



**ECO HOUSING , SECTOR 150  
NOIDA**

**A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE  
REQUIREMENT FOR THE DEGREE OF:**

**BACHELOR OF ARCHITECTURE**

**BY**

**(SYED AZHARUDDIN)**

**(ROLL NO. 1170101027)**

**THESIS GUIDE**

**(PROF. SANGEETA SHARMA)**

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**LUCKNOW.**

**SCHOOL OF ARCHITECTURE AND  
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of the students and can be accepted as partial  
fulfillment of the requirement for the degree of  
Bachelor’s degree in architecture, school of  
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Prof. Mohit  
Kumar  
Agarwal

Dean of  
Department

---

External  
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---

Prof. Sangeeta  
Sharma

Head of  
Department

---

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Roll No.:1170107027

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# INTRODUCTION

# ECO HOUSING

An Eco-housing (or Eco-home) is an environmentally low-impact home designed and built using materials and technology that reduces its carbon footprint and lowers its energy needs. Eco-homes are measured in multiple ways meeting sustainability needs such as water conservation, reducing wastes through reusing and recycling materials, controlling pollution to stop global warming, energy generation and conservations, and decreasing CO2 emissions.

AN ECO HOUSING CAN INCLUDES PASSIVE TECHNIQUES.

Higher than normal levels of thermal insulation

Better than normal air-tightness

Good levels of daylight

Passive solar orientation — glazing oriented south for light and heat

Thermal mass to absorb that solar heat

Heating from renewable resources (such as solar, heat pump or biomass)

Photovoltaic panels, small wind turbine or electricity from a 'green' supplier.

Natural materials — avoidance of PVCu and other plastics

Rainwater harvesting

Grey-water collection

Composting toilet

Solar panels or wind turbines

Geothermal heating and growing plants on the roof to regulate temperature, quieten the house, and to produce oxygen

A vegetable patch outside the house for some food.

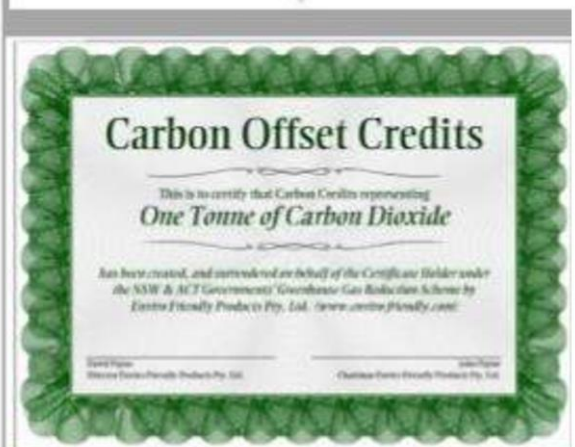
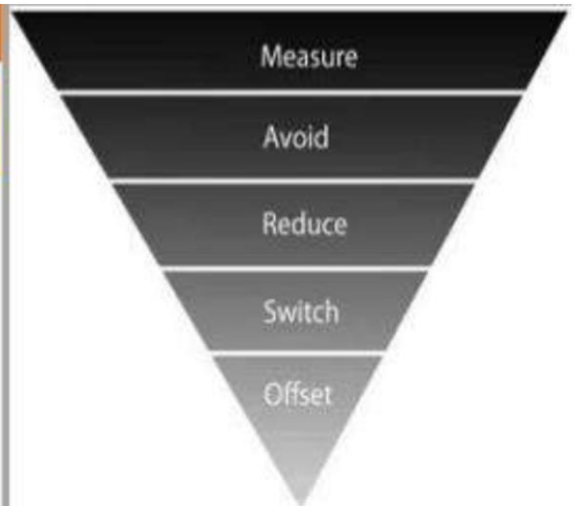


## RESEARCH

### PRIMARY RESEARCH: carbon neutral development

Understanding the concept of carbon neutral development will include the following step by step process.:

- Understand the terminologies carbon neutral, carbon footprint, carbon offset..
- Define major carbon emitting sources.
- Understand the scope of the project and confine the emission sources taken into consideration
- Define carbon neutral with respect to a neighborhood
- Calculate and estimate the emissions from a project of similar scale to that of the program
- Compare and analysis the emissions with other similar projects
- Understand the international standards for a carbon neutral development
- Understand the major emitters in numbers
- Estimate the carbon footprint needed to negate and bring the project to a zero carbon point.



KYOTO PROTOCOL



Red marked countries are not committed to any reduction  
Yellow full reduction and green minimal reduction

## RESEARCH

**Zero Energy Design (ZED) differs from Carbon Neutral Design (CND)** in that it is more concerned with the reduction of the operating energy requirements for a building, focusing on the *eventual use of zero fossil energy*. The official ASHRAE definition for a Net Zero Energy building is "buildings which, on an annual basis, use no more energy than is provided by on-site renewable energy sources."

"Design With Climate", 1963, by Victor Olgyay was the first book to take a critical look at the need to relate building design to climate

## Targeting Carbon: Reduce, Renew, Offset

### ZED and CND buildings:

- begin the design with a positive acknowledgment of their climate, location and orientation
- take advantage of the sun to reduce their energy requirements
- take advantage of the wind to reduce their energy requirements
- employ a high degree of passive solar heating to reduce their energy requirements
- employ a high degree of natural ventilation to reduce their energy requirements
- manipulate the microclimate around their buildings to temper the environment
- use shading devices and vegetation to control summer over heating
- employ a high degree of day lighting to reduce their energy requirements
- have a broader acceptable range of temperature and humidity when assessing occupant comfort
- are typically super insulated if located in a cool to cold climate
- use higher quality glazing systems to control heat flow
- interior finishes include thermal mass to store the free heat they capture from the sun
- use highly efficient mechanical, electrical and plumbing equipment
- generate their own electricity through wind turbines, photovoltaic's and micro generation facilities
- their goal is to be able to generate more electricity than they require for operation
- include occupant education as part of their design strategy to ensure the proper, energy efficient long term use of the building

To build carbon neutral also suggests a paradigm shift from the classic 3 Rs, *reduce, reuse and recycle*, to Reduce, Renew and Offset:

**Reduce** - build less, protect natural ecosystems, build smarter, build efficiently.

**Renew** - use renewable energy, restore native ecosystems, replenish natural building materials, use recycled and recyclable materials.

**Offset** - compensate for the carbon you can't eliminate, focus on local offset projects. Carbon offsetting is gaining popularity, but it needs to be remembered that purchased offsets cannot be generated in adequate quantity to perpetuate and sustain our current practices.



## RESEARCH

### SECONDARY RESEARCH: architectural strategies adoptable for zero carbon environment

Secondary research will include the development of strategies based on the studies, case studies and literature surveys. The process will include the following :

- Analyzing the core issues by putting up the main carbon emission sources in frame
- Looking into case studies, literature and proposals for existing strategies
- Resolving each issue separately by studies and bringing forth viable options.
- Develop architectural strategies from these studies that resolves the issue.

### modularizing traditional and advanced technologies

This will include the rationalization of strategies developed from the second stage. Strategies are modularized for further replication in the Indian context which is the only viable option for lesser footprint. This stage of research will follow the below given strategy:

- Search for traditional methods and modern age technologies that aids sustainable development
- Developing and incorporating this methods into the design in a viable manner.
- Possibility of modularizing these methods to make it a replicable unit



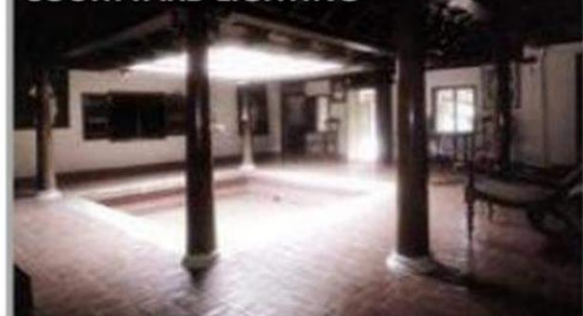
Flexible solar cells

### High energy wind turbines



Vetical greens

### COURTYARD LIGHTING



WATER AS A CENTRAL FACILITY

# ABOUT PROJECT

## ABOUT PROJECT

THIS PROJECT PRESENTED HERE IS A ECO HOUSING WITH REQUIRED AMENITIES LIKE COMMERCIAL COMPLEX, SCHOOL CLUBHOUSE, LOCATED IN NOIDA. TO CONSERVE NATURAL RESOURCES AND TO CONTROL CARBON EMISSION , WE NEED TO DESIGN GREENN & ECO-FRIENDLY BUILDING.

LARGE NUMBER OF INNOVATIONS ARE AVAILABLE FOR EFFICIENTLY OPERATING THE BUILDINGS INCLUDING USE OF RECYCLED MATERIAL FOR CONSTRUCTION, WASTEWATER TREATMENT AND USE, ENERGY EFFICIENCY, SOLAR HEATING, PASSIVE SOLAR HEATING, CREATING URBAN GREEN SPACES IN PROXIMITY TO COMPACT HOUSING.



## ABOUT THE CITY

### NOIDA , UTTAR PRADESH

- NOIDA, NEW OKHLA INDUSTRIAL DEVELOPMENT AUTHORITY, IS PLANNED CITY LOCATED IN GAUTAM BUDDH NAGAR DISTRICT.
- IT IS A SATELLITE CITY OF DELHI AND IS A PART OF THE NATIONAL CAPITAL REGION (NCR).
- NOIDA CAME INTO ADMINISTRATIVE EXISTENCE ON 17 APRIL 1976 AND CELEBRATES 17 APRIL AS " NOIDA DAY".
- IT WAS SET UP AS AN URBANISATION THRUST DURING THE CONTROVERSIAL EMERGENCY PERIOD (1975-1977). THE CITY WAS CREATED UNDER THE UP INDUSTRIAL AREA DEVELOPMENT ACT, 1976 BY THE INITIATIVES OF SANJAY GANDHI.
- NOIDA WAS RANKED AS THE BEST CITY OF UTTAR PRADESH AND THE BEST CITY IN HOUSING IN ALL OF THE INDIA IN "BEST CITY AWARD".
- IT IS CONSIDERED TO BE INDIA'S GREENEST CITY WITH NEARBY 50% GREEN COVER THE HIGHEST OF ANY IN INDIA.
- NOIDA IS DIVIDED INTO THREE POLICE ZONES IE NOIDA, CENTRAL NOIDA AND GREATER NOIDA, EACH OF THEM COMES UNDER A ZONAL, DCP (SP RANK).



# **SITE STUDY**



## SITE LOCATION

THE SITE IS PROPOSED FOR GROUP HOUSING PROJECT IS LOCATED AT SECTOR 150, NOIDA.

- **CLIENT :-** ACE PARKWAY GROUP
- **LOCATION :-** NOIDA
- **SITE AREA :-** 14.79 ACRES
- **SHAPE:-** SQUARE
- **TOPOGRAPHY:-** THE SITE SANDY AND FLAT LAND
- **SITE FEATURES:-** ON THE SOUTH SIDE YAMUNA RIVER IS 2KM AWAY. SPORT COMPLEX IS ALSO PROPOSED 1 KM WAY FROM SITE
- **SOIL TYPE:-** LIGHT BROWN SANDY SILT
- **LONGITUDE AND LATITUDE:-** 28°25'51.7"N 77°29'01.7"E



ACE PARKWAY





## SITE ORIENTATION

- ROADS ON NORTH , WEST AND SOUTH SIDE WITH FOOTPATH
- BOTH SIDES OF SITE AREA EQUAL.
- DEPENDING ON THE WIND FLOW THE ORIENTATION OF WILL BE ON NORTHEAST - SOUTHWEST AXIS.



## LANDMARK NEAR THE SITE

- SHAHEED BHAGAT SINGH PARK.
- SHIV MANDIR
- NOIDA - GREATER NOIDA EXPRESSWAY



## ACCESSIBILITY TO THE SITE

- THE PROPOSED SITE IS WELL CONNECTED THROUGH NOIDA-GREATER NOIDA EXPRESSWAY.
- **HIGHWAY:-** THE NEAREST HIGHWAY IS YAMUNA EXPRESSWAY WHICH IS 4KM (NORTH) FROM PROPOSED SITE
- **AIRPORT:-** INDIRA GANDHI INTERNATIONAL AIRPORT 47 KM AWAY FROM SITE.
- **BUS STAND:-** NOIDA BUS STAND 25 KM AWAY FROM SITE.
- **RAILWAY STATION:-** ANAND VIHAR RAILWAY STATION, NEW DELHI. 38 KM AWAY FROM SITE.
- **METRO STATION:-** KNOWLEDGE PARK METRO, NOIDA. 4 KM AWAY FROM SITE.



# ON SITE CONDITIONS

## SOIL

- THE SOIL PRESENT IS LIGHT BROWN SANDY SILT.
- BEARING CAPACITY 3000 POUNDS/ SQ.FT.
- SANDY SOIL IS USUALLY DRY, NUTRIENT AND FAST DRAINING
- SILT PARTICLES ARE LARGE ENOUGH TO DRAIN WELL BUT SMALL ENOUGH TO HOLD MORE PLANT NUTRIENTS THAN SAND .

## TOPOGRAPHY

- THE SITE IS FLAT LAND, JUST LIKE SURROUNDING AGRICULTURE LAND.

