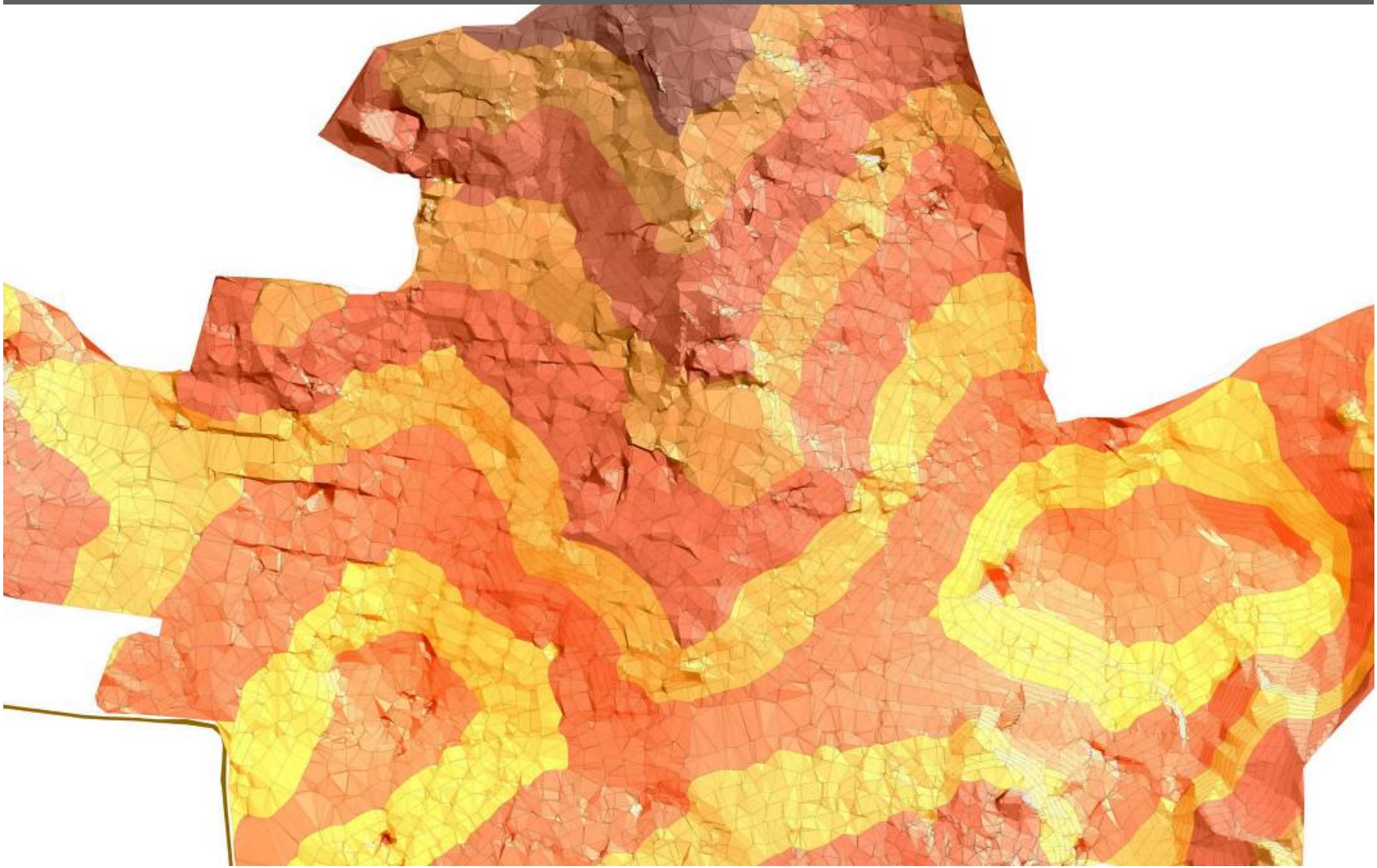


BAB ZAERS, Terrain Conditions

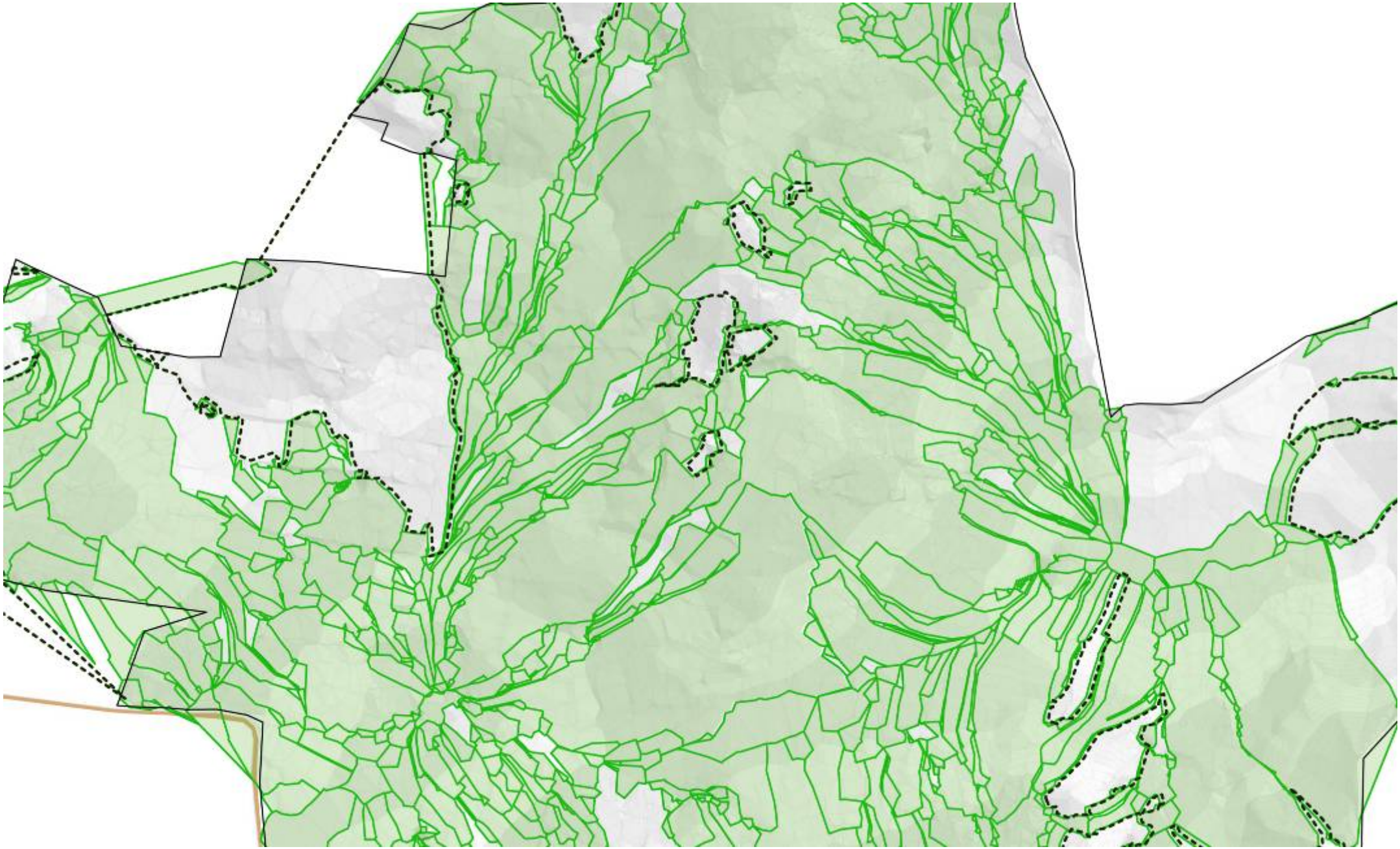


BAB ZAERS, Hydrological Conditions

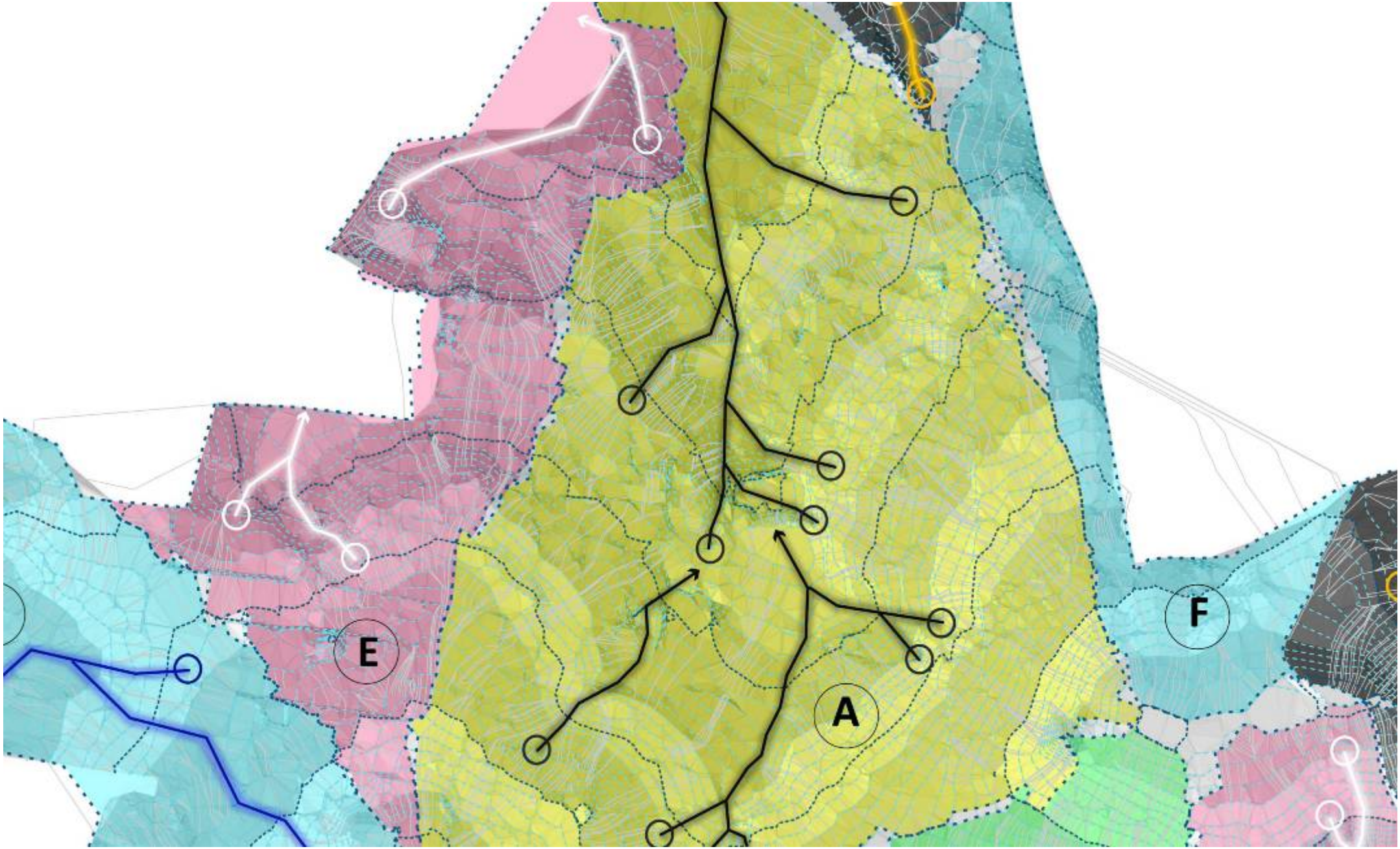
THE INHERENT CAPABILITIES AND POTENTIALS OF THE LAND NEED TO BE MEASURED, ACCOUNTED FOR AND ENGAGED WITH TO DEVELOP AN INHERENTLY SUSTAINABLE PROGRAM DISTRIBUTION FOR THE DEVELOPMENT



COMPRHENDING THE PHYSICAL ASPECTS OF THE LAND SUCH AS TOPOGRAPHICAL FEATURES, SLOPES ETC.



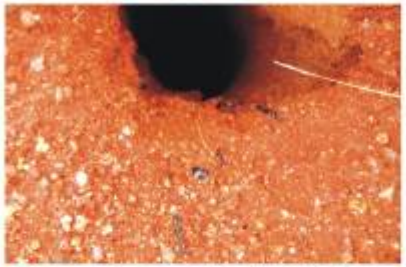
COMPRHENDING INTANGIBLE QUALITIES OF LAND SUCH AS MICRO WATERSHEDS



ESTABLISHING A NATURAL ORDER AND ZONING OF THE SITE BASED ON HYDROGEOLOGY

SOIL PROFILE

Red loamy soil: fertile soil, good for agriculture when tilled.



Red sandy soil: found near the ridges with vegetation

Sandy soil : found over water channels, minimal vegetation

Gravelly soil : found on ridges, well drained. Encourages certain species of grass and groundcover

Rocky outcrop: scattered throughout the site, well drained and hosts a few pioneer species of vegetation

LOCALIZATION OF SITE CONDITIONS BASED ON SOIL PROFILE AND RELATED ATTRIBUTES TO IT

Water collection pond with rocky bed.

Large, dry open well adjacent to the site boundary now used through a bore-well

Naturally vegetated swale that carry water from the catchment to collection ponds.

Streams carrying overflow from the ponds on the site.

Figure 1 : Site and its surrounding

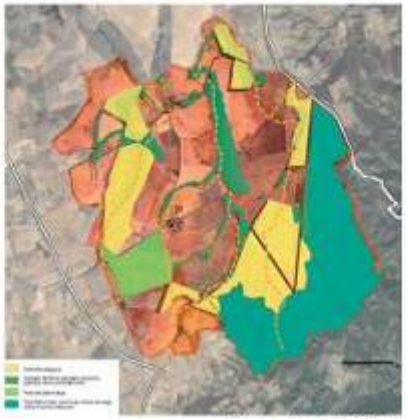


Figure 4 : Vegetation

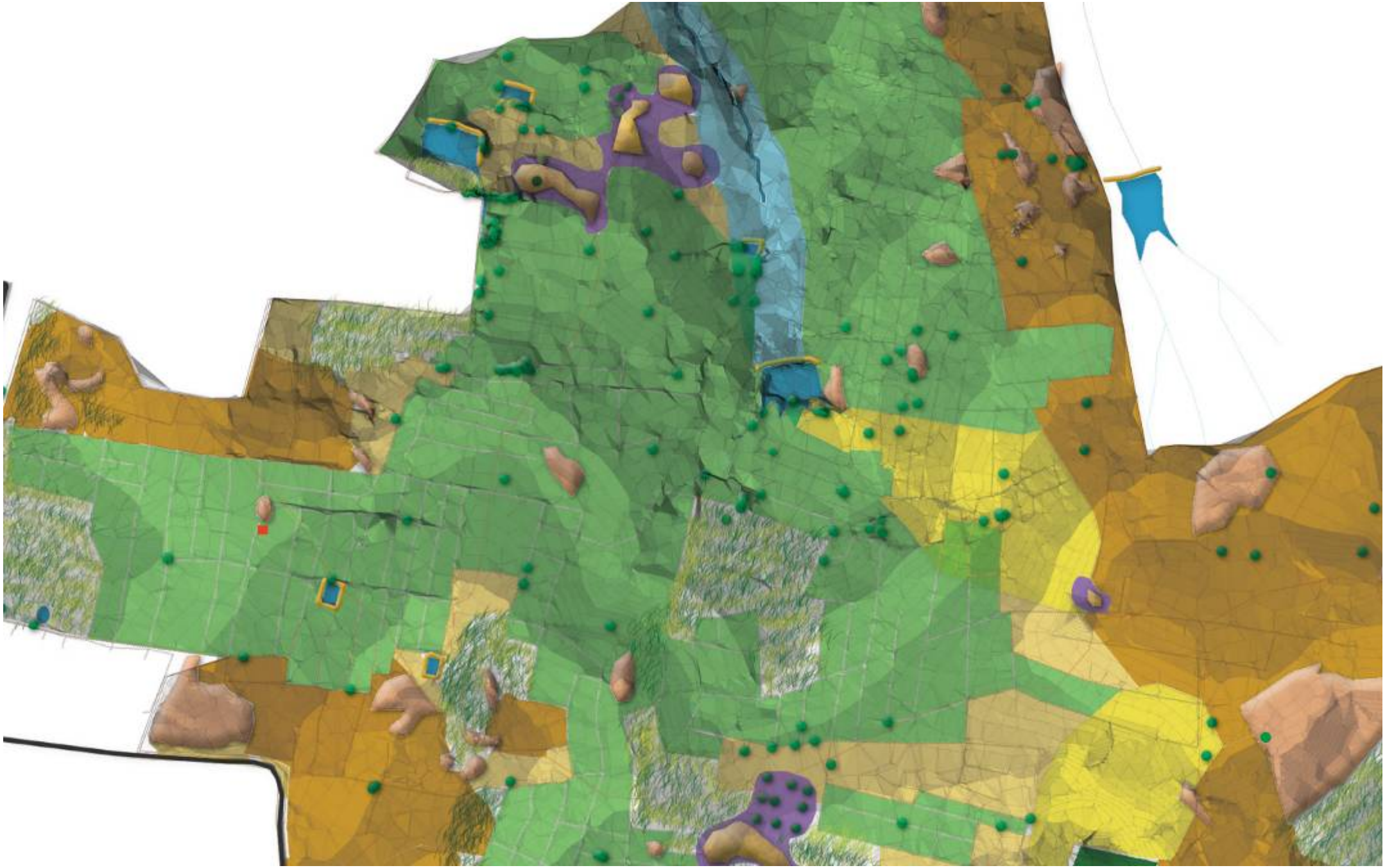
Figure 2 : Topography and open landscape

