

KENI WETLAND RETREAT



ENVIRONMENTAL DESIGN RESOLUTION



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SLIIT SCHOOL OF ARCHITECTURE

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INTRODUCTION

OUR PROJECT IS TO DESIGN AN ENVIRONMENTALLY FRIENDLY RETREAT FOR THE VISITORS OF ANAWILUNDAWA BIRD SANCTUARY AND WETLAND. WE NEED TO CONSIDER THE INVOLVEMENT OF ENVIRONMENT IN OUR DESIGN, WHEN DESIGNING A RETREAT IN WETLAND OR IN A CONTEXT WHICH IS FILLED WITH NATURAL RESOURCES. AND WE NEED TO THINK ABOUT HOW WE GOING TO USE THEM TO ATTRACT OR REGENERATE A USER'S MIND.

IN THIS PROJECT I WILL USING THE SAME PLAN OF ACTION TO ACHIEVE THE OVERALL AIM OF RETREAT WITH A MINIMUM DAMAGE OR WASTE FOR ENVIRONMENT. THESE AIM WILL BE ACHIEVED BY USING MAIN ELEMENTS. SUCH AS :

- * POSITIONING AND ORIENTATION
- * NATURAL LIGHTING
- * VENTILATION
- * ACOUSTIC BARRIER
- * RENEWABLE ENERGY
- * FLORA AND FAUNA
- * MATERIALS

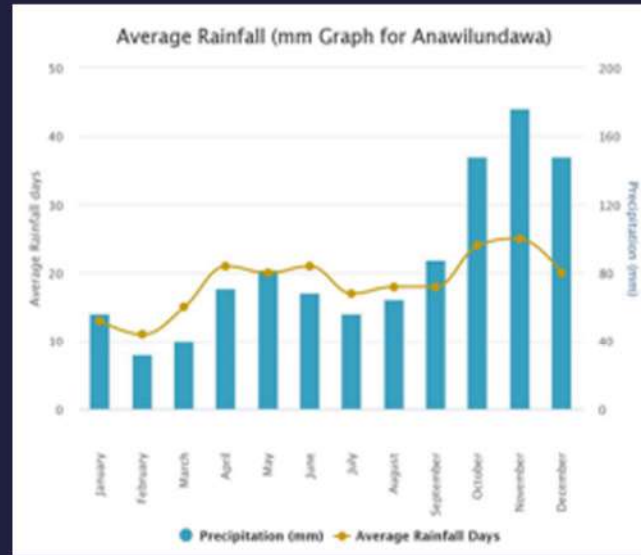
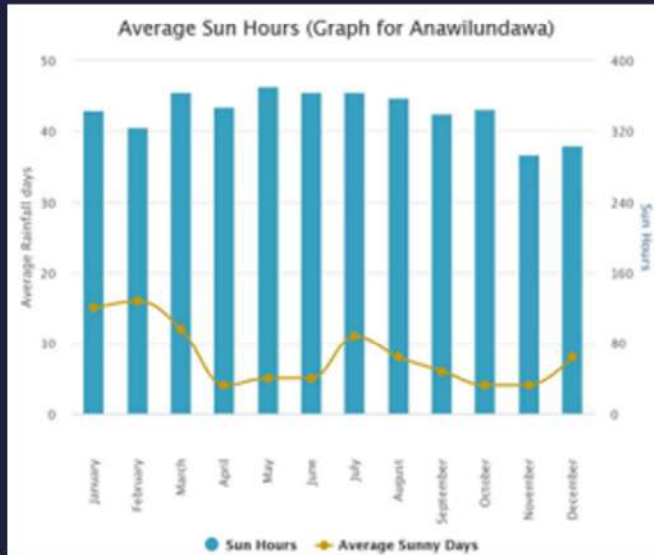
PREVIOUS ELEMENTS SERVES ANOTHER MAJOR PART OF DESIGN CALLED 'SUSTAINABLE ARCHITECTURE'. BY MINIMIZING THE NEGATIVE ENVIRONMENTAL IMPACT OF BUILDINGS BY EFFICIENCY AND MODERATION IN THE USE OF MATERIALS, ENERGY, AND THE ECOSYSTEM AT LARGE. SUSTAINABLE LIVING CAN ALSO BE REPRESENTED BY ADAPTAION OF CULTURE, TRADITION OF LOCAL COMMUNITY AND LOCAL CLIMATE.

SUSTAINABLE LIVING ARCHITECTURE CAN BE BENEFICIAL FOR CLIENT ,USERS AND LOCAL COMMUNITY.

- * REMUNERATIVE FOR CLIENT AND LOCAL
- * LESS COST IN UTILITY INFRASTRUCTURE
- * HEALTH AND COMFORT OF INHABITANTS
- * ENHANCING TOURISM
- * EVOLVEMENT IN MARKET



CLIMATE AND CONDITION



THE GRAPH SHOWS THE AVERAGE SUN HOURS OF ANAWILUNDAWA. IT CLARIFIES THE DIRECT IMPACT OF SUN RADIATION WILL BE HIGH. SINCE THE SUN HOURS ARE HIGH, NATURAL LIGHTING STRATEGY CAN BE EXECUTED IN OUR DESIGN PROCESS.

THIS GRAPH SHOWS THE ANNUAL RAINFALL IN ANAWILUNDAWA. WHICH MEANS ON HOT SEASONS (FEB - APRIL) ANAWILUNDAWA WON'T BE FACING DROUGHT. BECAUSE OF 10-12 DAYS OF MINIMUM RAINFALL IN HOT SEASONS.

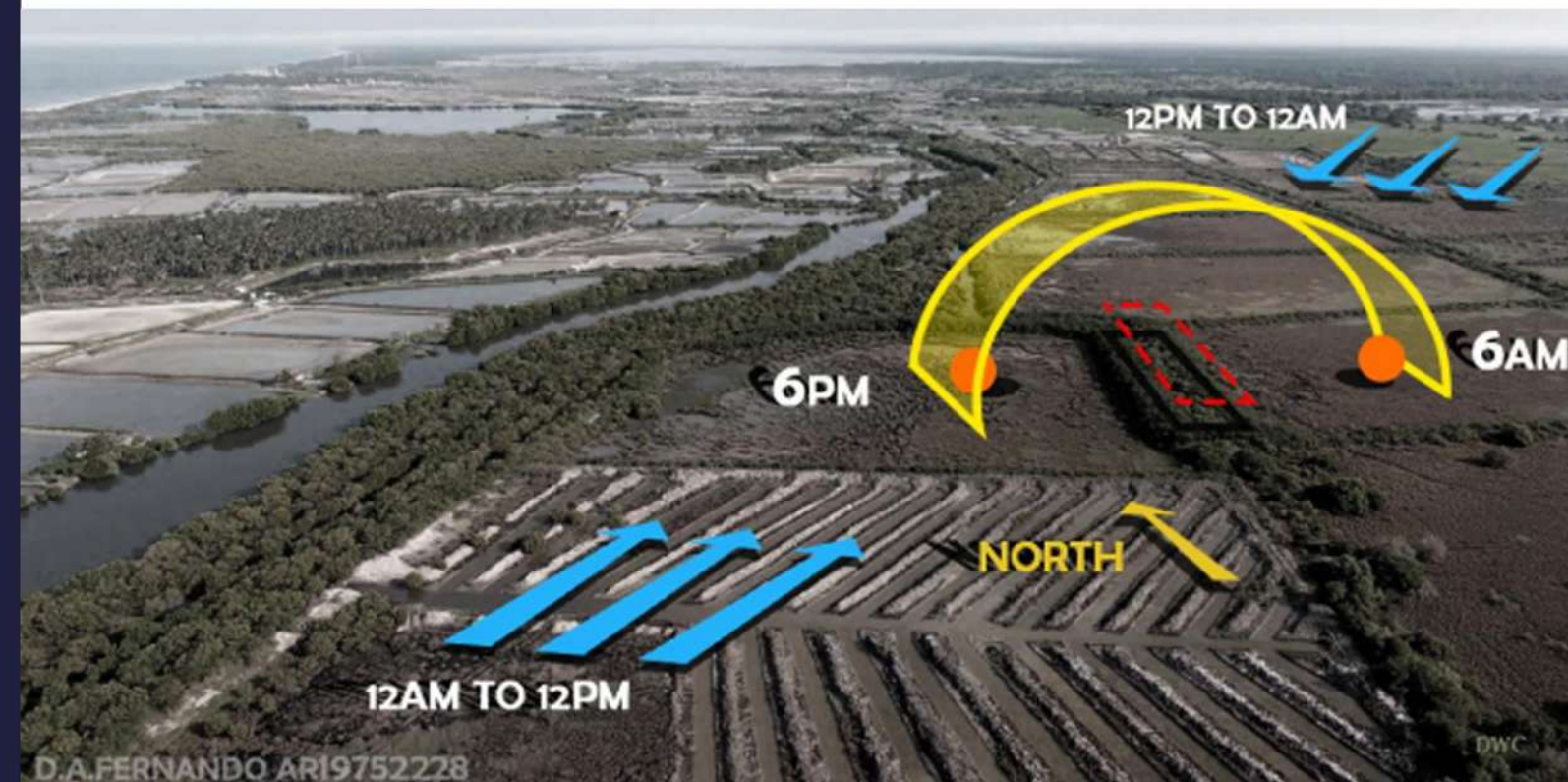
THE ANNUAL SUN HOURS AND RAINFALL(MM) GRAPH CAN CHANGE BECAUSE OF CURRENT POLLUTION AND OTHER NATURAL THREATS.

- HOT & DRY CLIMATE
- TEMPERATURE -31°C
- HUMIDITY - 50%
- WIND -24 KM/H
- WIND DIRECTION FROM NORTH 13°
- AVG. ANNUAL RAINFALL - 1000MM-1500MM



THE SITE IS LOCATED NEAR DUTCH CANAL. AND ITS SURROUNDED BY ABANDONED PRAWN FARM LANDS. WHICH IS UNDER A PROJECT TO PLANT MANGROOVES IN THOSE FARM LANDS TO CREATE HABITATION FOR BIRDS AND AVOID DROUGHT BY UPCOMING INCREASE IN GLOBAL TEMPERATURE.

THE SITE HAS A DROP OF 0.85M. IT WILL NOT GET FLOODED BECAUSE IT DESIGNED WITH TWO SMALL DAM TYPE SYSTEMS TO LET WATER IN AN OUT. THE WATER SURFACE IS BLACKISH (SLIGHTLY SALTY). SOIL TYPE CAN BE IDENTIFIED AS CLAY LOAM SOIL. THERE ARE UNDERGROUND SATURATED WATER WAYS BECAUSE THE SITE ITSELF IS LOCATED ON A WATER CHANNEL.



PASSIVE COOLING

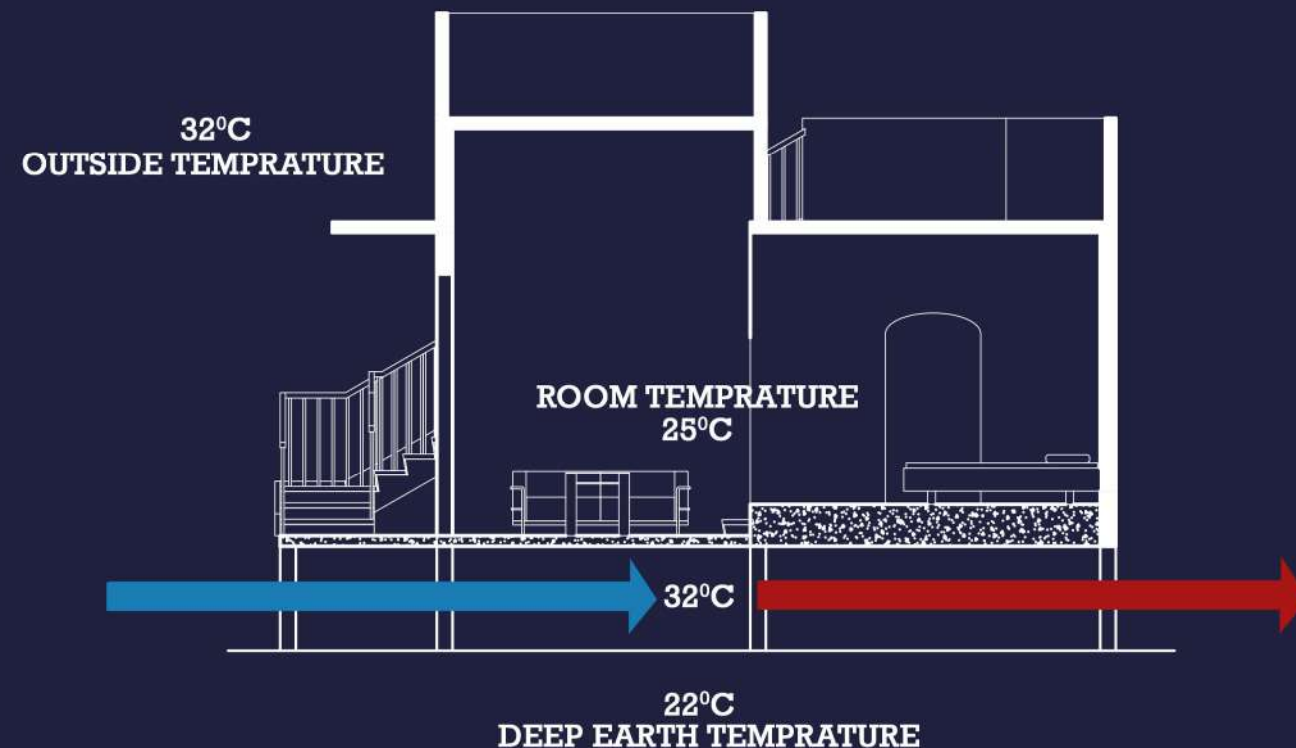
PASSIVE COOLING IS MEANT BY CREATING A THERNMAL COMFORT WITHIN A BUILD OR SPACE BY CONSUMING LESS OR ZERO ENERGY CONSUMPTION. PASSIVE COOLING IS MEANT FOR BOTH BUILDING AND HUMAN. PASSIVE COOLING CONTACT WITH HUMAN IN BOTH PHYSICAL AND MENTAL HEALTH CRATING A COMFORT FOR PEOPLE WILL INCREASE THE PRODUCTIVITY IN HUMAN. RENEWABLE ENERGIES LIKE SUN AND WIND, WILL BE USED AS THE RESOURCE TO ACHIEVE PASSIVE COOLING.

