

**PRESENTATION PANEL**

UNIVERSITY OF BRIGHTON  
MING HUNG DAVIS MAK  
MARCH 2 | 2019-2020

STUDIO 02 | SIMON BEAMS | OMID KAMVARI

### Manifesto

Architecture has long been designated as a structure for humans, setting borders to nature. In other words, architecture tends to force nature to adapt to man-made infrastructure. The negative impact of the traditional building industry on the environment appears to create an ecological crisis. A possible alternative approach to architecture is to co-design with nature. Projects in co-designing with nature are often prototyped at the scale of the branch and tree. Co-designing at architectural scales is less convincing in the context of designing with the eco-system.

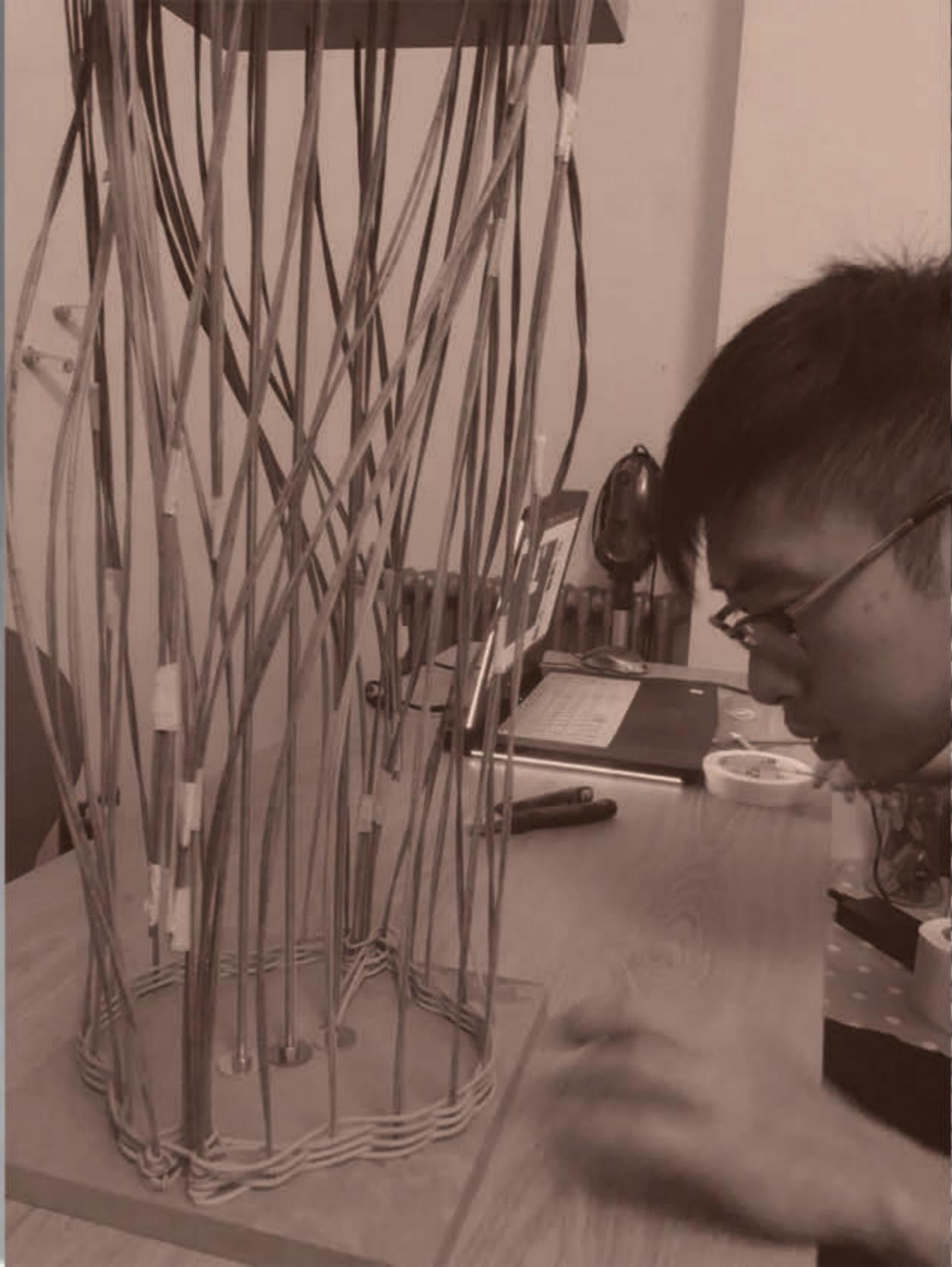
Co-designing with nature has been successfully prototyped at small scales. At a building scale, the incorporation of 'green' elements is not incorporating the eco-system in a meaningful sense. In this research study, I am exploring the integration of a forest eco-system with a tower typology as a provocation, questioning how co-design strategies might be applied on a more architectural scale. Theoretical research regarding the relationship between nature and culture, together with studies of existing co-design projects, form the basis understanding of what co-design could be. The research is formed by series of drawings and prototyping which helps to explore the concept of co-design. They are the methodology of how I interpret the strategies of what co-design could be in a tower typology. The result helps to address the question of how co-designing with nature could work on a large architectural scale. Living soil is one of the proposals that helps to introduce the eco-system. Building material and structural system could be integrated with the living soil which generate a continuous development of eco-system. Human interaction also plays a critical role in seeding the development. Moreover, our perception of nature is important in exploring the conduct of co-designing with nature. It creates new understanding of nature and culture which also identifies the current ecological crisis. The proposed concept of co-designing with the eco-system reveals that architecture is the medium of culture to nature. The research then leads to a more in-depth understanding of ecology and of a system that works with it.