## VEGETATION

- THE VEGETATION COMPRISES OF GRASSY SMALL BUSHES.
- SITE SURROUNDING COMPRISES OF ASHOKA (SARACA ASOCA) , NEEM (AZADIRACHTA INDICA) TREES AND WINE PALM ( BORASSUS FLABLIFER) IS PLANTED ON THE DIVIDER.

## TRAFFIC MOVEMENT

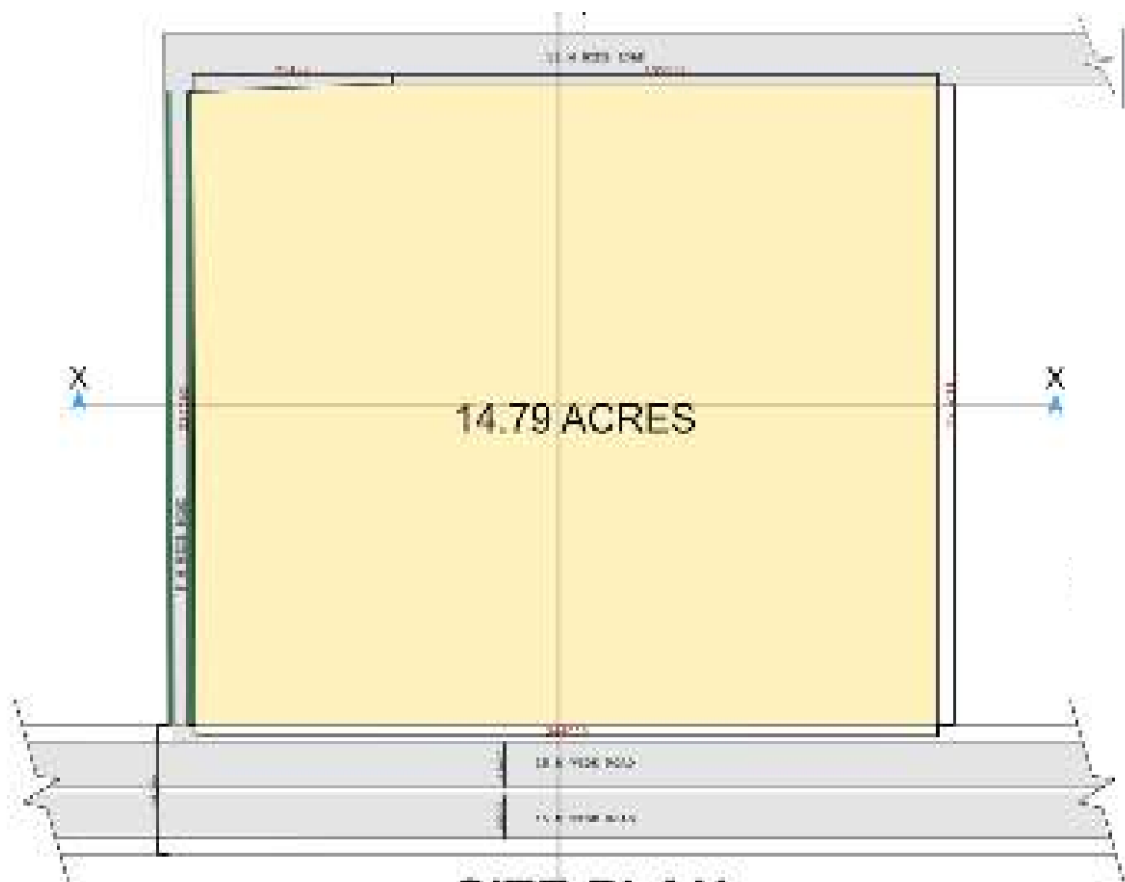
- LOW TRAFFIC MOVEMENT NEAR SITE BECAUSE THE SECTOR IS UNDER DEVELOPEMT.
- ON MAIN HIGHWAY TRAFFIC BUSES- 1 BUS IN EVERY 1 MIN DAY TIME.

## DRAINAGE

- WASTE WATER DRAIN LINE ARE UNDER CONSTRUCTION ON THE FRONT PERIPHERY OF THE SITE.







**SITE PLAN**

6M WIDE ROAD  
IN WEST

EXISTING BUILDING

PROPOSED SITE

**SECTION AT X-X**

18M WIDE ROAD  
IN SOUTH

15M WIDE LANE  
EACH SIDE

PROPOSED SITE

**SECTION AT Y-Y**



# SERVICES

## • DRAINAGE

LOCAL DRAINS ARE WELL CONECTED TO THE SITE BUT UNDER CONSTRUCTION .  
DRAIN IS CONNECTED TO THE FRONT PERIPHERY OF THE SITE.  
DEPTH OF THE RCC DRAIN IS 600MM.

## • WATER SUPPLY

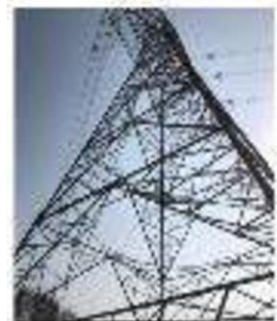
BASIC WATER IS SUPPLIED THROUGH BORE WELL.  
HANDPUMPS WERE ALSO IN SOME SURROUNDING AREA.

## • SEWAGE

NO SEWAGE LINE AS AREA IS UNDER DEVELOPMENT.

## • ELECTRICITY

ELECTRICITY CONNECTION IS AVAILAIBLE AT RHE STE  
SUPPLIED BY U.P ELECTRICITY BOARD.  
ELECTRIC LINES IS PASSING FROM THE MAINROAD  
OF THE PROPOSED SITE.  
HIGH-TENSION LINE IS NEAR SITE.



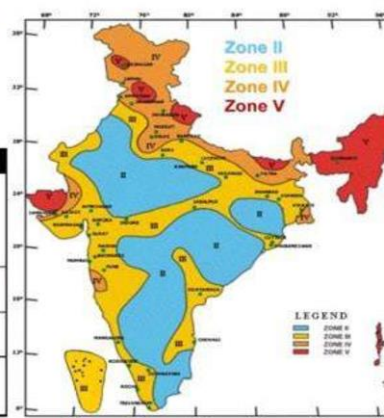
## SEISMIC ZONE

NOIDA FALLS IN SEISMIC ZONE IV, ONE OF THE  
REGION HIGHLY PRONE TO EARTHQUAKE .  
(THE HIGHEST RISK ZONE IS V).

Seismic Zone  
Map of India: -2002

About **59 percent** of the land area of India is liable to seismic hazard damage

Zone	Intensity
Zone V	Very High Risk Zone Area liable to shaking Intensity IX (and above)
Zone IV	High Risk Zone Intensity VIII
Zone III	Moderate Risk Zone Intensity VII
Zone II	Low Risk Zone VI (and lower)



LEGEND



## Seismic Zones in India



## EARTHQUAKE MAGNITUDE SCALE



# SWOT ANALYSIS

## STRENGTH

- THE SITE IS FREE FROM NOISE POLLUTION THAT COMES FROM TRAFFIC.
- NOIDA - GREATER NIDA EXPRESSWAY IS WELL CONNECTED.

## WEAKNESS

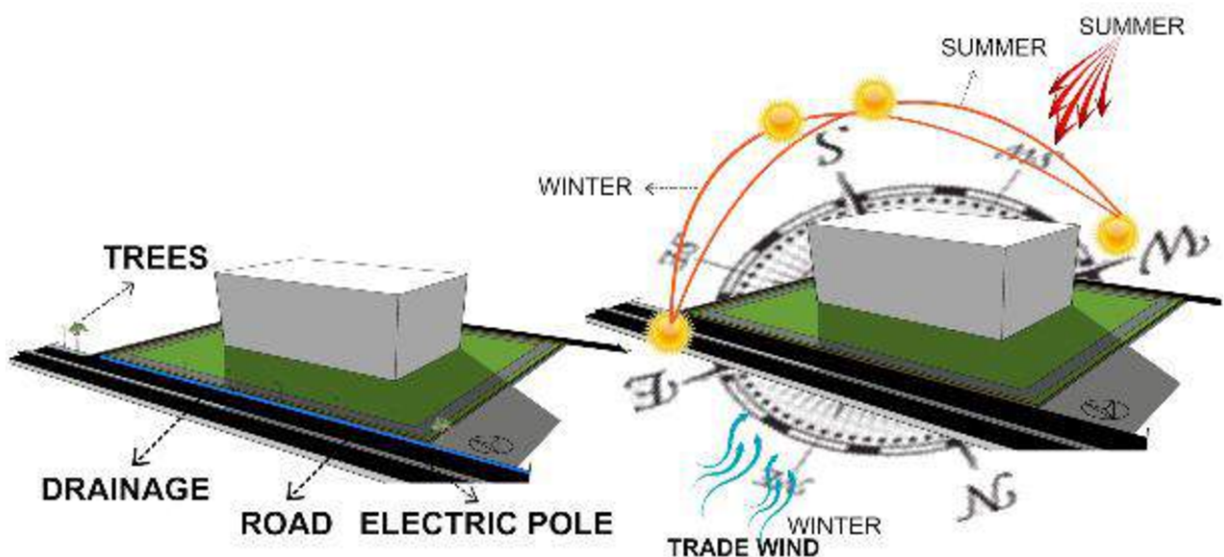
- AS THE SECTOR IS UNDER-DEVELOPMENT PROPER TRANSPORTATION IS NOT AVAILABLE AND BASIC AMENITIES ARE FAR AWAY.

## OPPORTUNITY

- THERE IS A OPPORTUNITY FOR GREEN BELT TO ENHANCE THE SUSTAINABILITY TO THE SITE.

## THREATS

- PROPOSED SITE COME UNDER 4TH SEISMIC ZONE IN INDIA.
- UNSUSTAINABLE MANAGEMENT OF ITS LAND & WATER RESOURCES.



# LITERATURE STUDY



# BEDZED ZERO EMISSION NEIGHBOURHOOD-URBAN SCALE

## ABOUT: BEDZED ZERO EMISSION HABITAT-URBAN SCALE

THE BEDDINGTON ZERO ENERGY DEVELOPMENT (BEDZED) IS THE UK'S LARGEST **CARBON- NEUTRAL ECO- COMMUNITY** THE FIRST OF ITS KIND IN THE COUNTRY. COMPLETED IN 2002, BEDZED WAS DEVELOPED BY THE PEABODY TRUST IN PARTNERSHIP WITH BILL DUNSTER ARCHITECTS AND BIO REGIONAL DEVELOPMENT GROUP( ENVIRONMENTAL CONSULTANTS).

BEDZED IS A MIXED- USED ,MIXED -TENURE DEVELOPMENT THAT INCORPORATES INNOVATIVE APPROACHES TO ENERGY CONSERVATION AND ENVIRONMENTAL SUSTAINABILITY



## SITE DETAIL

**LOCATION:** WALLINGTON, SOUTH LONDON **UK**

**DATES:** planning began 1999, completed 2002

**TYPE:** new construction on former brown field Site

**USE:** residential, office/ workshop , open spaces

**SIZE:** 3.5 acres,1.42 hectares

**PEOPLE:** 240 residents (100 units).100 workers

**ACTORS:** Peabody trust, bio regional

**ARCHITECT:** BILL DUNSTER ARCHITECT

**ENERGY &ENGINEERING CONSULTANT:** over Arup and partners

**QUANTITY SURVEYORS:** Gardiner and theobold



## ► URBAN CONTEXT

THIS SITE IS SITUATED IN A DENSE RESIDENTIAL SUBURB OF WELLINGTON IN SOUTH LONDON. ACTIVITY IS MAINLY RESIDENTIAL. THE SITE EDGE IS THE MAIN ROAD CONNECTING CITY TO WELLINGTON TOWN. THE PROPOSAL WAS AN END PRODUCT OF THE DECISION BY UK TO GO CARBON NEUTRAL BY 2036. THE PROPOSAL WAS A LIVE DEMONSTRATION OF THE POSSIBILITIES OF ZERO CARBON NEIGHBOURHOODS WHICH IS ACHIEVABLE WITH PROPER INTERVENTION.



## PROGRAM

100 ECO HOMES – THE PROJECT MAIN BUILD INCLUDES 100 RESIDENTIAL HOMES.

1405 SQUARE METER OF WORK SPACE – WORK SPACE FOR THE RESIDENTS ARE PROVIDED ALONG THE SIDE TO BRING FORTH THE CONCEPT OF WORK AND LIVE TOGETHER.

COMMERCIAL SPACE – BASIC COMMERCIAL NEEDS ARE SATISFIED BY PROVIDING A COMMERCIAL CENTRE.

EXHIBITION CENTER – BED ZED PAVILION IS AN EXHIBITION CENTER DEMONSTRATION THE CARBON NEUTRAL ACTIVITIES.

CHILDREN'S ACTIVITY – A DAY CARE CENTER IS PROPOSED WITHIN THE SITE.  
SHOW FLAT – A LIVE FULLY FURNISHED FLAT IS KEPT FOR DEMONSTRATION.



## PROJECT INTRODUCTION

The **Beddington** zero energy development (BEDZED) is the UK's largest **carbon-neutral eco-community**. The first of its kind in the country. Completed in 2002, BEDZED was developed by the Peabody trust in partnership with Bill Duxter Architects and Bio Regional Development Group (environmental consultants).