PASSIVE COOLING STARTEGIES USED IN RETREAT DESIGN.

- * EVAPORATIVE COOLING
- * CROSS VENTILATION
- * THERMAL MASS
- * REDUCTION OF DIRECT RADIATION

THERMAL MASS

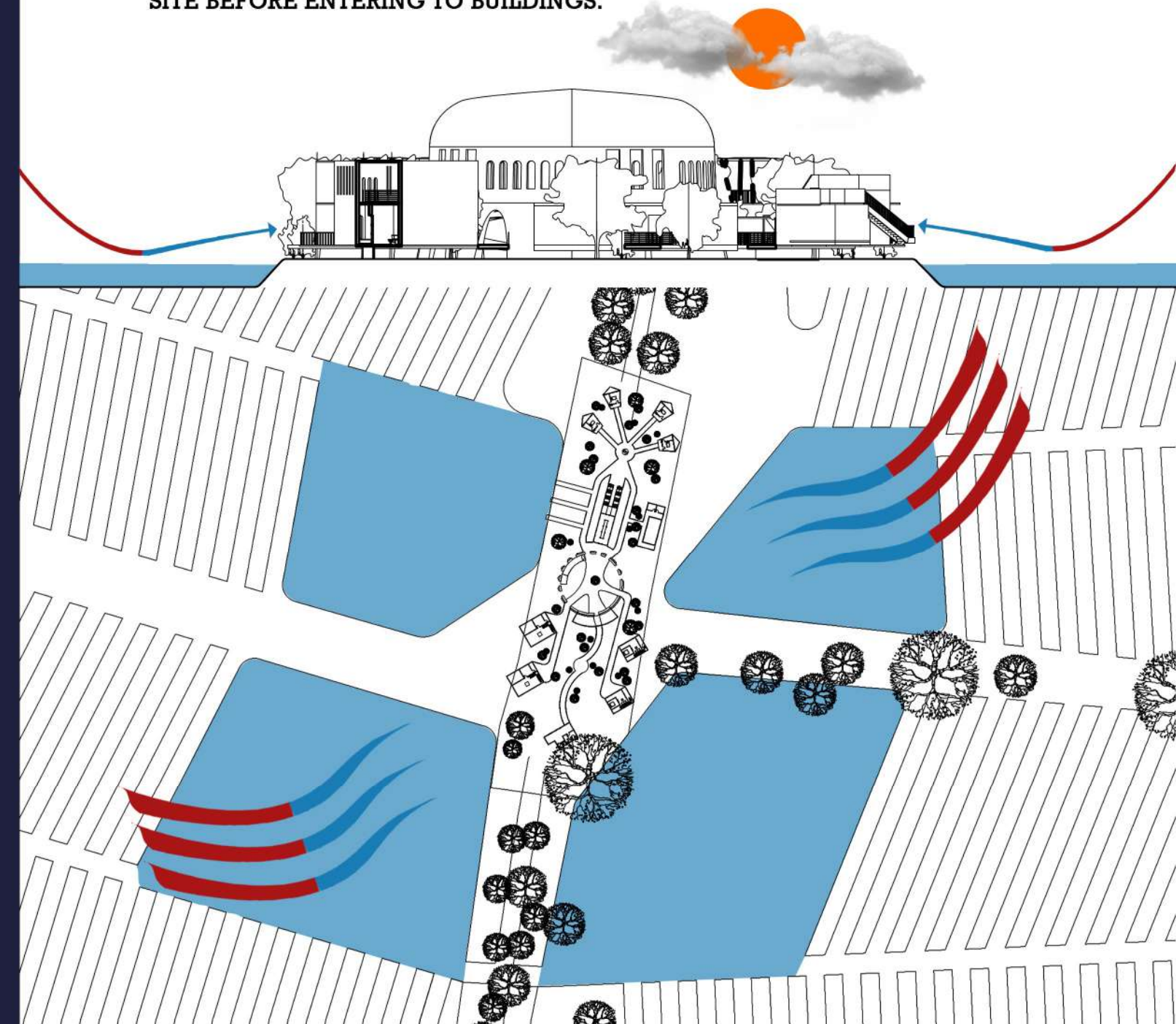
THERMAL IS USED AS A STORAGE SYSTEM TO HOT AND COOL IN PASSIVE BUILDINGS. SINCE ANAWILUNDAWA IS A HOT CLIMATE AREA THE THERMAL MASS WILL BE USED AS THE COOL STORAGE. EVEN THOUGH DEEPER EARTH TEMPRATURE OF RETREAT SITE IS LOW, EARTH COUPLING METHOD CAN NOT BE USED BECAUSE OF ITS SOIL CONDITIONS. INSTEAD OF EARTH COUPLING THE OPEN ELEVATED STRUCTURE WILL BE USED KEEP THE STRUCTURES COOLER THAN THE OUTSIDE TEMPRATURE.



EVAPORATIVE COOLING

EVAPRATIVE COOLING STRATERGY IS COOLING DOWN THE WIND USING WATER BODY BEFORE WIND ENTERING THE SITE OR BUILDING. THIS PASSIVE COOLING METHOD WILL BE EXECUTED WITH THE PROPOSAL AROUND THE SITE. WHICH IS CURRENTLY A GOVERNMENT PROPOSAL TO MANGROOVES PLANTATION IN ABANDONED PRAWN FARMS IN SITE CONTEXT. WITH SOME THAT WATER BODIES ALSO WILL BE PROPOSED WITH A DEPTH OF 2M AS SHOWN IN SITE LAYOUT PLAN.

WITH THIS STRATERGY WE CAN CONVERT THE VENTILATION SOURCE FROM WIND TO COOL BREEZE. IT WILL MAINTAIN THE ROOM TEMPRATURE IN A COMFORTABLE ZONE. POLLUTED AIR WILL BE FILTERED BY VEGETATION IN THE SITE BEFORE ENTERING TO BUILDINGS.

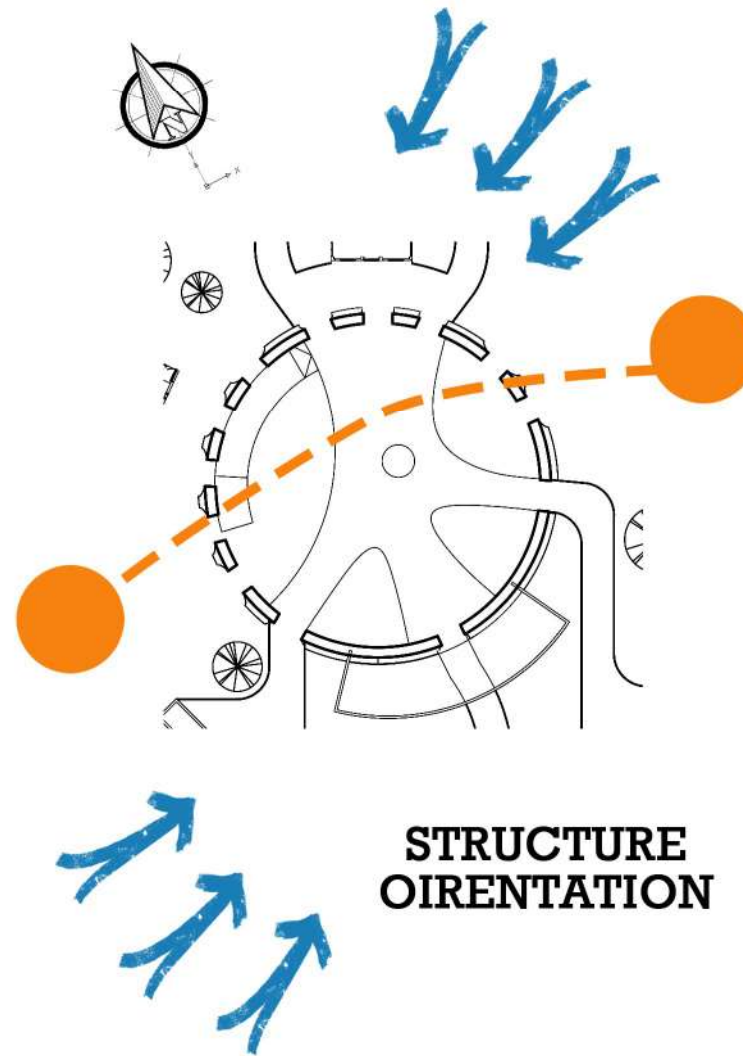
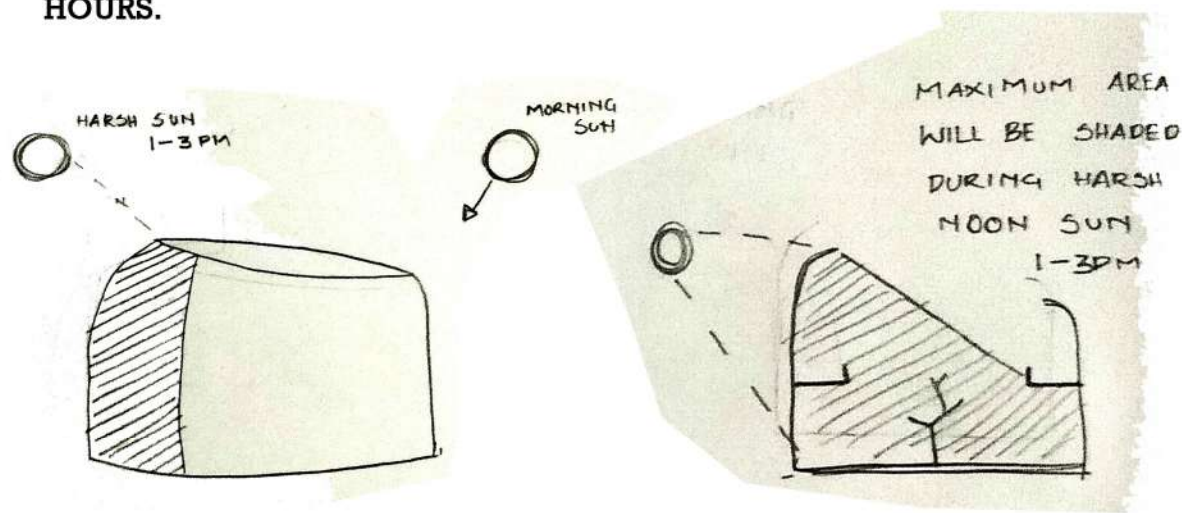


THE WELL

THE STRUCTURE HAVE BEEN HIGHLIGHTED NOT ONLY BY ITS TECTONIC FORM. I HAVE USED OTHER ENVIRONMENTAL FACTORS LIKE VEGETATION, VIEW AND PASSIVE COOLING TO MAKE IT UNIQUE FROM OTHER SPACES IN RETREAT.

