INDIAN INSTITUTE OF TECHNOLOGY

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GREEN INITIATIVES

ARCOP

SUSTAINABILITY

Creating a regenerative campus

A campus which produces more resources than needed for their own use and is able to provide resources for other projects \ people

Our approach to Sustainability

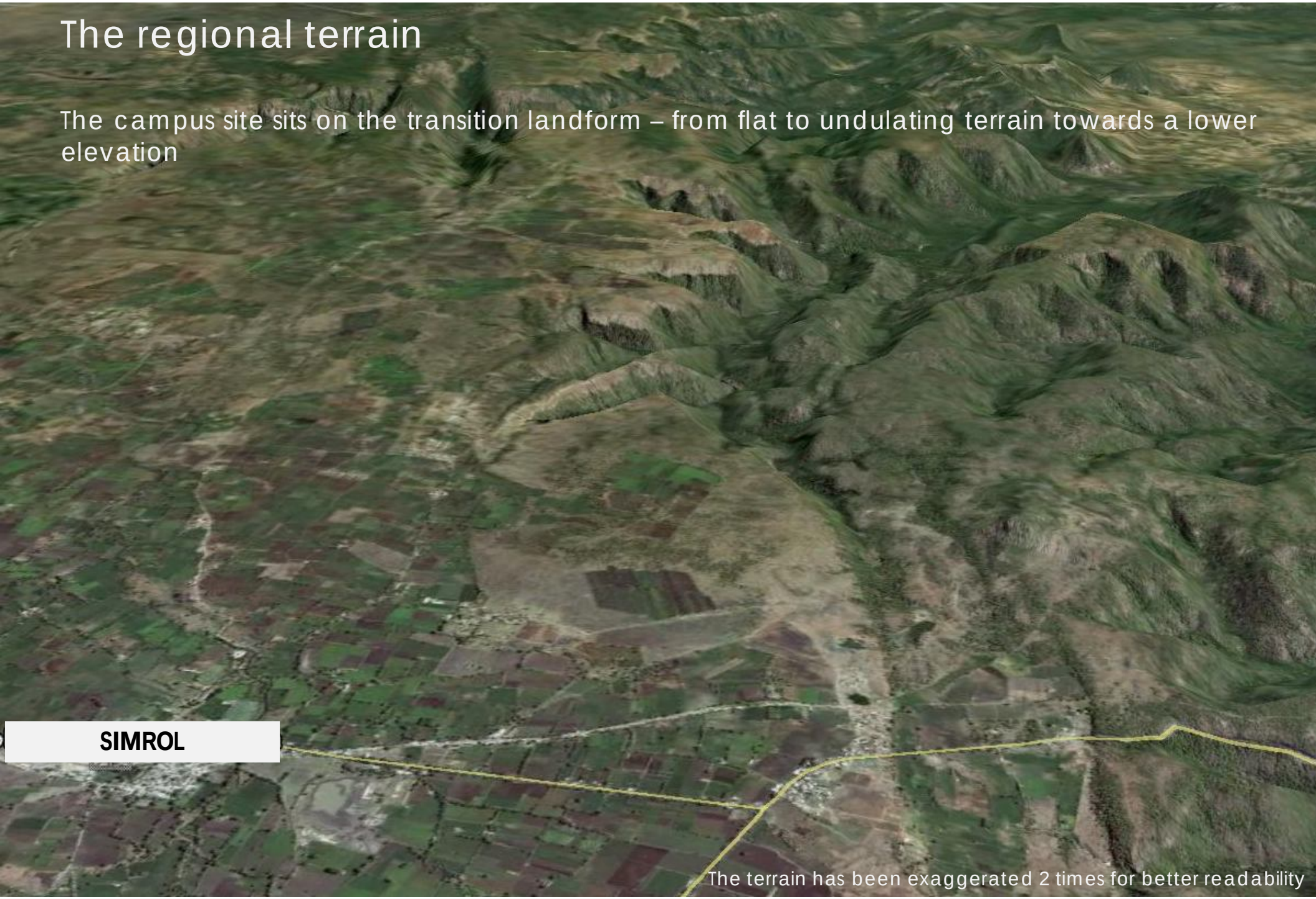
“Ecologically sound, socially just and economically viable, and will continue to be so for future generations”
(The Brundtland Commission & triple bottom line)