□BEDZED is a mixed- used ,mixed -tenure development That incorporates innovative to approaches to energy Conservation and environmental sustainability.

## URBAN CONTEXT

This site is situated in a dense residential . Suburb of wellington in south London activity is mainly residential . The site edge is the main road connecting city to wellington town. The proposal was a end product of the decision by UK to go **CARBON NEUTRAL** BY a2036.

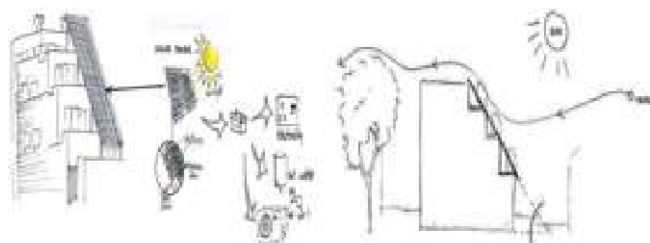
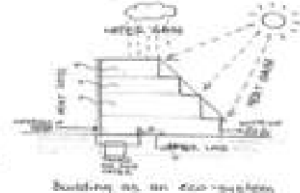
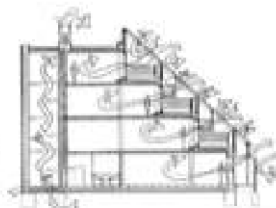
The proposal was a live demonstration of the possibilities of zero carbon neighbourhoods which is achievable with proper intervention.



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## FORM

Four different typologies have been designed at Bed ZED, loosely based on traditional English urban forms, each with different subdivisions creating a variety of flat types.

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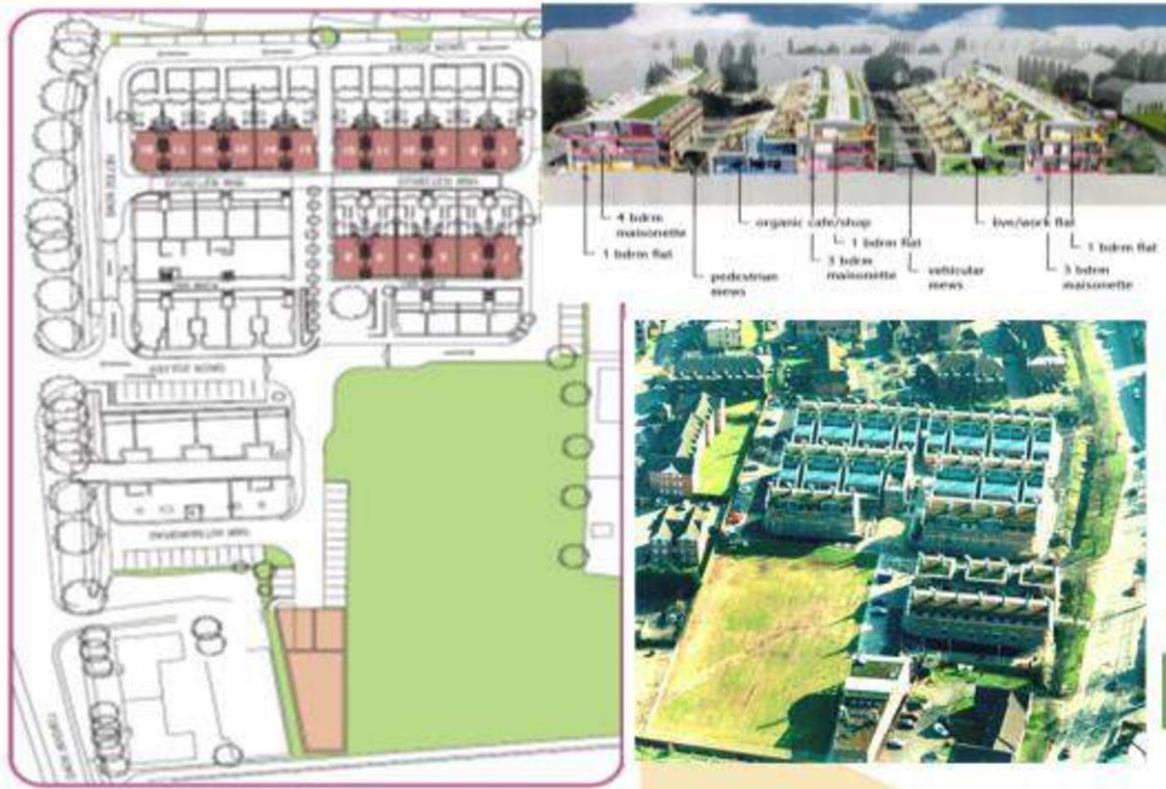
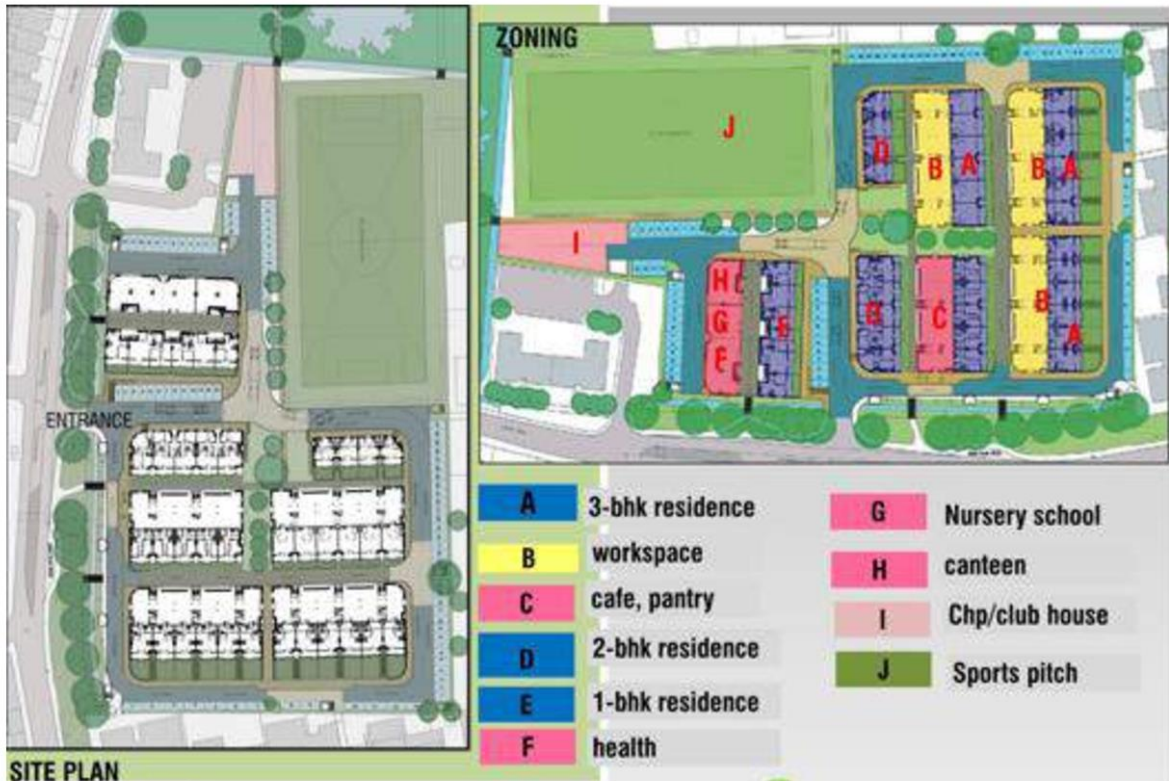
## Bed ZED – CONCEPT AND FORM



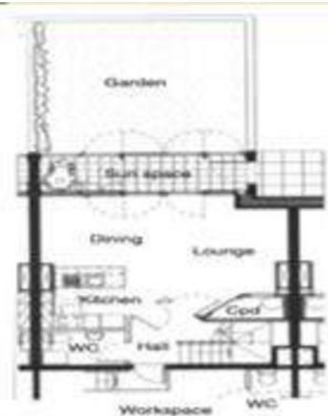
Total population of 90,000  
40,000 residents  
50,000 business commuters

- ☐ south-facing terraces with front gardens
- ☐ terraces with workspace and vehicle mews
- ☐ pedestrian-only mews with gable-end entry workspace and café/shop
- ☐ housing with space for community activities such as childcare, health and arts.

# ZONING AND SITE PLAN







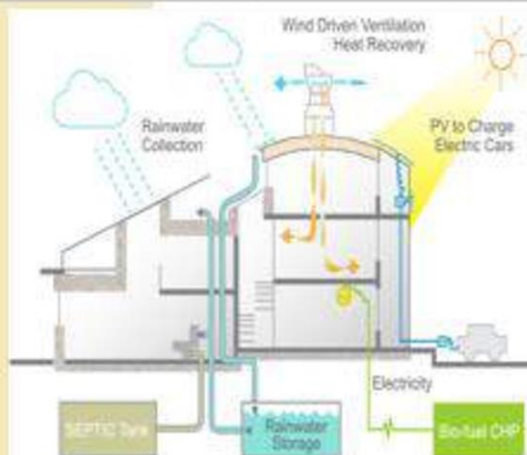
**GROUND FLOOR PLAN**



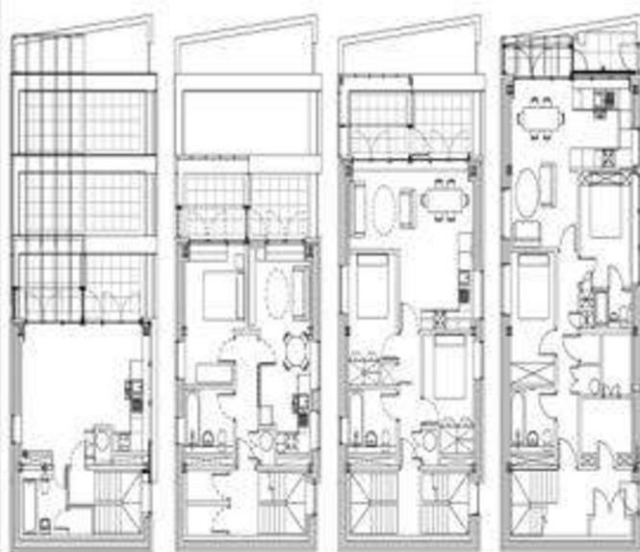
**FIRST FLOOR PLAN**



**SECOND FLOOR PLAN**



**WEST SIDE ELEVATION**



**GROUND FLOOR**

**FIRST FLOOR**

**SECOND FLOOR**

**THIRD FLOOR**



**NORTH ELEVATION**

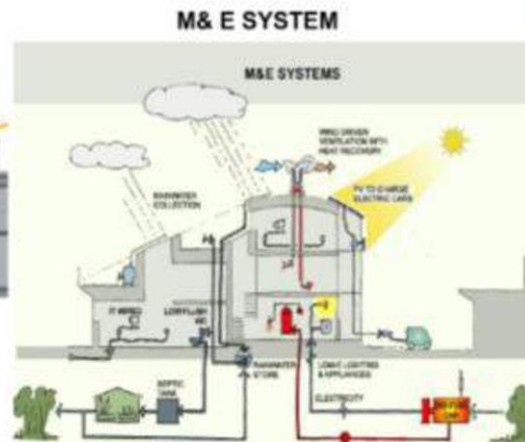
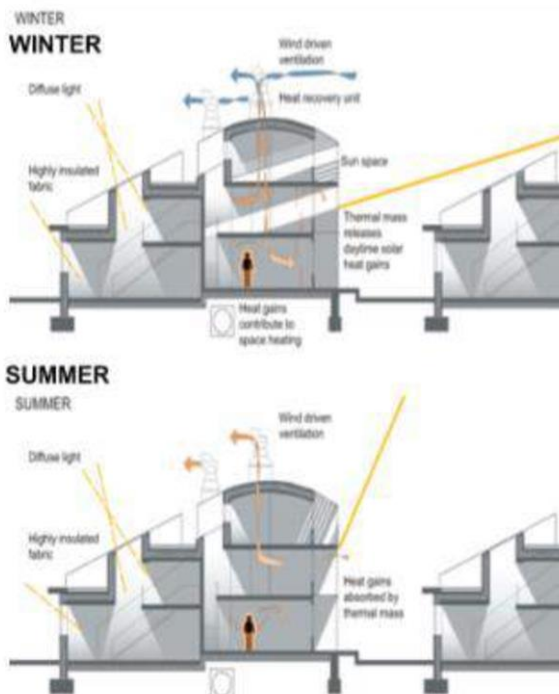
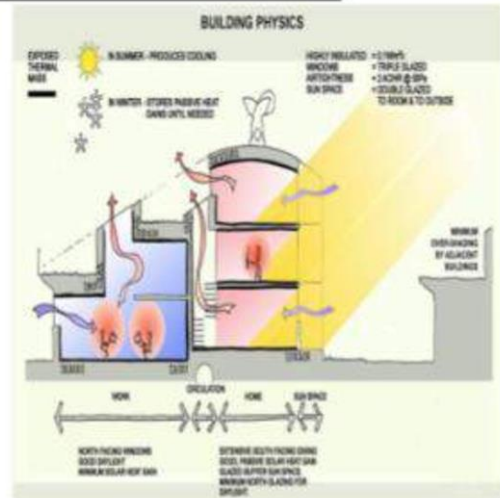
**SOUTH ELEVATION**



**EAST SIDE ELEVATION**

## Bed ZED – AIM –REDUCED THERMAL DEMAND

- **PASSIVE SOLAR GAIN ; DWELLINGS FACE SOUTH WITH**
- **TRIPLE – STOREY CONSERVATORIES (SUN SPACES)**
- **SUPER INSULATION ; 300 MM INSULATION JACKET**
- **AROUND EACH TERRACE**
- **2 SKINS OF DOUBLE- GLAZING TO SOUTH EL-**
- **EATION AND TRIPLE- GLAZING FOR ALL OTHER ELEVATIONS**
- **THERMAL MASS PROVIDED BY DENSE CON-  
CRETE**
- **BLOCK WORK AND CONCRETE FLOOR**
- **SLABS AND EXPOSED  
RADIANT SURFACES TO AID HEAT ABSORP-**



A COMBINED HEAT AND POWER PLANT WAS DESIGNED TO BURN BED ZED WASTE TO PRODUCE HOT WATER AND ELECTRICITY. EFFLUENT FROM THE BUILDINGS IS TREATED ON SITE AND THE WATER IS USED FOR FLUSHING TOILETS<sup>6</sup>

► **SPACE HEATING**

THROUGH THE INNOVATIVE DESIGN CONSTRUCTION HEAT FROM THE SUN AND HEAT GENERATED BY OCCUPANTS AND EVERY DAY ACTIVITIES SUCH AS COOKING , IS SUFFICIENT TO HEAT BEDZED HOMES TO COMFORTABLE TEMPERATURE. THE NEED FOR SPACES HEATING, WHICH ACCOUNTS FOR A SIGNIFICANT PART OF THE ENERGY AND DEMAND IN CONVENTIONAL BUILDING , IS THEREFORE REDUCED OR COMPLETELY ELIMINATED.