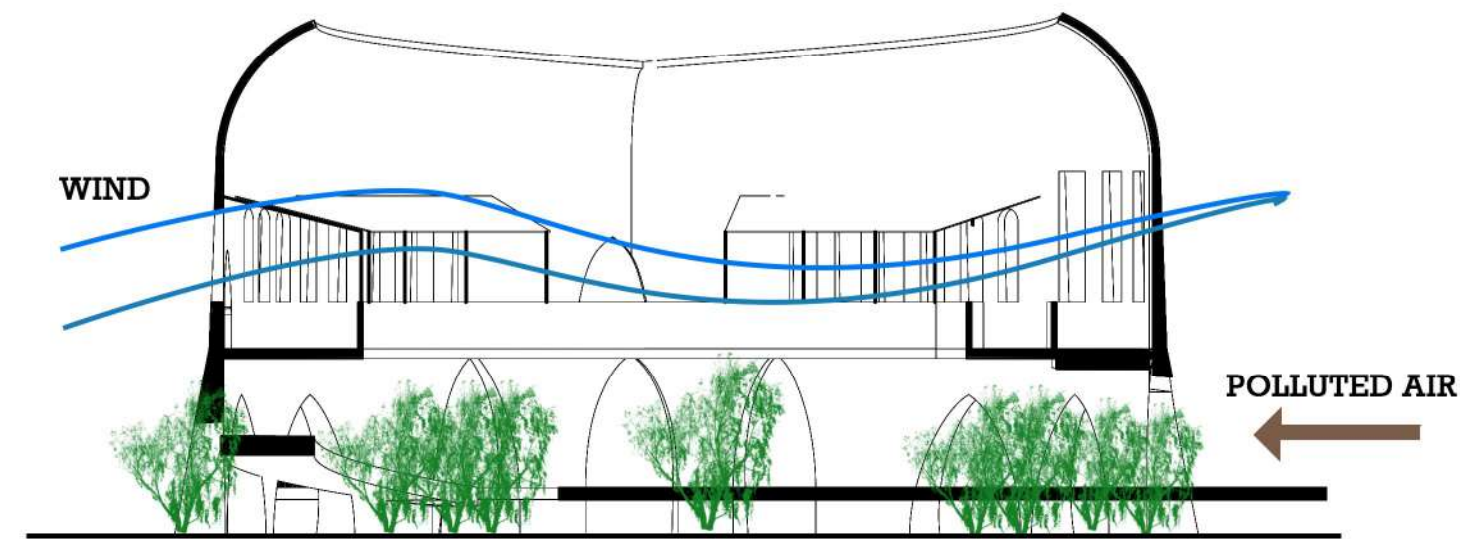
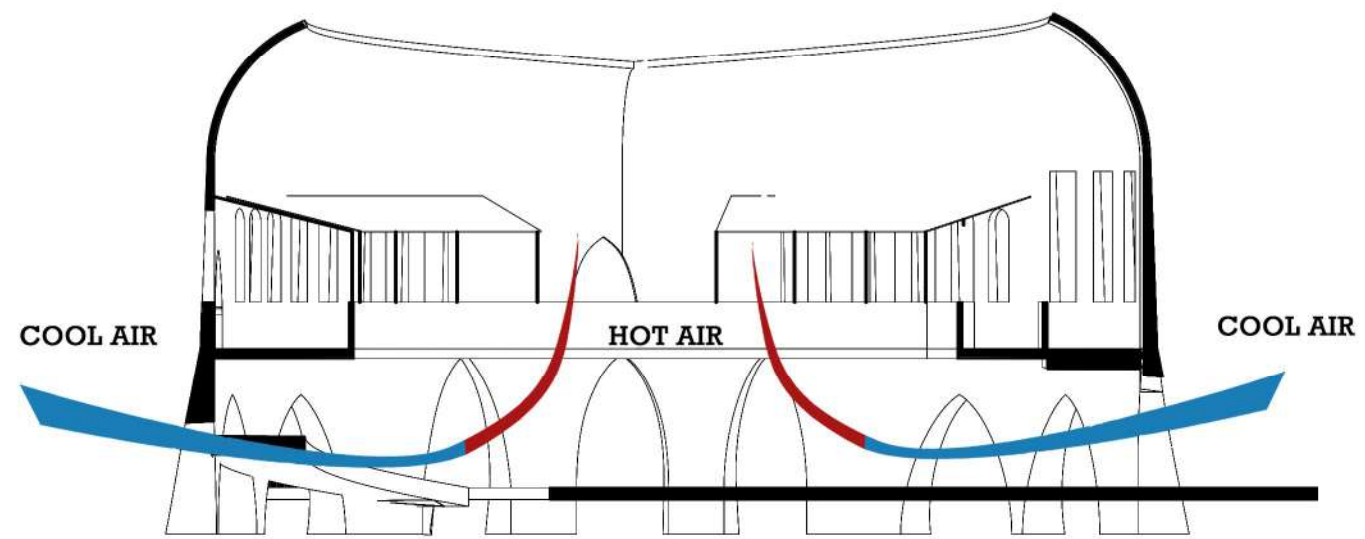
ORIENTATION AND SHADING

SINCE THE STRUCTURE HAS A LARGE VOID, DIRECT IMPACT OF SUN IS VERY HIGH. TO AVOID THE DIRECT OF NOON SUN WE HAVE PROVIDED THATCH ROOF FOR DINING AREA. IN EAST AND WEST SIDE ATRUCTURE HEIGHTS ARE DIFFERENT. THE PURPOSE FOR IT TO LET MORNING SUN MORE IN TO THE SPACE AND PROVIDE MORE SHADE ON HOT SUN HOURS.



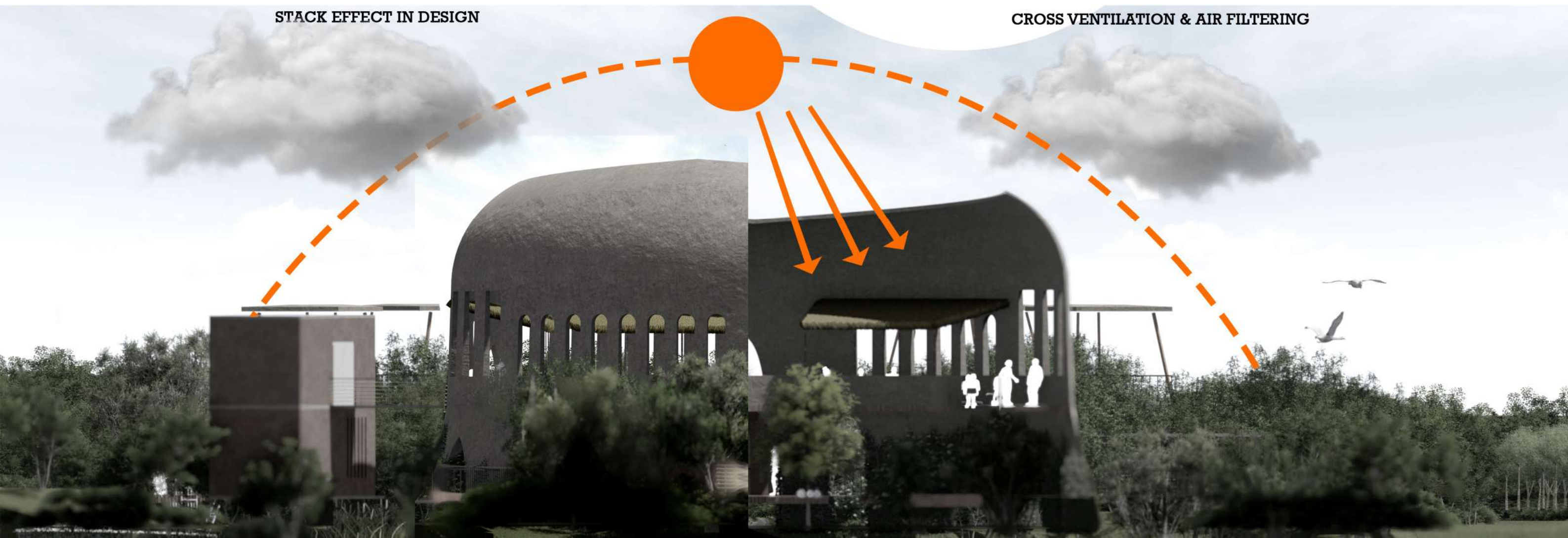
THE WELL ACT AS A JUNCTION TO WHOLE DESIGN. WHERE DIFFERENT TYPE OF PEOPLE MEET AND COMMUNICATE. BY DEVELOPING THAT CONCEPT I HAVE DESIGNED AN AREA BY CLOSED BOUNDRY WITH LARGE VOID OPENING. SINCE IT WAS A DENSED AREA I HAVE APPLIED PASSIVE COOLING STRATEGIES TO MAINTAIN THE TEMPRATURE IN A COMFORT ZONE FOR THE VISITORS.

THE SERIES OF WINDOWS WILL PROVIDE THE NEEDED VENTILATION. EVEN THOUGH VEGETATIONS IN SITE IS DENSED, MAXIMUM HEIGHT IS ABOUT 3- 3.5 M. SO THE CROSS VENTILATION WON'T BE DISTURBED BY TREES. THE POLLUTED AIR MOSTLY TRAVEL NEAR GROUND LEVEL. BY USING VEGETATION INSIDE THE STRUCTURE WE CAN FILTER THE AIR BEFORE IT GETS INSIDE. THIS WILL STABILIZE THE COMFORT LEVEL BUILDING.



STACK EFFECT IN DESIGN

CROSS VENTILATION & AIR FILTERING

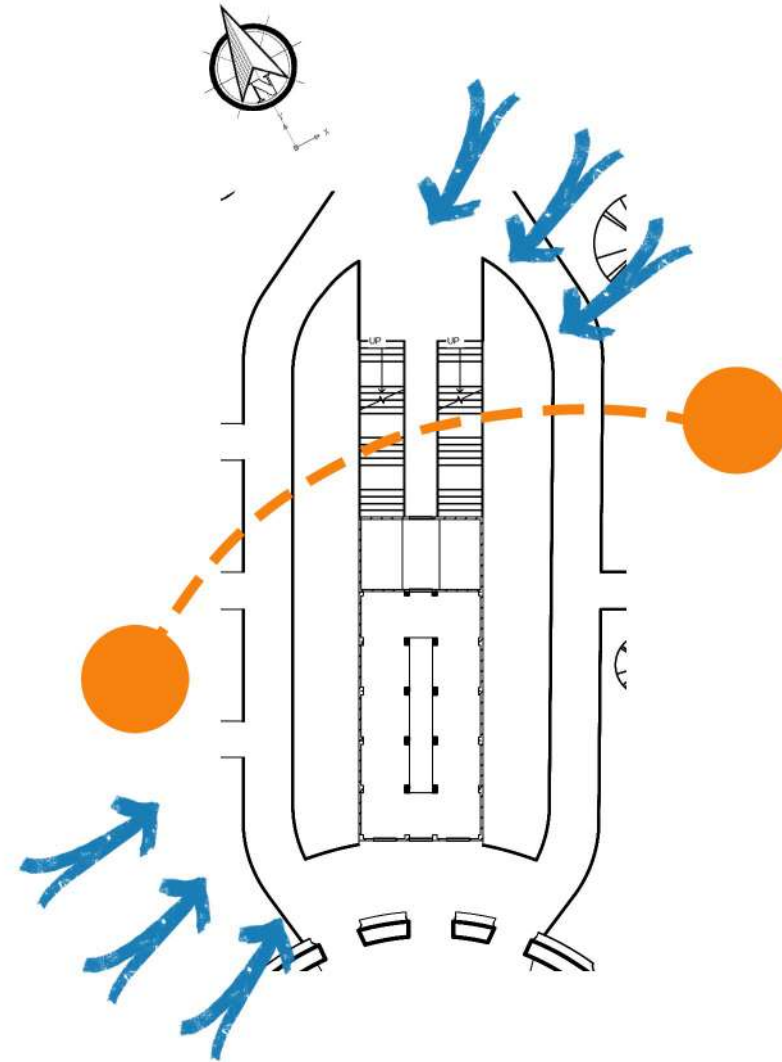


EXHIBTION AREA

EXHIBITION AREA WILL THIS WILL A FULLY ENCLOSEDSPACE WITH PUBLIC ACCESS. EVEN THOUGH ITS A SMALL AREA, IT NEEDS TO BE COMFORTABLE AND BRIGHT TO ENJOY THE EXHIBITION. THERE ARE SPECIFIC REQUIREMENT TO FULFIL TO PRESERVE THE EXHIBIT ITEMS.