Figure 5 : Agricultural patterns

Figure 3 : Water resources

Figure 6 :Geographical identity

MORE LOCAL UNDERSTANDING OF DIFFERENT PATTERNS OF SITE OVERLAPS AND PHYSICAL FEATURES



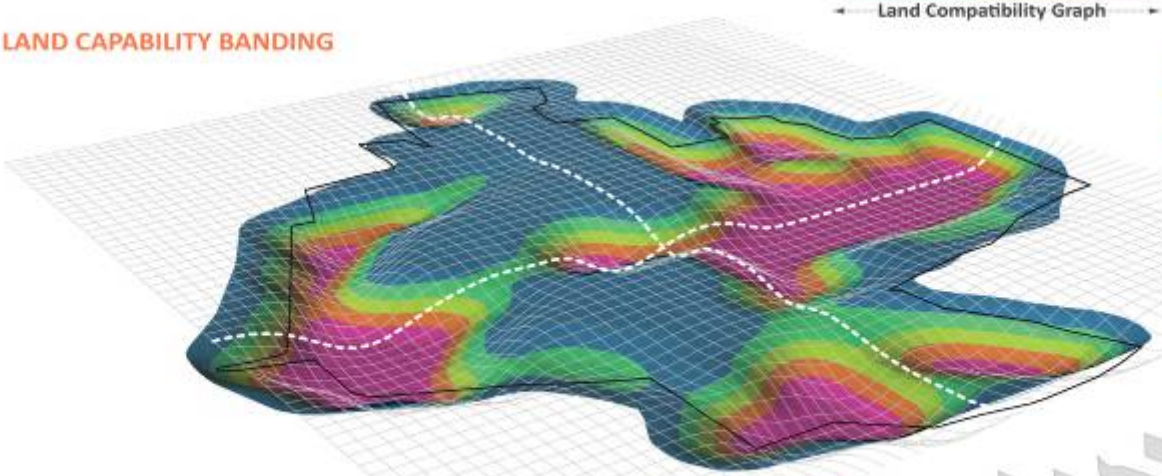
ESTABLISHING THE NATURAL LAND USE PATTERN AND CHARACTERSTICS FOR THE LAND AND AS IMMEDIATE PRECINCTS

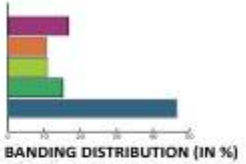
LAND CAPABILITY - CONTOUR GRAPH

BUILDABLE BAND — CONSERVED BAND

Land Compatibility Graph

LAND CAPABILITY BANDING



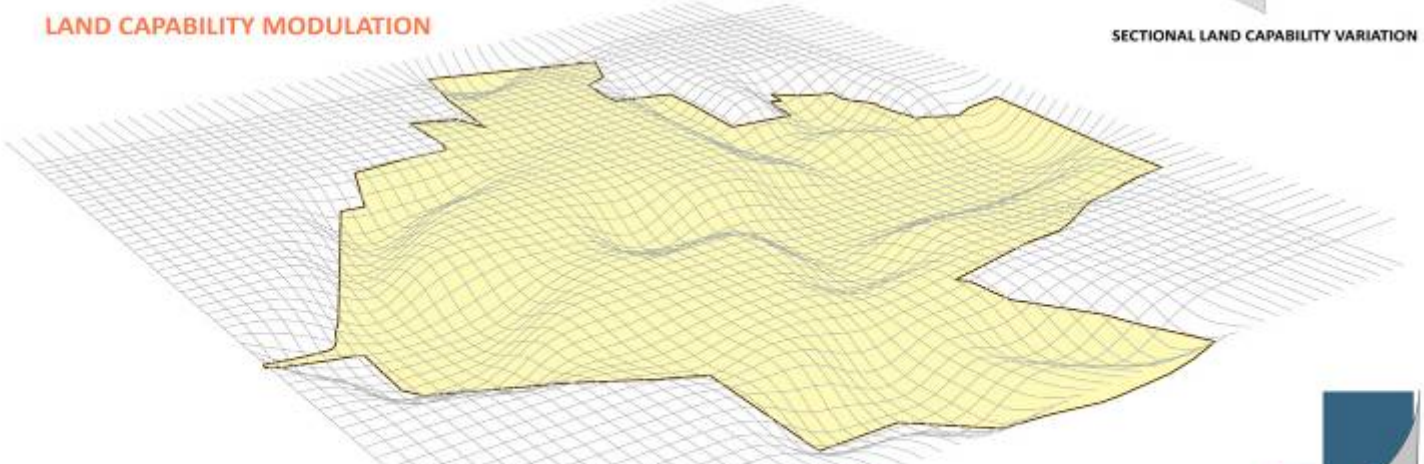


BANDING DISTRIBUTION (IN %)

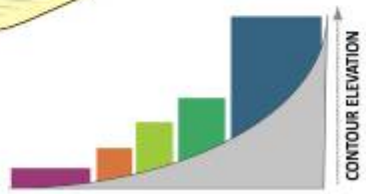
En I: For the self sufficiency of the settlement, renewable source of energy can be harvested at areas with high elevation, devoid of any physical obstruction and non buildable and non cultivable areas. Which makes this as Energy zone.En I: For the self sufficiency of the settlement, renewable source of energy can be harvested at areas with high elevation, devoid of any physical obstruction and non buildable and non cultivable areas. Which makes this as Energy zone.

SECTIONAL LAND CAPABILITY VARIATION

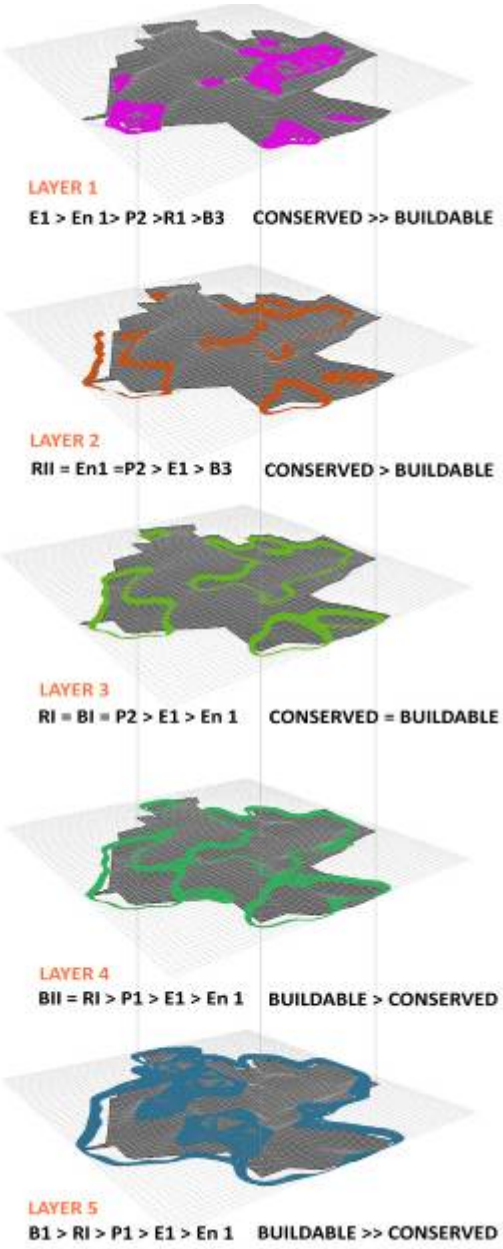
LAND CAPABILITY MODULATION



En I: For the self sufficiency of the settlement, renewable source of energy can be harvested at areas with high elevation, devoid of any physical obstruction and non buildable and non cultivable areas. Which makes this as Energy zone.En I: For the self sufficiency of the settlement, renewable source of energy can be harvested at areas with high elevation, devoid of any physical obstruction and non buildable and non cultivable areas. Which makes this as Energy zone.



BANDING GRAPH



LAYER 1
E1 > En 1> P2 >R1 >B3 CONSERVED >> BUILDABLE

LAYER 2
RII = En1 =P2 > E1 > B3 CONSERVED > BUILDABLE

LAYER 3
RI = BI = P2 > E1 > En 1 CONSERVED = BUILDABLE

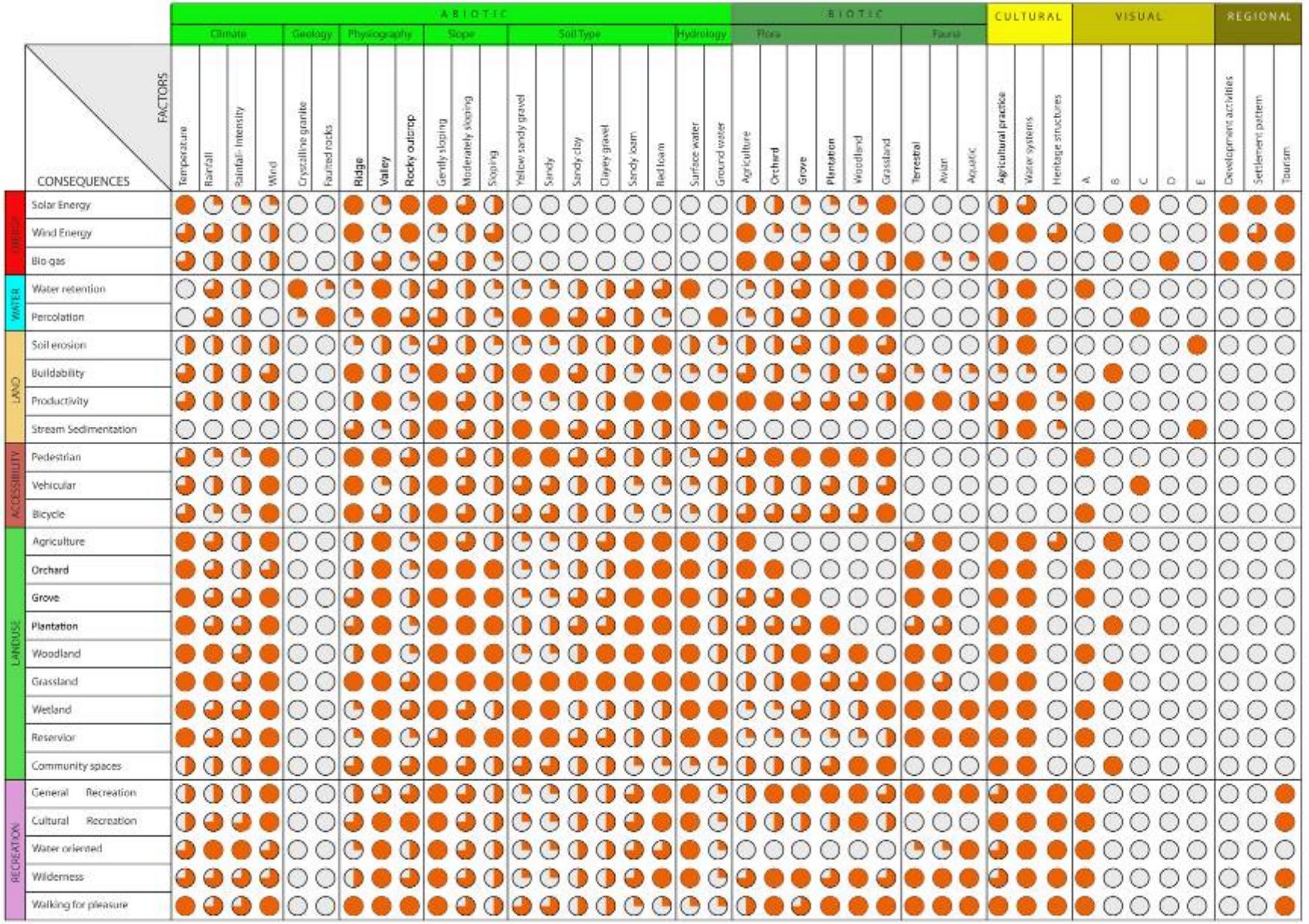
LAYER 4
BII = RI > P1 > E1 > En 1 BUILDABLE > CONSERVED

LAYER 5
B1 > RI > P1 > E1 > En 1 BUILDABLE >> CONSERVED

POSTIONING A SITE AS A LAND CHARACTER ALLOWS THE SITE TO BE INTERPRETED AND ANALYZED AS AN OVERLAP OF BOTH TANGIBLE AND INTANGIBLE FEATURES THEREBY UNDERSTANDING IT AS A FIELD OF VARIED OPERATIONS AND INHERENT CAPABILTIES

LAND COMPATIBILITY MATRIX

MAXIMUM COMPATIBILITY · MEDIUM COMPATIBILITY · LOW COMPATIBILITY · INCOMPATIBLE · NOT RELEVANT



BASED ON A DETAILED SITE CONDITIONS THE LAND CAPABILITY IS A PROCESS TO DETERMINE THE CAPACITY OF THE LAND BOTH IN TERMS OF ITS GROUND CONDITIONS AS WELL AS CONTEXTUAL FORCES AND LIVELIHOOD PATTERNS