## Harvest Festival Intangible Heritage

In ancient english word, harvest means haerfest - Autumn, which it states the season for gathering the food for both land. This crucial time of the year is exceptionally extraordinary within the past when the success was a honest to goodness matter of life and passing. The total community/life cycle includes creatures, would depends on the harvest of the crops to outlive through the cold winter. Food market and stall is one of the conventional celebration within the harvesting festival. Individuals would give out and share their nourishment with others. Eating geese is one of the convention because it was said to bring financial protection for the following year. Corn dolly is made in several shape as a social representation of the goddess of the grain, and put within the cultivate as a sense of luckiness to the another collecting season.

With the development of the innovation, less and less man-power was contributed to the collections/harvesting of the crops. Genetic modified crops were created to resist the extraordinary climate conditions caused by the climate alter. The food we gotten not gather in harvest time. Ready to purchase varies sort of food in year round. We are taking the harvesting item for granted. With the climate alter, rural arrive would certainly be influenced. Over populace are giving raise to the nourishment frailty of the world. Uneven distribution of resource will become a major issue. Balance between populace and food are my key interests in this proposition which I would like to examine the concept of vertical agricultural tower with livable space.



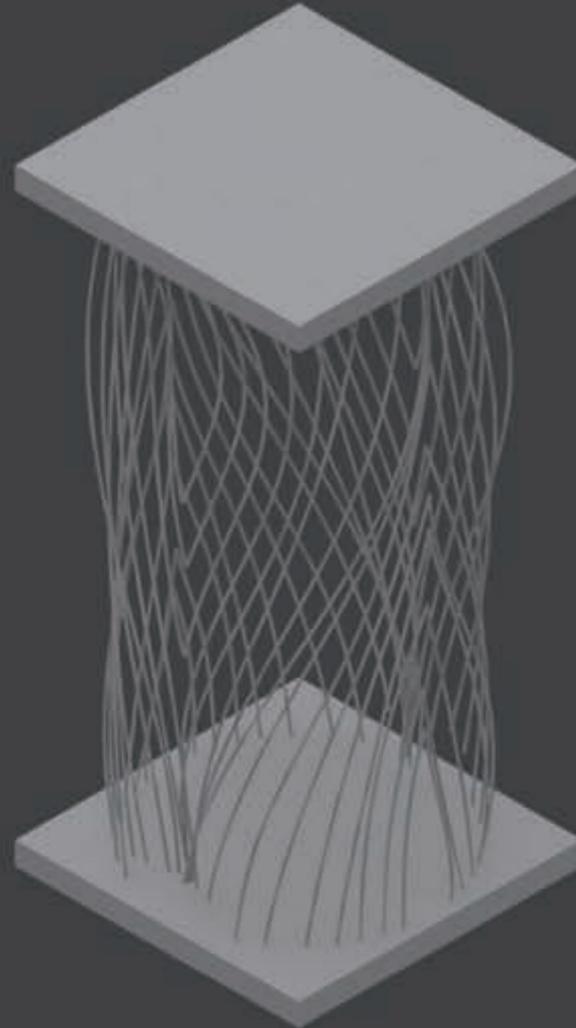


## Prototype Structural Formation

In the development of the totem, I made a spiral concept model to observed the spiral formation of the corn doll in 3 dimension, from that it starts to generated an idea of how the totem could be formed in an abstracted way of representation in both symmetrical and spiral form. The vertical symmetry of the sketches would be benefit/better representation of the connection and the inverted triangle concept of the proportion between human population/ animals / crops. The spiraling of the pattern is created in stacking the wood sticks in turning direction from every level. The spiral pattern is generated from a large turn in relation to small one on the top.

In the development through the rhino modeling, I was trying to test on the twisting angle between the center point. The twisting angle of the totem that I used is 45 degree in a quarter section so as to give symmetry to the totem form. At the first 3D model, I was using the mentioned method to build a twisting/spiral form work with connection between each of the twisting line.