## **SERVICES**

### **• BIO WASTE SEGRIGATION**

PEOPLE SEPARATE THEIR WASTE IN THEIR KITCHENS TO MAKE RECYCLING AND COMPOSTING EASIER. SIXTY PER CENT OF WASTE IS RECYCLED<sup>8</sup>, THREE TIMES THE UK AVERAGE. RESIDENTS ENCOURAGE EACH OTHER TO RECYCLE<sup>9</sup>



### **• COMBINED HEAT AND POWER PLANT**

BED ZED RECEIVES POWER FROM A SMALL SCALE COMBINED HEAT AND POWER PLANT (CHP). IN CONVENTIONAL ENERGY GENERATION , THE

- HEAT THAT IS PRODUCED AS A BY-PRODUCT OF GENERATING ELECTRICITY IS LOST. WITH CHP TECHNOLOGY , THIS HEAT CAN BE HARNESSSED AND USED. AT BED ZED THE HEAT FROM THE CHP PROVIDES HOT WATER , WHICH IS DISTRIBUTED AROUND THE SITE VIA A DISTRICT HEATING SYSTEM OR SUPER-INSULATED PIPES . IF RESIDENTS OF WORKERS REQUIRE
- A HEATING BOOST , EACH HOME OR OFFICE HAS A DOMESTIC HOT WATER TANK THAT DOUBLE AS A RADIATOR . THE CHP PLANT AT BEDZED IS POWER BY OFF-CUTS FROM TREE SURGERY WASTE THAT WOULD OTHERWISE GO TO LANDFILL . WOOD IS A CARBON NEUTRAL FUEL BECAUSE THE GREENHOUSE GASES RELEASED WHEN IT'S BURNED EQUAL TO THAT ABSORBED BY THE TREE AS IT GREW.

## **Bed ZED – AIM –REDUCED THERMAL DEMAND**

### **• SERVICES**

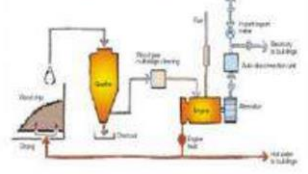
GREEN WATER TREATMENT PLANT (GWTP) AN EFFLUENT TREATMENT FACILITY USED TO EFFLUENT TO A STANDARD WHEREBY IT CAN USED FOR TOILET FLUSHING AND IRRIGATION . THE BEDZED SYSTEM COM-PRISES TWO UNDERGROUND SEPTIC TANK FOLLOWED BY A SERIES OF TREATMENT TANKS THAT TREAT THE WATER BIOLOGICALLY.

### **• BEDZED WASTEWATER RECLAMATION PLANT**

BED ZED IS AGAIN USING RECYCLED WATER AND NOW HOSTS THE UK'S FIRST BIOREACTOR (MBR) FOR RECYCLING WASTE

### **• WATER FOR NON-POTABLE DOMESTIC USE (TOILET FLUSHING AND IRRIGATION )**

THE WATER CONSERVATION MEASURE INCLUDE :  
LOW FLOW TABS IN HOUSEHOLD AND COMMERCIAL SPACES  
DUAL –FLUSH TOILETS IN DEVELOPMENTS  
BIO MEMBRANE REACTOR FOR ON-SITE RECYCLED-WATER .



## ► INFERENCES

### • TARGET ACHIEVED AT THE END OF FIVE YEARS

- **ENERGY** : 81% reduction in energy use for heating , 45 % reduction in Electricity use (compared to local av.).
- **TRANSPORT** : 64% reduction in a car mileage 2,318 km/year (compared To national av.).
- **WATER**: 60% waste recycled .  
Food : 86 % of residents buy organic food .
- **COMMUNITY** : residents know 20 neighbour by name on average .

### • POSITIVES

- ❖ Bed zed community
- ❖ Architecture / design
- ❖ Sustainability
- ❖ Wellbeing (feeling of spaces , light , quiet , health ....)
- ❖ Garden and sunspaces.
- ❖ Cost
- ❖ Location
- ❖ Other (uniqueness , modernity ...)
- ❖ Facilities ( community centre , car, club , shower. ...)
- ❖ size



## ► WIND COWLS

**WIND COWLS BED ZED'S WIND COWLS ARE PART OF THE PASSIVE VENTILATION**

**SYSTEM. THEY ARE THE COLOURFUL COWLS LOCATED ON THE ROOF . THEY BRING IN FRESH AIR THROUGH ONE DUCT AND EXPEL IT THROUGH THE ANOTHER.**

**A DISTINCTIVE FEATURE OF THE BUILDINGS IS THE WIND COWLS ON THE ROOFS. THESE NEW KINDS OF WEATHERCOCK VENTILATE THE HOUSES AND RECOVER HEAT FROM THE AIR COMING OUT. THE ROOFS ARE COVERED BY SOLAR PANELS (TO GENERATE ELECTRICITY) AND PLANTS (FOR INSULATION AND A HABITAT FOR WILDLIFE)**



# GOOD EARTH MALHAR MEDLEY

## ABOUT MALHAR MEDLEY

MEDLEY IS THE NEW COMMUNITY AT GOODEARTH'S MALHAR ECO VILLAGE. SINCE IT WELCOMED ITS FIRST RESIDENT FAMILY, 5 YEARS BACK, MALHAR HAS BECOME A VERITABLE LUSH GARDEN—WITH HOMES, TREE-LINED PATHS, LARGE OPEN AREAS AND A CLOSE-KNIT COMMUNITY OF RESIDENTS. IT IS SET OFF FROM THE NOISE AND POLLUTION OF THE CITY. YET, OFFERS EXCELLENT CONNECTIVITY: THE PERIPHERAL RING ROADS AND URBAN TRANSPORTATION HUBS ARE EASILY ACCESSIBLE.

MEDLEY'S MAIN ENTRANCE OPENS TO A CENTRAL PARK NEXT TO WHICH ARE THE TOWNHOUSES. THIS LARGE GREEN-SPACE IS THE ENTRY TO THE INNER STREETS THAT CONNECT WITH THE VILLAMENTS AND APARTMENTS.



## SITE DETAIL

<b>SITE AREA :-</b>	4 ACRES
<b>GROUND COVERAGE :-</b>	40%
<b>GROUND COVERAGE AREA :-</b>	7000 SQ MT
<b>BUILT UP AREA :-</b>	16782 SQ.MT
<b>LOCATION :-</b>	KENGERI, BANGLORE
<b>TYPOLOGY :-</b>	TOWN VILLA, APARTMENT
<b>NO. OF UNITS :-</b>	119
<b>PLOT AREA :-</b>	168 SQ. MT TO 234 SQ. MT
<b>UNIT AREA :-</b>	140 SQ.MT TO 232 SQ. MT
<b>LONGITUDE &amp; LATTITUDE:-</b>	12.8846° N, 77.4648° E
<b>CLIMATE :-</b>	TROPICAL WET

## ACCESSIBILITY TO SITE

**NEAREST BUS STATION**  
APSRTC BUS STATION 18.2KM

**NEAREST RAILWAY STATION**  
KENGRI RAILWAY STATION 5.3KM

**NEAREST AIRPORT**  
BENGALURU INTERNATIONAL AIRPORT 61.5KM



## SITE PLANS



## ► FLOOR PLANS



**GROUND FLOOR PLAN**



**FIRST FLOOR PLAN**



## SECOND FLOOR PLAN

**5BHK TOWN HOUSE 2867SQFT**



### VILLA SECTION







GROUND FLOOR PLAN

GROUND FLOOR PLAN



FIRST FLOOR PLAN

FIRST FLOOR PLAN

### 3BHK VILLA 1927SQFT



Villains (with garden)

Walk-up House



## **DESIGN FEATURES**

### **ENERGY:-**

DESIGN FOR NATURAL LIGHT & VENTILATION: ALL THE HOMES HAVE BEEN DESIGNED WITH ADEQUATE NATURAL LIGHT AND CROSS VENTILATION. LARGE WINDOWS, WIDE VERANDAHS, AIR CHANNELS FOR CIRCULATION, AND THERMALLY CONDUCTIVE MATERIALS, ARE ALL FEATURES WHICH REDUCE THE NECESSITY FOR ARTIFICIAL LIGHT AND VENTILATION.

### **DESIGN FOR SOLAR ENERGY**

SUNLIGHT WILL BE GREATLY SOURCED UPON AT MALHAR TO LIGHT UP YOUR HOMES DURING THE DAY AND TO HEAT WATER. THIS IN TURN LEADS TO LOWERED POWER CONSUMPTION AND GREATER SAVINGS ON ENERGY BILLS. PROVISIONS FOR CONNECTING SOLAR WATER HEATERS AND PHOTO-VOLTAIC PANELS FOR POWER WILL BE MADE ON THE ROOF.

### **WATER**

#### **RAINWATER HARVESTING & RECHARGING**

AT MALHAR ECO-VILLAGE, TRUE TO ITS NAME, RAINWATER CONSERVATION TAKES ON A SPECIAL SIGNIFICANCE. RAINWATER IS HARVESTED AND THE GROUND WATER IS RECHARGED THROUGH WELL SPREAD OUT PERCOLATION CHANNELS ACROSS THE DEVELOPMENT. ROOF WATER WILL ALSO BE CHANNELLED THROUGH PIPES, PASSED THROUGH A SERIES OF FILTERS AND COLLECTED IN THE WATER TANK. WITH INTERMITTENT RAINS IN BANGALORE, THIS SUPPLEMENTS THE SUPPLY THROUGH BORE WELLS. THEY ARE ALSO CONTEMPLATING DIGGING A SMALL OPEN WELL AT THE BORE WELLS TO DIRECT THE RAINWATER TO IT.

#### **WATER RECYCLING**

AN ON-CAMPUS SEWAGE TREATMENT PLANT RECYCLES ALL WASTE WATER GENERATED AT MALHAR. THE WASTE WATER FROM THE KITCHENS AND BATHROOMS IS COLLECTED AND TREATED IN A CENTRALISED TREATMENT PLANT TO EMERGE CLEAN. THIS WATER IS THEN USED FOR GARDENING AND FOR TOILET FLUSHING..







## **WASTE MANAGEMENT**

THEY PROPOSE TO HAVE AN EFFICIENT GARBAGE DISPOSAL SYSTEM THAT SEPARATES SOLID AND NON-BIODEGRADABLE WASTE FROM THE ORGANIC WASTE. ORGANIC WASTE CAN BE COMPOSTED AND THE COMPOST REUSED AS MANURE. SOME OF THE NON- BIODEGRADABLE WASTE CAN BE INCINERATED.



## **MATERIAL**

LOCALLY AVAILABLE MATERIAL SHOULD BE USED. LESS CARBON EMISSION MATERIAL ARE USED. NATURAL MATERIAL MAKE HOME MORE COMFORTABLE AND AGE BEAUTIFULLY.

## **EARTH BLOCK**

SOIL EXCAVATED FROM FOUNDATIONS, BASEMENTS, TANKS AND WATER BODIES IS STABILIZED USING A SMALL PERCENTAGE OF CEMENT AND MOULDED INTO BLOCKS.

THESE BLOCKS ARE SPECIFICALLY DESIGNED FOR THE STRUCTURE AND QUALITY CONTROL IS DONE ON-SITE.