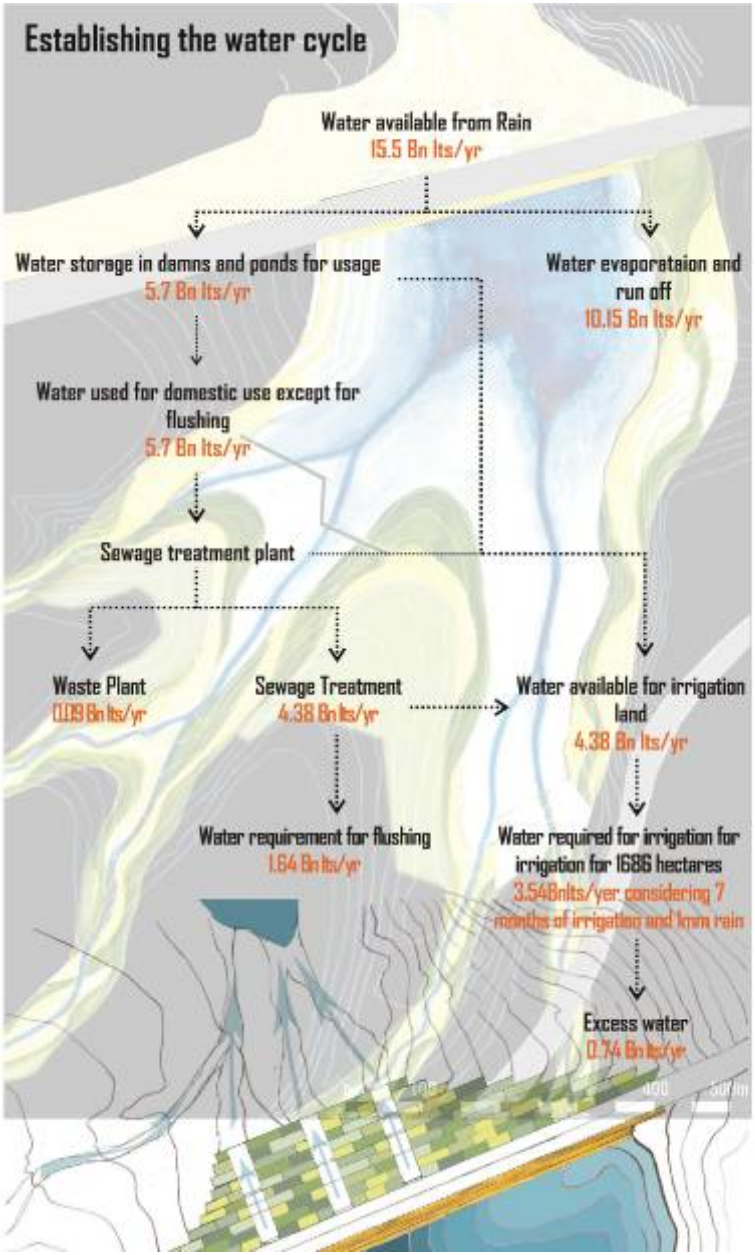



Figure 1 : Drainage and topography

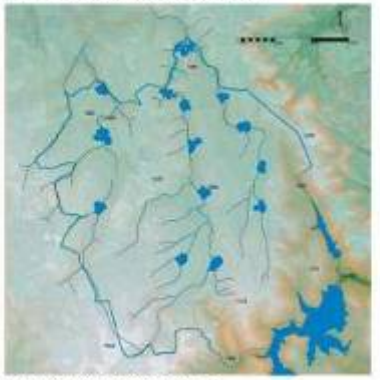


Figure 2 : Potential reservoirs


Figure 3 : Integrated greenways


Figure 4 : Local water and Reservoir network


Figure 5 : Waste Water recycling plants / Treated water network

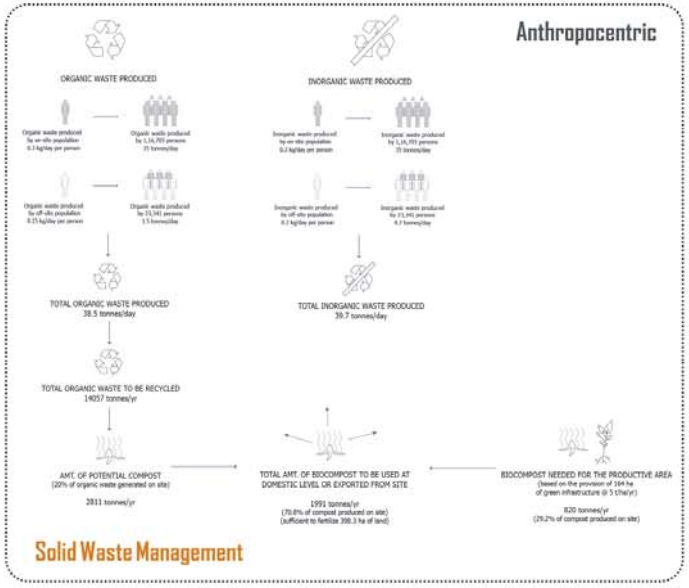

Figure 6 : Grey water and sewage network

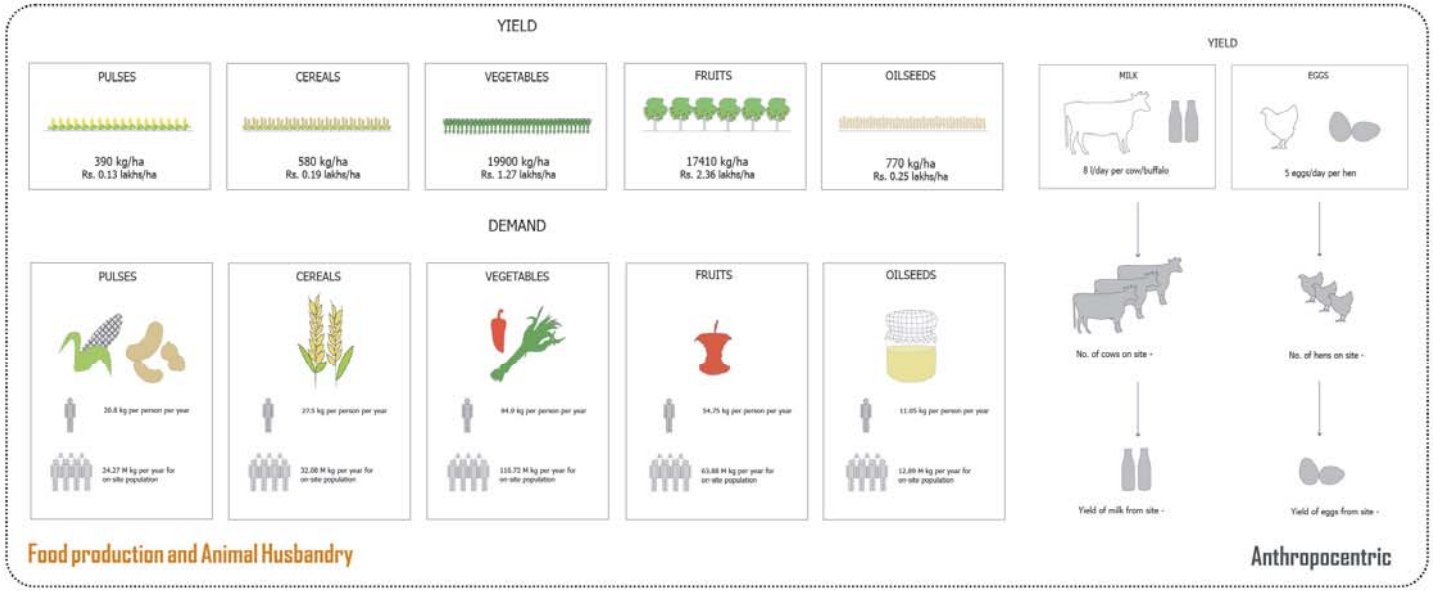
BASED ON THE ESTABLISHMENT OF DEVELOPMENT CAPABILITY POTENTIALS OF THE LAND THE PARRALLE PROCESS ESTABLISHING AN INTEGRATED MODEL OF URBANISM INCLUSIVE OF PRODUCTIVE ASPECTS OF LAND IS THE CAPACITY ANALYSIS FOR THE LAND

Employment Statistics

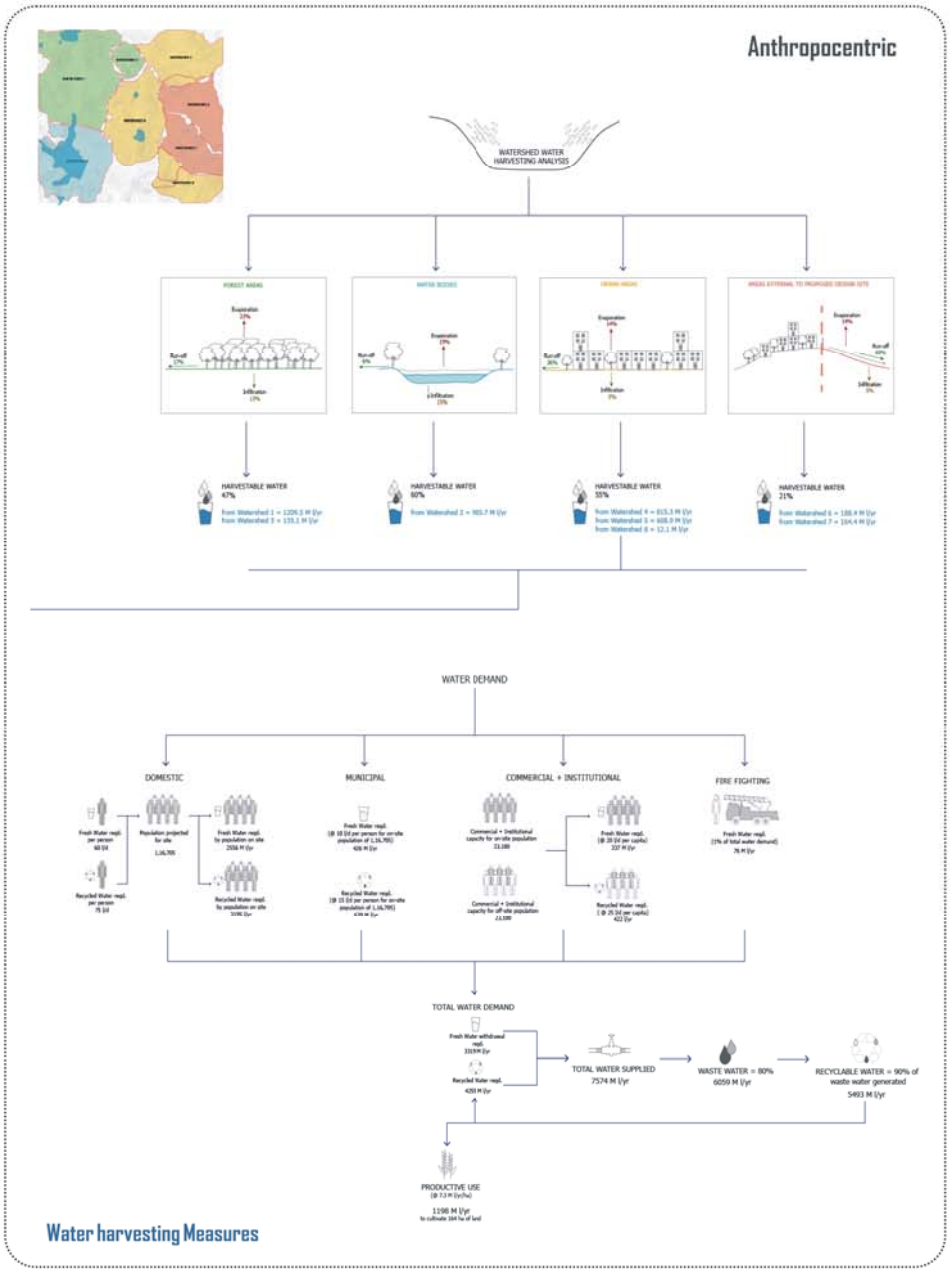
Anthropocentric

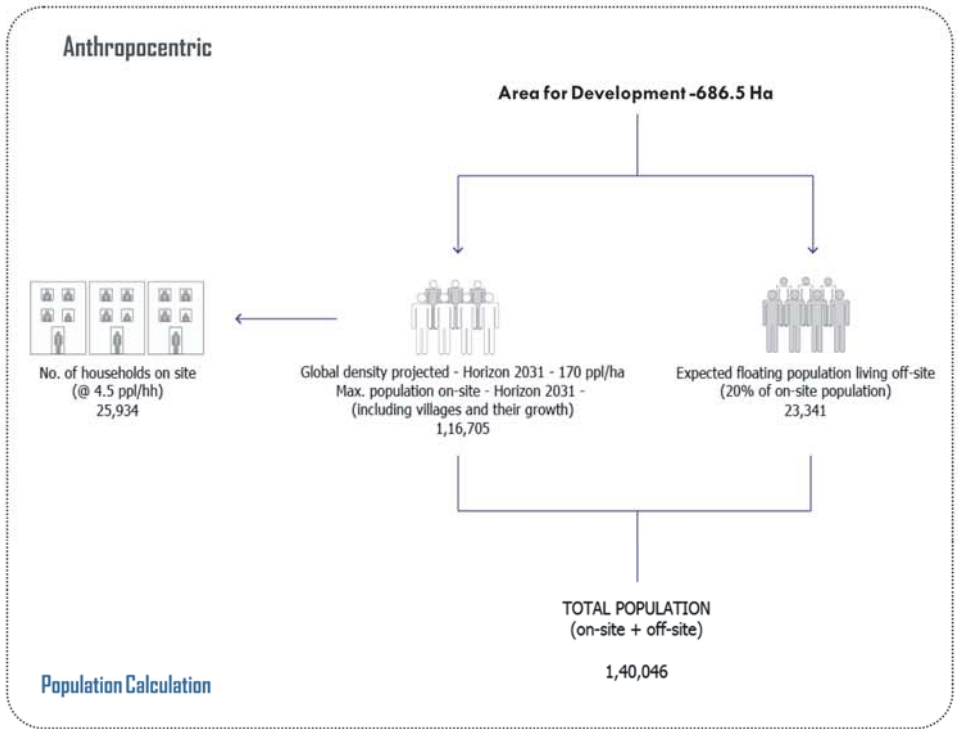
YEAR	POPULATION	WORKING POPULATION	AGRICULTURE AND ALLIED SECTOR	MANUFACTURING SECTOR	CONSTRUCTION SECTOR	TRANSPORTATION AND COMMUNICATION SECTOR	TRADE SECTOR	OTHER SERVICES
		assuming a workforce participation rate of 39.26% as per the 2011 census and increasing by a factor of 1.54% in the progressing years						
2011	116620	45785	458	13278	4579	4121	8241	15109
2021	116620	47581	476	13798	4758	4282	8565	15702
2031	116620	49377	494	14319	4938	4444	8888	16294

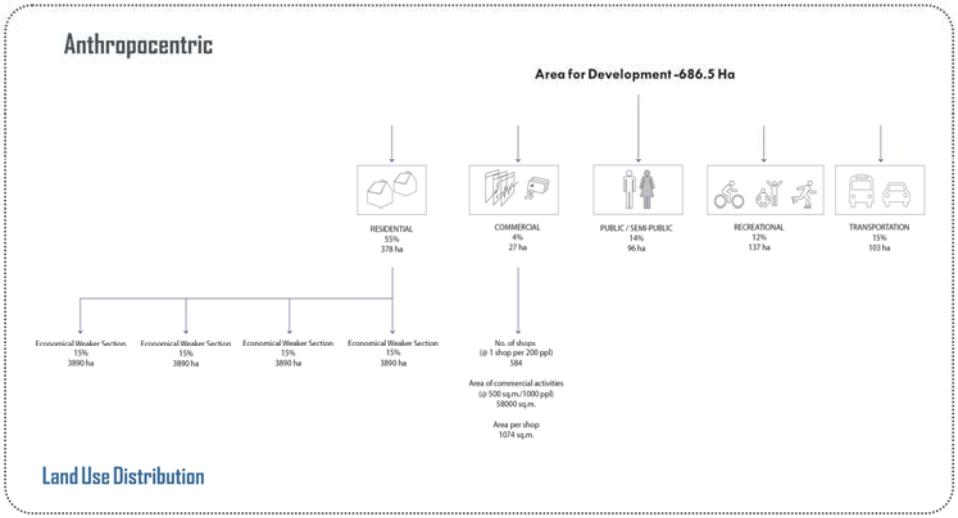




CAPACITY ANALYSIS OF LAND PRODUCTIVITY NOT LIMITED JUST FOOD PRODUCTION BUT ALL FORMS OF ECO SYSTEMS SERVICES







CAPACITY ANALYSIS OF LAND PRODUCTIVITY NOT LIMITED JUST FOOD PRODUCTION BUT ALL FORMS OF ECO SYSTEMS SERVICES

HYDROLOGICAL CHARACTERISTICS

IPrecipitation is the ultimate source of all water flowing in streams and rivers. However, not all precipitation becomes streamflow. When precipitation occurs, some amount of water is intercepted and held, or abstracted, by watershed vegetation in the form of infiltration, surface detention, evapotranspiration etc. The amount of interception depends on the type, density, and growth stage of the vegetation, on rainfall intensity, and on wind speed. Eventually, when all surface storage is filled, and either the rainfall intensity exceeds the infiltration rate or the ground is saturated; water will begin to flow over the surface of the ground. This flow is called stormwater runoff or simply runoff, also called effective rainfall.