How do we do it

Some strategies to achieve this …

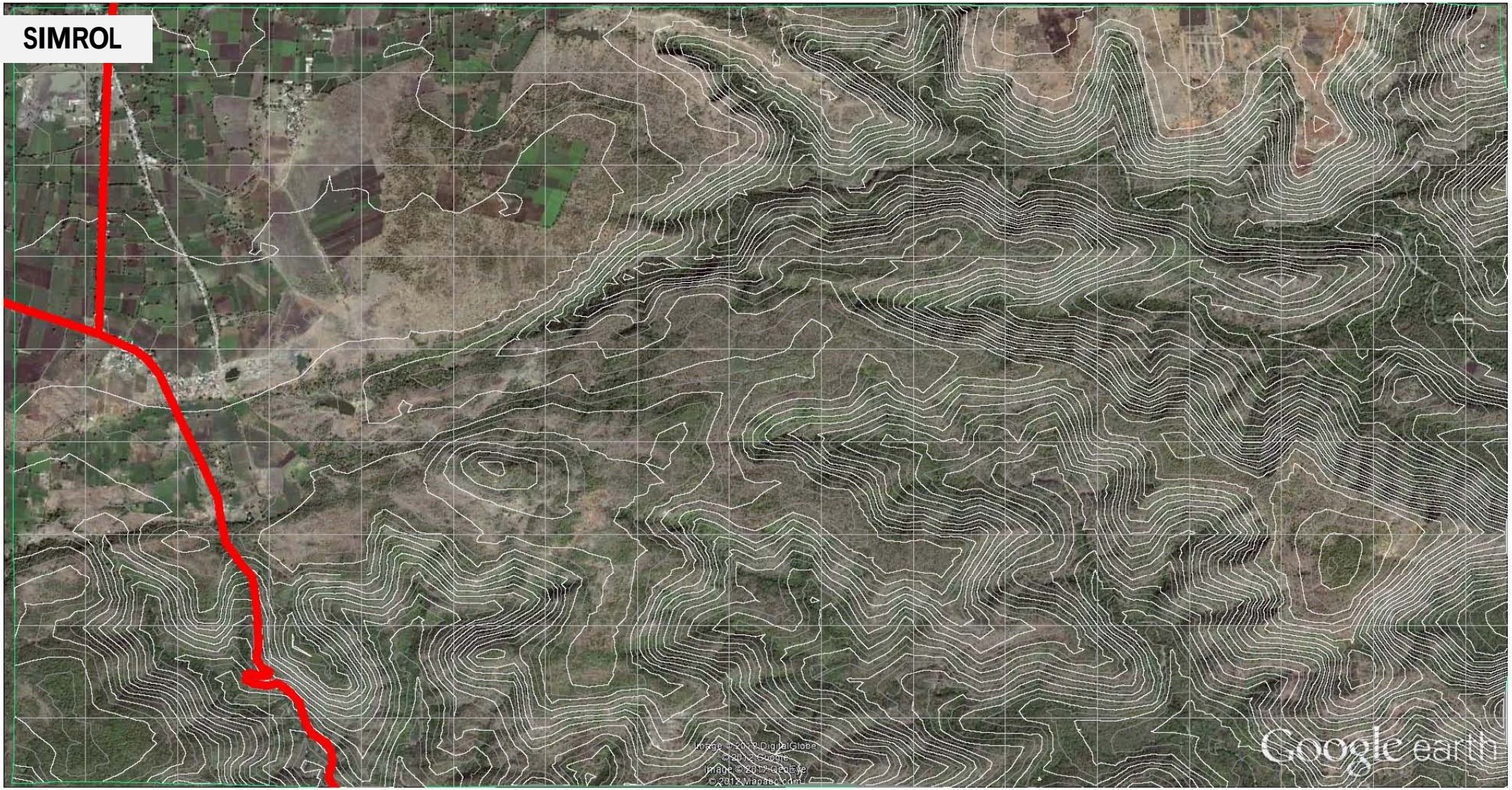
The regional terrain

The campus site sits on the transition landform – from flat to undulating terrain towards a lower elevation