## **STONE**

ANOTHER LOCALLY AVAILABLE MATERIAL WITH EXCELLENT INSULATING PROPERTIES AND AESTHETIC BEAUTY.



## **WOOD**

TO PROMOTE ITS USE AS A RENEWABLE RESOURCE, THEY INTEND TO PLANT TIMBER SPECIES WITHIN THE COMMUNITY. A WARM, INTIMATE MATERIAL, IT REPLACES HIGH ENERGY CONSUMING STEEL AND ALUMINIUM TYPICALLY USED FOR DOORS AND WINDOWS



## **NATURAL FLOORING**

AS FLOORING MATERIALS, WOOD, STONE AND CLAY ARE GOOD FOR HUMAN HEALTH. THEY OFFER BETTER INSULATION AND COMFORT THAN SYNTHETIC FLOORS

# CASE STUDY

# GOOD EARTH MALHAR FOOTPRINT

## ABOUT MALHAR FOOTPRINT

IT IS THE FIRST COMMUNITY AT MALHAR , SPARED OVER 7 ACRES, IT HAS BEEN KEPT FRE OF VEHICULAR MOVEMENT WITH HOMES ARRANGED AROUND A NETWORK OF STREET AND LANDSCAPED COURTYARD.

THIS OFFER MANY ADVANTAGES TO THE RESIDENTS, WHILE ENSURING THAT THE CAR IS WITHIN A SHORT WALK FROM HOME.

THE CLUSTER SPACES AND INTERCONNECTONG STREET ARE EXCLUSIVELY PEDESTRIAN,OFFERING A SAFE PLACE FOR RESIDENTS TO WALK AND CHILDREN TO PLAY.

THE INTENTION WAS EVOKE THE VERNACULAR THE ORGANIC, WITHIN THE RIGID REUIRE-MENT AND WEAVE CONCEPT OF SUSTAINABILITY SEAMLESSLY INTO THE DESIGN.



## SITE DETAIL

<b>SITE AREA :-</b>	7 ACRES
<b>GROUND COVERAGE :-</b>	40%
<b>GROUND COVERAGE AREA :-</b>	11,330 SQ MT
<b>BUILT UP AREA :-</b>	18580 SQ.MT
<b>LOCATION :-</b>	KENGERI, BANGLORE
<b>TPOLOGY :-</b>	CLUSTER HOUSING
<b>NO. OF UNITS :-</b>	96
<b>PLOT AREA :-</b>	168 SQ. MT TO 234 SQ. MT
<b>UNIT AREA :-</b>	140 SQ.MT TO 232 SQ. MT
<b>LONGITUDE &amp; LATTITUDE:-</b>	12.8846° N, 77.4648° E
<b>CLIMATE :-</b>	TROPICAL WET

TWO AND THREE BEDROOM OPTION

## ACCESSIBILITY TO SITE

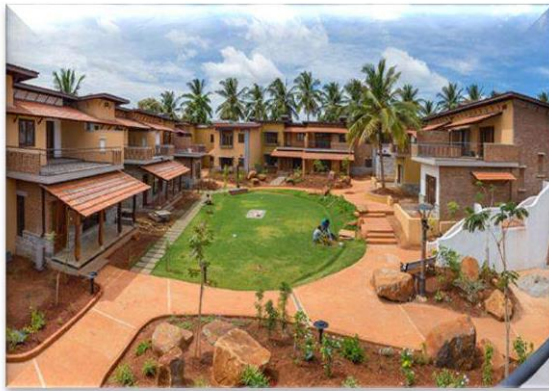
**NEAREST BUS STATION**  
APSRTC BUS STATION 18.2KM

**NEAREST RAILWAY STATION**  
KENGRI RAILWAY STATION 5.3KM

**NEAREST AIRPORT**  
BENGALURU INTERNATIONAL AIRPORT 61.5KM







## **PLANNING**

THE CLUSTER PLAN EMERGED AS A BASIC UNIT OF THE LAYOUT. A GROUP OF 9-16 HOUSES AROUND AN OPEN SPACE, WITH A SHARED PARKING LOT AT ONE CORNER. THE OPEN SPACES IN THE CLUSTER WAS OF THE PROPORTION OF A LARGE COURTYARD, RENDRING THE CLUSTER HUMAN IN SCALE AND APEDESTRIAN ONLY SPACE.

A HIERACHY OF THE SPACE WAS USED TO CREATE A SENSE OF PLACE WITH IN THE LAYOUT. THE VARIATION OF THE LEVELS CREATED INTERESTING TRANSITION, AND THE RELATIONSHIP BETWEEN LEVELS.



## **ARCHITECTURE & LANDSCAPING**

TO COUNTER THE COOKIE CUTTER EFFECT A VARIETY OF TYPE DESIGN HAVE BEEN WORKED, WHICH MEET THE CHALLENGE OF LOGISTICS . THE SPACES RESPOND TO THE REUIREMENTS, BUT ENCOURAGE MULTI USE, AND A CUL TURE SENSITIVE, THEY PROMPT VALUES OF CONSERVATION AND ECONOMY OF DESIGN. LANDSCAPE WAS CREATING AWARENESS ABOUT PLANT AND ANIMAL LIFE AND NATURAL PROCESSES, THROUGH THE DESUGN OF THE LANDSCAPE.

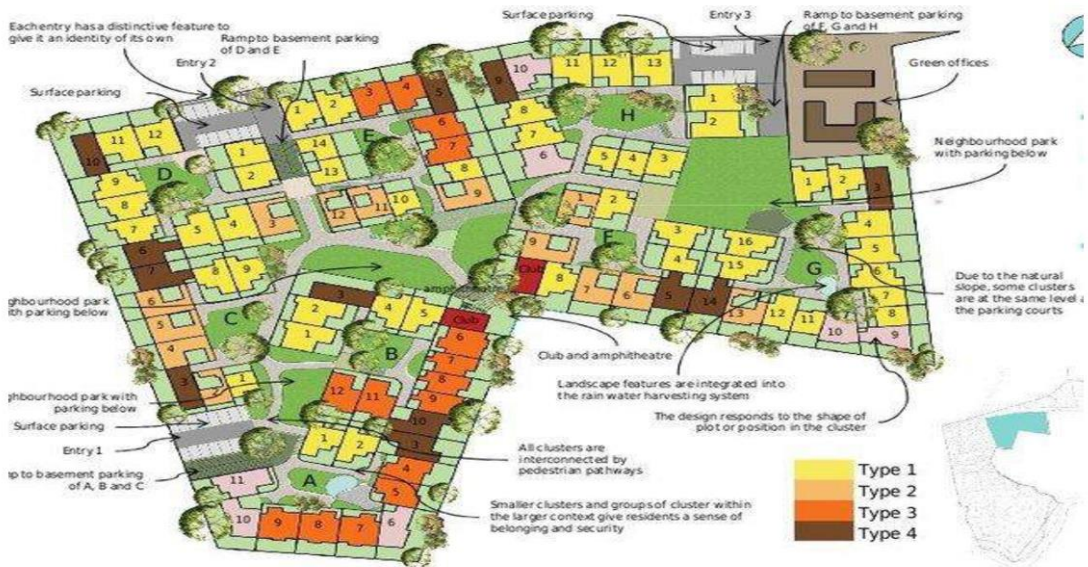
### **CLIMATE**

THE SCALE OF THE CLUSTER PARKS, THE PROXIMITY OF THE BUILDING, SHADED MOST OF THE WALLS, REDUCING THE HEAT ABORPTION BY WALL. AIR CORRIDOR ARE CREATED IN THE TRANSITION BETWEEN CLUSTER, DREW BREEZE INTO LAYOUT, KEEPING IT WELL VENTALIZED.

### **OPEN AREA**

TOTAL OPEN SPACE 60% OF SITE AREA.  
SOFT SCAPE COMPRISED OF 48% OF TOTAL SITE AREA.





## TYPE 1

<b>PLOT AREA :-</b>	<b>168 SQ.MT</b>
<b>GROUND FLOOR :-</b>	<b>97.5 SQ.MT</b>
<b>FIRST FLOOR :-</b>	<b>80 SQ.MT</b>
<b>TOTAL BUILT UP AREA:-</b>	<b>177.5 SQ.MT</b>



TYPE 1  
Plot area 168 sq. ft.  
Ground floor area 97.5 sq. ft.  
First floor area 80 sq. ft.  
Total built up area 177.5 sq. ft.

## TYPE 2

<b>PLOT AREA :-</b>	<b>186 SQ.MT</b>
<b>GROUND FLOOR :-</b>	<b>111.5 SQ.MT</b>
<b>FIRST FLOOR :-</b>	<b>99.5 SQ.MT</b>
<b>TOTAL BUILT UP AREA:-</b>	<b>211 SQ.MT</b>



TYPE 2  
Plot area 186 sq. ft.  
Ground floor area 111.5 sq. ft.  
First floor area 99.5 sq. ft.  
Total built up area 211 sq. ft.

## THE OPEN PLAN HOME

THE OPEN PLAN HOME CLEVERLY DESIGNED SPACES WITH MINIMAL WALLS OR NO WALLS AT ALL SEEM TO FLOW SEAMLESSLY FROM THE ENTRANCE VERANDAH, THROUGH THE LIVING AND DINING AREAS TO THE REAR VERANDAH AND INTO THE REAR GARDEN. THIS CREATES A SENSE OF SPACIOUSNESS IN AN OTHERWISE COMPACT PLAN AND THE BEAUTY OF THE OUTDOORS CAN BE APPRECIATED FROM VARIOUS POINTS WITHIN THE HOME.

THE POSITION OF THE PLOT IN THE LAYOUT AND PROXIMITY TO THE PARKS WILL DECIDE THE EMPHASIS ON THE FRONT OR REAR GARDEN.

## THE COURTYARD HOME

THE GARDEN COURTYARD HOME LIKE THE AANGANS OF THE OLD TRADITIONAL HOUSES THESE HOMES HAVE WALLED GARDENS THAT ARE OPEN TO THE SKY BUT ARE AN EXTENSION TO THE BUILT SPACES OF THE HOUSE. THE GARDENS ARE ENVELOPED ON TWO OR THREE SIDES BY VERANDAHS AND WINDOWS THAT OVERLOOK THEM INCLUDING THOSE OF THE FLOOR ABOVE. THIS WAY THE MAIN AREAS WITHIN THE HOME ARE ORIENTED TO THIS GARDEN. MORE PRIVATE OF THE HOMES IN PATTERNS, THEY HOWEVER RETAIN A VIBRANT CONNECTION TO THE REST OF THE COMMUNITY THROUGH THE FRONT VERANDAH THAT OPENS OUT TO THE STREET..

## TYPE 3

**PLOT AREA :-** 168 SQ.MT  
**GROUND FLOOR :-** 100 SQ.MT  
**FIRST FLOOR :-** 89 SQ.MT  
**TOTAL BUILTUP AREA:-** 189 SQ.MT



TYPE 3B  
 Plot Area: 168 sq. ft.  
 Ground Floor Area: 100 sq. ft.  
 First Floor Area: 89 sq. ft.  
 Total Builtup Area: 189 sq. ft.

## TYPE 4

**PLOT AREA :-** 234 SQ.MT  
**GROUND FLOOR :-** 99.5 SQ.MT  
**FIRST FLOOR :-** 97.5 SQ.MT  
**TOTAL BUILTUP AREA:-** 197 SQ.MT



TYPE 4B  
 Plot Area: 234 sq. ft.  
 Ground Floor Area: 99.5 sq. ft.  
 First Floor Area: 97.5 sq. ft.  
 Total Builtup Area: 197 sq. ft.

### THE SPLIT LEVEL HOME

THIS TYPE OF HOUSE IS LOCATED WHERE THE NATURAL SLOPE IS THE STEEPEST, THE LEVELS WITHIN THE HOUSE FOLLOWING THAT OF THE LAND. THE DIFFERENCE IN THE LEVELS CREATES INTERESTING PRIVATE SPACES BUT DOES NOT COMPROMISE ON THE SPACIOUS OF THE HOUSE.

SEPARATED BY JUST FEW STEPS, THESE LEVELS ALLOW FOR THE PLAY IN THE VOLUME OF THE SPACE CREATING A DYNAMIC VISUAL MOVEMENT.

### THE CORNER HOME

THE CORNER HOME AS THE NAME SUGGESTS, THESE HOMES OCCUPY THE CORNERS OF THE LAYOUT. AFFORDING MORE PRIVACY THAN THE OTHERS, THEY HAVE LARGER OPEN SPACES THAN THE OTHERS, THEY HAVE LARGER OPEN SPACES WITHIN THE PLOT; EITHER AN L SHAPED YARD OR A SPACIOUS BACKYARD, OR AN ENTRANCE COURT WITH A LARGE BACKYARD. THEY TRULY RESPOND TO THE LOCATION AND THE PROFILE OF THEIR SITES AND ARE UNIQUE IN CHARACTER.



## Features

Sustainability drives our design and choice of materials such that you and your environment forge a relationship for life. We use a combination of the modern and the traditional in our materials, techniques and details, creating a unique aesthetic that has a global flavour while being decidedly Indian. We integrate traditional crafts into our designs for their inherent value and to promote skilled crafts persons.