Peak runoff rate. Overland and shallow concentrated travel time can be estimated with a relationship developed by Overton and Meadows (1976) based on Manning's equation. The relationship is:

$t_t = 0.007 (nL)^{0.8} / P_2^{0.5} * S^{0.4}$,

t_t = Time of travel in hours (water to reach from one end of site to the other)
n = Manning's coefficient (Based on the vegetation cover or surface cover)
L= Segment length in feet (Length of site) = **1550'**
P_2= 2 years, 24 hr rainfall in inches = **21.57"**
S= slope (average slope of the site) = **0.058**

Abstractions from rainfall include interception by vegetation, surface storage, evapotranspiration, and infiltration. Increasing impervious area in a watershed causes increase in both runoff volume and peak discharge. Increase in runoff volume is caused by the reduction of precipitation abstraction (infiltration, interception, and surface storage). Water also moves more quickly and directly from remote points in the watershed to the outlet. Reducing the travel time means that shorter, more intense storms contribute to the flow, and more flow accumulates at the outlet simultaneously.

The site in Vasind used to be forest with dense undergrowth

The site in Vasind is covered with pastures and fallow land at present

If Business as Usual (BAU) is carried out on the site

Low Impact Development (LID)

The following calculations prove that Low impact development help bring the peak runoff rate close to the rate of the virgin landscape of the region, hence reducing the flooding impacts to a huge extent. Erosion to the land is reduced protecting soil and vegetation from being flown away.

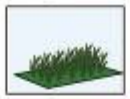
Groundcover	Manning's coefficient (n)				
	Hard paved, roofs etc 0.011	0%	0%	30%	10%
	Turf 0.20	0%	0%	30%	10%
	Row crops 0.20	0%	100%	0%	20%
	Wood with light undergrowth 0.40	0%	0%	40%	40%
	Wood with dense undergrowth 0.80	100%	0%	0%	20%
	Manning's coefficient (n)	0.8	0.2	0.22	0.38
	Peak runoff rate (t_t)	**1.4 hrs**	**0.46 hrs**	**0.51 hrs**	**0.78 hrs**

Table for Manning's coefficients n for various groundcovers given in Annexure 2

STORMWATER MANAGAMENT REQUIREMENT

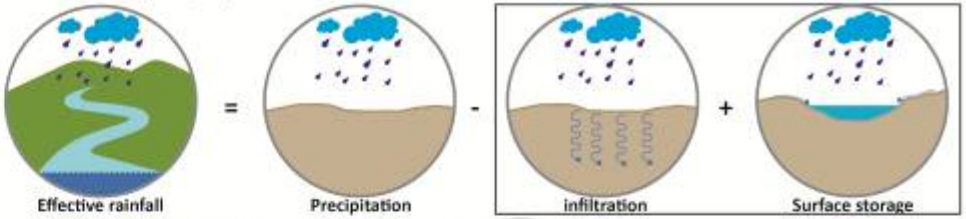
If rainfall intensity exceeds the infiltration rate, and all other abstractions are sated, runoff will occur. The amount of rainfall that becomes runoff during a storm is called the effective rainfall. Abstractions other than infiltration and surface storage can be ignored in a storm event. So, effective rainfall equals precipitation less infiltration and surface storage.

Effective rainfall, or runoff, is expressed by units of length. One cm (inch) of runoff is the runoff produced by one cm (inch) of effective rainfall over a specified site.

Curve number approach to estimating runoff

The curve number (CN) is a characteristic of soil type and cover.

Soil is divided into four hydrologic soil groups (HSGs) based on their infiltration capacity. Group A soils have the most rapid infiltration, and group D have the slowest. Generally, A soils are sandy, and D soils are heavy clays. The CN represents the potential for a soil to produce runoff from a given rainstorm.



The site belongs to the hydrologcal soil group D.

In the CN method, effective rainfall or runoff is estimated by the relationship:

$Q = (P-0.2S)^2 / P + 0.8\,S,\ P > 0.2S$

Q is the effective rainfall or runoff in inches or mm, P is precipitation, and S is a parameter given by:

$S = (1000/CN) - 10$

Precipitation (P) in inches = **5**

The site in Vasind used to be forest with dense undergrowth

The site in Vasind is covered with pastures and fallow land at present

If Business as Usual (BAU) is carried out on the site

Low Impact Development (LID)

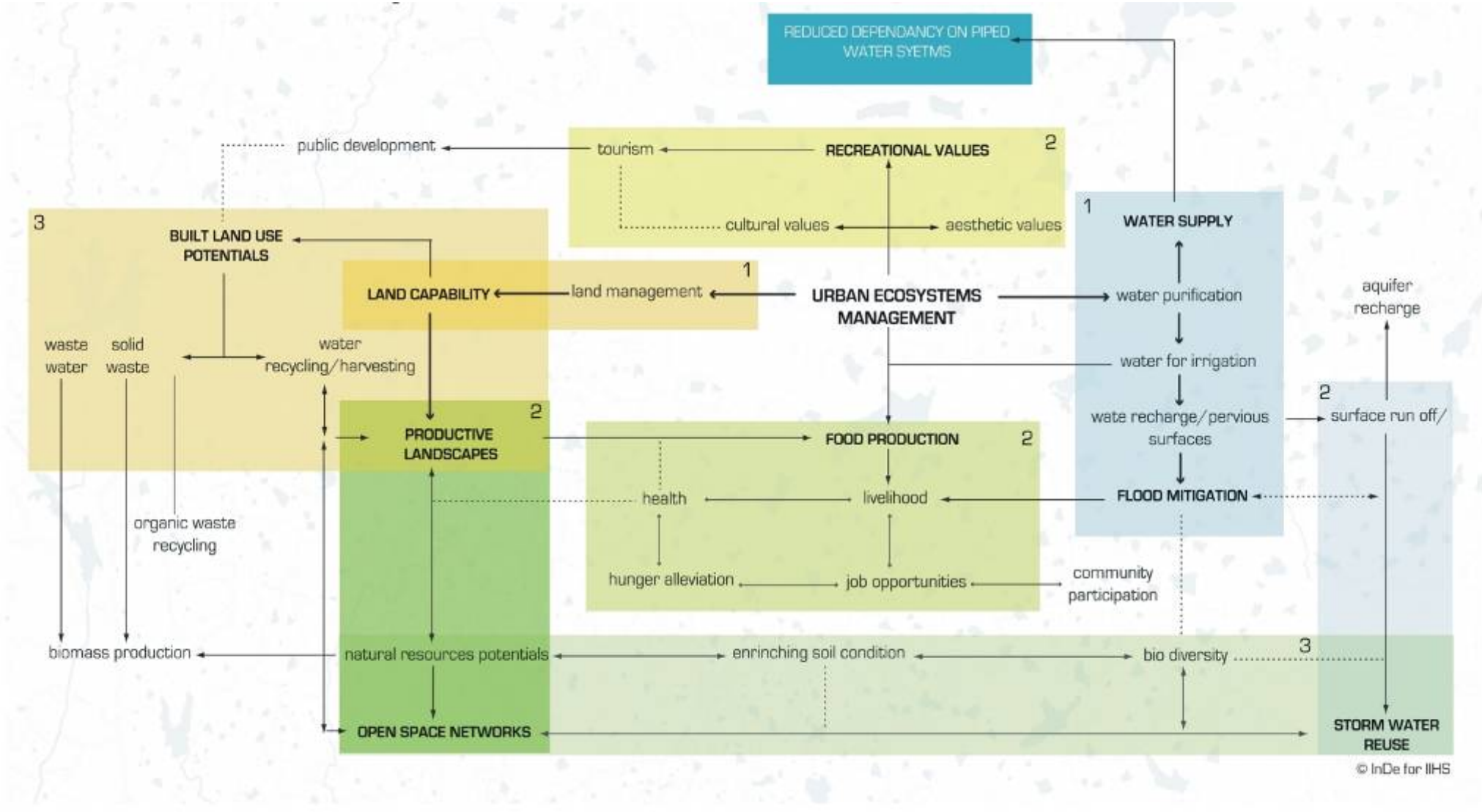
The following calculations provide the volume of storm water that has to be ameliorated with Integrated Management Practices.

IMPs are distributed, multifunctional, small-scale controls, selected for their ability to achieve the site design water quantity and quality objectives in a cost-effective manner. Clearly, BAU practices would require more IMPs than LID.

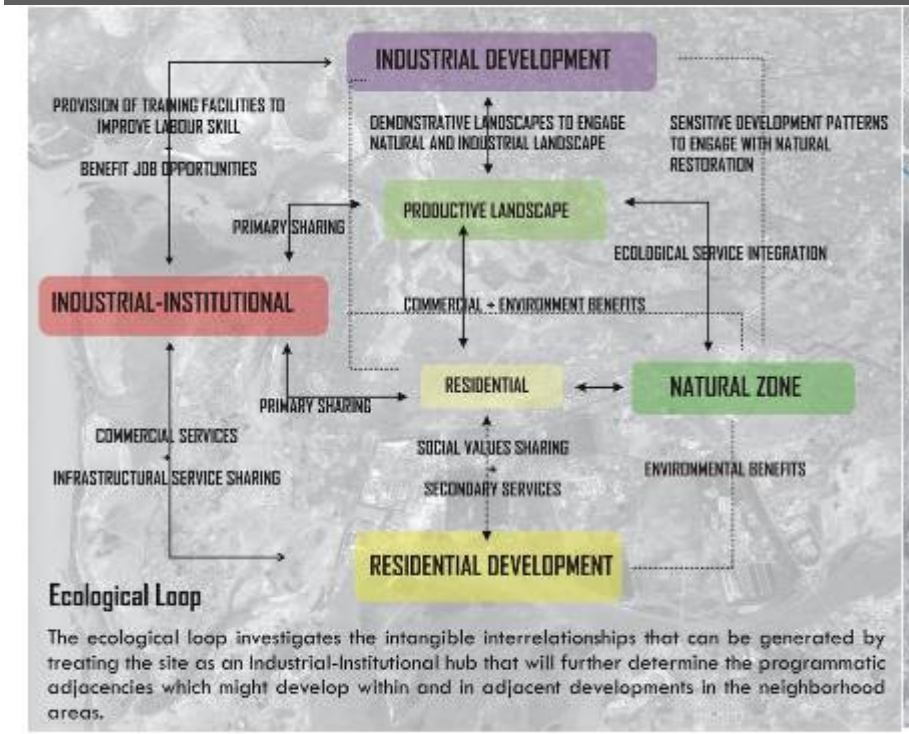
Groundcover	Curve number CN				
	Hard paved, roofs etc 98	0%	0%	30%	10%
	Turf 89	0%	0%	30%	10%
	Row crops 84	0%	100%	0%	20%
	Wood with light undergrowth 79	0%	0%	40%	40%
	Wood with dense undergrowth 77	100%	0%	0%	20%
	Composite curve number (CN)	77	84	87.7	82.5
	S	2.99	1.90	1.40	2.12
	Effective Rainfall in inches (Q)	**2.62**	**3.27**	**3.64**	**3.13**

The retention volume in cubic m. (area of site in sq.m. multiplied by the difference in effective rainfalls of any case-study and the virgin landscape) — **15.57** | **24.42** | **12.11**

Table for Curve Number (CN) for various groundcovers given in Annexure 2

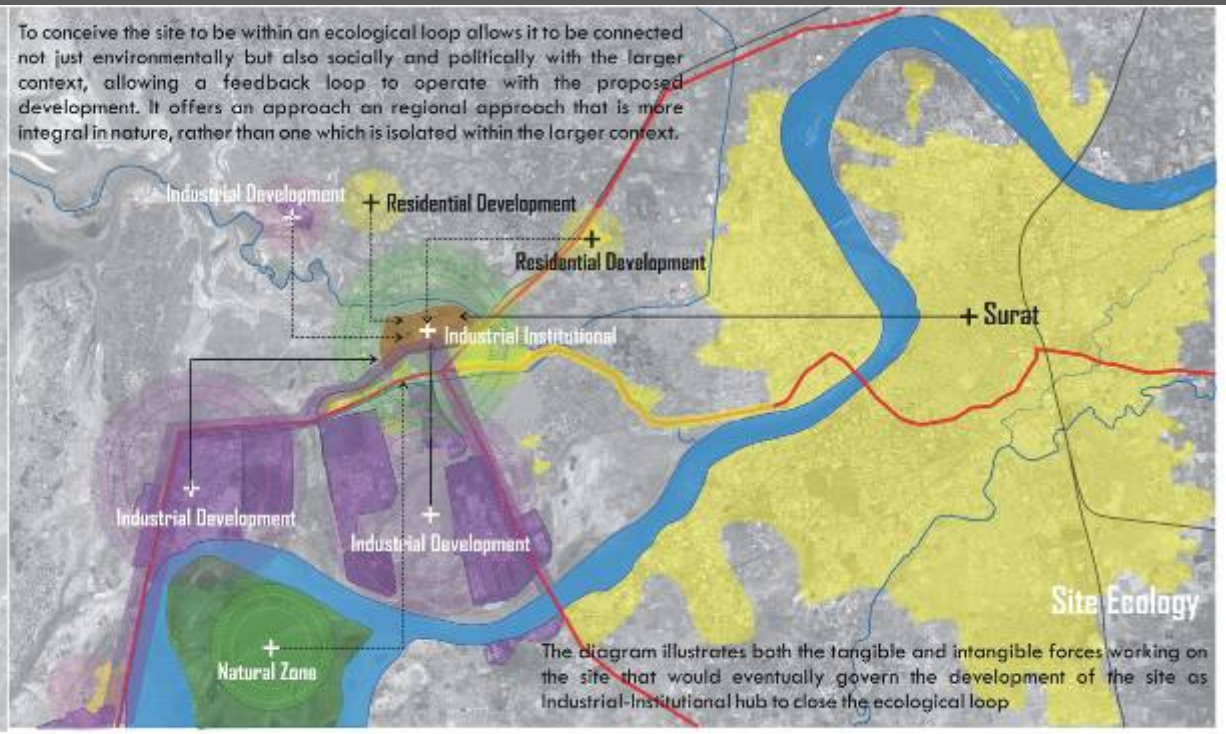


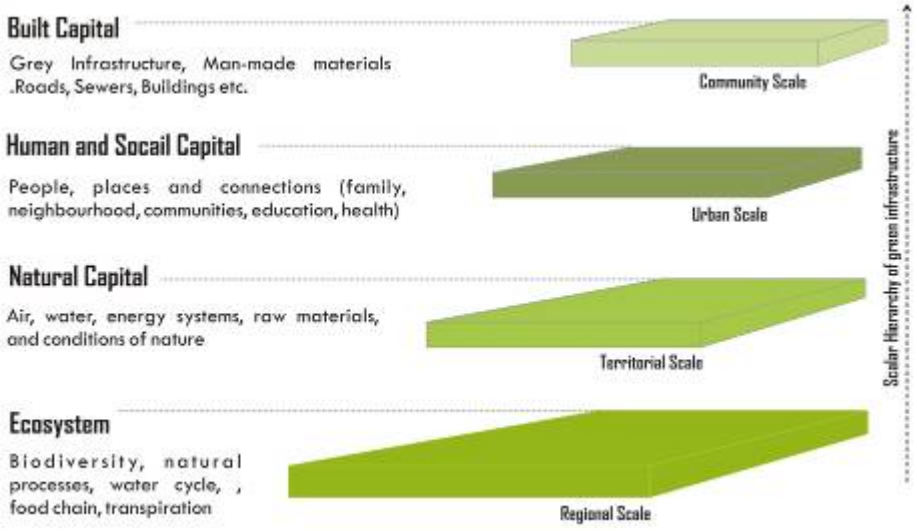
UNDERSTANDING THE ESTABLISHMENT OF ECOLOGICAL UNDERSATNDING AND LOOPS NOT ONLY ALLOWS FUNCTIONAL DERIVATIONS FOR THE PROJECT BUT ALSO ALLOWS SPATIAL AND QUALITATIVE LOOPS OF INTER RELATIONSHIP OF RELATED FUNCTIONS.