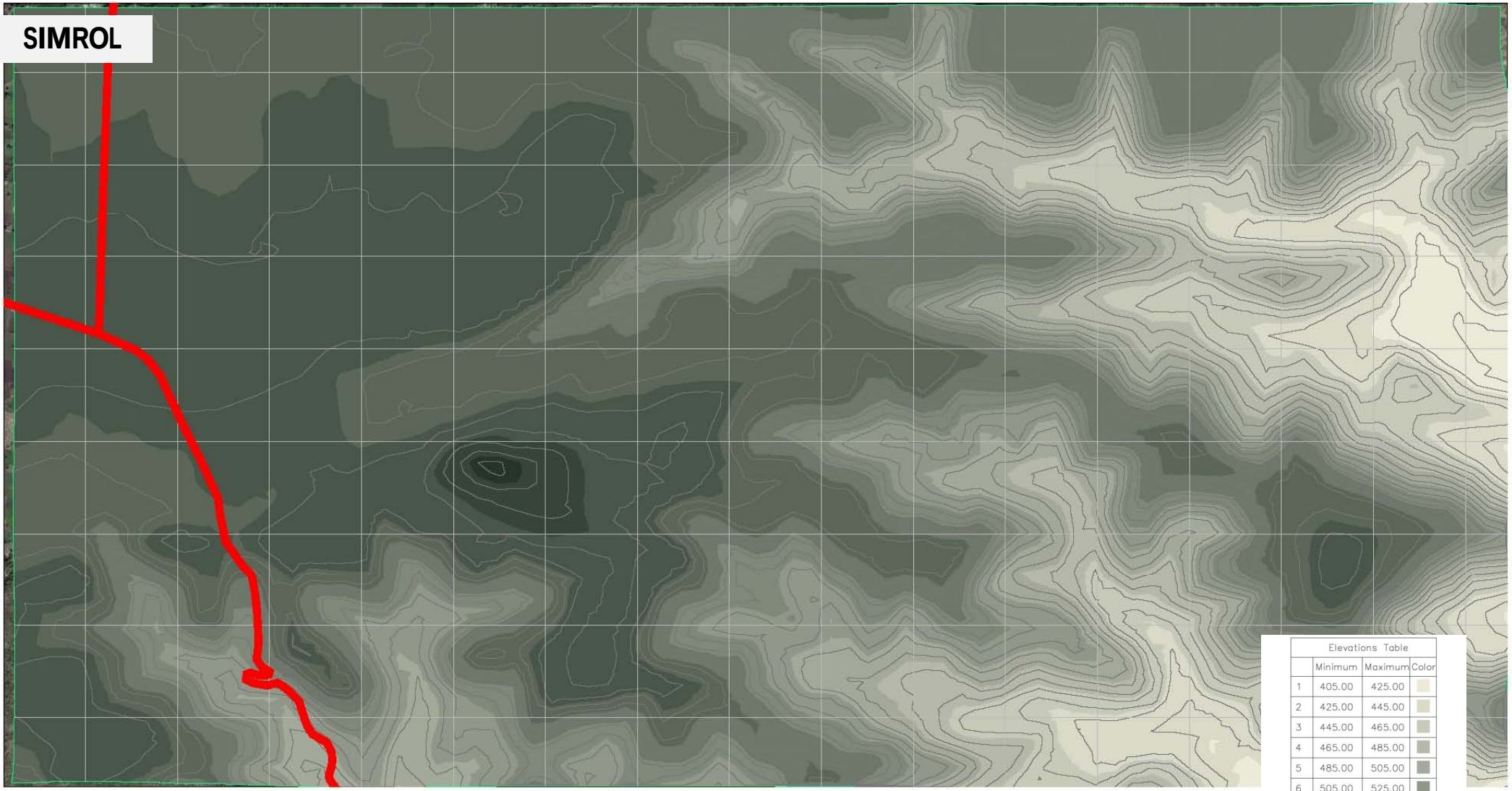


The regional plan

The contour plan



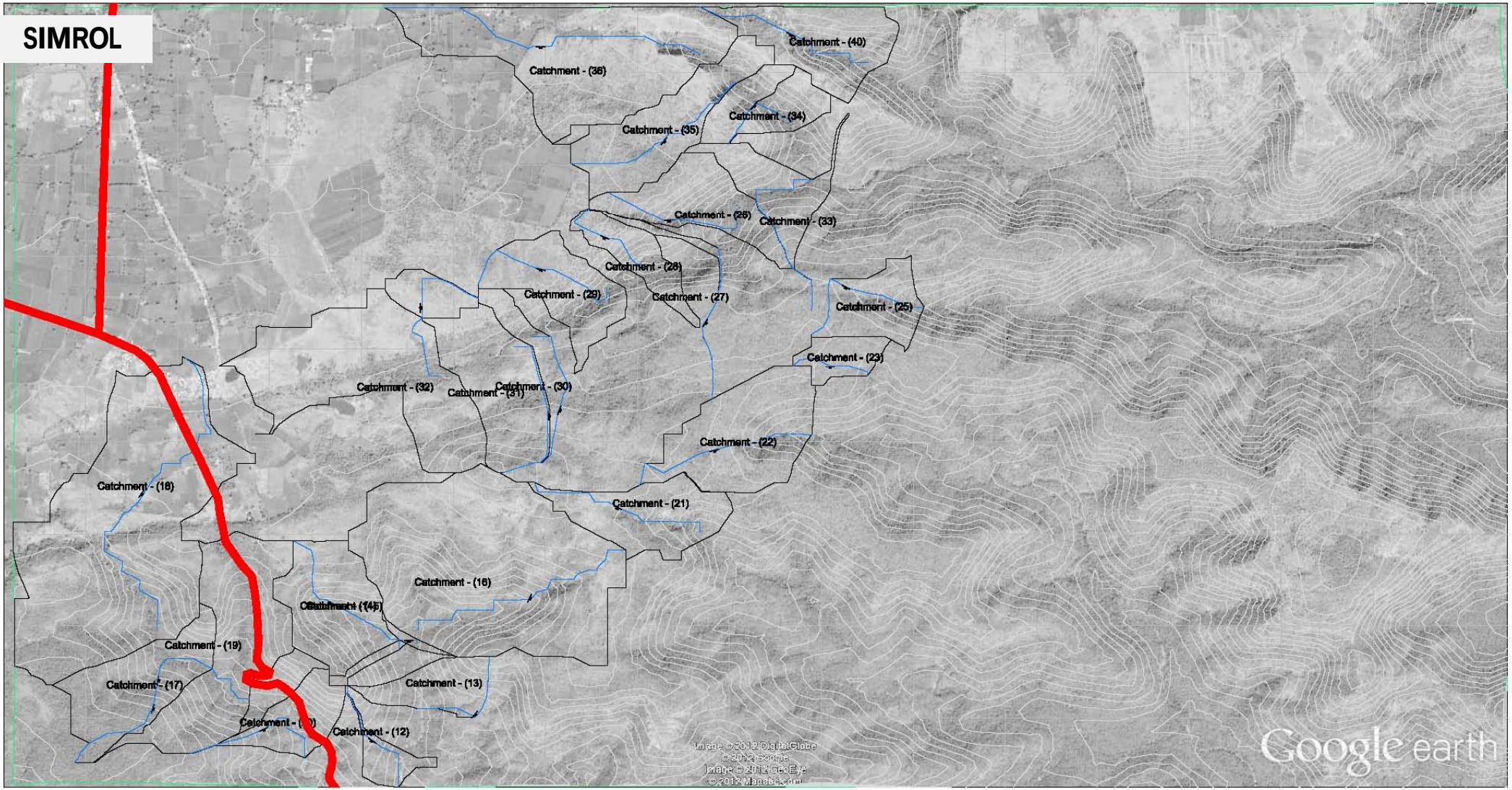
The elevation plan



Elevations Table			
	Minimum	Maximum	Color
1	405.00	425.00	
2	425.00	445.00	
3	445.00	465.00	
4	465.00	485.00	
5	485.00	505.00	
6	505.00	525.00	
7	525.00	545.00	
8	545.00	565.00	
9	565.00	585.00	
10	585.00	605.00	
11	605.00	625.00	
12	625.00	645.00	

Elevation difference of almost 150 mts plus –
Good view potentials.
The valley should be designed as a bio diversity park

The watershed plan



Respect the path of flow of water – multiple catchments and directions

Retain natural terrain -levels within the campus to retain the water runoffs

History sheet – YEAR 2000

Existing lakes on site – edge of transition

Trees bind the soil on the edge where slopes start

History sheet – YEAR 2012

Multiple lakes created due to quarry – natural lakes possible due to possible rock strata.

Possibility: Rain fed lakes for storage - interconnected to continue the ecological cycle and runoff

Our Strategies for Regenerative Campus of IIT Indore

Our green campus should…

Water Positive, Energy Positive, Low On Carbon, Zero Waste Campus.

Master Planning Strategies for Regenerative Campus

Minimal Site Interventions

Respecting the natural terrain as far as possible.

Concentric Development of phases - The pie approach :

Each phase of development is complete and sustainable.

Phase 1 to be strategically located so that all building zones grow in a continuous fashion and do not get scattered around.

Minimize the infrastructure cost.

The amenities and green open system to be phased carefully.

Short term plantation in future phases so that the campus looks complete also in its initial phases