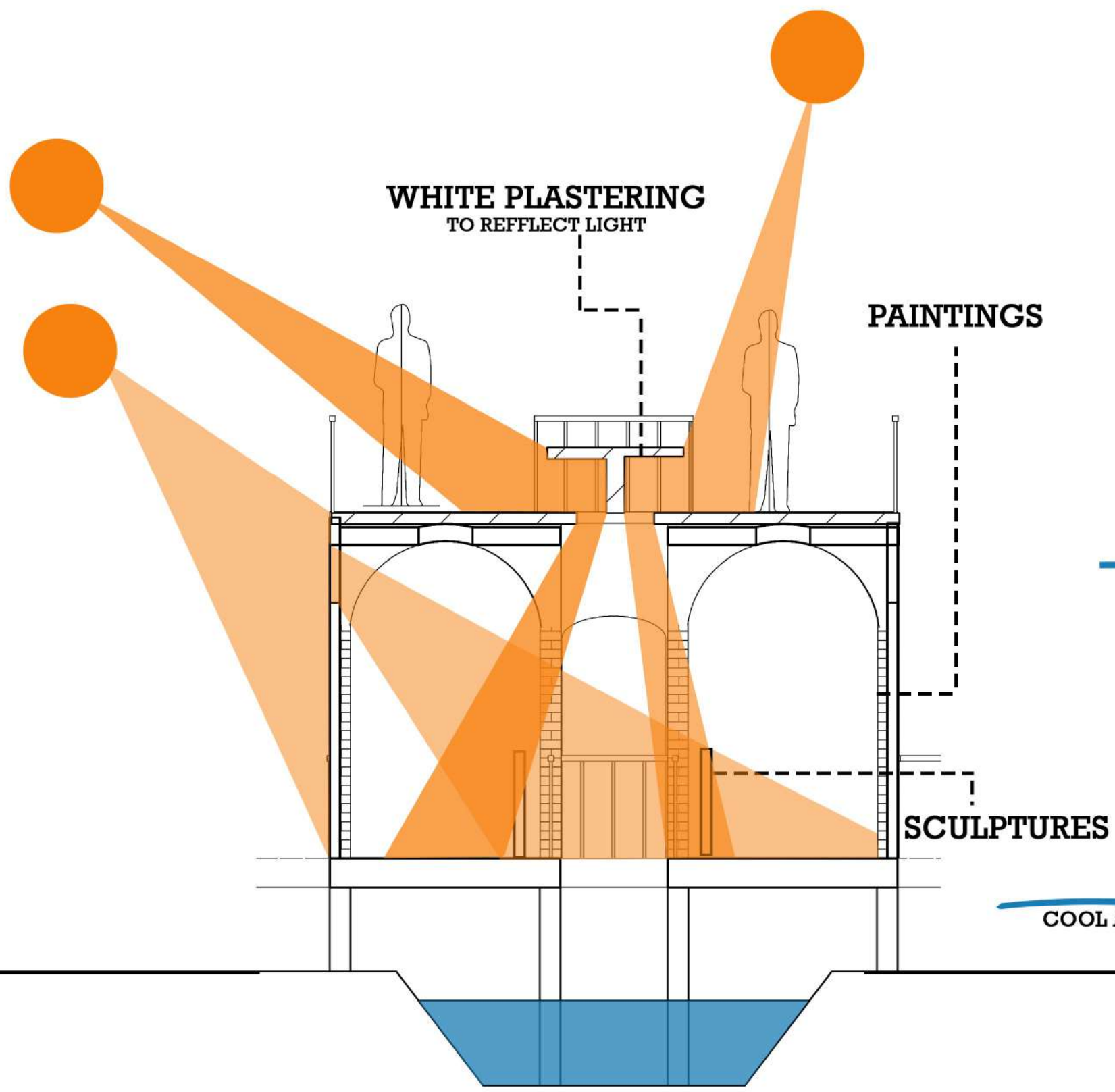
ORIENTATION

THE STRUCTURE IS ORIENTED IN A WAY TO ALLOW REQUIRED AMOUNT OF LIGHT AND MAXIMUM VETILATION THROUGH IN AND OUT. IT POSITIONED IN MIDDLE OF SITE NEXT TO THE MAIN AREA FOR EXTENDING THE VIEW FROM FIRST FLOOR.

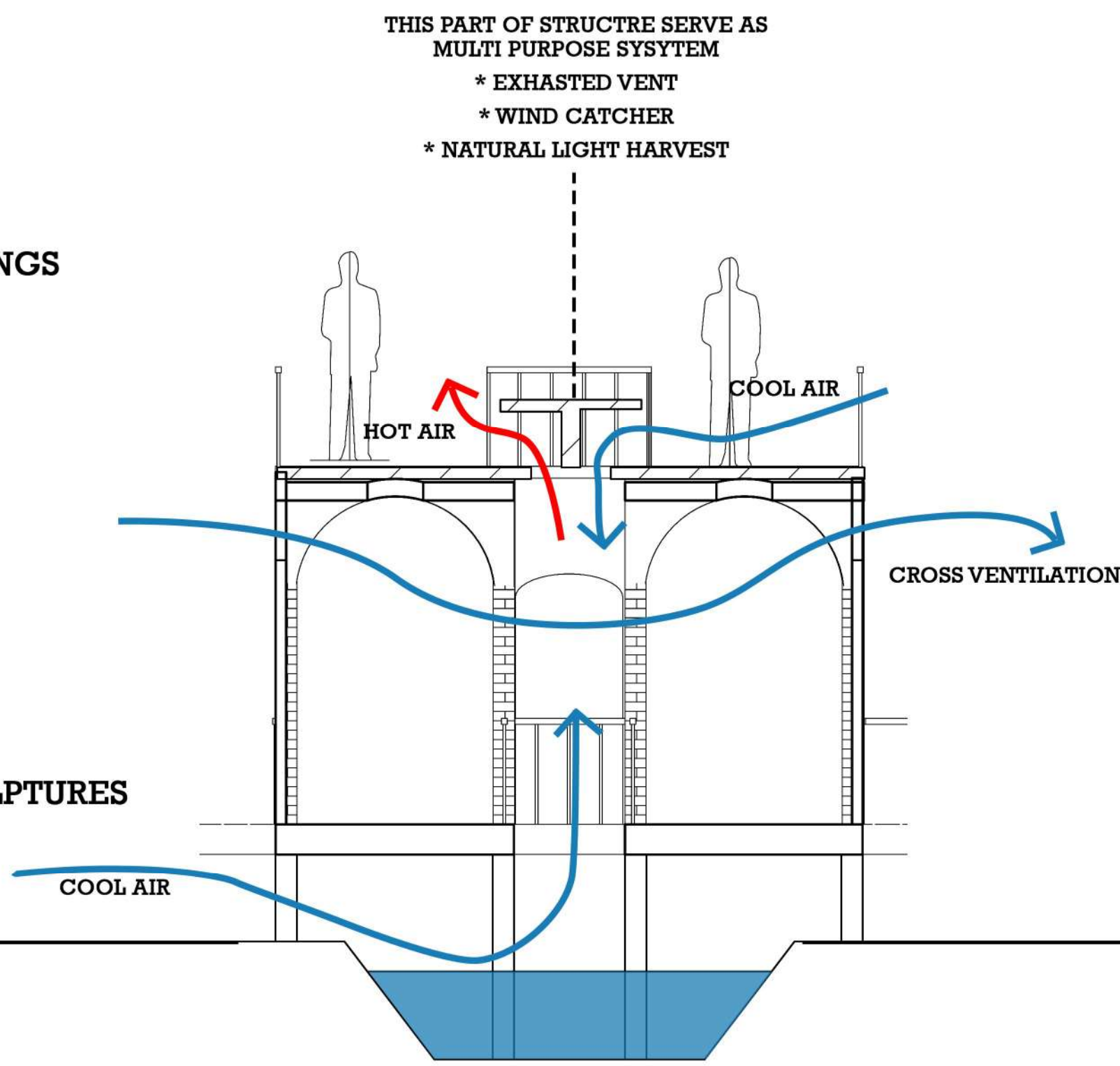


STRUCTURE
ORIENTATION





NATURAL LIGHTING IN STRUCTURE



NATURAL VENTILATION IN STRUCTURE

DOMES

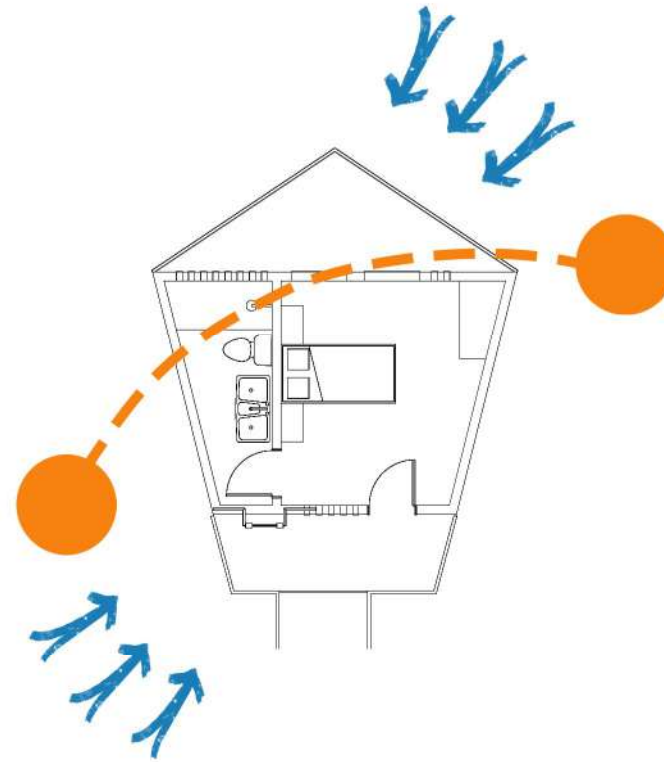
ORIENTATION AND POSITIONING

COUPLE DOME



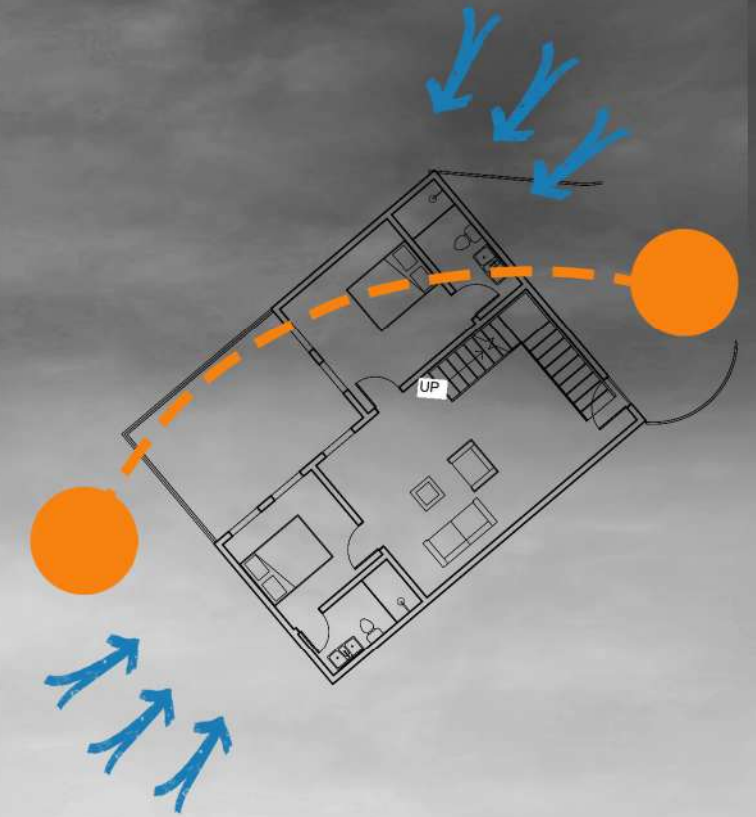
COUPLE DOMES WERE ORIENTED FACING THE MORNING SUN. TO PROVIDE MORE ENERGY FOR A YOUNG DAY AND CREATE ROMANTIC VIBE THROUGH SPACE.

SINGLE DOME



SINGLE DOMES ORIENTATION DIFFER FROM EACH OTHER. TO MAKE IT MORE ISOLATED FOR THE USERS AND TO AVOID NOISE DISTURBANCE FROM EACH OTHER.

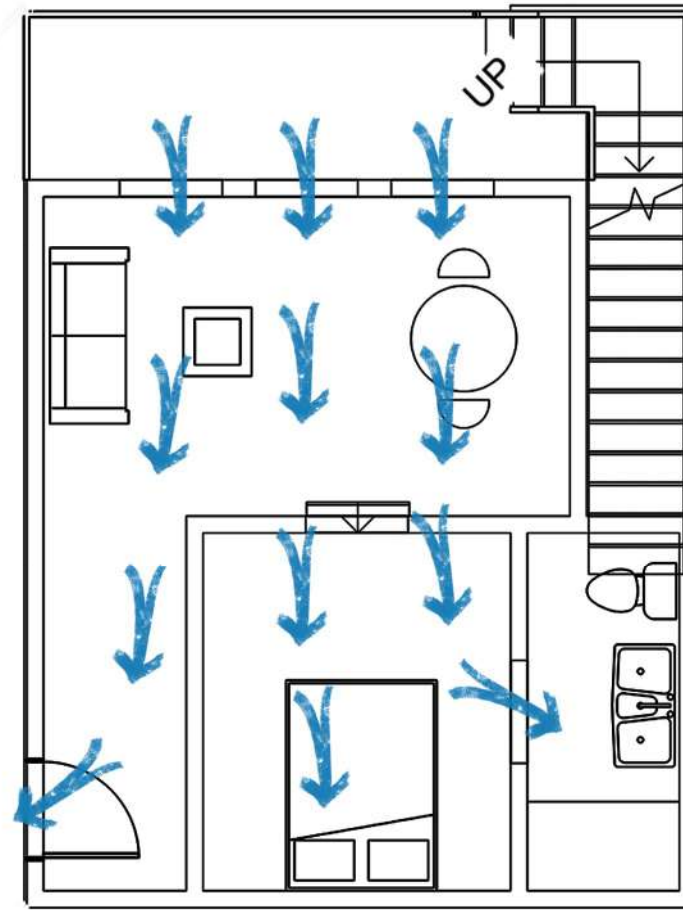
FAMILY DOME



FAMILY DOMES ARE FACED TO EVENING SUN BECAUSE THEY GATHER MOST LIKELY FOR EVENING PARTIES. IT CAN CREATE A CALM ENVIRONMENT