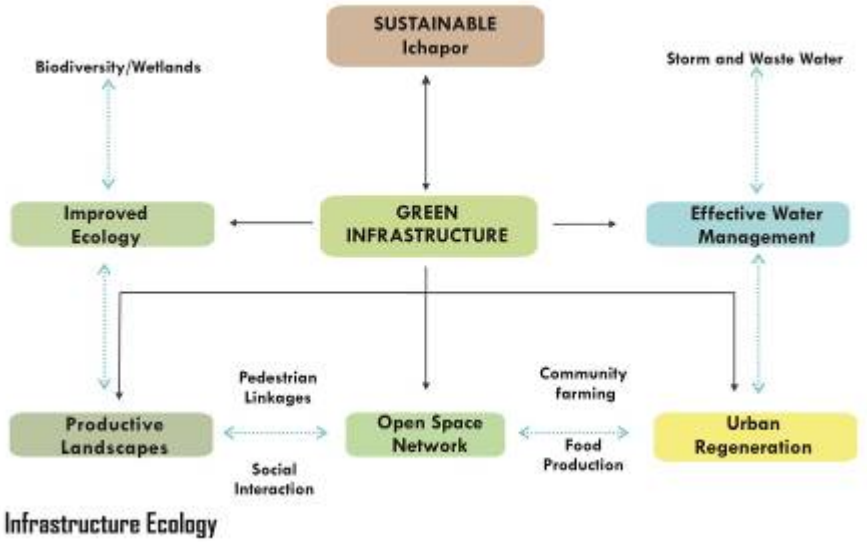


Ecological Loop

The ecological loop investigates the intangible interrelationships that can be generated by treating the site as an Industrial-Institutional hub that will further determine the programmatic adjacencies which might develop within and in adjacent developments in the neighborhood areas.



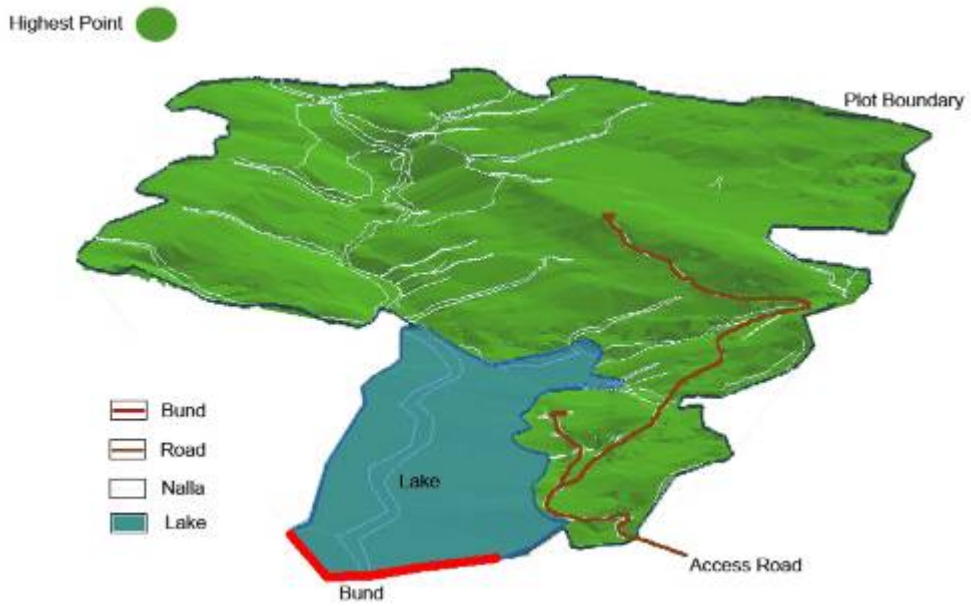


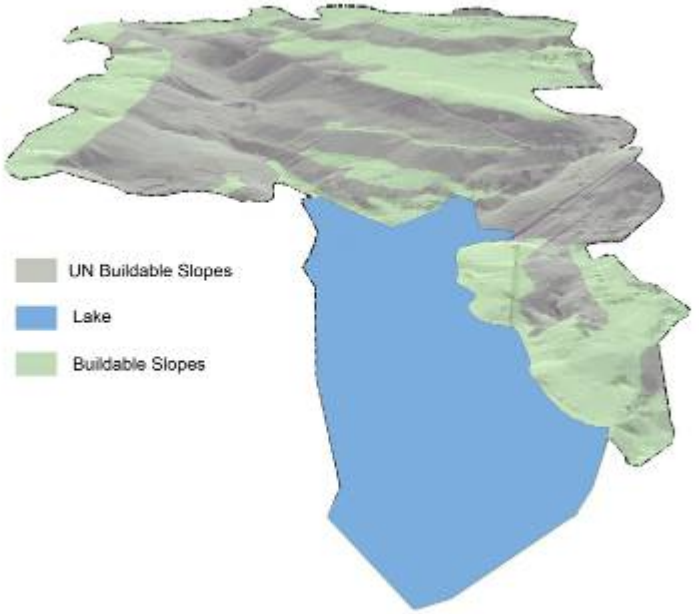


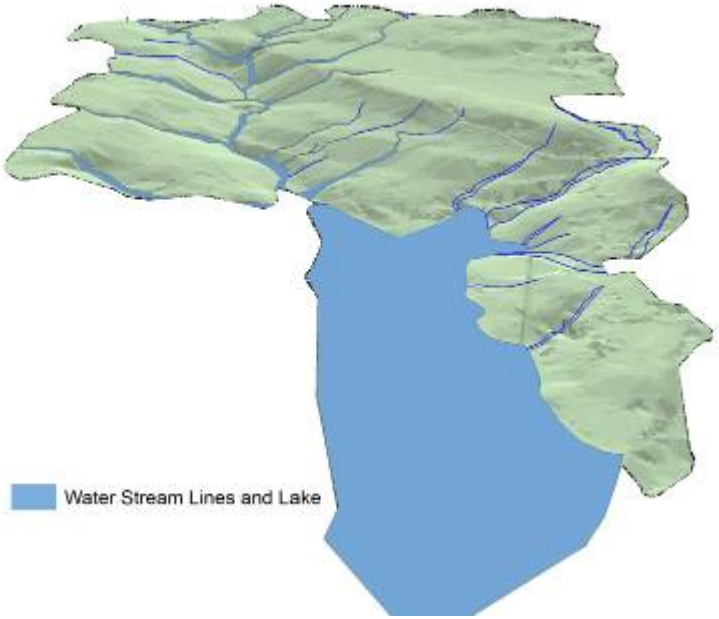
UNDERSTANDING THE ESTABLISHMENT OF ECOLOGICAL UNDERSATNDING AND LOOPS NOT ONLY ALLOWS FUNCTIONAL DERIVATIONS FOR THE PROJECT BUT ALSO ALLOWS SPATIAL AND QUALITATIVE LOOPS OF INTER RELATIONSHIP OF RELATED FUNCTIONS.

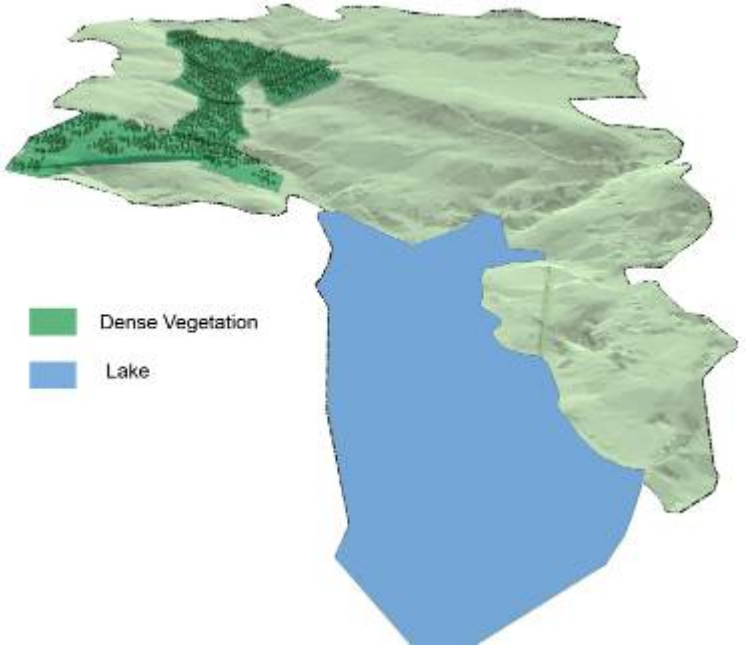
THE CHALLENGE APART FROM ADDRESSING THE BROADER LEVEL ECOLOGICAL LOOPS AND ESTABLISHING LAND CAPACITY CONSIDERTAIONS, STILL REMAINS TO INCORPORATE THE SAME INTO A PHYSICAL IMPLEMENTABLE AND INTEGRATED STRATEGY –

A COMPRHENSIBLE MASTER PLAN AND DESIGN GUIDELINES INCORPORATING ALL ASPECTS LAND PRODUCTIVITY









THE FIRST PROCESS IN AN INTEGRATED DEVLOPMENT PROCESS SHOULD BE THE APPREACIATION OF NATURAL PARAMETRS THAT WOULD BE THE PRIMARY INFRASTRUCTURE FOR THE DEVLOPMENT OF THE SITE.

NATURAL CHARACTERS OF THE SITE

Understand the natural characters (geology, fauna and flora...), Consider topography, open-landscape and natural components before planning the project

WATER NETWORK

Identify water resources and watershed. Design a network to collect, store, treat and distribute water.

GREENWAY NETWORK

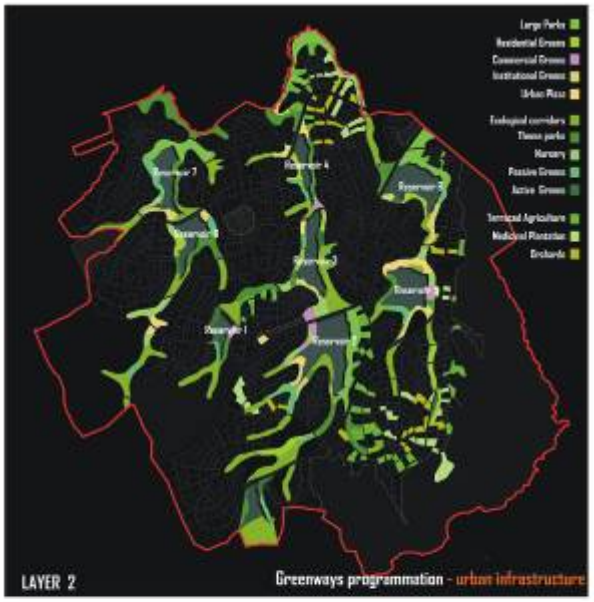
Develop green corridors to counter habitat fragmentation. Add landscape values to the water network. Link green areas in both ecological and recreational perspectives

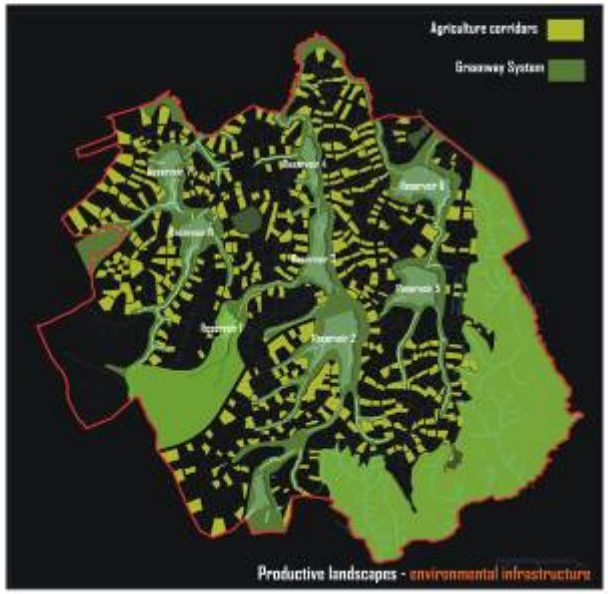
MOBILITY INFRASTRUCTURE

Design a legible, permeable and safe network for movement, Recognize priority for pedestrianns and cyclist segregating them from vehicular movements Integrate transport public within the network

AGRICULTURE NETWORK

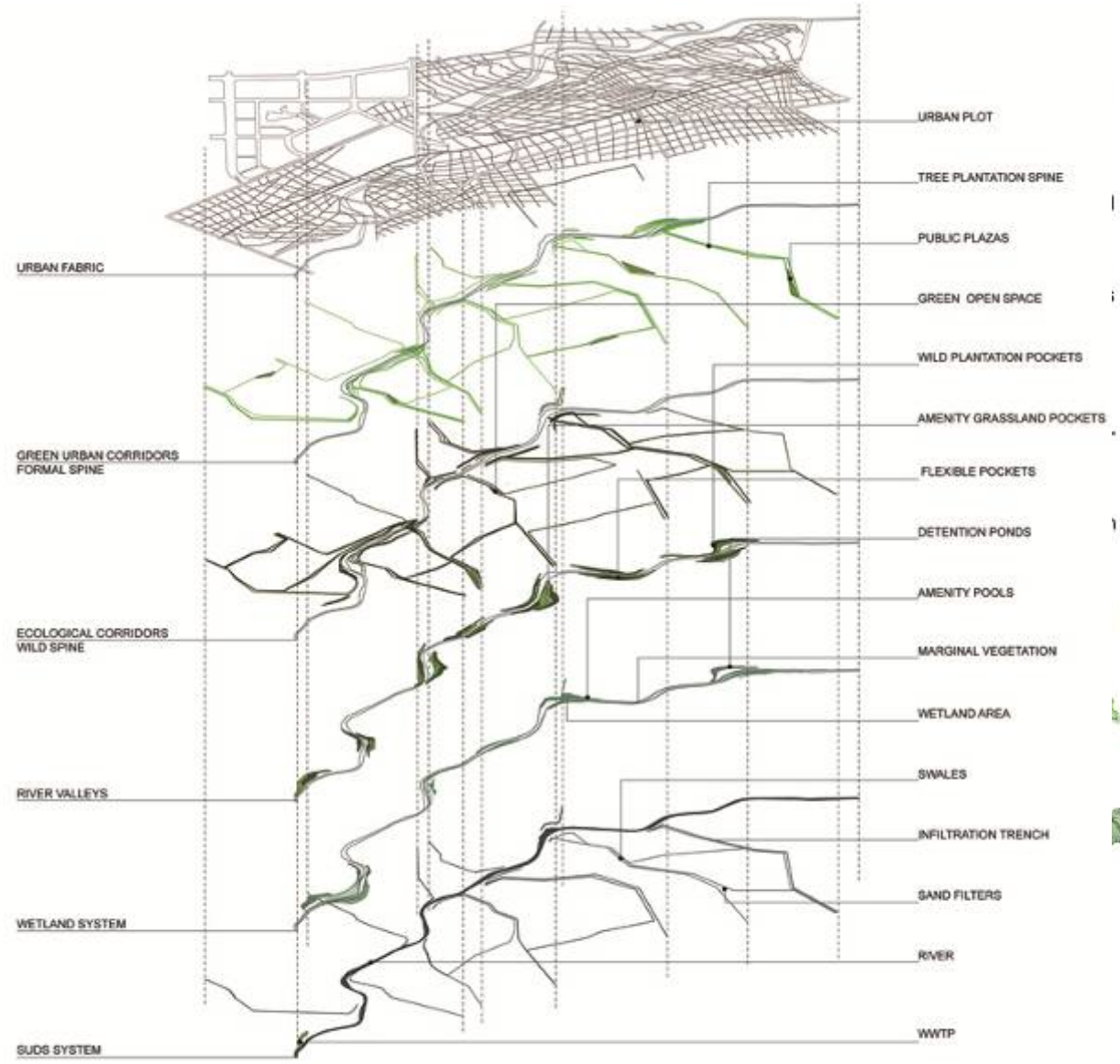
Include agriculture to the urban structure, Create a food system integrated within the city which ensures food security