Master Planning Strategies for Regenerative Campus

Interactions and Proximities –

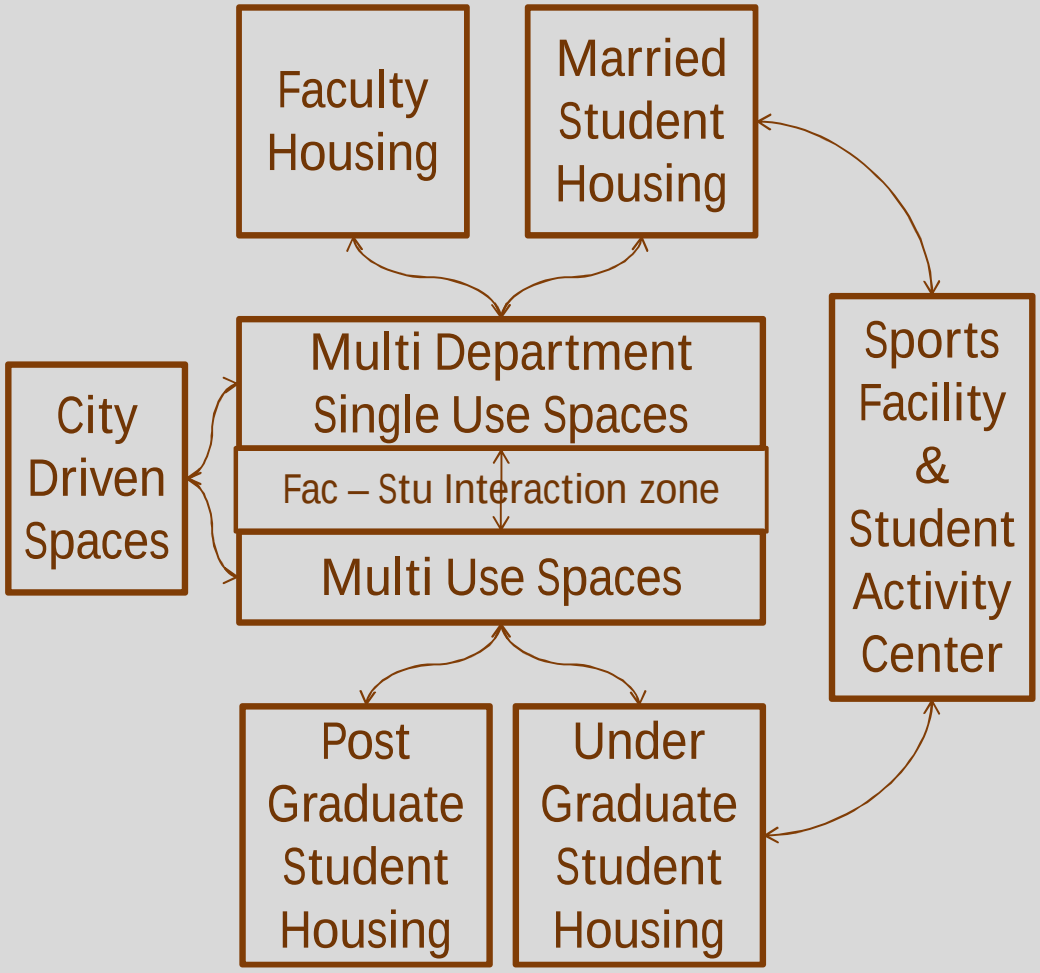
Efficient correlations between various uses & interdependencies.

Formal – Informal, Outdoor and Indoor spaces must facilitate these interactions

A 10 min walking philosophy

Encourage walking through well defined pedestrian paths.

Minimize carbon footprint by provision of bicycle movement network.



proximity associations

Energy Planning Strategies for Regenerative Campus

Architecture Initiatives

Passive architecture :
Systems like Double skin on the external walls, atriums, wind channels make environment livable & reduce the heat load.

Central Campus monitoring Hub : Sustainability is a continuous process. GRIHA rating is reviewed after a span of 3-4 years and a certificate is reissued. Hence equally important is to monitor the buildings for any inefficiency. Approach to make the campus work like a fine tuned machine.

Micro zone cooling :
Space accommodates both desk and equipment zone. The equipment heat is larger part of the heat load.

Buffer the two kinds of zones to increase efficiency.

Energy Planning Strategies for Regenerative Campus

Use roof tops for PV panels

Around 50000 sq m will be able to generate around 4 MVA

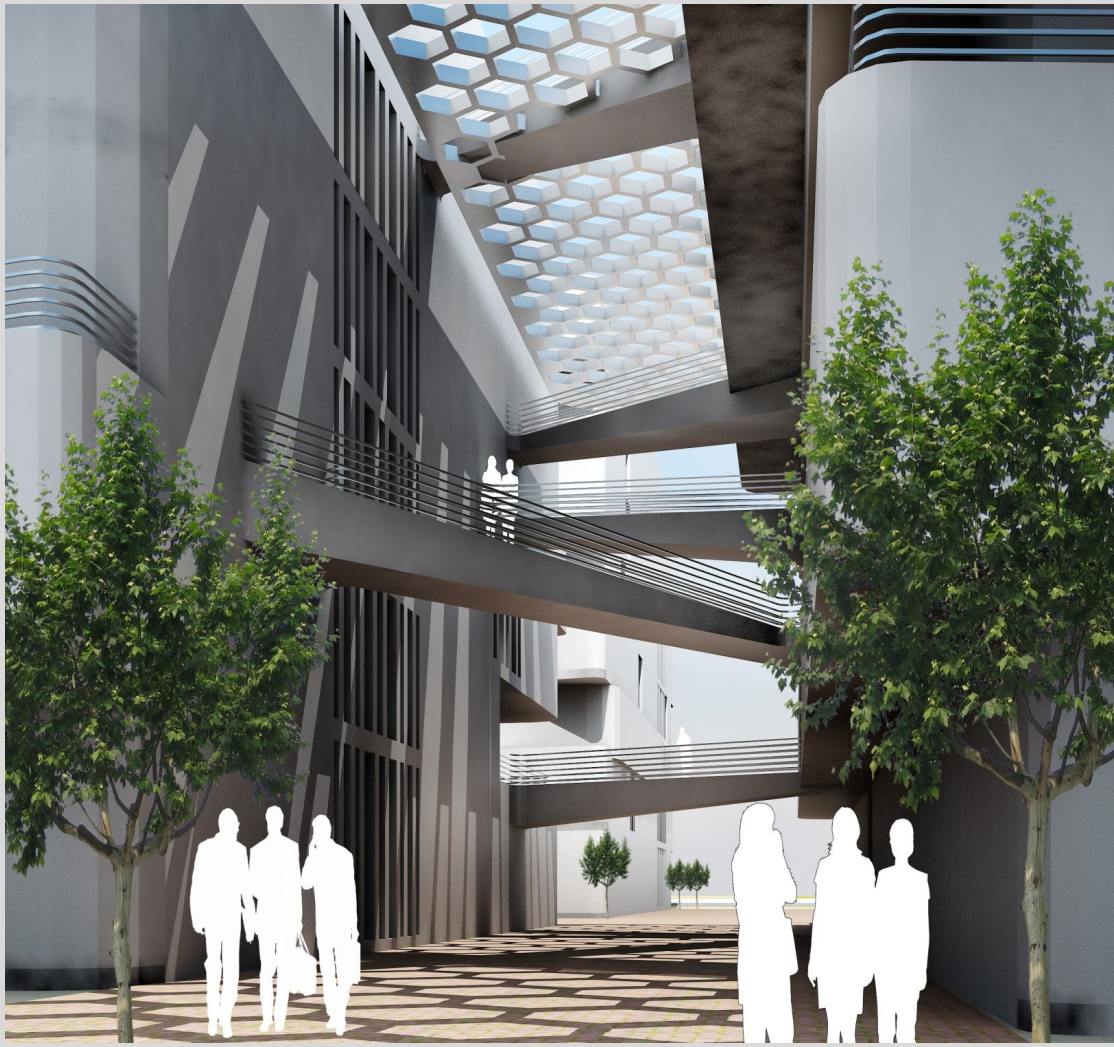
As the future phases eat away the solar farms, a part of the loss can be made up by roof tops PV