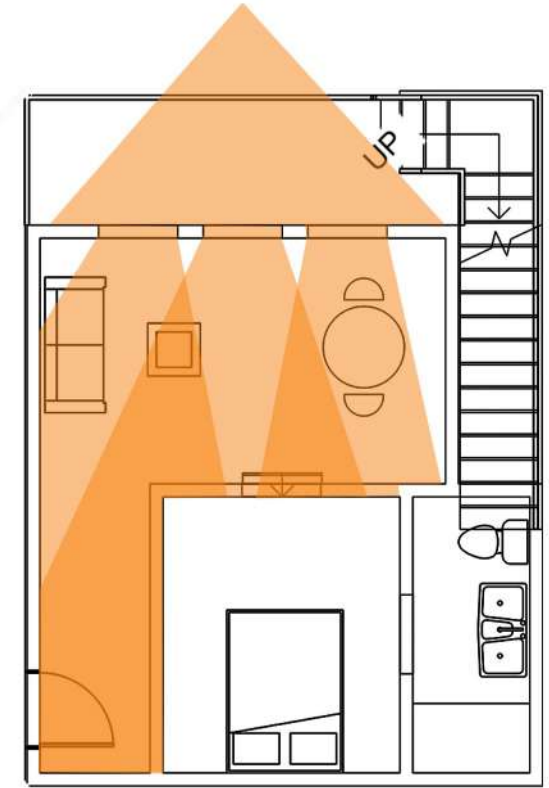


COUPLE DOME

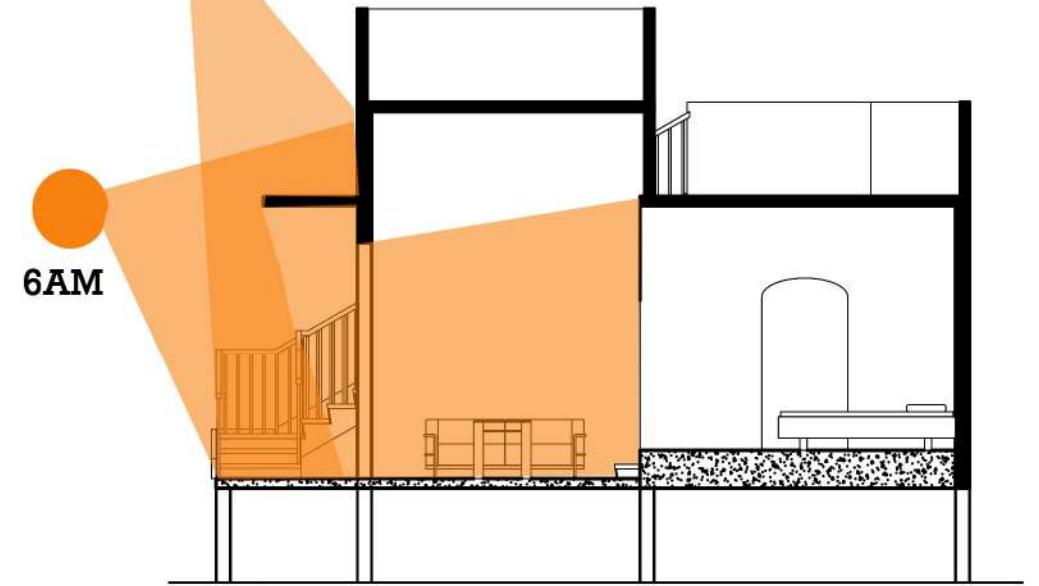


CROSS VENTILATION

THIS DOME WAS CREATED IN A CONCEPT OF ROMANCING WITH NATURE. WHERE THE INVASION OF NATURE MUST BE MORE SENSITIVE. TO FULFIL THAT REQUIREMENT IT HAVE BEEN DESIGNED AS A SINGLE SPACE. SO THE INVASION OF NATURE WONT BE DISTURBED.



11AM



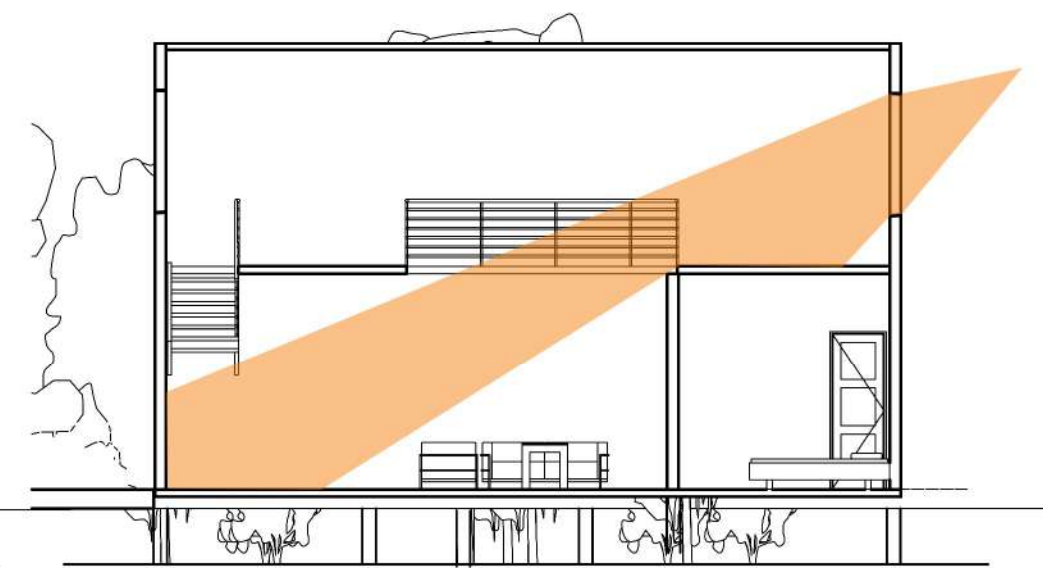
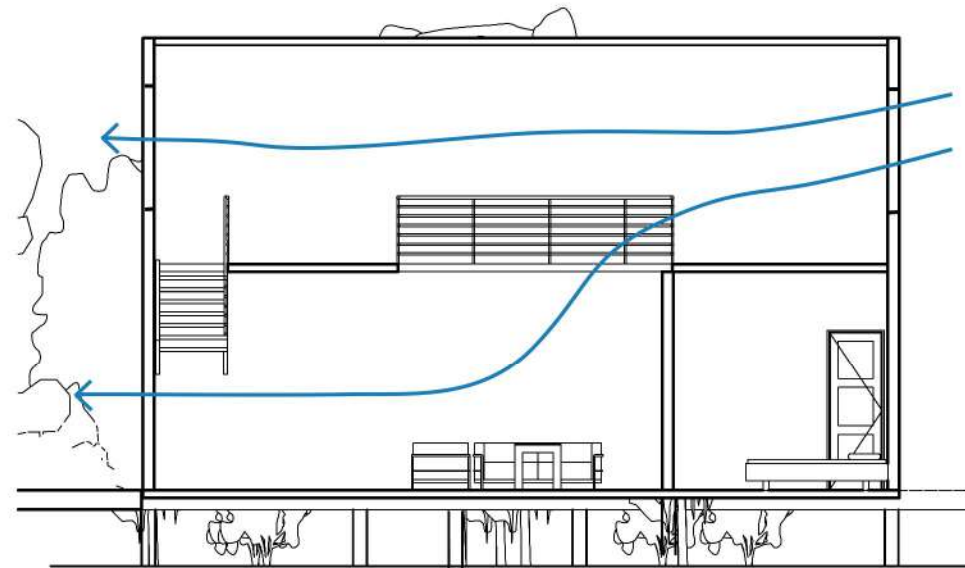
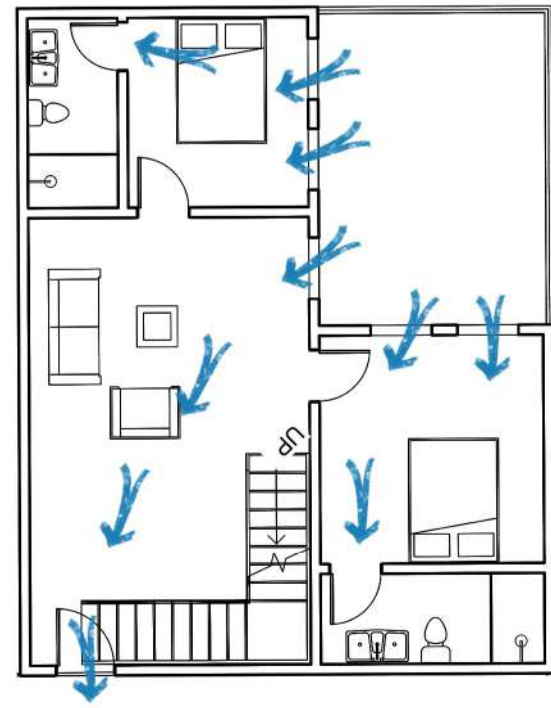
6AM

NATURAL LIGHTING



FAMILY DOME

WITH THE SAME IDEA OF WIND CATCHER I HAVE PLACED OPENINGS IN FIRST FLOOR TO ALLOW MORE WIND AND SUNSLIGHT TO ENTER THE SPACE

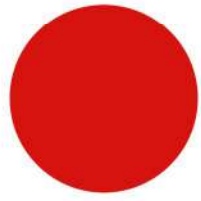


CROSS VENTILATION

NATURAL LIGHTING

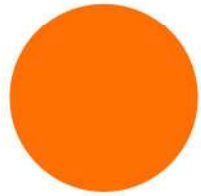


ACOUSTIC ZONING



HIGH NOISE AREA

THIS ZONE CONSIST OF THE MAIN GATHERING AREA, RESTAURANT SPACE AND PUBLIC VIEW POINT. THIS WILL BE THE MOST CROWDED AREA IN WHOLE WETLAND RETREAT BASED ON ITS FUNCTIONS. THIS WILL BE THE BOUNDRY FOR PUBLIC USE TO AVOID UNNECESSARY DISTURBANCE TO RESIDENTIAL AREA.



MID-RANGE NOISE AREA

THIS ZONE IS AN ACTIVITY AREA PROPOSED FOR WATER ACTIVITIES. IT'S A SEMI- PUBLIC AREA. THE NOISE SOURCE WILL BE THE MOTOR BOATS AND HUMAN CROWDING. BUT THE NUMBER OF HUMAN PRESENCE WILL BE LESS THAN MAIN AREA.



DISTURBED AREA

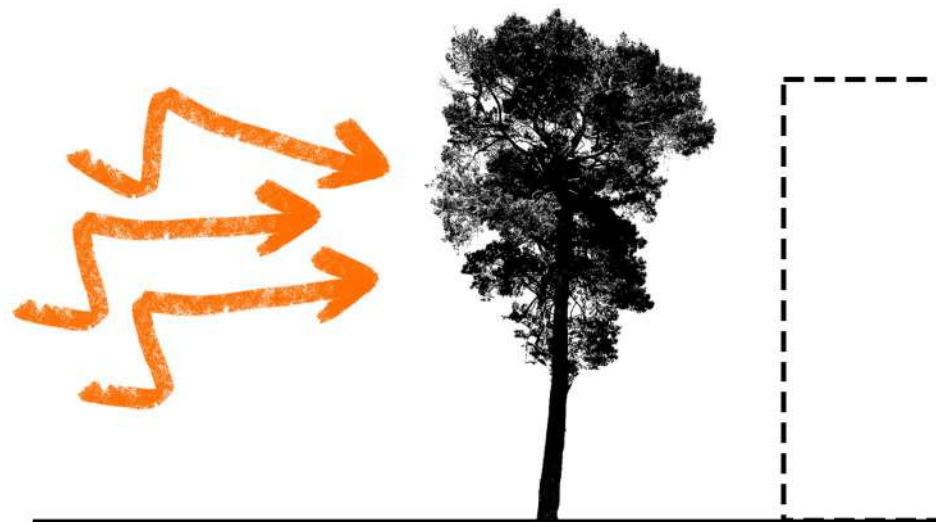
THIS PRIVATE AREA IS NOT AN NOISE PRODUCING ZONE. THIS IS A RESIDENTIAL AREA WHICH GOT DISTURBED BY THE NOISE FROM MAIN GATHERING SPACE AND RESTAURANT. AMOUNT NOISE CAN BE REDUCED USING SOUND BARRIERS AND INSULATIONS.



ZERO NOISE AREA

THE ZONE IS PROPOSED FOR THE RESIDENCE OF PEACE SEEKERS AND WILD LIFE PHOTOGRAPHERS.WHICH NEEDS TO BE MORE CALM THE OTHER AREAS OF RETREAT. FOR THOSE REASONS ITS PLACED AWAY FROM HUMAN EXISTENSE.

THE DENSED VEGETATION IN SITE WILL BE USED TO AVOID THE EXCESSIVE NOISE FROM HIGH NOISE AREA. IN THIS STRATERGY THE TREES WILL ACT AS A SOUND BARRIER.



FLORA AND FAUNA

SUSTAINABLE WATER BODY

THE EXISTING SITE AND SURROUNDING IS NOT SUITABLE FOR BIRD HABITATION. SO THE WATER BODIES WHICH WERE PROPOSED IN MASTER PLAN IS TO CREATE HABITATION FOR BOTH MANGROOVE AND WATERFOWL HABITAT BIRDS. WHICH MAKES THE POND INTO A SUSTAINABLE WATER BODY. THIS WILL CARRY A HUGE IMPACT ON ENVIRONMENTAL ATTRACTION OF WETLAND RETREAT.