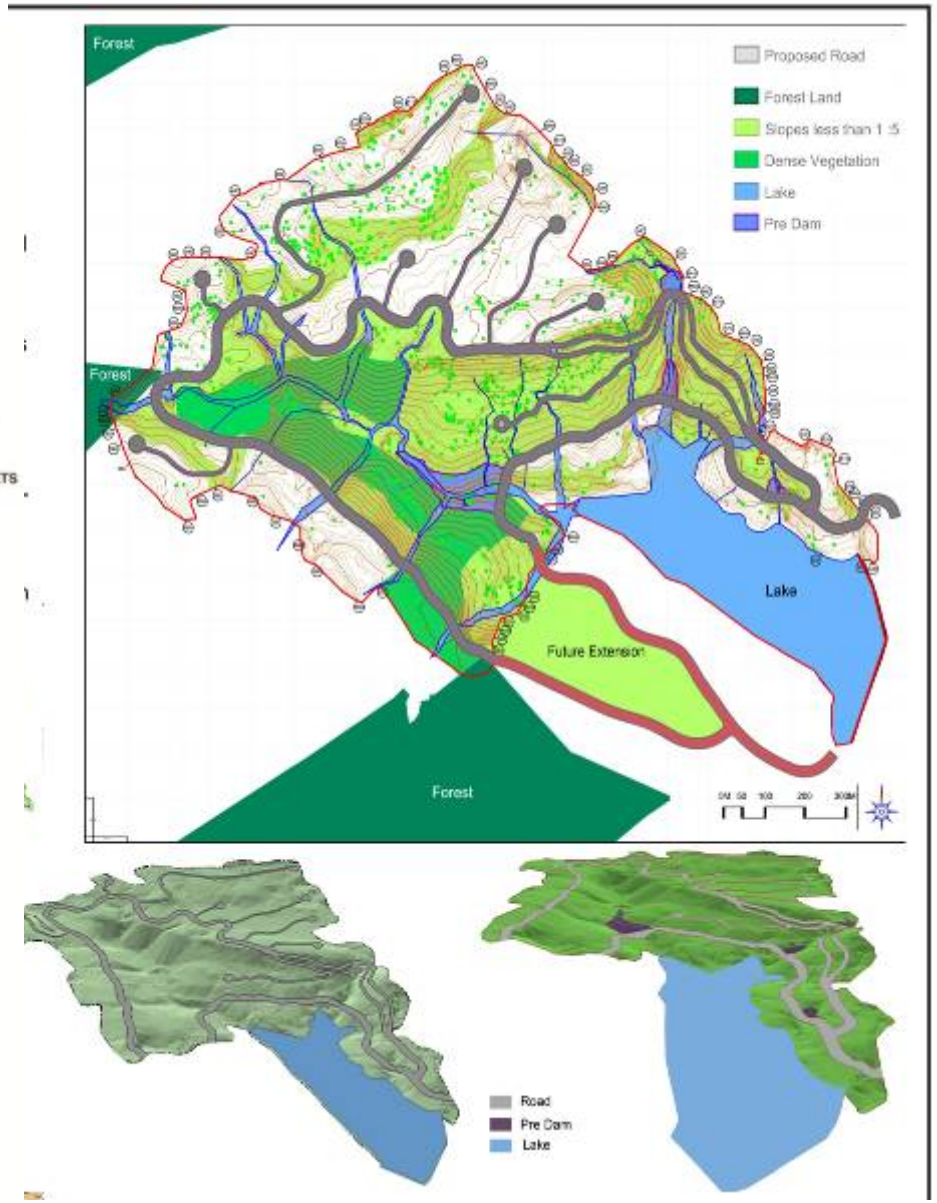


THE PRIMARY INFRASTRUCTURE THEN DEVELOPED IS CAPABLE TO ORGANIZE ALL OTHER RELATED INFRASTRUCTURE OF THE DEVLOPMENT THEREBY ALLOWING ALL ASPECTS OF PRODUCTIVITY TO MEDIATE ALL SCALES OF DEVELOPMENT

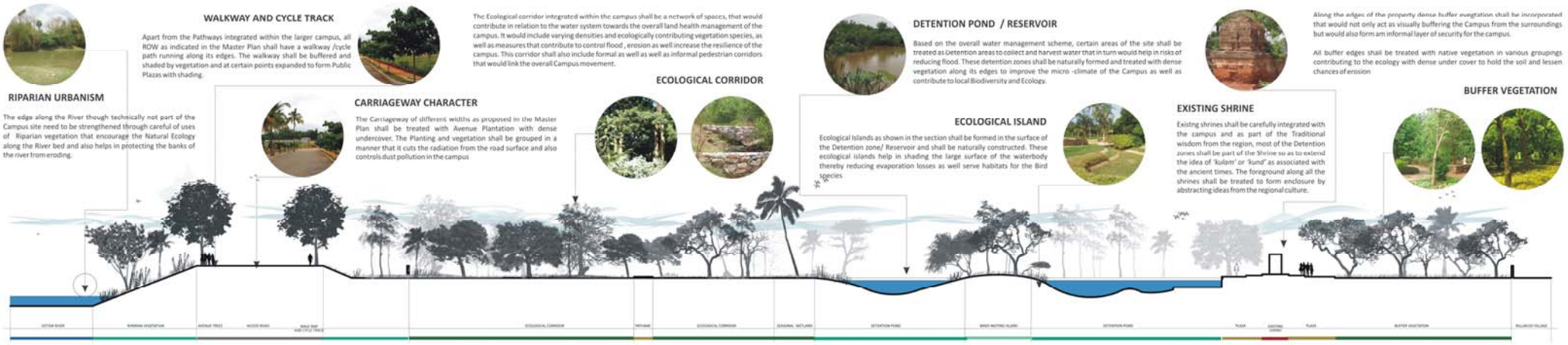
THIS ALLOWS THE OPEN SPACE NETWORK LAND USE TO OF THE SITE TO BE DERIVED MORE ON THE CHARACTER OF THE NATURAL CAPABILITY OF THE LAND THAN BEING ASSIGNED AS SECONDARY SPACES OF THE OVERALL DEVELOPMENT.



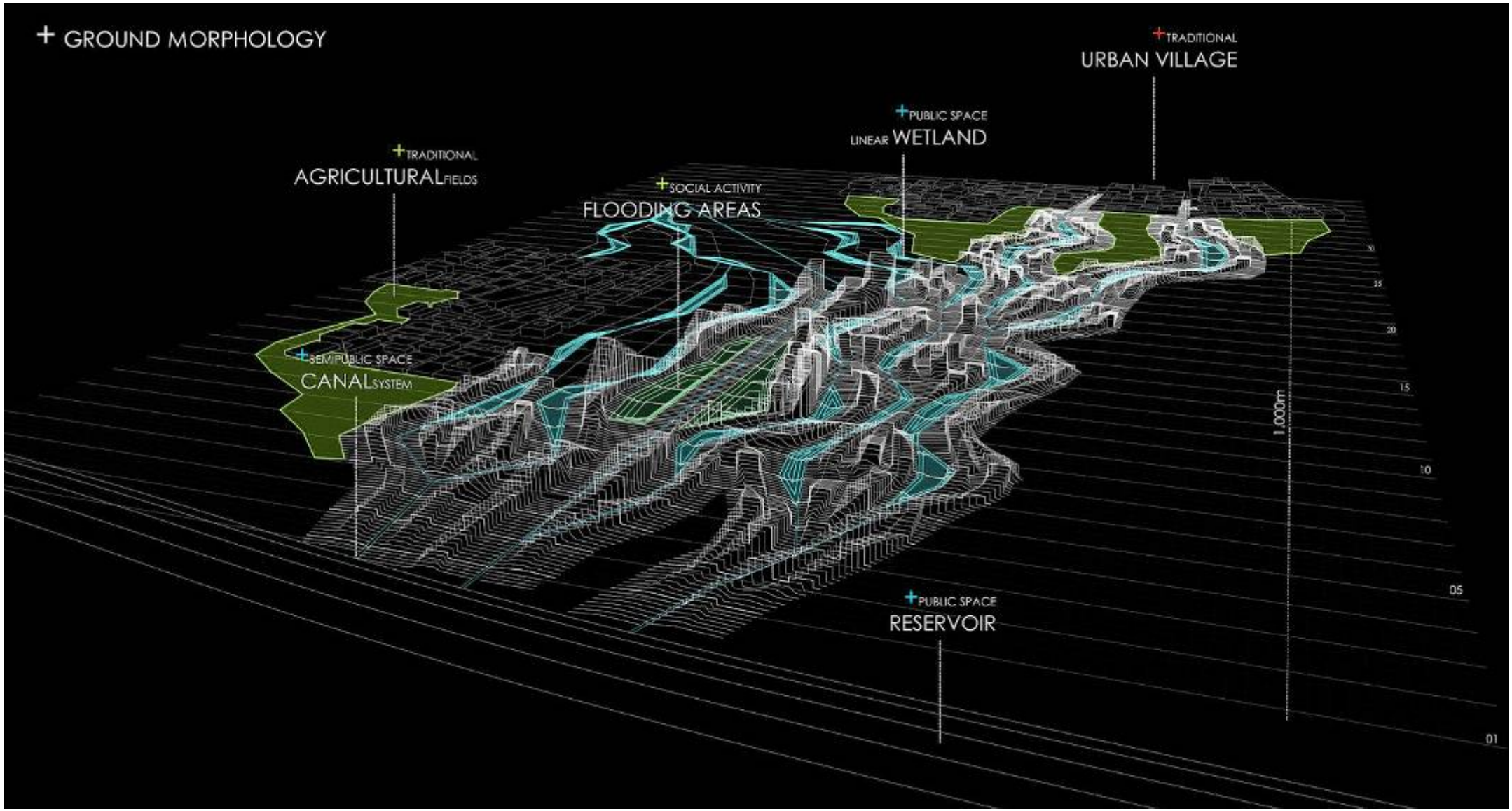
LANDSCAPE NETWORK STRATEGY



IT ALLOWS THE VARIOUS PRODUCTIVE FIELDS TO EXIST WITH EACH OTHER MUTUALLY AND IN AN INTEGRATED MANNER RATHER THAN IN ISOLATION AND OPERATE AS ACONTINOUS NETWORK OF GREEN INFRASTRUCTURE

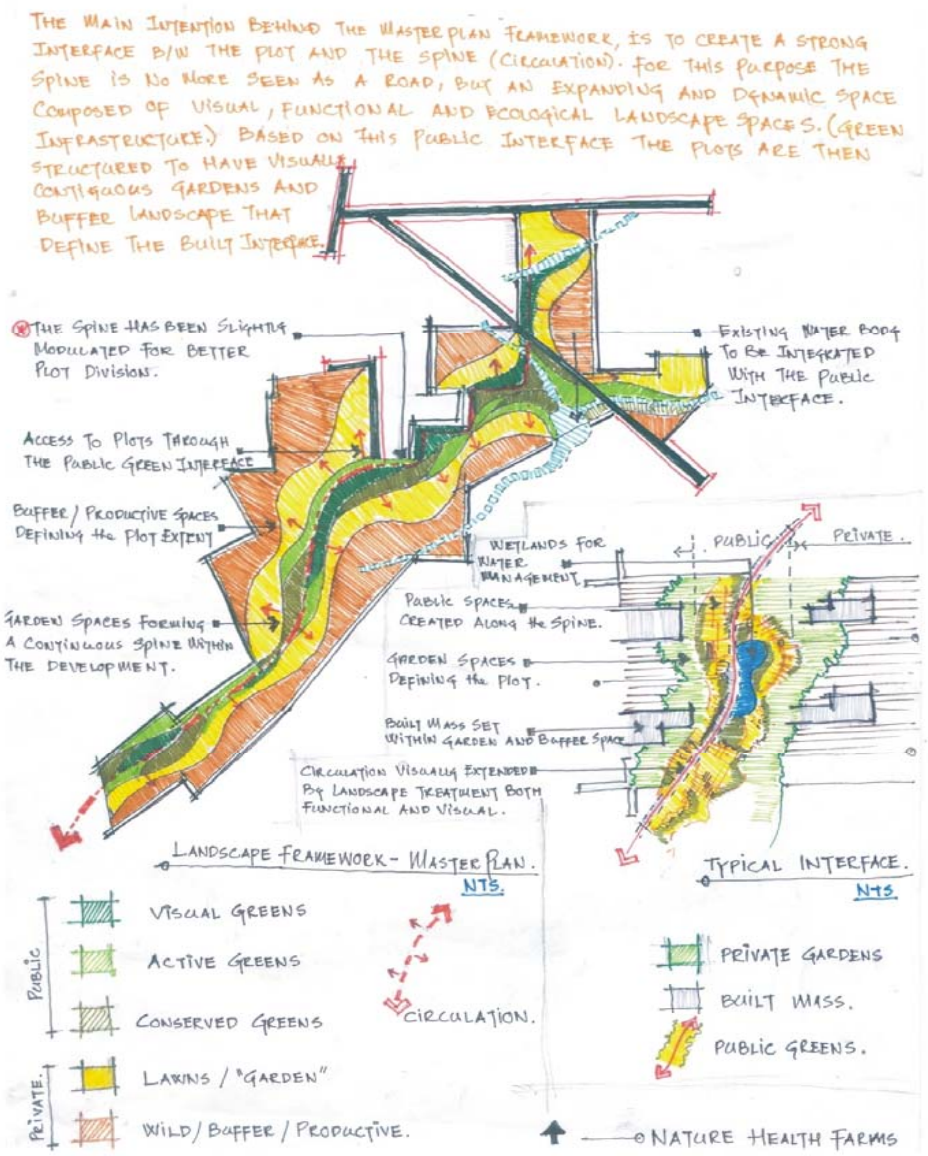


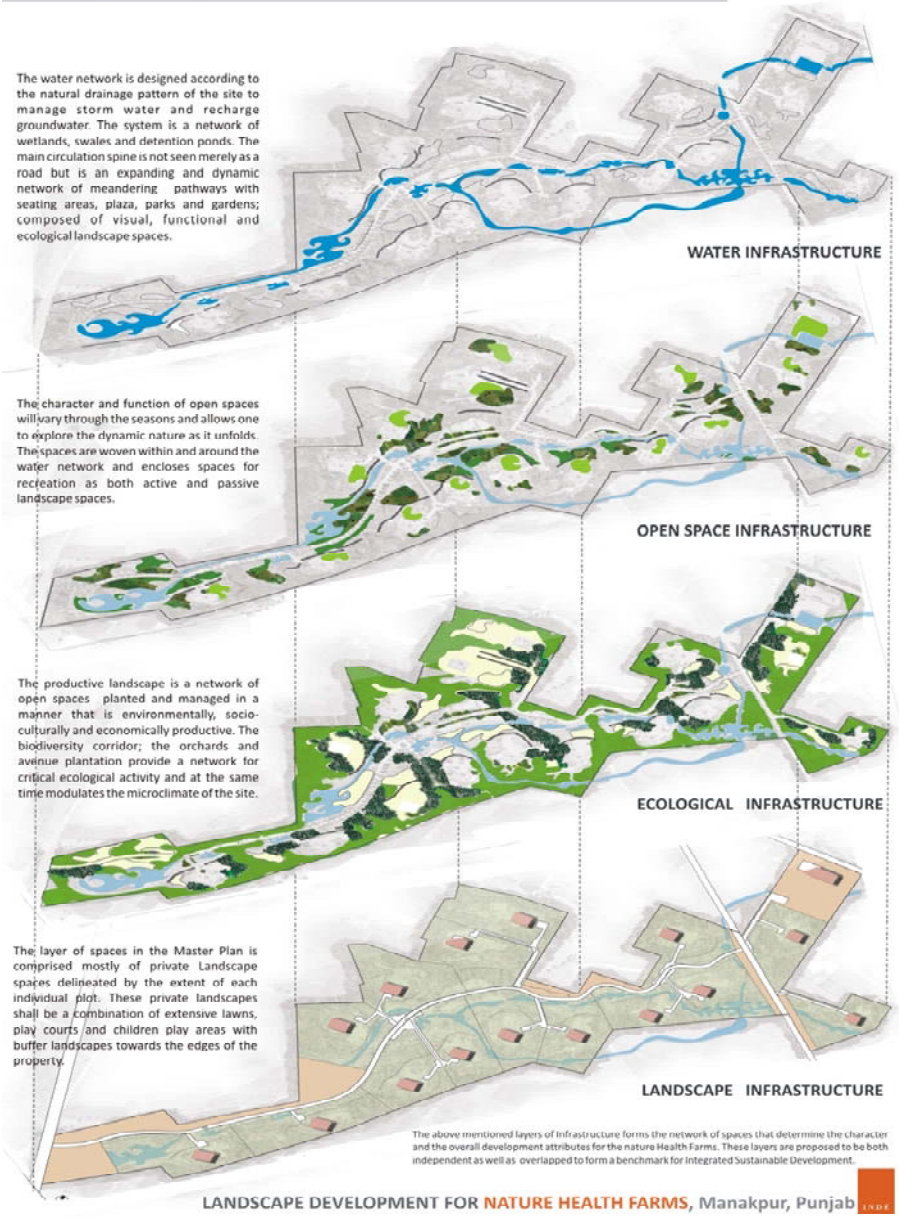
INTER RELATIONSHIPS BETWEEN VARIOUS ECOLOGICAL SYSTEMS AS WELL AS THE BUILT FABRIC PATTERN



ECO SYSTEM INFRASTRUCTURE MEDIATING RELATIONSHIP BETWEEN OPEN SPACES AND THE BUILT FABRIC.