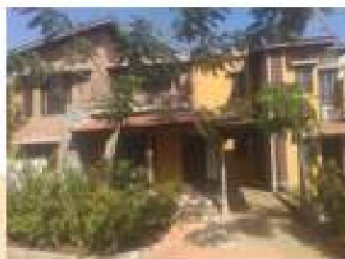
## Craft

Traditional crafts like carpentry, stonework and masonry are slowly dying out as they cannot adapt to newer material, technology and requirement. But the value they impart to a space cannot be overlooked. We make a conscious effort to integrate these crafts and their skilled crafts persons in the building process. In all our work, we emphasise human resource rather than material.

## Energy

**Design for natural light & ventilation:** All the homes have been designed with adequate natural light and cross ventilation. Large windows, wide verandahs, air channels for circulation, and thermally conductive materials, are all features which reduce the necessity for artificial light and ventilation. You will be the proud resident of an energy efficient home.

**Design for solar energy:** Sunlight will be greatly sourced upon at Malhar to light up your homes during the day and to heat water. This in turn leads to lowered power consumption and greater savings on your energy bills. Provisions for connecting solar water heaters and photo-voltaic panels for power will be made on the roof.



## Material

Our choice of material is based on a balance of local availability, efficiency of manufacturing processes and durability over time. Natural materials make your homes more comfortable and age beautifully. Wherever possible we use recycled materials and always use resources optimally.

**Earth blocks:** Soil excavated from foundations, basements, tanks and water bodies is stabilized using a small percentage of cement and moulded into blocks. We use resources from the site itself thereby reducing the amount of materials being transported in. These blocks are specifically designed for the structure and quality control is done on-site. Besides being engineered for strength and durability, walls made of these are aesthetically pleasing when detailed well.



**Stone:** Another locally available material with excellent insulating properties and aesthetic beauty. Today building with stone is a craft that is slowly disappearing with the increasing dependence on factory-made synthetic materials, and therefore the need to revive its use.

**Wood:** At Malhar, wood is more than just an aesthetic source. To promote its use as a renewable resource, we intend to plant timber species within the community. A warm, intimate material, it replaces high energy consuming steel and aluminium (typically used for doors and windows). We believe in recycling old timber—from houses that are demolished, from packing cases, and from plantation timber—as opposed to forest timber.



**Natural floors:** As flooring materials, wood, stone and clay are good for you and your family's health. They offer better insulation and comfort than synthetic floors. Besides they age beautifully as the years go by.

**Paints:** We only use paints that are non-toxic, lead-free and low in VOC. Volatile Organic Compounds (VOC), commonly found in most indoor and outdoor paints, give out low-level toxic emissions into the air for years after application. Lower VOC paints preserve both the indoor and outdoor air quality of your home and help your family breathe easy.

**Rainwater harvesting and recharging:**

At Malhar eco-village, true to its name, rainwater conservation takes on a special significance. Rainwater is harvested and the ground water is recharged through well spread out percolation channels across the development. Roof water will also be channelled through pipes, passed through a series of filters and collected in the water tank. With intermittent rains in Bangalore, this supplements the supply through bore wells. We are also contemplating digging a small open well at the bore wells to direct the rainwater to it.

**Water recycling:** An on-campus sewage treatment plant recycles all waste water generated at Malhar. The waste water from the kitchens and bathrooms is collected and treated in a centralised treatment plant to emerge clean. This water is then used for gardening and for toilet flushing.

**Waste**

**Waste management:** We propose to have an efficient garbage disposal system that separates solid and non-biodegradable waste from the organic waste. Organic waste can be composted and the compost reused as manure. Some of the non-biodegradable waste can be incinerated. For the metals and plastics, one could look at recycling agencies which can pick up the waste.





# ASIAN GAMES VILLAGE

## ABOUT ASIAN GAMES VILLAGE

THE SITE WAS DEVELOPED AS THE ATHLETE'S VILLAGE FOR THE 1982 ASIAN GAMES HELD IN NEW DELHI. THIS SITE WAS DESIGNED BY RAJ REWAL. THE VILLAGE IS THE FIRST OF ITS KIND IN THE GAMES SERIES. BUILT ON THE REMAINS OF THE 15 TH CENTURY KHILJI DYNASTY'S SIRI FORT OVER AN AREA OF 35 ACRES, THIS RESIDENTIAL COLONY HAS 853 HOUSING UNITS, COMPRISE 300 INDIVIDUAL TOWN HOUSES AND 553 APARTMENT IN TWO FLOORS TO FOUR FLOOR WITH EACH UNIT TYPE HAS VARIATION ACCORDING TO AREA. THE AVRAGE SIZE OF THE FLAT IS ABOUT 111.5 SQ M , SOME 83.6 SQ.MT AND SOME 167.2 SQ. MT.

IN THE ASIAN GAMES HOUSING, THE URBAN PATTERN OF JAIPUR AND JAISELMER HAS BEEN EXPLORED.



## SITE DETAIL

<b>SITE AREA :-</b>	35 ACRES
<b>GROUND COVERAGE :-</b>	40%
<b>GROUND COVERAGE AREA :-</b>	56656 SQ MT
<b>BUILT UP AREA :-</b>	1,80,000SQ.MT
<b>LOCATION :-</b>	HAUZ KHAS,NEW DELHI
<b>TPOLOGY :-</b>	CLUSTER HOUSING
<b>NO. OF UNITS :-</b>	853
<b>PLOT AREA :-</b>	83.6 SQ. MT TO 167.2 SQ. MT
<b>UNIT AREA :-</b>	140 SQ.MT TO 232 SQ. MT
<b>LONGITUDE &amp; LATTITUDE:-</b>	28.5475° N, 77.2190° E
<b>CLIMATE :-</b>	COMPOSITE

## ACCESSIBILITY TO SITE

**NEAREST BUS STATION**  
ISBT NEW DELHI 18.7KM

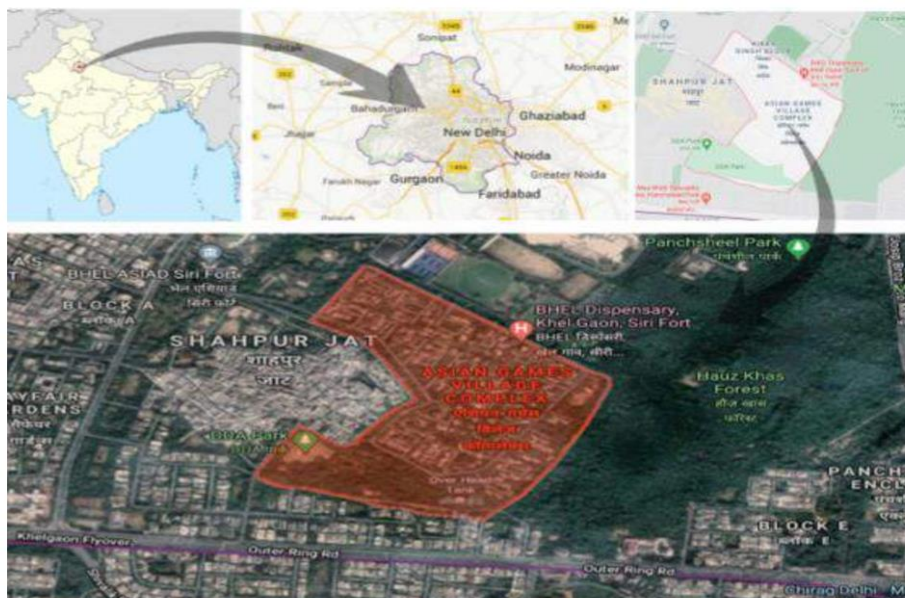
**NEAREST RAILWAY STATION**  
NEW DELHI RAILWAY STATION 12.6KM

**NEAREST AIRPORT**  
INDIRA GANDHI INTERNATIONAL AIRPORT 12.5KM

**NEAREST METRO STATION**  
GREEN PARK METRO STATION 3.9KM







## OBJECTIVES AND CONCEPT OF DESIGN

THE CONCEPT IS BASED UPON A SEQUENCE OF OPEN SPACES KINKED BY NARROW, SHADED PEDESTRIAN STREETS AND CONTAINING BOTH RECREATIONAL AND COMMERCIAL ACTIVITIES.

### IDEAS BEHIND THE CONCEPT

AN OBVIOUS SOURCE OF INSPIRATION FOR SUCH NARROW STREETS LINKING THE HOUSING UNITS IS THE TRADITIONAL STREET SCALE AND PATTERN FOUND IN MANY INDIAN CITIES, WHERE NARROW PATHS BECOME SPACES FOR ENCOUNTERS BETWEEN PEOPLE, AND THE OPEN SQUARES OFFER A SENSE OF NEIGHBOURHOOD.



## DESIGN FEATURES

- CLUSTERING OF BUILDING.
- COURTYARDS PROVIDING PUBLIC SPACE WITHIN THE BUILDING.
- SCATTER OF THE TERRACES PERMITTING YET ANOTHER SET OF ACTIVITIES.
- STREETS ARE NARROW, SHADED, BROKEN UP INTO SMALL UNITS CREATING PAUSES, POINTS OF THE REST & CHANGING.
- GATEWAYS ALLOW FOR A CHANGE & CONTAIN A COMMUNITY, BRIDGES FORMED BY LINKING 2 NEIGHBOURING HOUSES.



CLUSTERING OF BUILDING.



COURTYARD PROVIDING PUBLIC SPACE.



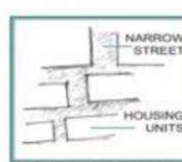
SCATTER TERRACES.



NARROW STREETS.



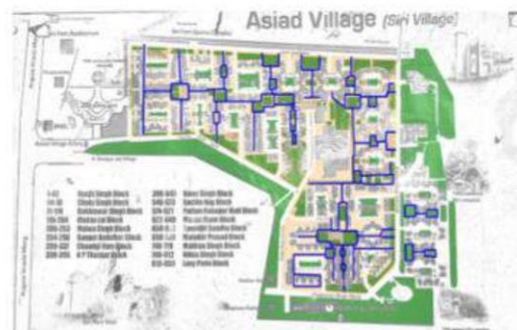
COMMUNITY HALL.



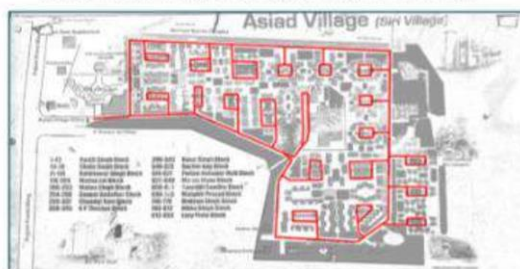
SKETCH OF STREET PATTERN IN ASIAN VILLAGE



DINNING COMPLEX WHICH IS NOW USED AS RECREATION HALL AND COMMUNITY CENTRE



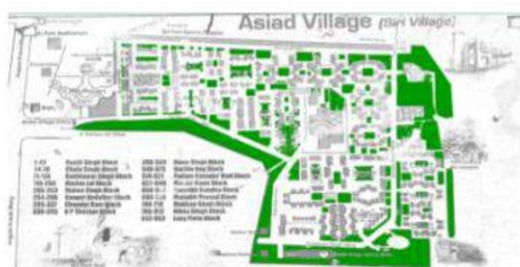
PEDESTRIAN PATHWAY



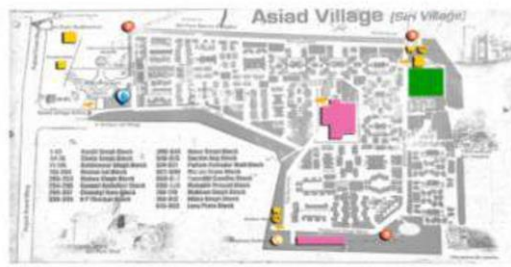
VEHICULAR MOVEMENT



BUILDING BLOCKS



GREEN AREA



AMENITIES AND SERVICES





GROUND FLOOR

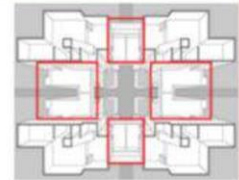
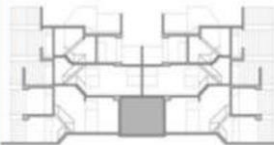
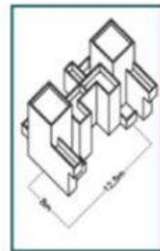
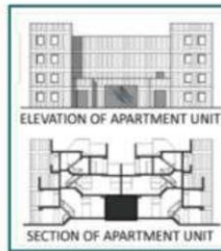
GROUND FLOOR MILWAUKEE

FIRST FLOOR

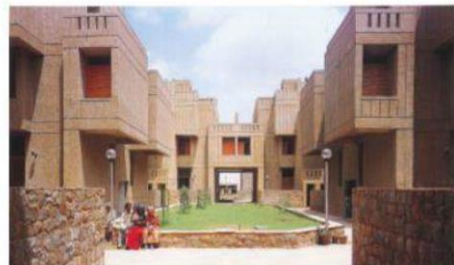
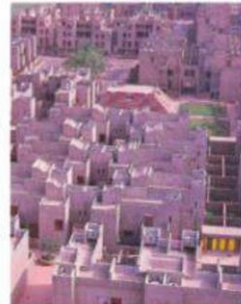
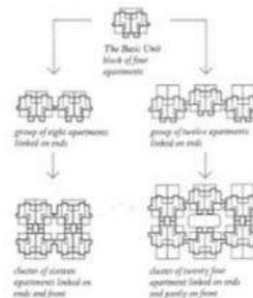
FIRST FLOOR MILWAUKEE