REDIRECTED WATER BODY THROUGH SITE

USING EXISITING INTRUDED PART OF STREAM INSIDE THE SITE AND SURROUNDING WATER SOURCE, A LARGE STREAM WILL BE DEVELOPED. THE PURPOSE OF THIS STREAM IS TO PROVIDE WATER TO VEGETATION IN THE RETREAT SITE. THE OTHER PURPOSE IS TO CREATE ADAPTIVE ENVIRONMENT OR BIRD IN RETREAT. THIS WILL CREATE A ECO-FRIENDLY DESIGN WHICH CONSIST OF FLORA AND FAUNA IN DESIGN. AT END WE CAN SOLVE MAJOR PROBLEM OF OUR SITE '**BIRDS NOT VISIBLE**' FROM CRITICAL ANALYSIS.

USE AND IMPACT OF FLORA IN DESIGN

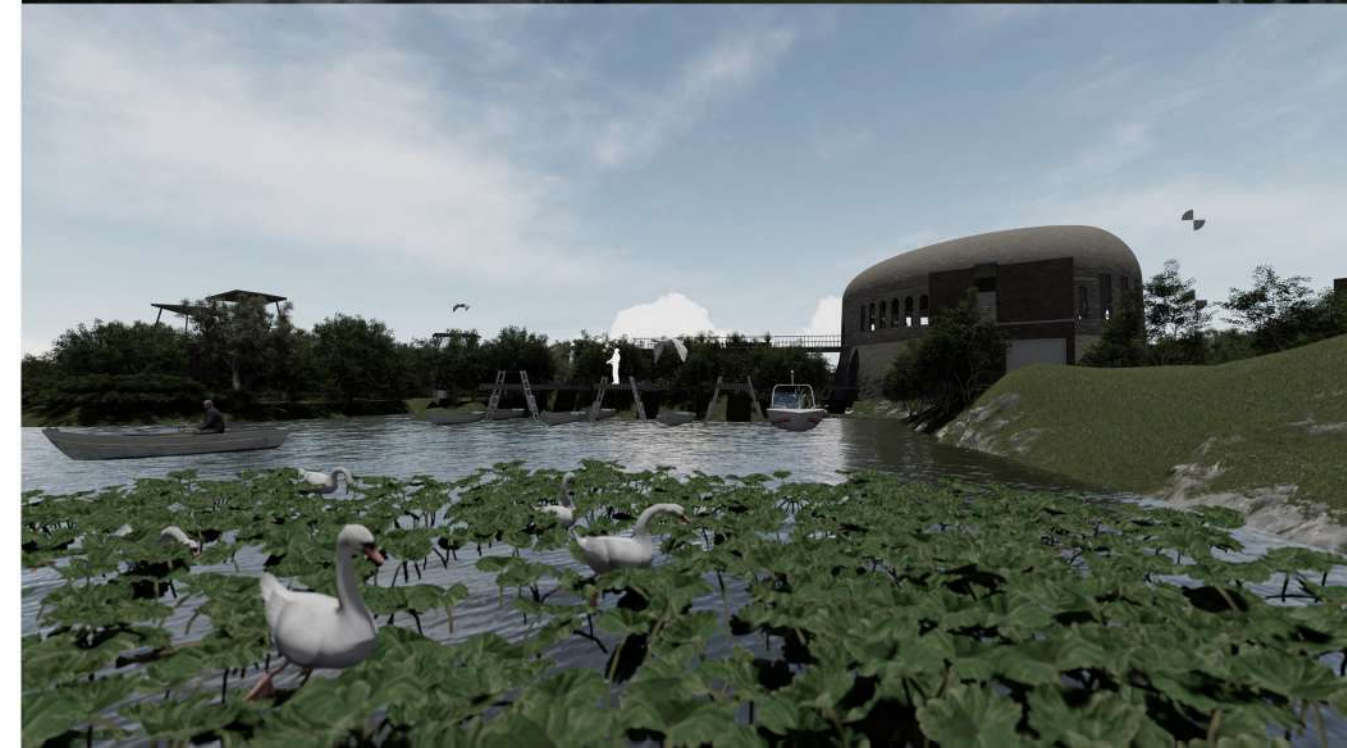
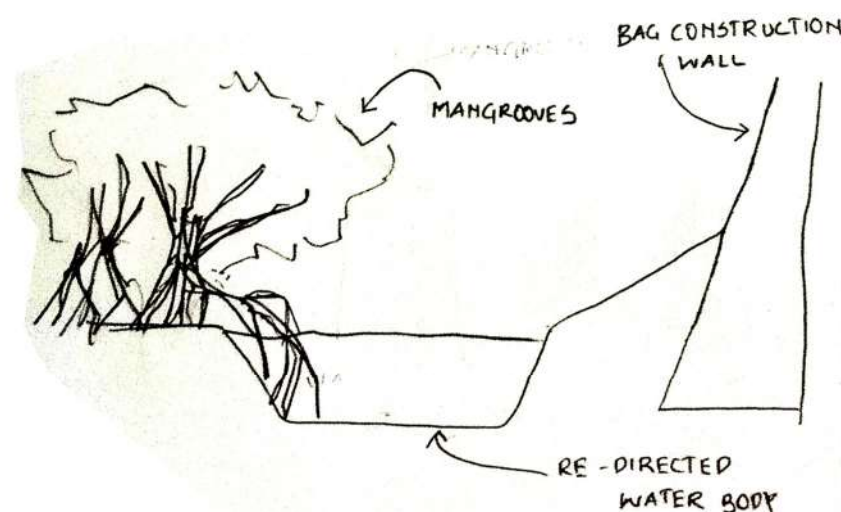
THE FLORA IS ALSO A PART FOR BIRD HABITATION PROCESS IN OUR DESIGN. MANGROOVE PLANTATIOPN WILL BE CONTINUED THROUGH OUR DESIGN, AT THE EDGE OF REDIRECTED WATER BODY. USES OF FLORA IN OUR DESIGN WILL HAVE DIRECT AND INDIRECT IMPACT IN BOTH STRUCTURE AND HUMAN.

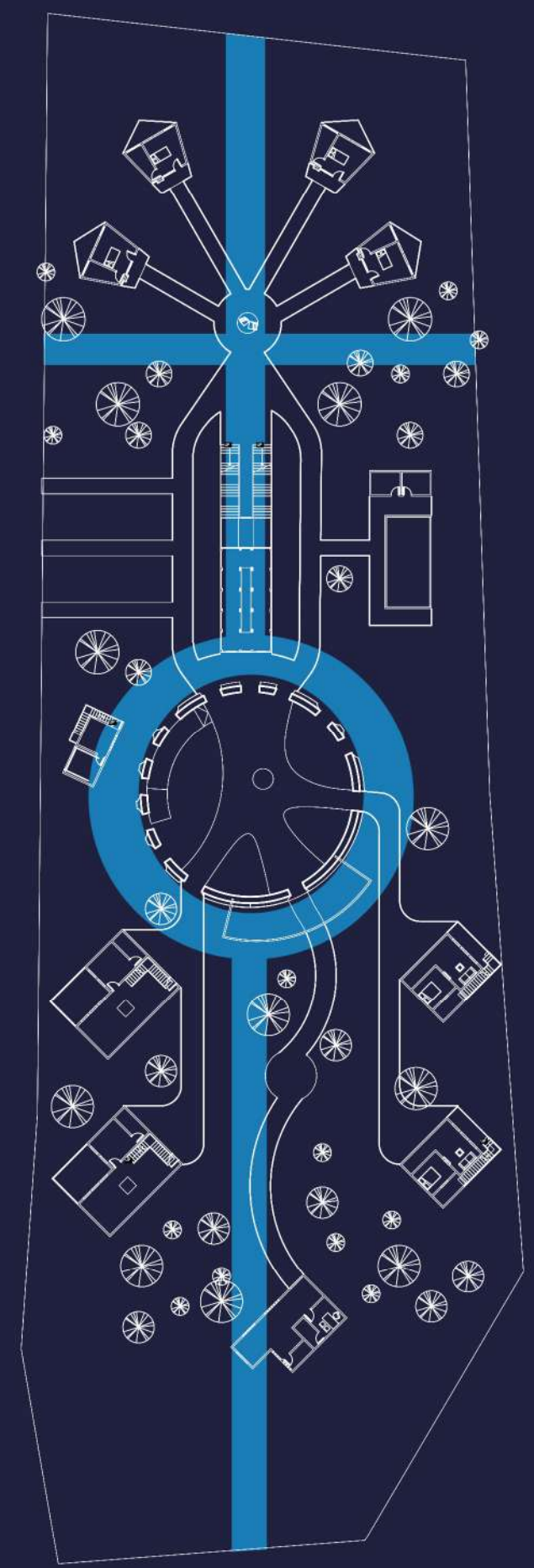
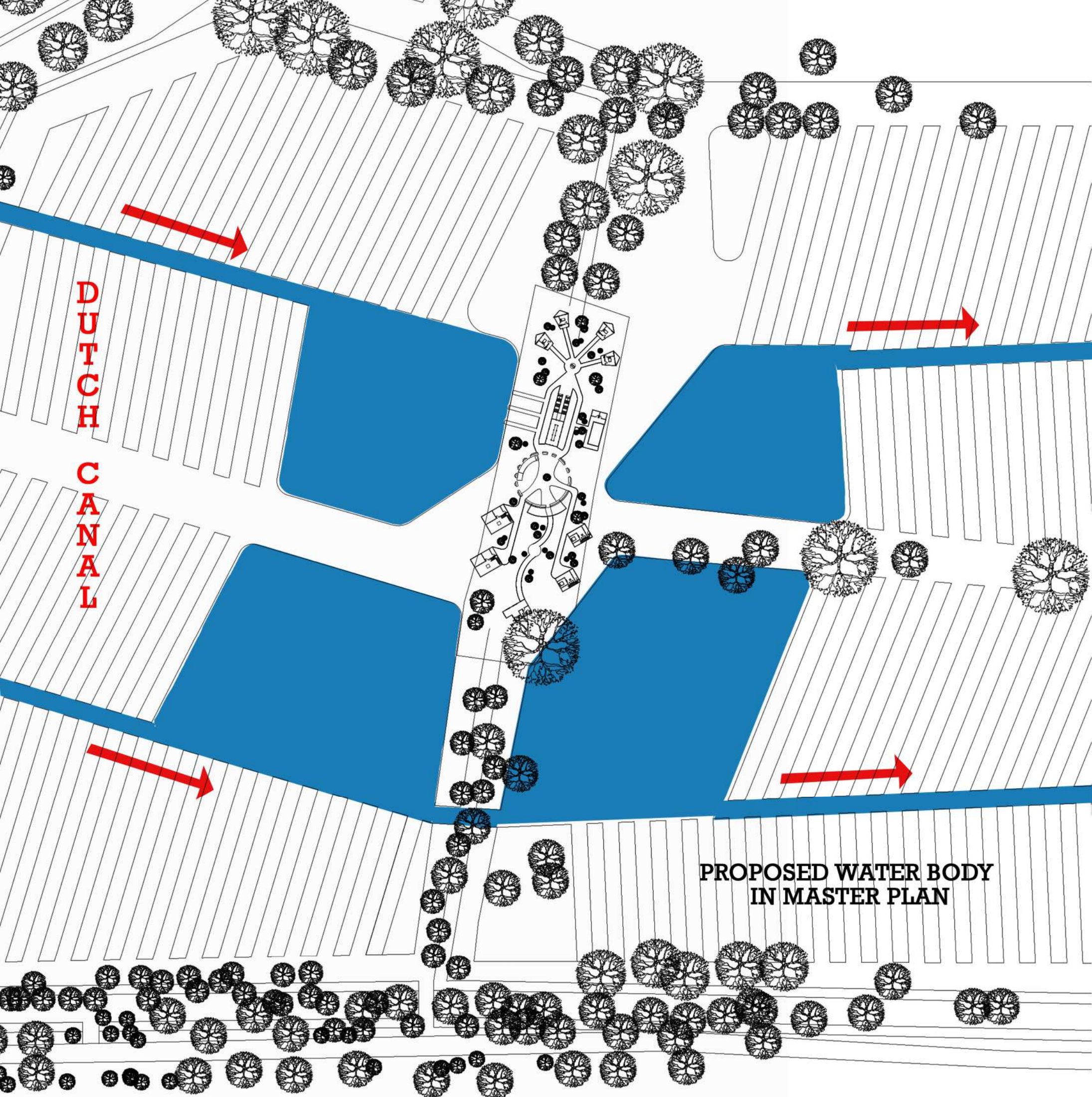
DIRECT IMPACT

- * THERMAL COMFORT
- * NOISE BARRIER
- * AIR FILTERING
- * CALM ENVIRONMENT

INDIRECT IMPACT

- * RICH BIO-DIVERSITY
- * DROUGHT PROTECTION
- * AIR, WATER CLEANING
- * PRESERVING HABITATION.





VIEWS

EVEN THOUGH THE SITE HAS DENSE VEGETATION . IT HAS A HEIGHT LIMIT OF 3M - 3.5M. BECAUSE OF THAT I HAVE PLACE EACH VIEW POINTS OVER THAT HEIGHT LIMIT TO PROVIDE THE UNDISTURBED VIEW FOR THE VISITOR. LOWER DECKS IN 1M LEVEL FROM GROUND IS PLACED IN LESS VEGETATED PLACE TO PROVIDE THE VIEW.