Battery less Solar power

Connect the generated power to the main grid, eliminating batteries which require replacement every 3-4 years

R E S – To act as primary source for energy guzzlers like workshops, heavy labs.

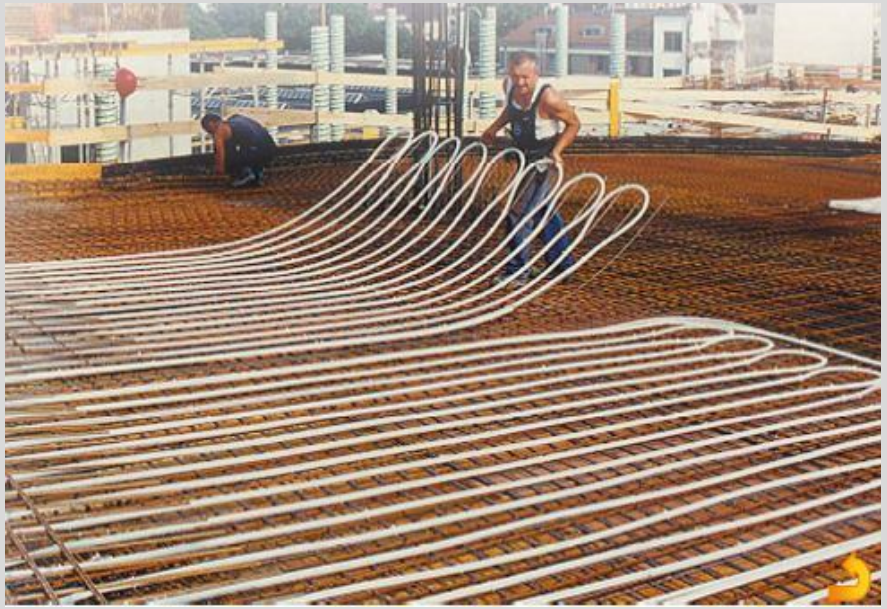
BIO MASS to ENERGY
Campus Wastage



FUTURE HVAC Planning Strategies for Regenerative Campus

Central Cooling

Taking advantage of the diversity of day and night loads.



Radiant cooling

The chilled slabs system could be used to lower energy consumption than conventional cooling systems.

Alternatively use of radiant cooling panels for large spans .

Earth cooling technique

Exploring the earth cooling technique for cooling the return side of the chilled water pipe .
As long as the substrata conditions allow for heat exchange, it should be possible.

Water Planning Strategies for Regenerative Campus

Water Balance.

Triple process for water is visualized.

Recharge (Aquifer),
Store(for utilization) and
Moisture retention(keep the soil moist).

All the three are important is achieving a complete ecological cycle:

Food Securities Strategies for Regenerative Campus

The food crises is real. The campus must demonstrate itself with innovative ideas towards this concern.

Edible campus.

There are enough paved surfaces within the campus which are not utilized. The idea is to convert these spaces with edible gardens.

Student Program.

Taking a clue from the Mc Gill campus where students participate in community kitchens, which further provides cooked food for many unprivileged members of the city.

The social responsibility of the students \ campus can be achieved

Underutilized terrace transformed into a productive and attractive place

Bare, paved over concrete plaza being transformed through the use of design fragment

Bush hammered concrete wall

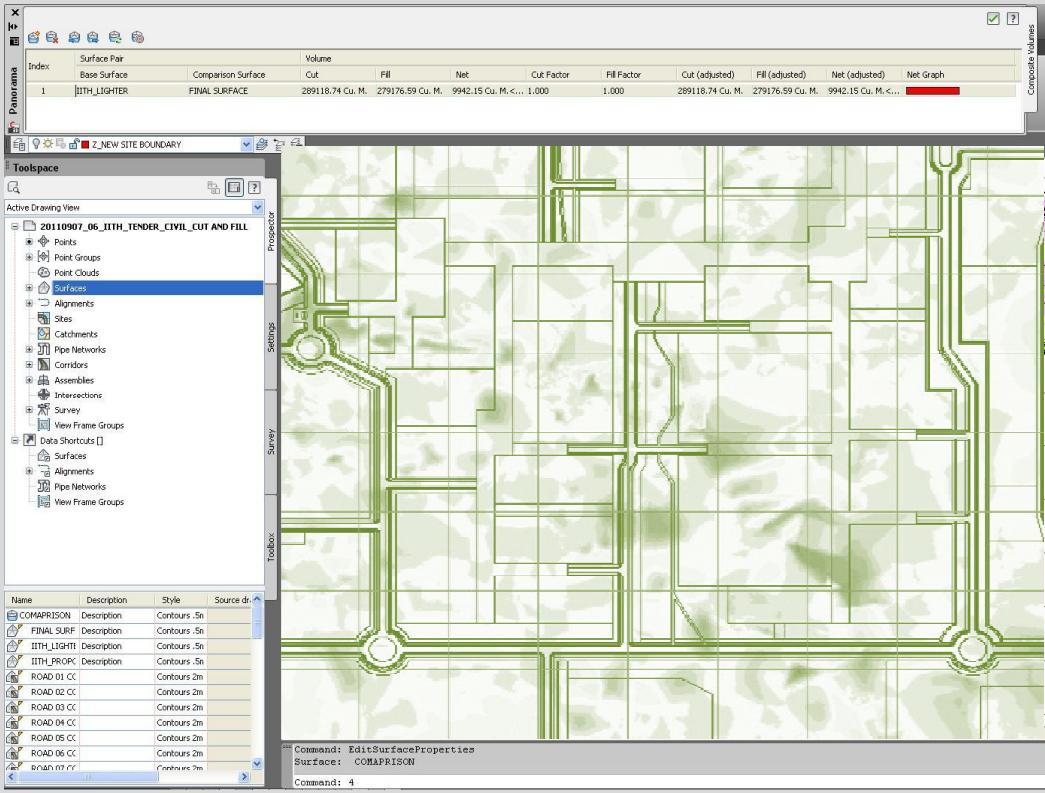
Vertical growing: bush beans over concrete wall