TOP VIEW ONE OF THE INTERIOR COURTYARD OF A TYPE-E UNIT BLOCK BUILDING OVERHANG PROVIDE SHADE

### TYPE D APARTMENT UNIT



THE UNIT HAVE BEEN DESIGNED SO THAT IT CAN FORM A CLUSTER WITH EITHER 4OR 6 UNITS TO CREATE A VARIETY OF INNER SPACES



## ECO HOUSING





GATEWAY FRONT VIEW

SUCCESSIVE COURTYARD IN THIS BLOCK ESSENTUATE THE LINNEAR AXIAL PLANING OF THE "MOHALLAS"

ASIDE HOUSING IS A 4 STO-REYS 3-BEDROOM FLAT ON THE GROUND FLOOR A2 BEDROOM FLAT ON A FIRST FLOOR AND A 3 BEDROOM DUPLEX NIT ON THE TOP TWO STOREYS. EACH UBIT HAS PRIVATE OPEN SPACE AS COURTYARD



GROUND FLOOR PLAN



FIRST FLOOR PLAN



SECOND FLOOR PLAN



THIRD FLOOR PLAN

#### REMARKS

WATER SUPPLY IS FROM NEARBY PUMP STATION AT HAUZ KHAS WITH NO STORAGE PROVISION

SURFACE PARKING IS PROVIDED IN BETWEEN EVERY CLUSTER WITH PARALLEL PARKING PROVI-SION ALONG ROAD

ELECTRICAL SUPPLY IS FROM SUB-STATION AT HAUZ-KHAS

FIRE TENDER CAN REACH THROUGH OUT THE SITE THROUGH SITE SETBACK

SOCIETY GUARDS,CCTV ARE USED AS SECURITY SYSTEM

#### TYPE G

#### MERITS

MICRO-CLIMATE IS DEVELOPED IN SITE THROUGH DENSE VEGETATION

ALMOST 80% OF UNITS HAVE ACCESS THROUGH PRIMARY ROADS

SUFFICIENT SURFACE PARKING IN BETWEEN CLUSTER AND ALONG ROAD AS PARALLEL PARKING SPACE

WASTE MANAGEMENT AT SITE

DISPOSAL AREAS AT REGULAR INTERVALS WITH ATM AND GROCERRY STORES

PROPER WIDTH OF ROADS ARE PROVIDED AT ALL SCALE

#### DE-MERITS

STORES ARE PROVIDED AT FAR DISTANCES

A SMALL COMMUNITY HALL IS PROVIDED WITH 24.23 MT X 14.6 MT

PROVISION OF OTHER ENERGY SOURCES ARE NOT INCLUDED

#### VEGETATION



PEDESTRIAN PATHWAY



NEEM



KASIA



ASHOK



SAHTUT



ARI PALM



GULAR



DURANTA



# COMPARITIVE ANALYSIS

SR. NO	PARAMETERS	CASE STUDY		LITERATURE STUDY	
		GOOD EARTH MALHAR FOOTPRINT	ASIAN GAMES VILLAGE	BEDZED ZERO EMISSION HABITAT	MALHAR MEDLEY
1)	SITE AREA	7 ACRES	35 ACRES	3.5 ACRES	4 ACRES
2)	GROUND COVERAGE	40%	40%		40%
3)	GROUND COVERAGE AREA	11330 SQ.MT	56656 SQ.MT		7000 SQ.MT
4)	BUILT UP AREA	18580 SQ.MT	180000 SQ.MT		16782 SQ.MT
5)	NO. OF UNITS	96	853	100	119
6)	UNITS AREA				
	TYPE 1	177 SQ.MT	256 SQ.MT	56 SQ.MT	266 SQ.MT
	TYPE 2	211 SQ.MT	296 SQ.MT	118 SQ.MT	179 SQ.MT
	TYPE 3	189 SQ.MT	114 SQ.MT		80 SQ.MT
	TYPE 4	197 SQ.MT	133 SQ.MT		99.5 SQ.MT
	TYPE 5	-	148 SQ.MT		-
	TYPE 6	-	130 SQ.MT		-
	COMMUNITY HALL	135 SQ.MT	270 SQ.MT		200 SQ.MT
7)	PARKING	100	SURFACE PARKING		
8)	SERVICES				
	WATER SUPPLY	YES	YES	YES	YES
	ELECTRICITY	YES	YES	YES	YES
	RAINWATER HARVESTING	YES	YES	YES	YES
	SOLAR PANEL	YES	-	YES	YES
	S.T.P	YES	-	YES	YES
	GREY WATER TREATMENT	YES	-	YES	YES

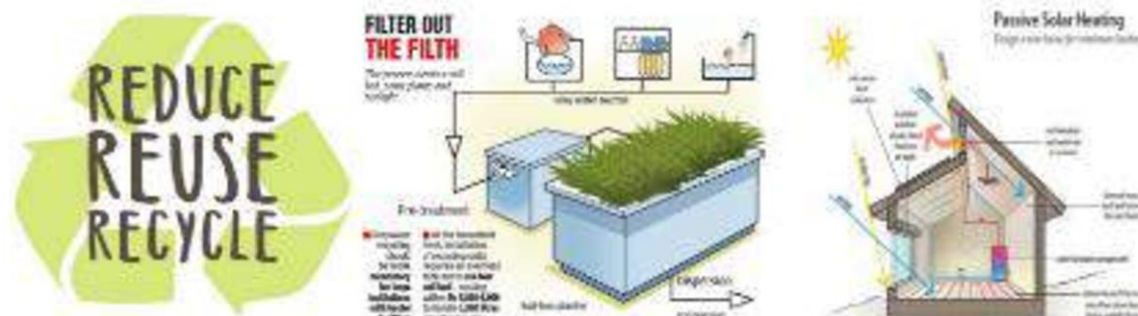


# CONCEPT

## ABOUT ECO HOUSING

AN ECO-HOUSING (OR ECO-HOME) IS AN ENVIRONMENTALLY LOW-IMPACT HOME

DESIGNED AND BUILT USING MATERIALS AND TECHNOLOGY THAT REDUCES ITS CARBON FOOTPRINT AND LOWERS ITS ENERGY NEEDS. ECO-HOMES ARE MEASURED IN MULTIPLE WAYS MEETING SUSTAINABILITY NEEDS SUCH AS WATER CONSERVATION, REDUCING WASTES THROUGH REUSING AND RECYCLING MATERIALS, CONTROLLING POLLUTION TO STOP GLOBAL WARMING, ENERGY GENERATION AND CONSERVATIONS, AND DECREASING CO<sub>2</sub> EMISSIONS

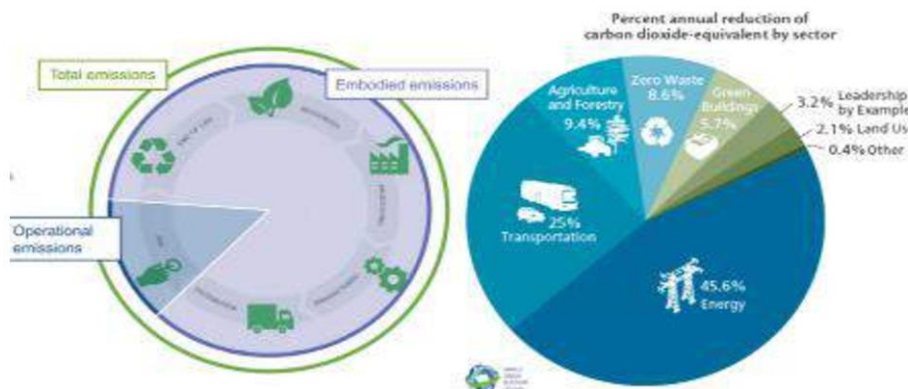


## CARBON FOOTPRINT

A CARBON FOOTPRINT IS HISTORICALLY DEFINED AS THE TOTAL SET OF GREENHOUSE GAS EMISSIONS CAUSED BY AN INDIVIDUAL, EVENT, ORGANISATION, OR PRODUCT, EXPRESSED AS CARBON DIOXIDE EQUIVALENT

## REDUCING CARBON FOOTPRINT

CARBON NEUTRALITY, OR HAVING A NET ZERO CARBON FOOTPRINT, REFERS TO ACHIEVING NET ZERO CARBON EMISSIONS BY BALANCING A MEASURED AMOUNT OF CARBON RELEASED WITH AN EQUIVALENT AMOUNT SEQUESTERED OR OFFSET, OR BUYING ENOUGH CARBON CREDITS TO MAKE UP THE DIFFERENCE. IT IS USED IN THE CONTEXT OF CARBON DIOXIDE RELEASING PROCESSES ASSOCIATED WITH TRANSPORTATION, ENERGY PRODUCTION, AND INDUSTRIAL PROCESSES SUCH AS PRODUCTION OF CARBON NEUTRAL FUEL.





# BASIC CONCEPT

## Carbon neutral development

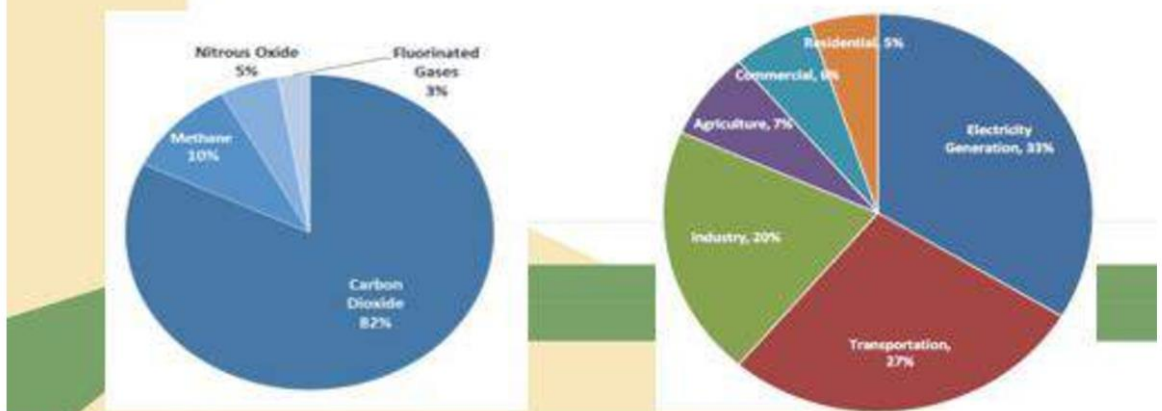
**Carbon neutrality**, or having a **net zero carbon footprint**, refers to achieving net zero [carbon emissions](#) by balancing a measured amount of carbon released with an equivalent amount sequestered or offset, or buying enough [carbon credits](#) to make up the difference. It is used in the context of carbon dioxide releasing processes associated with transportation, energy production, and industrial processes such as production of [carbon neutral fuel](#).



RECYCLING OF CARBN NEUTRAL PROMINANCE

### Carbon footprint

A **carbon footprint** is historically defined as the total set of [greenhouse gas](#) emissions caused by an individual, event, organisation, or product, expressed as [carbon dioxide equivalent](#).



# CONCEPT

## BIOPHILIC ARCHITECTURE

BIOPHILIC ARCHITECTURE IS AN APPROACH TO ARCHITECTURE THAT SEEKS TO CONNECT BUILDING OCCUPANTS MORE CLOSELY TO NATURE.

BIOPHILIC DESIGN IS A CONCEPT USED WITHIN THE BUILDING INDUSTRY TO INCREASE OCCUPANT CONNECTIVITY TO THE NATURAL ENVIRONMENT THROUGH THE USE OF DIRECT NATURE & INDIRECT NATURE, SPACE PLACE CONDITION.

### ► VISUAL CONNECT WITH NATURE

NATURAL OCCURING:- NATURAL ELEMENT, VEGETATION, NATURAL FLOW WATER, FRUIT BEARING PLANT

CONSTRUCTED :- GREEN WALL, ARTWORK DEPICTING NATURE, VERTICAL GARDEN.

### ► NON-VISUAL CONNECT WITH NATURE

NATURAL OCCURING:- FRAGMENTS OF HERBS, FLOWING WATER

CONSTRUCTED :- AUDIBLE & PHYSICALLY ACCESSIBLE WATER, PLANT , TEXTURED MATERIAL.

### ► PRESENCE OF WATER

FOUNTAIN, WATERWALL, REFLECTION OF WATER ON ANOTHER SURFACE.