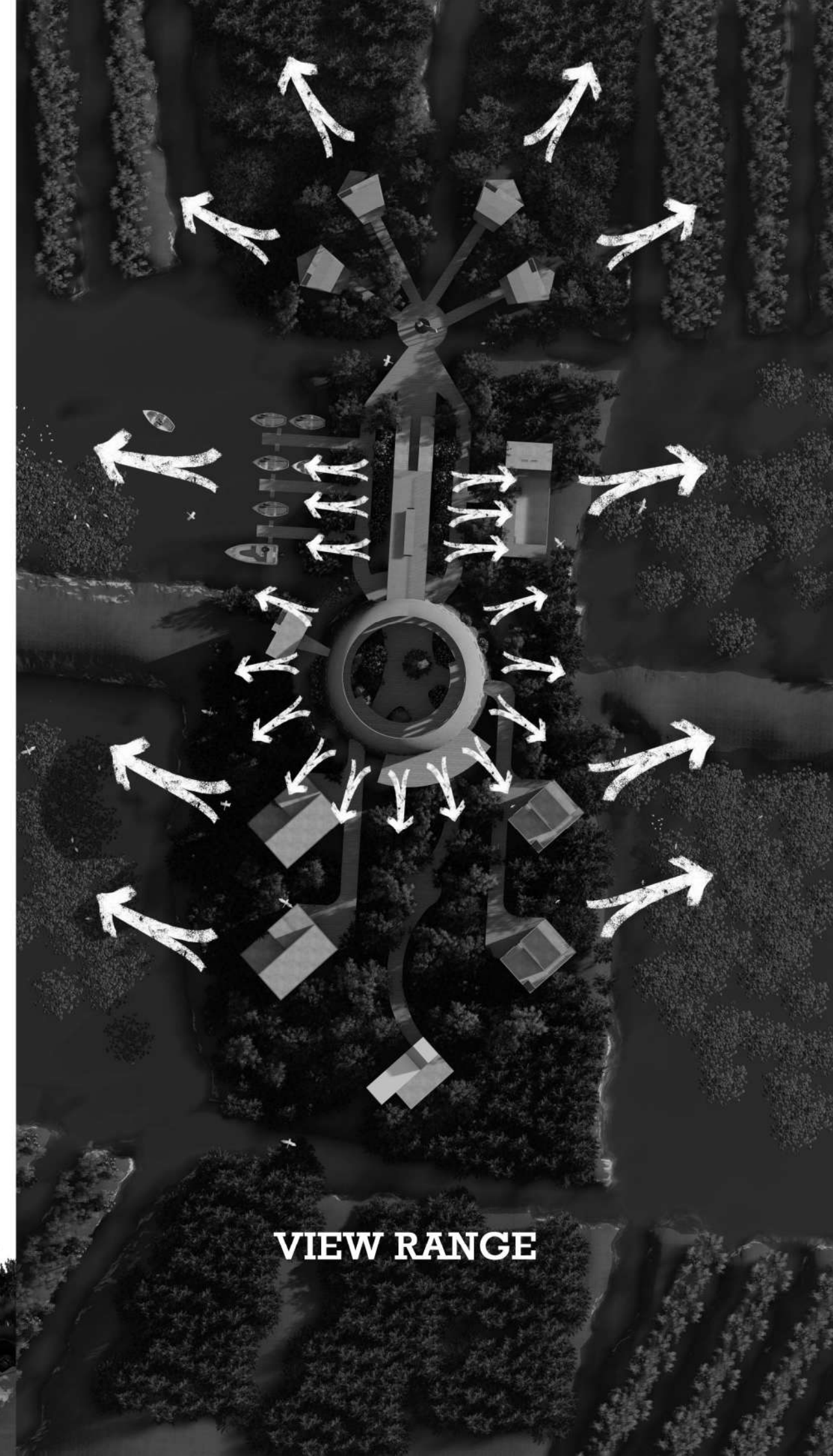
PROPOSED RETREAT SITE HAVE AN ADVANTAGE OF 360 PANAROMA VIEW CAN BE EXPERIENCE IN 4M LEVEL FROM GROUND. BECAUSE OF HEIGHT LIMITATION OF VEGETAION IN CONTEXT. USING THIS FACTOR I HAVE HIGHLIGHTED THE MAIN SPACE (THE WELL) BY GIVE THE PANAROMA VIEW. WHICH CANNOT BE EXPERIENCED FROM OTHER PLACES OF RETREAT.



CONTEXT - VIEW RANGE



VEGETATION & BUILDING HEIGHT DIFFERENCE



VIEW RANGE



WATER ACTIVITY



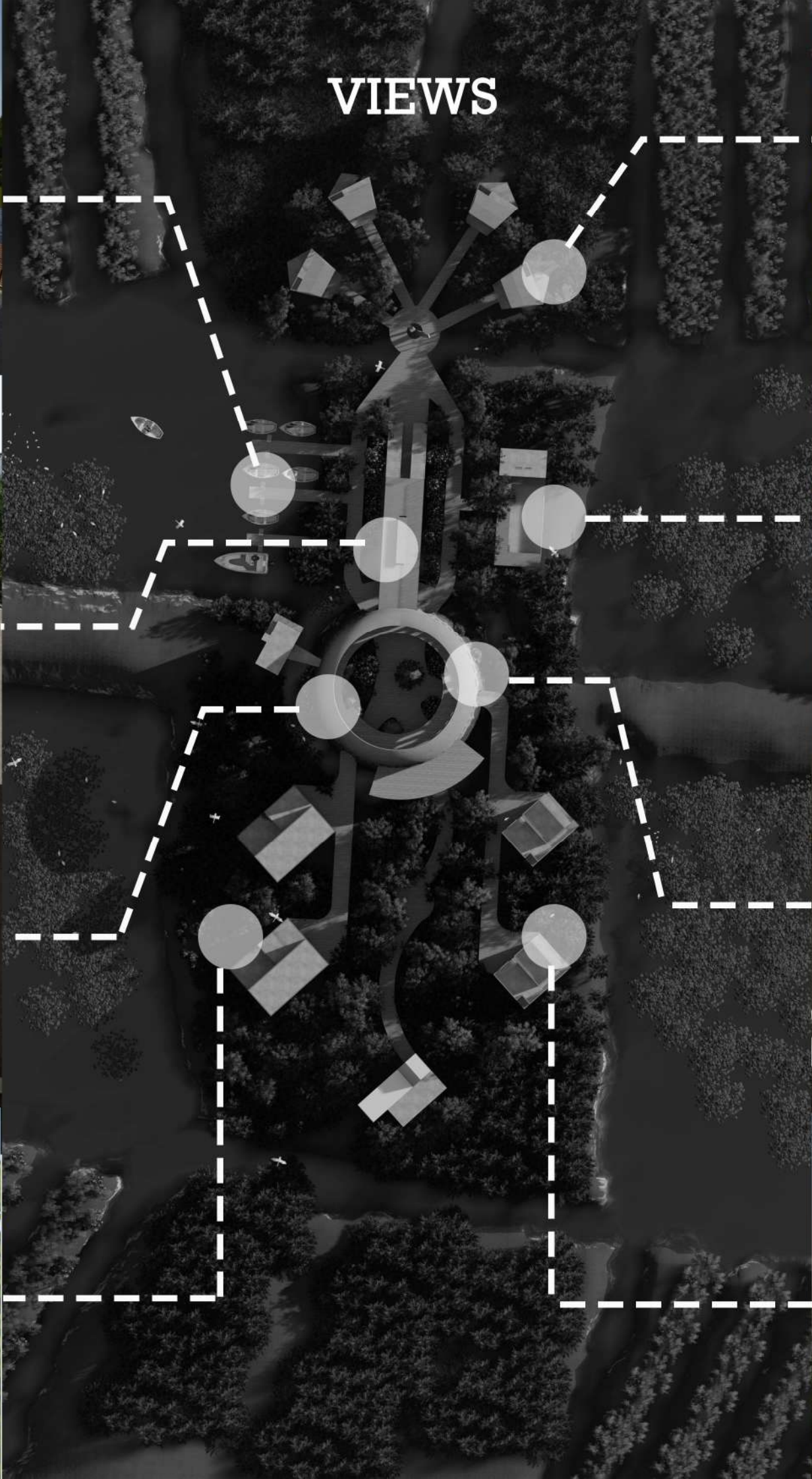
EXHIBITION AREA



WEST WELL



FAMILY DOME



VIEWS



SINGLE DOME



POOL



EAST WELL



COUPLE DOME

RENEWABLE ENEREGY IN DESIGN

RENEWABLE ENERGY IS REFFERED A ENERGY COMES FROM NATURAL SOURCES WHICH NEVER END OR KEEP REFILLING. SUN, WIND, WAVE ENERGIES ARE SOME EXAMPLES FOR THE RENEWABLE NATURAL SOURCES. RENEWABLE ENERGY IS OFTEN USED AS COMMON FACTOR IN DAILY USE TO AVOID SPENDING IN UTILITY INFRASTRUCTURE. WE ALSO WIL BE USING IT FOR SAME ADVANTAGE.

AVOIDED RENEWABLE ENERGY SYSTEMS

SOLAR PANELS - SOLAR PANEL REFELECT UV RAYS. WHICH MAKE DIFFICULTY TO SEE FOR BIRDS. IT COULD EVEN END UP BY COLLIDING WITH SOLAR PANEL. THREATS ARE SO HIGH. COULD BE A DISASTER FOR BIRD HABITATION.

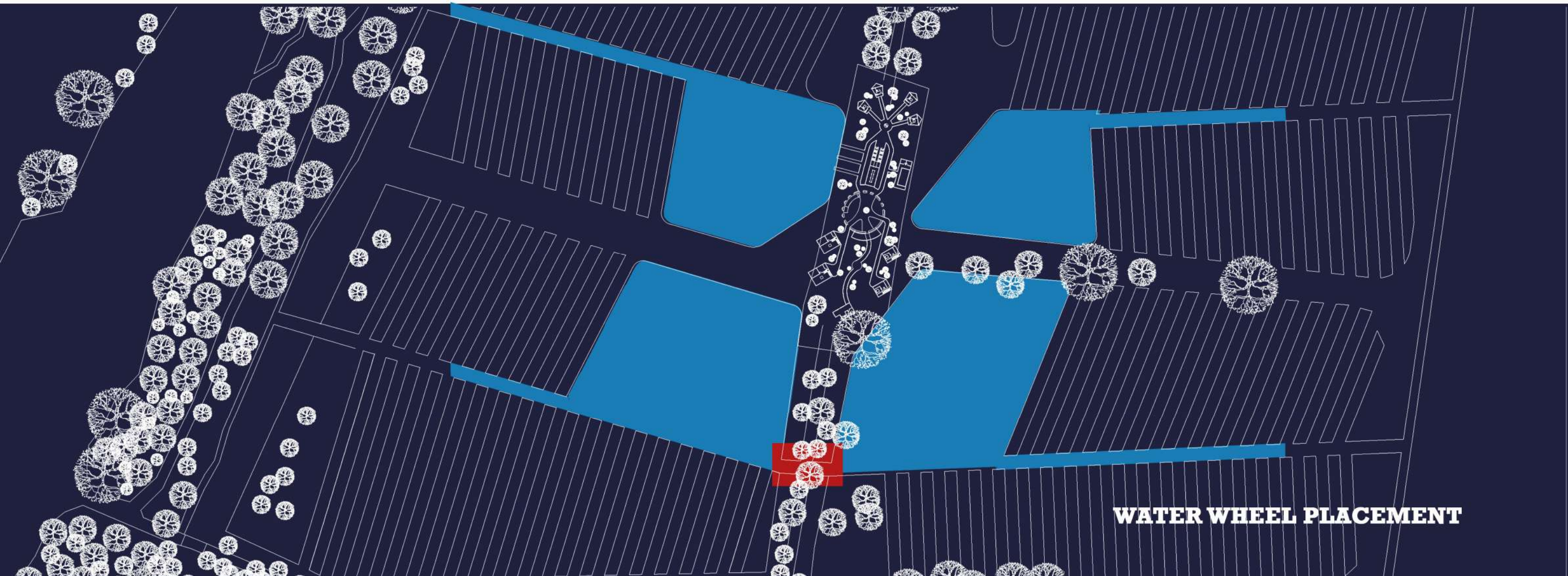
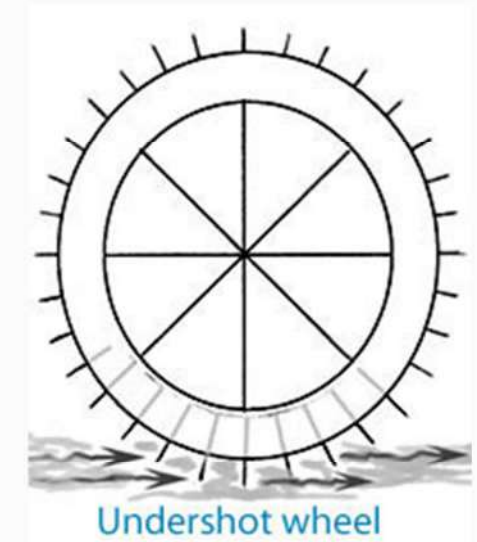
LARGE WIND MILLS - THREATS FOR BIRD ARE HIGH. IMPACT OF PLACING WILL RUIN THE CONTEXT.