Technology Utilization Strategies as a process

Technology to arrive upon optimum design though micro studies

BIM– lean approach to design & construction process

Campus monitoring hub - to monitor the state of buildings and master plan services.



GREEN ARCHITECTURE

Smart Building Envelop

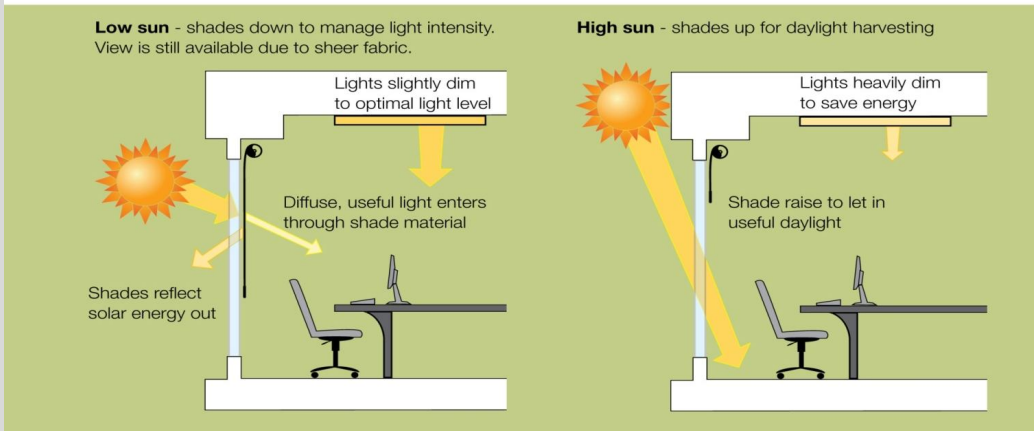
Real-time response to climatic, day light and functional variation.

Data Based information system.

Lighting Management System

Automated controls for efficiency through
Use of Occupancy detectors,
Day Light Sensors.

Low Energy Consuming fixtures i.e. LED



KEY DESIGN DECISIONS – IIT INDORE MASTER PLAN

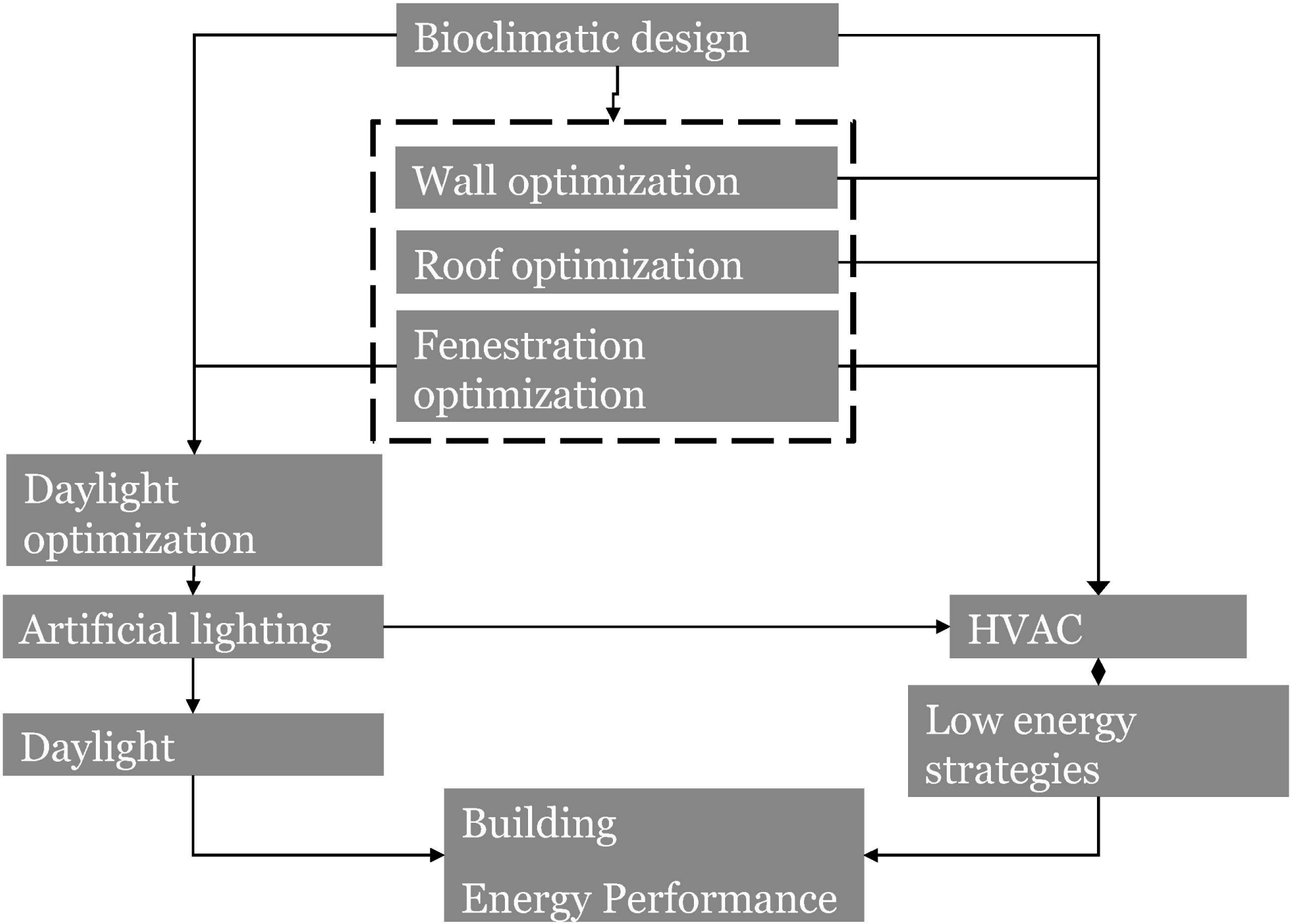
1. Sustainable Site Planning
2. Building Design Optimization
3. Energy Performance Optimization
4. Renewable Energy Optimization
5. Water Efficiency
6. Eco Friendly Materials
7. Indoor Environment Quality
8. Solid Waste Management