### ► THERMAL AND AIRFLOW VARIABILITY

### ► DYNAMIC AND DIFFUSED LIGHT

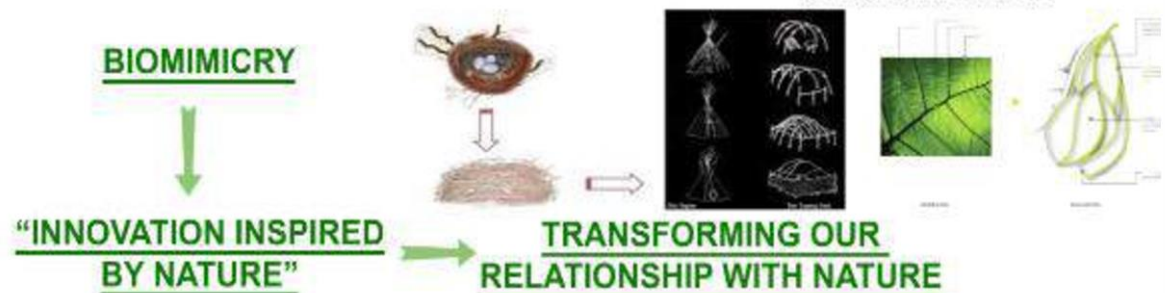


## BIOMIMICRY

BIOMIMICRY IS DEFINED IN THE BOOK AS A "NEW SCIENCE THAT STUDIES NATURE'S MODELS AND THEN IMITATES OR TAKES INSPIRATION FROM THESE DESIGNS AND PROCESSES TO SOLVE HUMAN PROBLEMS".

## ADVANTAGES

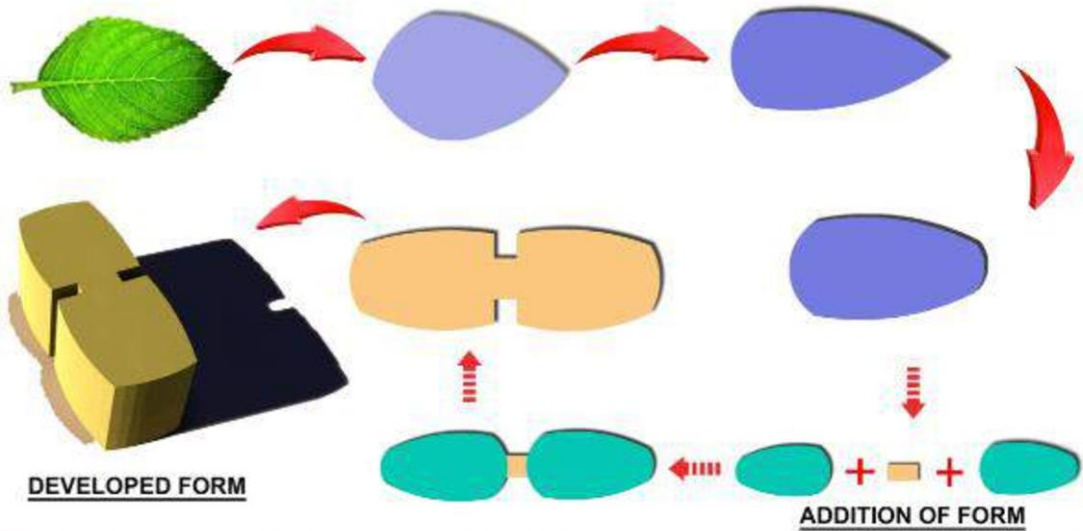
TO CREATE NEW WAY OF LIVING.  
TO SAVE ENERGY AND CUT MATERIAL.  
TO ELIMINATE WASTE



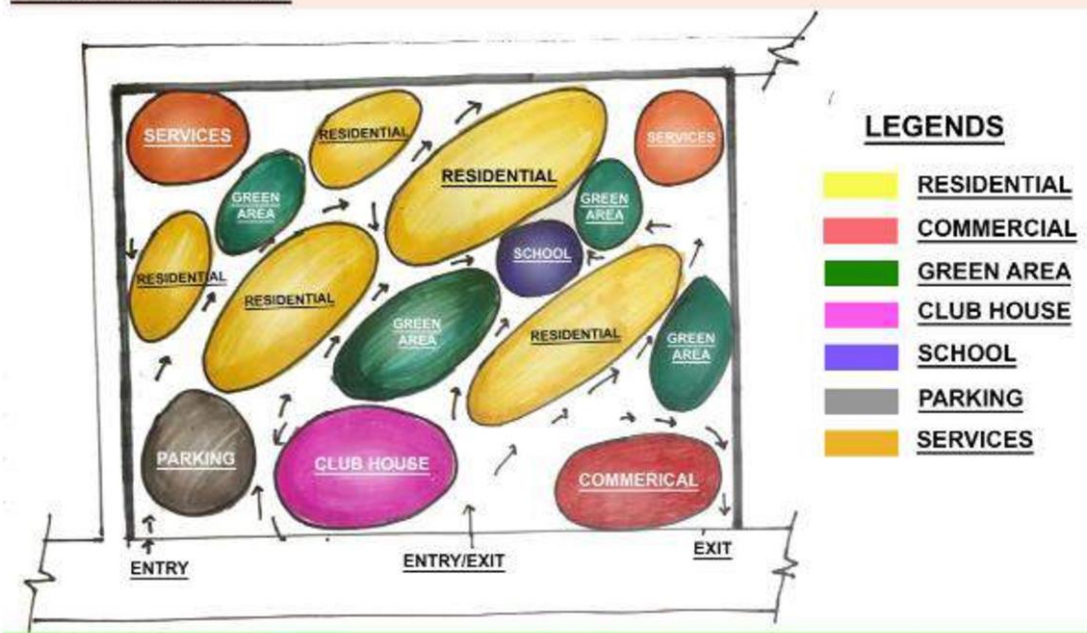


## FORM EVOLUTION

BUILDING FORM IS EVOLVED FROM LEAF.



## ZONING DIAGRAM



## SITE DEVELOPMENT



## **CONCEPTUAL SITE PLAN**

### CONCEPTUAL VIEW



## VERTICAL GARDEN



## **BUILDING VIEW**



**STREET VIEW**

O.A.T

### SHADED PATHWAYS



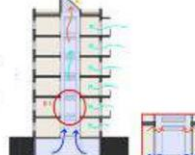
### SEATING IN PARK



### WATER FOUNTAIN



## GREEN FACADE



## **PASSIVE TECHNIQUE**





## TECHNIQUES

### SOLAR PANEL

SOLAR PANEL ALSO KNOWN AS PHOTOVOLTAIC PANEL. SOLAR PANELS ARE THOSE DEVICES WHICH ARE USED TO ABSORB THE SUN'S RAYS AND CONVERT THEM INTO ELECTRICITY OR HEAT. A SOLAR PANEL IS ACTUALLY A COLLECTION OF SOLAR (OR PHOTOVOLTAIC) CELLS, WHICH CAN BE USED TO GENERATE ELECTRICITY THROUGH PHOTOVOLTAIC EFFECT.

### GREY WATER TREATMENT

GREY WATER CAN BE DEFINED AS ANY DOMESTIC WASTEWATER PRODUCED, EXCLUDING SEWAGE. THE MAIN DIFFERENCE BETWEEN GREY WATER AND SEWAGE (OR BLACK WATER) IS THE ORGANIC LOADING. SEWAGE HAS A MUCH LARGER ORGANIC LOADING COMPARED TO GREY WATER.

### RAINWATER HARVESTING

RAINWATER HARVESTING (RWH) IS THE COLLECTION AND STORAGE OF RAIN, RATHER THAN ALLOWING IT TO RUN OFF. RAINWATER IS COLLECTED FROM A ROOF-LIKE SURFACE AND REDIRECTED TO A TANK, CISTERN, DEEP PIT (WELL, SHAFT, OR BOREHOLE), AQUIFER, OR A RESERVOIR WITH PERCOLATION.

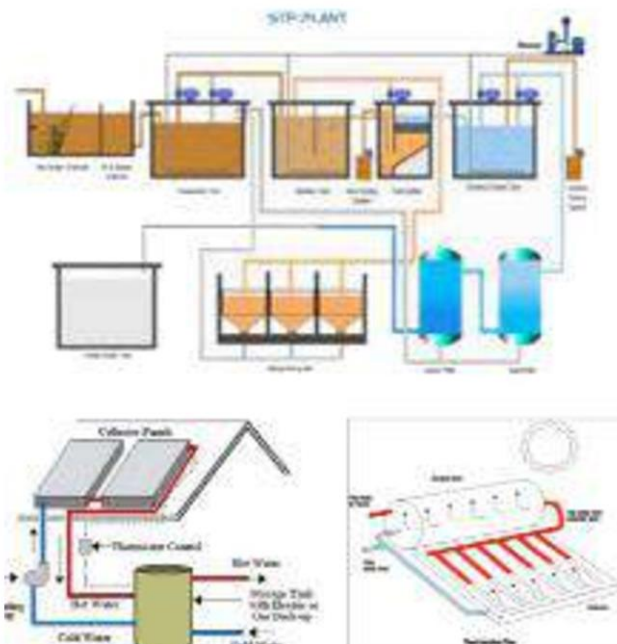
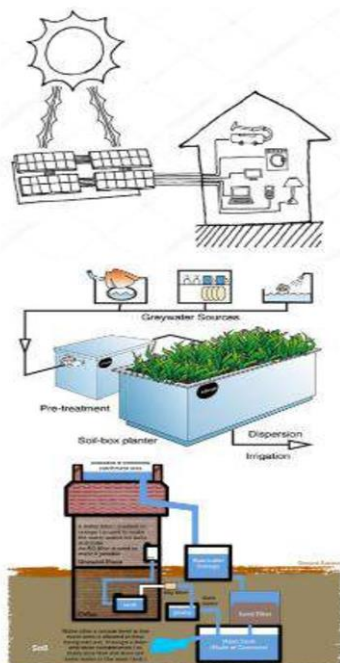
RAINWATER HARVESTING IS ONE OF THE SIMPLEST AND OLDEST METHODS OF SELF-SUPPLY OF WATER FOR HOUSEHOLDS, AND RESIDENTIAL AND HOUSEHOLD-SCALE PROJECTS, USUALLY FINANCED BY THE USER.

### S.T.P

SEWAGE TREATMENT PLANT IS THE PROCESS OF REMOVING CONTAMINANTS FROM WASTE WATER FROM HOUSEHOLD SEWAGE. BY PHYSICAL, CHEMICAL AND BIOLOGICAL PROCESS ARE USED TO REMOVE CONTAMINANTS AND PRODUCE TREATED WASTE WATER THAT IS SAFE FOR LAUNDRY AND TOILET FLUSH.

### SOLAR WATER HEATER

A SOLAR WATER HEATER IS A DEVICE THAT CAN BE USED TO CAPTURE SUNLIGHT IN ORDER TO HEAT THE WATER IN PIPES TO BE USED FOR BATH, SHOWER ETC.



## MATERIALS

### ACC BLOCKS

AUTOCLAVED AERATED CONCRETE (AAC) IS A LIGHTWEIGHT, PRECAST, FOAM CONCRETE BUILDING MATERIAL SUITABLE FOR PRODUCING CONCRETE MASONRY UNIT (CMU) LIKE BLOCKS.

AAC IS A HIGHLY THERMALLY INSULATING CONCRETE-BASED MATERIAL USED FOR BOTH INTERIOR AND EXTERIOR CONSTRUCTION.

### PORTLAND POZZOLONA CEMENT

PPC HAS MORE THAN 30% OF FLY ASH CONTENT, USE FOR STRUCTURAL, PLASTERING AND MORTAR. IT REQUIRE NEARLY 60% LESS ENERGY DURING PRODUCTION IN COMPARE TO OPC. CO2 EMISSION REDUCES FROM 25-30%.

### GRASS BLOCK PAVING

GRASS PAVERS ARE HOLLOW PAVERS USED FOR THE CONSTRUCTION OF PERMEABLE PAVEMENTS. PAVERS IS THAT THEY ALLOW THE GROWTH OF GRASS THROUGH THE PAVING GAPS. THIS MAKES THEM PERMEABLE, ALLOWING RAINWATER TO SOAK INTO THE GROUND.

### HEAT REFLECTIVE PAINT

THERMAL INSULATION OF INTERIOR & EXTERIOR WALLS. IT SIGNIFICANTLY OUT PERFORMS THE THERMAL CONDUCTIVITY AND HEAT TRANSFER PROPERTIES.

### BAMBOO

BAMBOO IS TYPE OF WOODY PLANT, THESE TREE GROW IRRESPECTIVE OF CLIMATIC CONDITION, SO IT IS ECONOMICAL. BAMBOO LUMBER IS TRADITIONALLY USED IN LANDSCAPING AND FURNITURE MAKING.

### RECYCLED RUBBER FLOORING

THESE ARE THE MOST ENVIRONMENTALLY FRIENDLY RUBBER FLOORS. MADE FROM RECYCLED RUBBER SUCH AS THAT FOUND IN OLD CAR TIRES, THIS MATERIAL HELPS TO ELIMINATE THE BUILD-UP OF WASTE MAKING IT A LOW IMPACT FLOOR COVERING CHOICE.

# **CONCLUSION**

**I HEREBY DECLARE THAT THE WORK DONE IN THIS THESIS PROJECT IS MY OWN WORK AND I HAVE COLLECTED THE DATA FROM VARIOUS SOURCES, WHICH I HAVE DULY ACKNOWLEDGED IN MY REPORT.**

**Date:**

**SYED AZHARUDDIN**

**Place: Lucknow**

**B.Arch (ARCHITECTURE)**

**Final year (2022-2023)**

**ROLL NO. 1170101027**

**SCHOOL OF ARCHITECTURE**

**BBDU**

**Lucknow.**