CONCEPTUAL MASTER PLAN SCHEME

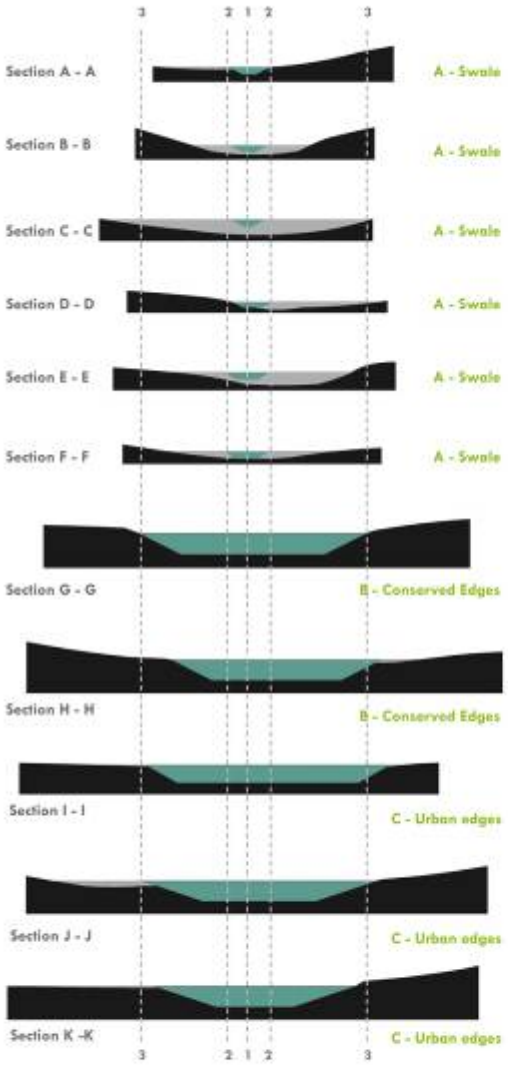




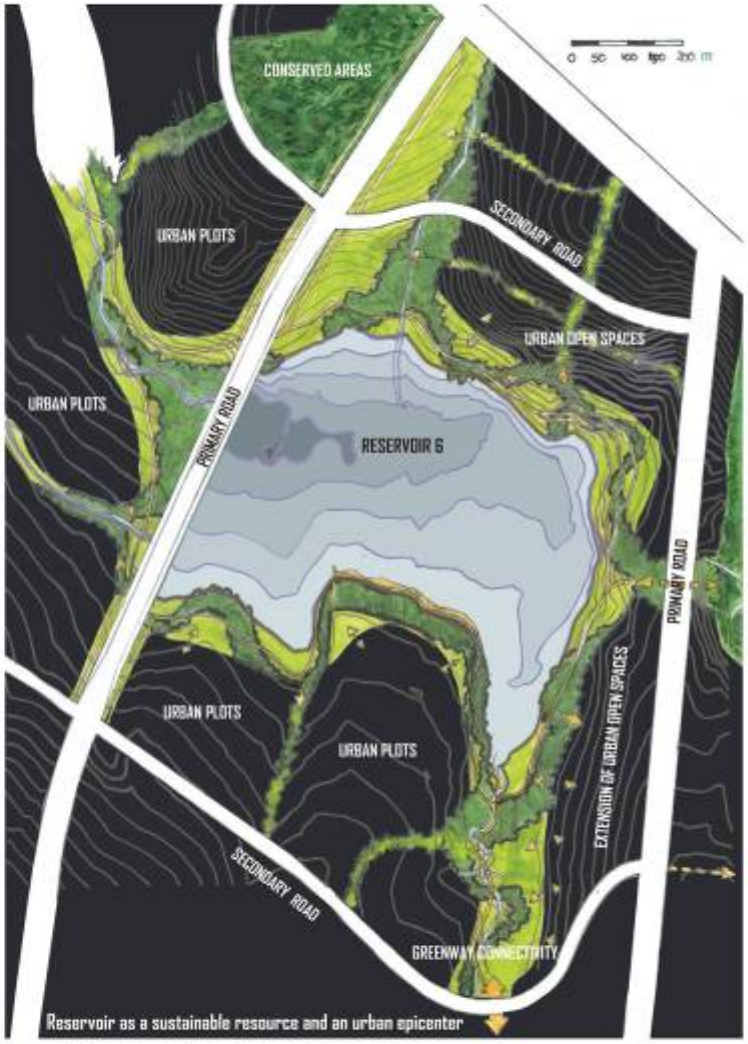
SUCH AN INTEGRATED APPROACH ALLOWS THE ENTIRE DEVELOPMENT AS A COHERENT SYSTEM OF INTERDEPENDANT FIELDS

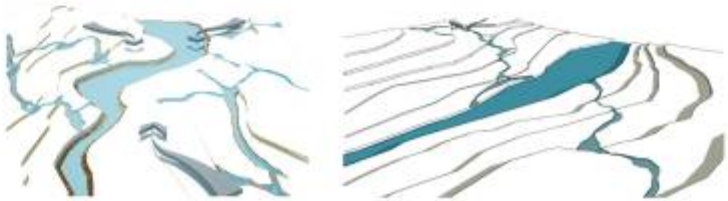
PRODUCTIVE LANDSCAPES AS A PHASING MECHANISM TO IMPROVE LAND HEALTH AND MANAGEMANT

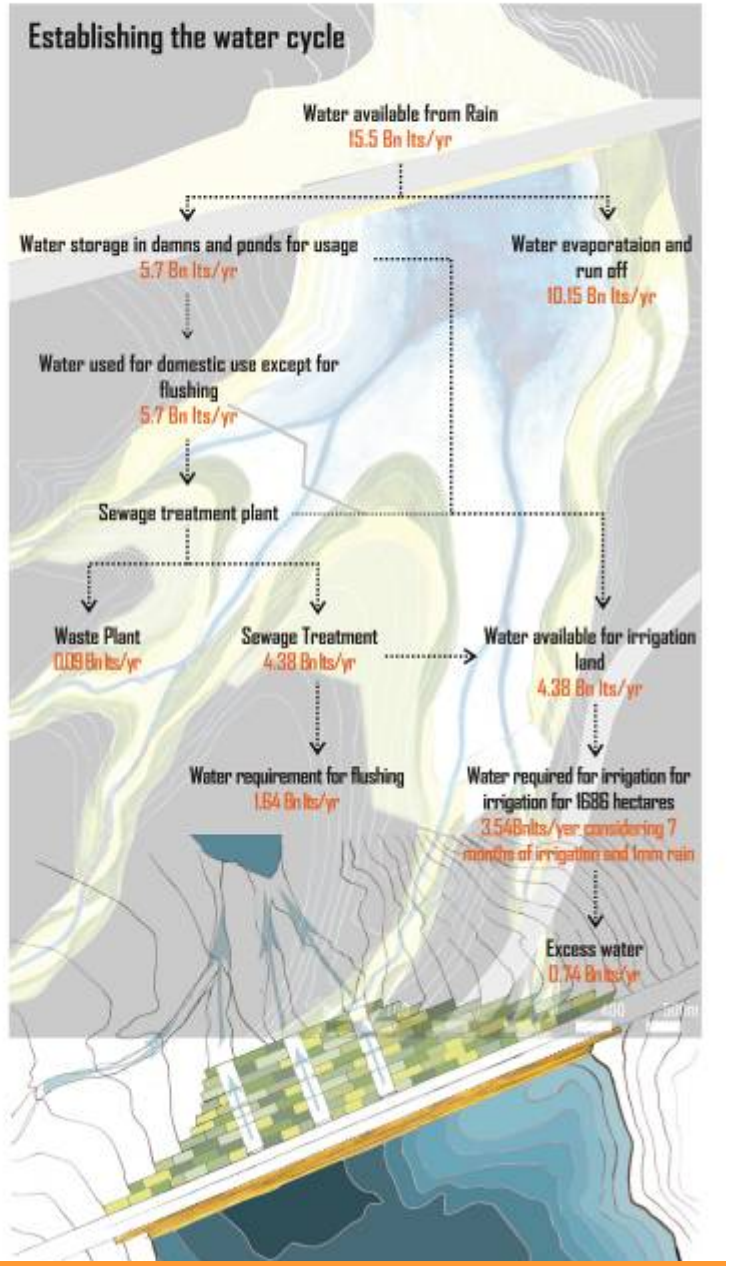
WATER



The water harnessed in the site is treated through a series of reservoirs of varying intensities and an integrated swale system. The system of reservoirs in the site vary not only in their physical form but also in their relation to topography as they incorporate the existing slopes of the terrain with minimum modulation. The system of reservoirs thus developed bear a strong hierarchical relationship that is based on two conditions - the principles of water management and on the relationship between urbanization and water.







MICRO LEVEL INFRASTRUCTURAL STARTEGIES IN CONTINUATION TO THE LARGE SCALE GREEN INFRASTRUCTURE FRAMEWORK.

Farming Varieties within the Proposed Development

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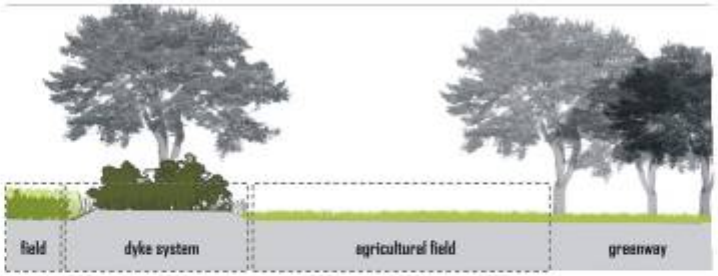
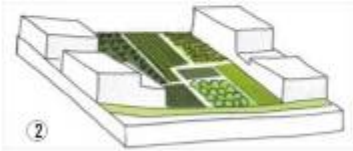
scales of sustainibility

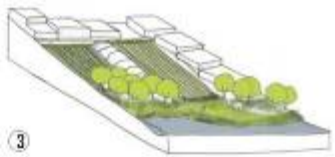


Spatial transition between agricultural fields and the greenways

Orchards Farm Planning



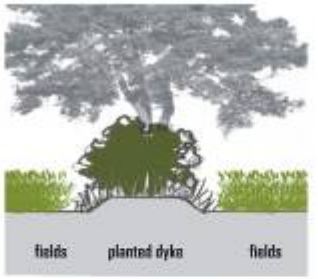
Farming along the reservoir edges



Cereals or Truck farming pattern

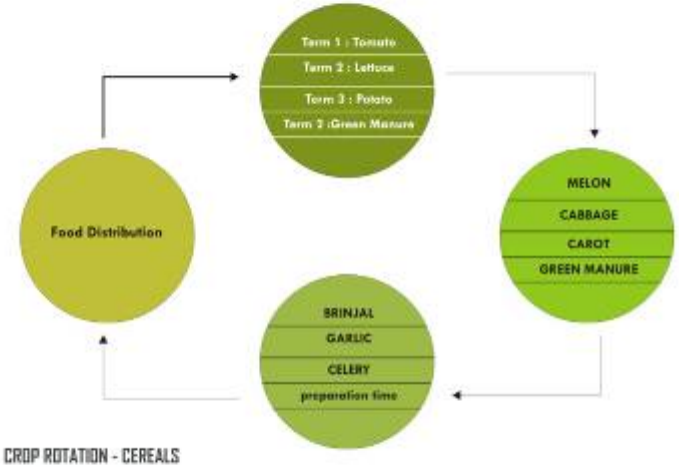
Spatial transition between agricultural fields and the

PROTOTYPE OF FARM MODELS BASED ON SLOPE AND URBAN PARAMETERS

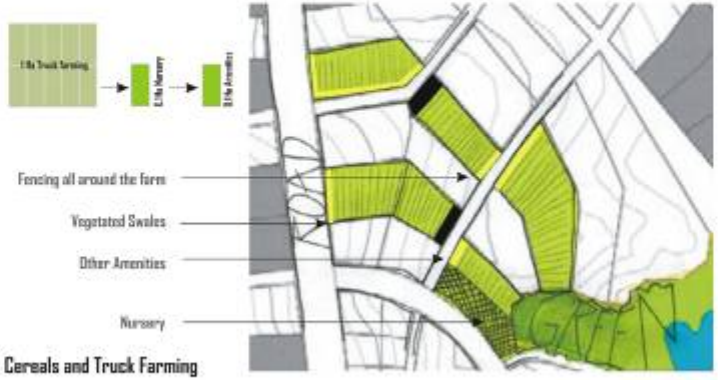


Cereal Planting perpendicular to slope

Cereal Planting on the slope



CROP ROTATION - CEREALS



Cereals and Truck Farming

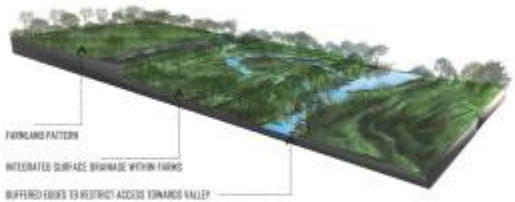
MICRO LEVEL INFRASTRUCTURAL STARTEGIES IN CONTINUATION TO THE LARGE SCALE GREEN INFRASTRUCTURE FRAMEWORK.