KEY DESIGN DECISIONS – IIT INDORE MASTER PLAN

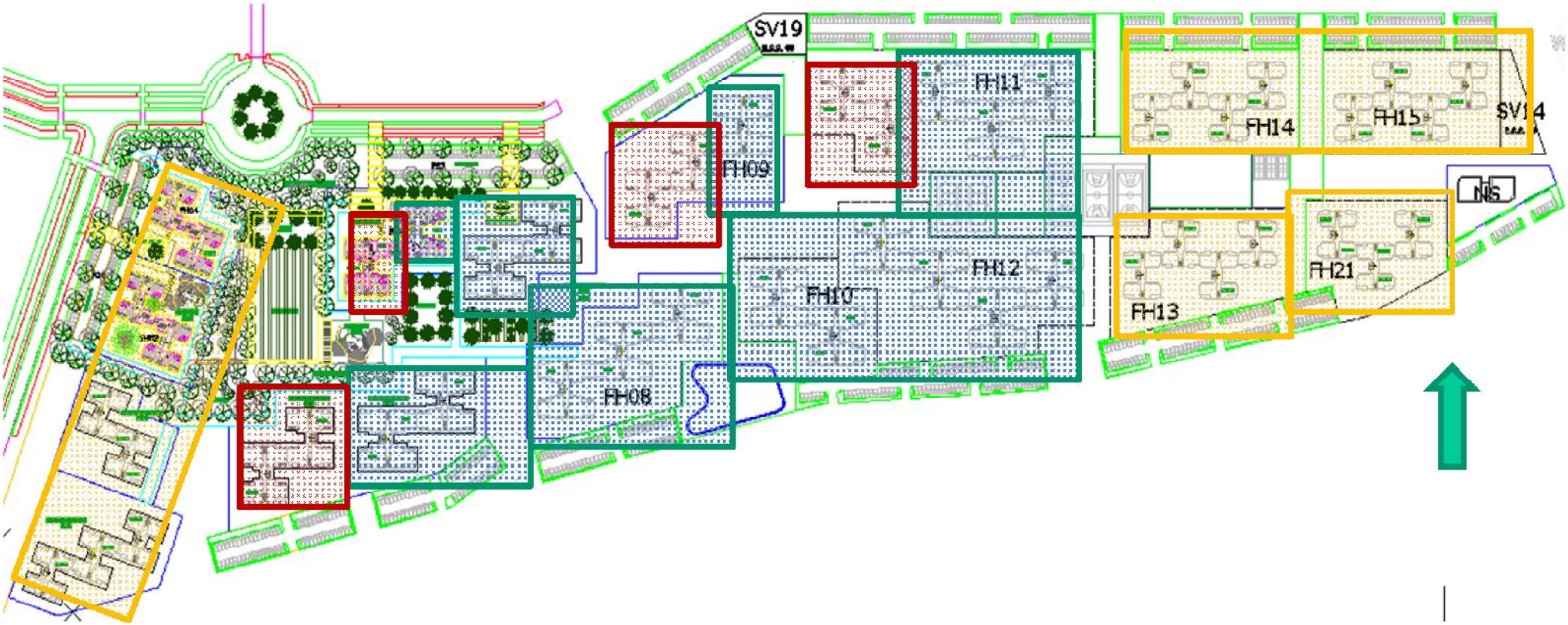
1. Reduce the “Demand”
2. Improve the “Operations”
3. Offset demand of “Finite Resources”