WATER WHEELS

THERE ARE THREE TYPES OF WATER WHEELS. WE WILL BE USING **UNDERSHOT** TYPE WATER WHEEL. USING THE PROPOSED WATER BODIES, WE CAN PLACE THE WATER WHEEL IN THE CONNETION TWO FARM LANDS. WHERE THE WATER WILL ON RUNNING. WE CAN USE THE FORCE OF RUNNING WATER TO PRODUCE ELECTRICITY. THIS TYPE WATER WHEELS HAVE ONLY 20 % EFFICIENCY.

INVOLEMENT IN DESIGN

BY INTRODUCING MEDIVEL PERIOD METHOD OF RENEWABLE ENERGY WILL ATTRACT MORE PEOPLE TO WATCH IT. WHICH CAN BRING MORE VISITORS INSIDE THE SITE AND MAKE THEM MOVE ALONG TO RETREAT.



COLTH WIND TURBINES

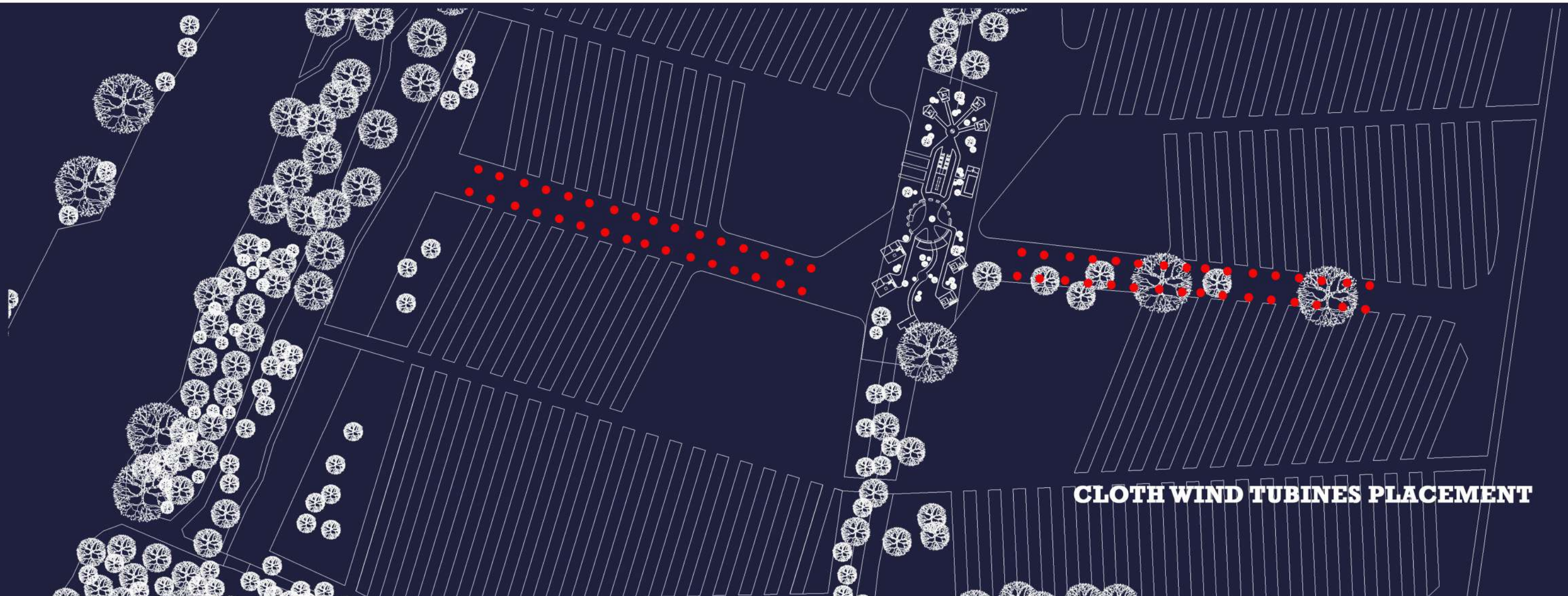
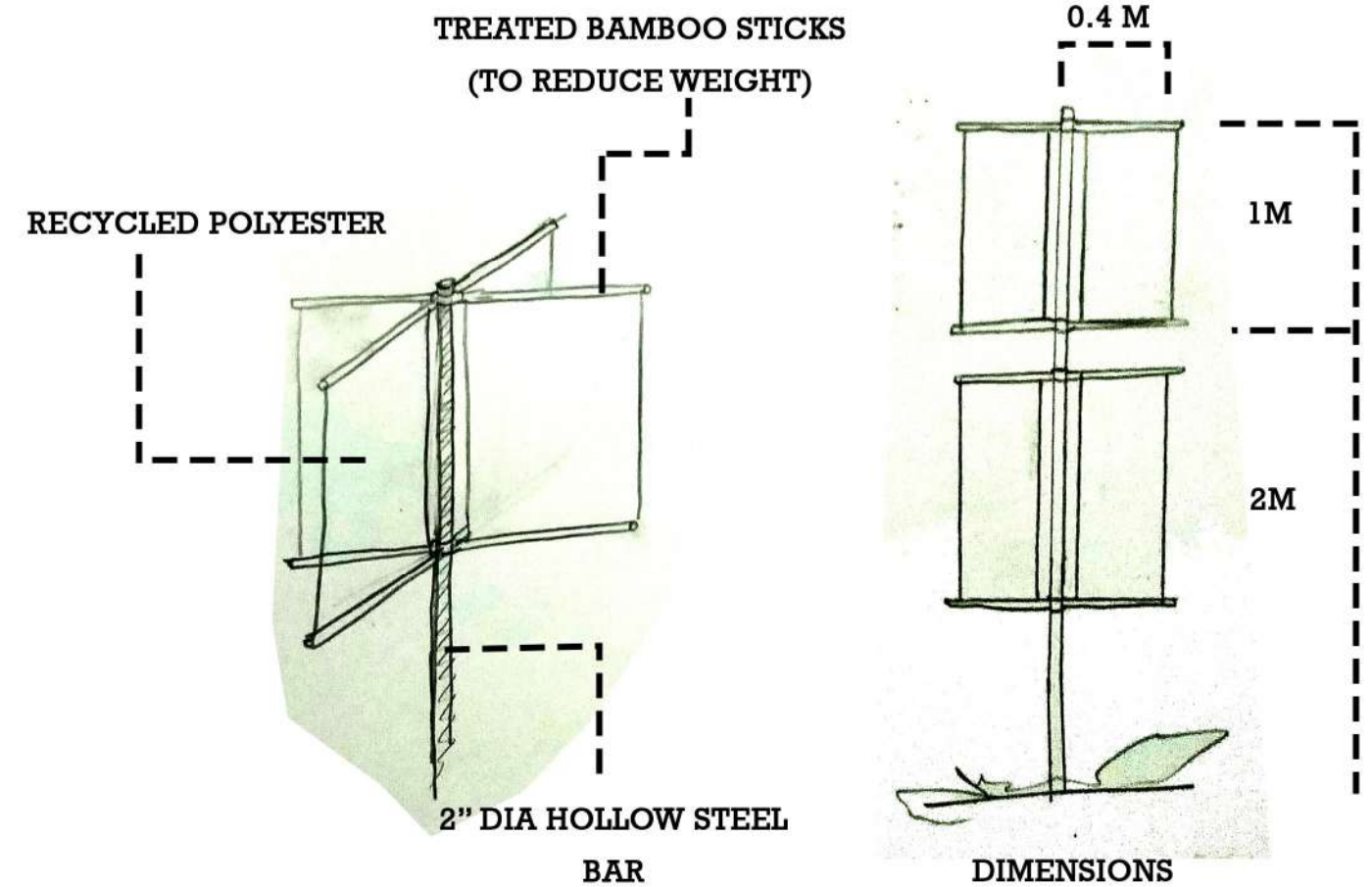
THE BIGGEST SOURCE AVAILABLE IN ANAWILUNDAWA IS THE WIND SOURCE. BUT PLACING LARGER TURBINES CAN BE THREAT TO BIRDS LIVELIHOOD. BUT INSTEAD OF LARGER TURBINES CLOTH TURBINES CAN BE USED TO AVOID THE ACCIDENTS AND CREATE AN ENERGY SOURCE. THIS WILL BE A SUSTAINABLE RENEWABLE ENERGY SYSTEM BECAUSE OF ITS MATERIAL USED TO BUILT IT.

MATERIALS:

2" DIA HOLLOW STEEL BARS - USED AS THE SUPPORT STRUCTURE OF TURBINE.

RECYCLED POLYESTER - USED AS THE CLOTH

RECYCLED POLYESTER IS WIDELY USED IN TEXTILE INDUSTRY. ITS AN ECO- FRIENDLY WATER PROOF FABRIC MATERIEL. WHICH IS MANUFACTURED FROM PET BOTTLES AND USED COLTHS. USING IT FOR TURBINE AS A GREAT ADVANTAGES LIKE LOW COST, REPLACEABLE AND RECYCLABLE.



MATERIALS

IN A DESIGN THE MATERIAL SELECTION PLAYS A KEY ROLE. WE SHOW EMOTIONS, SCENE, HISTORY AND EVERY THING THROUGH THE MATERIAL OF A DESIGN. IN OUR DESIGN THE STRUCTURE NEEDS TO MORE ECO-FRIENDLY TO COMBINE WITH NATURE AND CURRENTLY ACCURING BIRD HABITAION AROUND THE SITE CONTEXT. AND THE CONSTRUCTIONMETHODS NEEDS TO BE LESS IN DAMAGING SITE AND MATERIAL WASTAGE.

CONSTRUCTION MATERIALS:

- * ADOBE
- * RAMMED EARTH
- * BAG CONSTRUCTION
- * WOOVEN COILS
- * COMPRESSED WOODS
- * THATCH
- * TREATED TREE TRUNKS
- * CONCRETE
- * STEEL

MOST OF THE SOURCE FOR THE MATERIALS WERE GATHERED FROM THE SITE AND CONTEXT.

ADOBE	- MUD, STRAW, RUBBLES
RAMMED EARTH	- MUD CLAY
BAG CONSTRUCTION	- MUD, SACKS
WOOVEN COILS	- COCONUT HUSK
THATCH	- THATCH
TREATED TREE TRUNKS	- COLLECTED FROM TRIMMED TREE OF BUILD AREA

RAMMED EARTH STURCTURE IN RETREAT



MUD

MUD IS THE KEY MATERIAL I HAVE CHOOSE TO SHOW MY IDEA THROUGH DESIGN. TO REPRESENT ' WASTE TO MASSIVE '. THE MUD WILL BE GATHERED FROM THE PROPOSED WATER BODIES. THE DEPTH OF THE WATER BODIES WILL BE UPTO 2M. SO INSTEAD OF PILLING THOSE MUD AND WASTING, IT CAN BE USED FOR CONSTRUCTION. WITH THIS IDEA WE CAN REDUCE THE MATERIAL WASTAGE AND CREATE A SUSTAINABLE WATER BODIES. THE WATER BODIES CAN PROVIDE THE NEEDED AMOUNT OF CONSTRUCTION MATERIAL. THIS WILL RESULT **SUSTAINABLE MATERIAL USAGE.**

CONSTRUCTION METHOD USING MUD AS A MTERIAL CAN BE MASTERED EASILY. THIS WILL PROVIDE THE LOCALS A JOB OPPURTUNITY, WHICH CAN BE DEVELOPED AND APPLIED IN LOCAL COMMUNITY.

THROUGH THIS MATERIAL I WANTED CREATE A FEELING OF RURAL AND LUXURY CONTEXT IN RETREAT. THE RURAL WILL BE SHOWN BY THE TEXTURE AND LUXURY WILL BE FELT BY THE COMFORT FROM MATERIAL. MUD WILL ABSORB THE MOISTURE AND RELEASE IT IN HOT CLIMATE. THIS WILL BE A MAIN ADVATAGE OF USING THE MUD AS MATERIAL FOR RETREAT. HUMAN CROWDED AREA ALSO CAN BE PRESERVED COMFORT BY MUD. MUD AS ZERO CARBON FOOT PRINT. SO THE AFFECT TO ENVIRONMENT IS ALSO LOW. THIS REPRESENTS THE ECO-FRIENDLY AND SUSTAINABLE CHARACTER OF THIS MATERIAL.

OTHER MATERIAL COLLECTIONS

* THATCH- CAN BE COLLECTED FROM THE PADDY FIELDS IN ANAWILUNDAWA AFTER HARVESTING PROCESS. FREE OF COST. ANOTHER SUSTAINABLE MATERIAL AVAILABLE IN ANAWILUNDAWA.

* SACK - CAN COLLECT THE SACKS FROM FARMLAND AFTER USE OF TRANPORTING WEEDS AND SOIL.

* COIL - CAN BE PRODUCED FROM COCONUT HUSK. CURRENTLY IN ANAWILUNDWA THEY ARE PRODUCING COILS FROM COGNUT HUSK