SOCIAL LINKAGES

RESIDENTIAL GREENWAYS LAND USE TREATED AS A PASSIVE LANDSCAPE PATTERN

INSTITUTIONAL GREENWAYS LAND USE TREATED AS A EXTENSION OF THE URBAN SPACE

COMMERCIAL GREENWAYS LAND USE TREATED AS AN OPEN ENDED LANDSCAPE PATTERN



GREENWAYS ADJACENT TO FARMLANDS INTEGRATING SURFACE DRAINAGE PATTERNS

BAR ZAERS Ain Al Aouda

Pedestrian path landscape relations

Drip trays along the steps transport storm water towards the bottom of the valley and help in preventing soil erosion

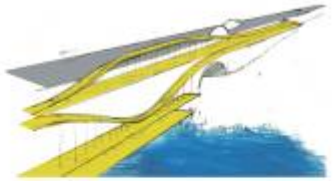
SPATIAL MORPHOLOGY THROUGH AGRICULTURAL PARCELS

SPATIAL RELATIONSHIP BETWEEN GREENWAYS AND URBAN EDGE

SPATIAL RELATIONSHIP BETWEEN GREENWAYS AND FARMLAND EDGE

Section through the valley with varying slope gradient. Where as the steep edge is treated with dense plantation to avoid erosion, the other edge engineered to accommodate social spaces such as an amphitheater

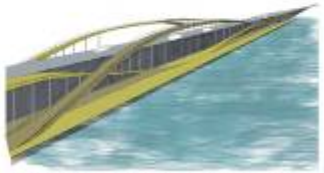
Section through the valley with moderately sloping side. One of the edges is stepped with terraces where as the other edge is uniformly sloped towards the valley



VEHICULAR ACCESS PATH ALONG RESERVOIR EDGE

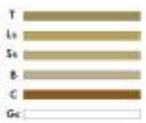
PEDESTRIAN ACCESSIBILITY TOWARDS THE RESERVOIR EDGE

PUBLIC DECKS EXTENDING ALONG THE RESERVOIR EDGE

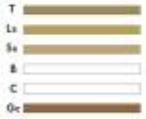


INTEGRATING PUBLIC MOVEMENT ALONG THE RESERVOIR

MICRO LEVEL INFRASTRUCTURAL STARTEGIES IN CONTINUATION TO THE LARGE SCALE GREEN INFRASTRUCTURE FRAMEWORK.



Planting around the Perimeter



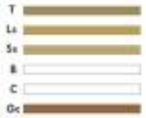
Kitchen garden patches for the mahouts

Levels of vegetation near elephant habitat

Space between visitor and elephant interaction

Spaces for the Mahout Community

Visitors Zone



Erosion Control Mechanism

Trees

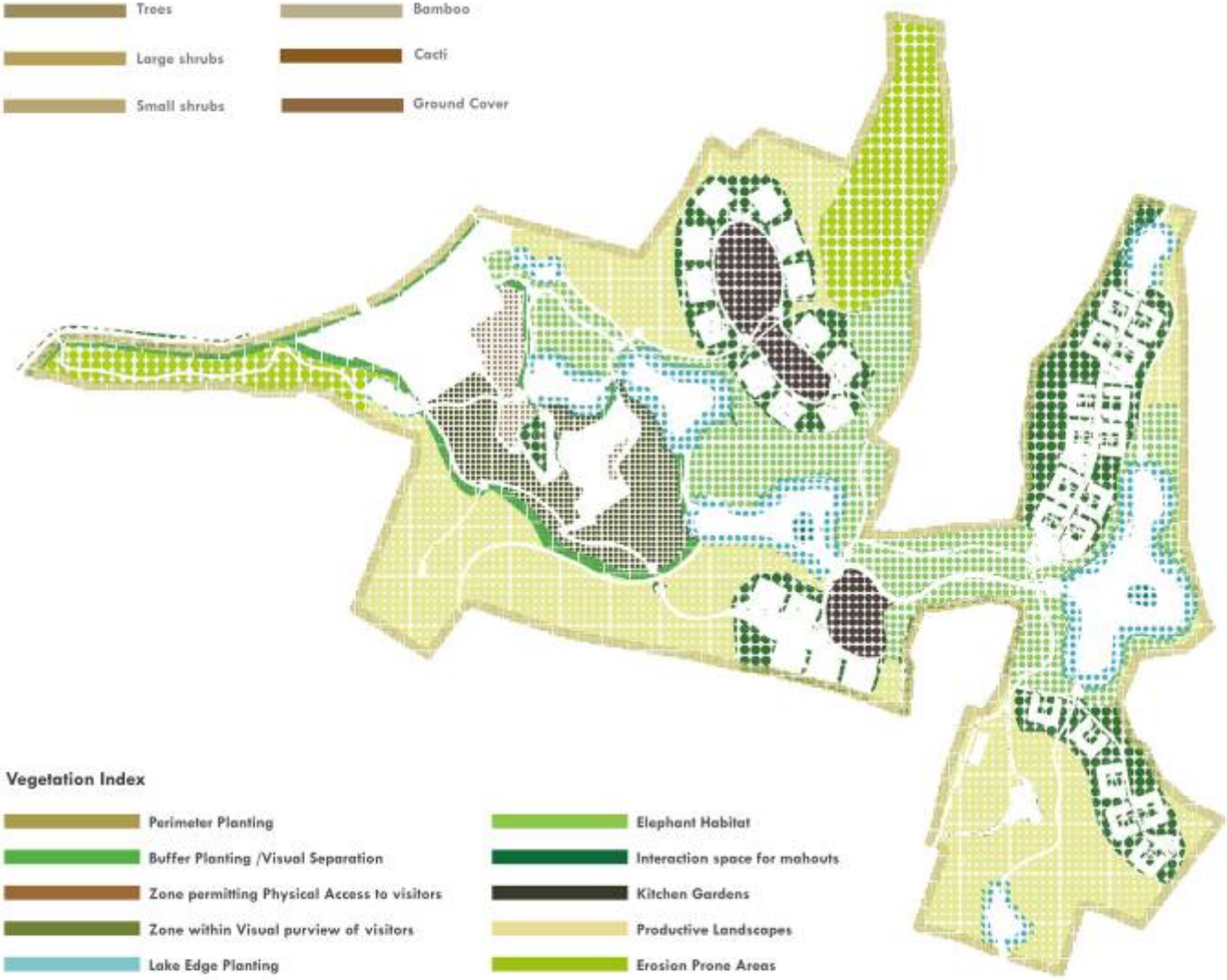
Large shrubs

Small shrubs

Bamboo

Cacti

Ground Cover



Vegetation Index

- Perimeter Planting
- Buffer Planting /Visual Separation
- Zone permitting Physical Access to visitors
- Zone within Visual purview of visitors
- Lake Edge Planting
- Elephant Habitat
- Interaction space for mahouts
- Kitchen Gardens
- Productive Landscapes
- Erosion Prone Areas

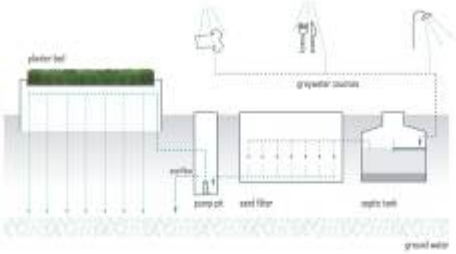
Planting Strategy

Establishment of a balanced ecosystem in this degraded site formed the crux of the design policy, an approximation of the natural habitat of the elephants. The selection of species for multi-storied vegetation is derived from the larger region, more specifically based on the ecosystem of the Aravali ranges. Zone-wise interpretation of the vegetation, such as the definition of the perimeter and microcosms of grasslands and wetlands, are characteristics that modulate visual access to the elephant habitat. The root system of the indigenous plant palette stabilizes the topsoil layer in this erosion-prone site in conjunction with other soil conservation measures.

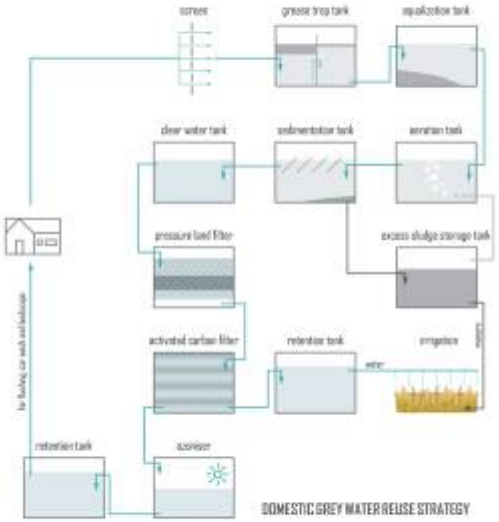
MICRO LEVEL INFRASTRUCTURAL STARTEGIES IN CONTINUATION TO THE LARGE SCALE GREEN INFRASTRUCTURE FRAMEWORK.

SERVICES

Vegetative waterways are natural or constructed channels that have been shaped to transport water at a non-erosive velocity from fields, diversions, terraces and road ditches. Divert all surface and subsurface flow of water by a diversion terrace or berm before establishing the waterway. Construct the waterway and establish erosion-resisting vegetation before constructing terraces or other water concentrating facilities. Above ground vegetation limits the erosive action of rain drops on the soil and decreases the amount of erosion caused by surface run off.

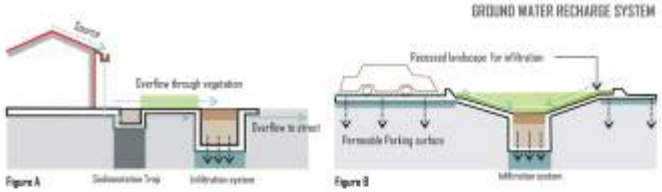


GREY AND BLACK WATER TREATMENT STRATEGY

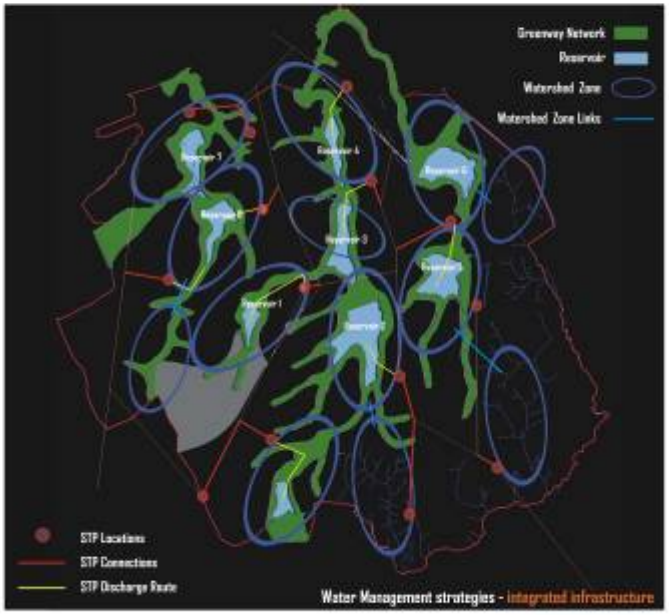


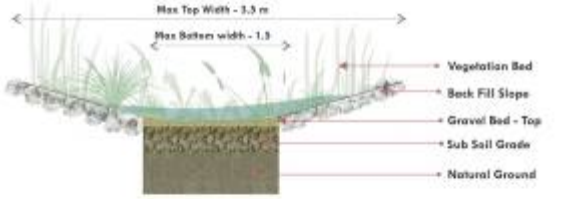
DOMESTIC GREY WATER REUSE STRATEGY

GROUND WATER RECHARGE SYSTEM



Effective control of runoff in urban areas involved reducing the velocity and flow of stormwater, as well as reducing pollutant discharges. To reduce stormwater from rooftops, flows from rain gutters and down spouts are infiltrated into adjacent soil, rather than discharged into the storm sewer system. Storm water runoff from paved surfaces are planned to be directed to vetiver channels called **swales** or **bio retention areas** before flowing into the storm sewers, again to allow the runoff to soak into the ground. Other Runoff mitigation systems include **infiltration basins** and **constructed wetlands.**





Sectional Detail through a swale

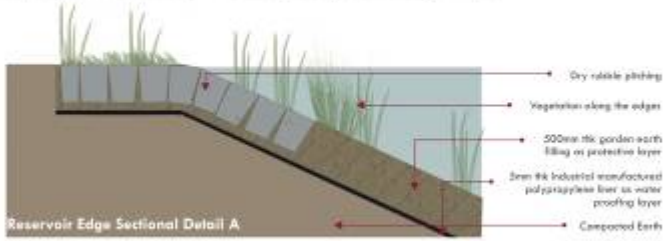
Detail of Swale along the pathways

Key Points on Reservoir Edge Treatment:

shallow depths along the lake edges are provided which apart from being a safety feature, is also planted with tall reeds. This feature encourages the habitat of wading and migratory birds

wading depth at the edge of the as a security measure

steeper slopes for the island edge with continuous pitching done at an angle of repose



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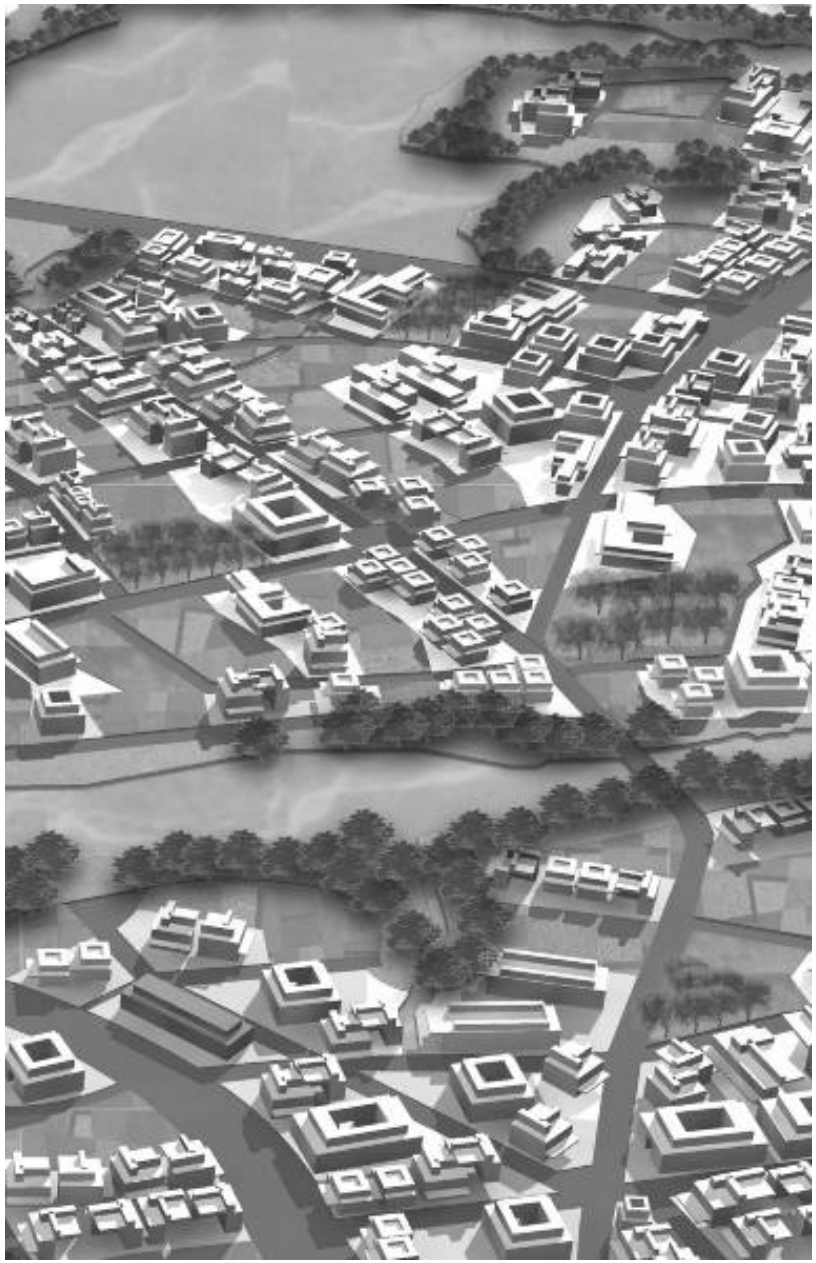
scales of sustainibility

MICRO LEVEL INFRASTRUCTURAL STARTEGIES IN CONTINUATION TO THE LARGE SCALE GREEN INFRASTRUCTURE FRAMEWORK.



THE ECO PRODUCTIVE STRATEGY EVENTUALLY ACTS AN MEDIUM THAT ALLOWS TO MEDIATE AND SUGGEST A SUSTAINABLE MODEL OF DEVELOPMENT ACROSS MACRO , MESO AND MICRO SCALES OF DEVELOPMENT IN AN INTEGRATED AND INTERRELTAED MANNER.