GREEN BUILDINGS

INTEGRATED APPROACH FOR BUILDING DESIGN



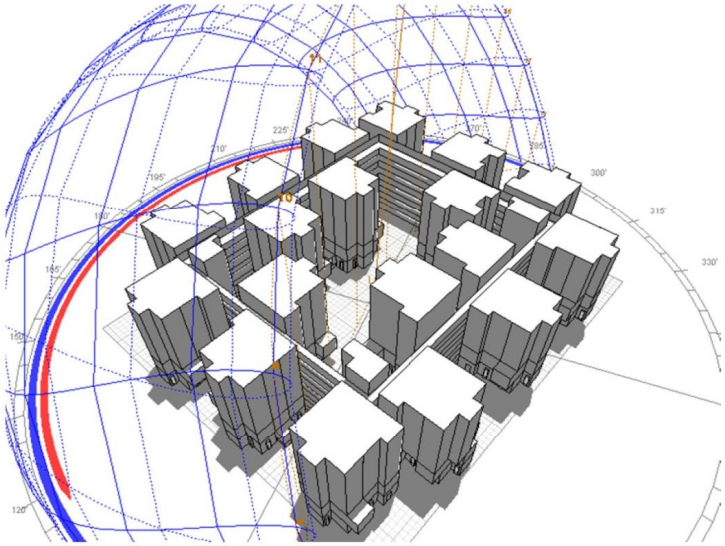
APPROACH FOR SITE PLANNING

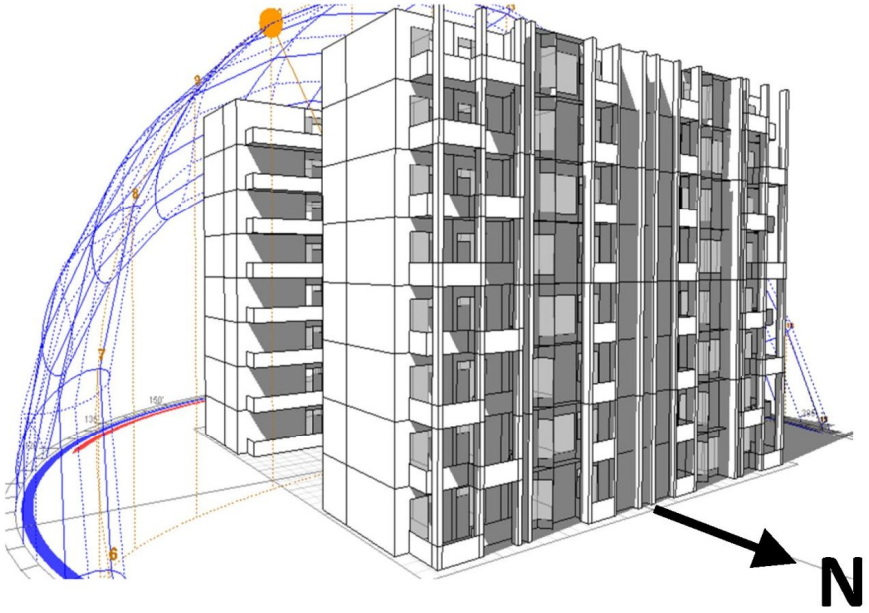


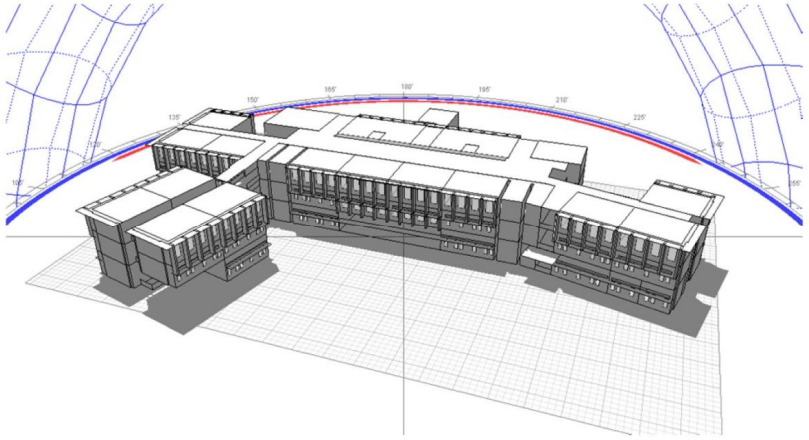
Key design elements from sustainability aspects

- **North-south oriented**
- **Mutually Shading**
- **Shaded Windows**

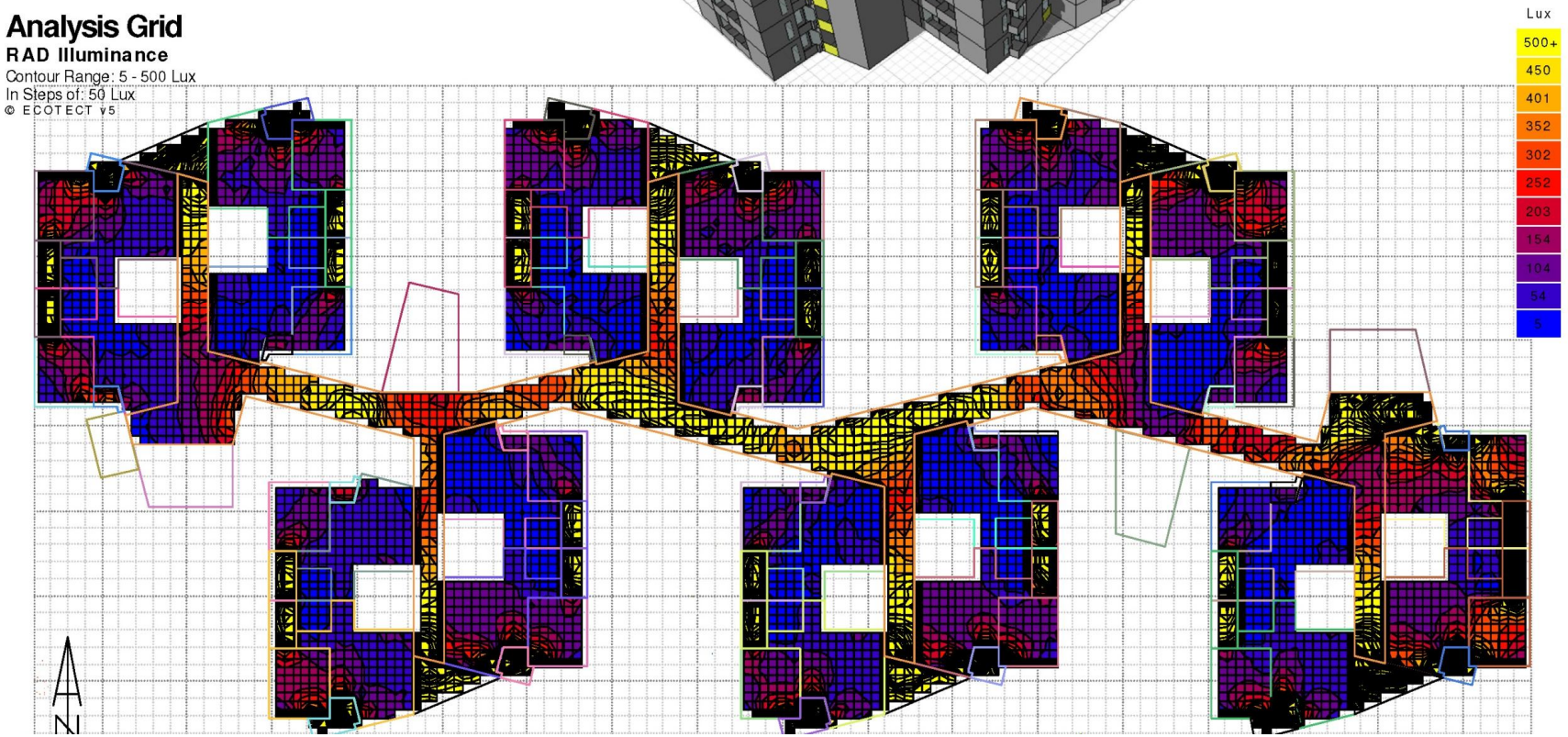
BUILDING LEVEL ANALYSIS - ORIENTATION







BUILDING LEVEL ANALYSIS – DAY LIGHTING AND SHADING



THANKS