The second model was made to push the boundary of adding in the concept elements and the junction between two symmetric form. A repetition of the twisting line which is connected throughout the edges. Then, I refined the repetition of the twisting angle and relatively soft edges. The totem is then formed.



Vertical Symmetric Structure  
Formed the Organic Shape  
Twisting Form is circle twisting in 45 degree  
Mixing in two different size  
Two horizontal plane acts as foundation

Skeleton Structure  
Totem Prototype

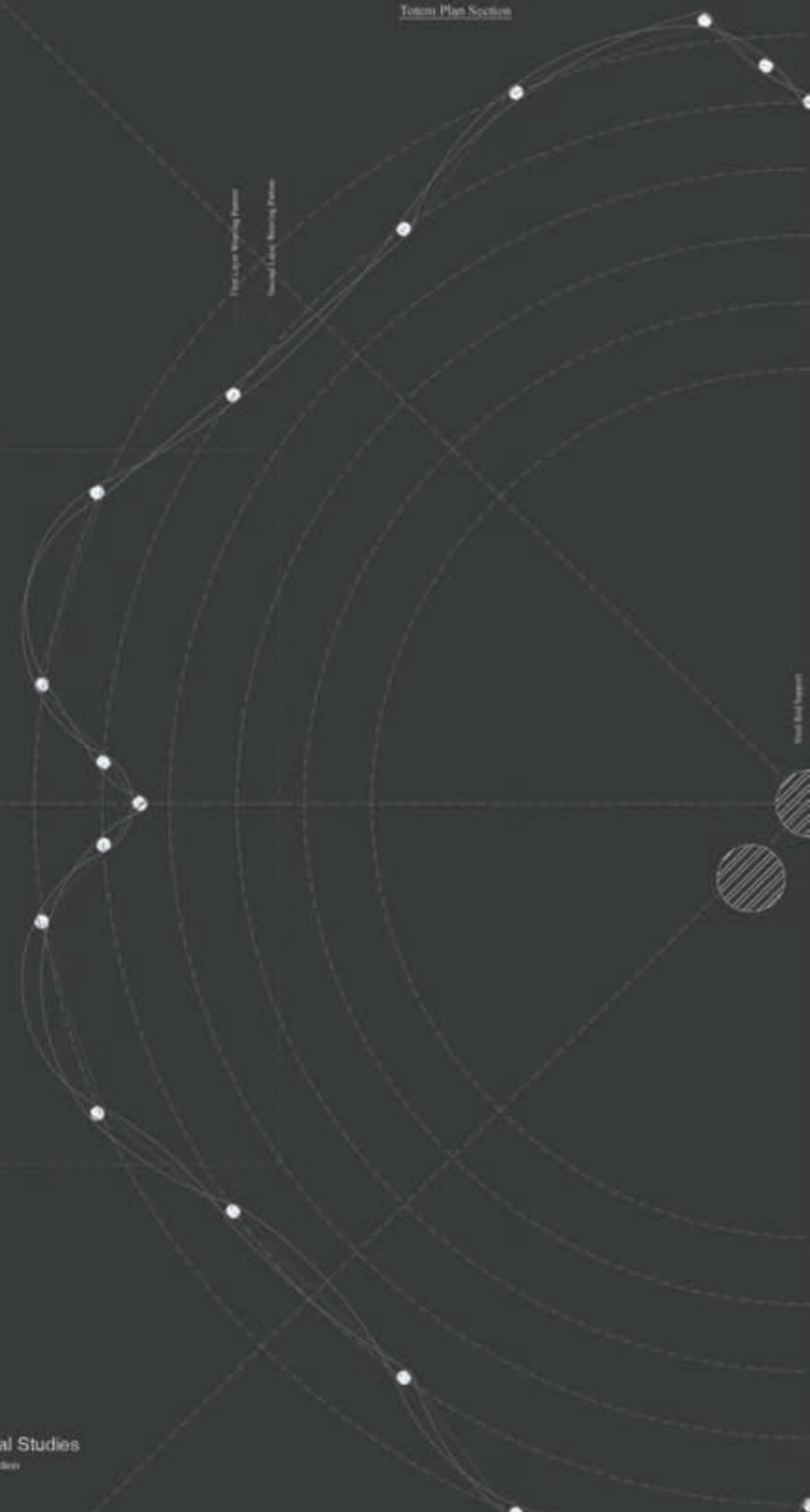


1. The distance between the two vertical supports will have influence bending angle of the center point. The center distance more difficult to build with the same diameter between the two vertical supports.

2. The structure is held by the compression of the strength of the column used in both directions. It gives the strength by twisting on the basis of compression.

Skeleton Detail

Weaving Technical Studies  
Totem Cross Section



Top Layer Weaving Pattern  
Bottom Layer Weaving Pattern

Totem Plan Section

Top Support

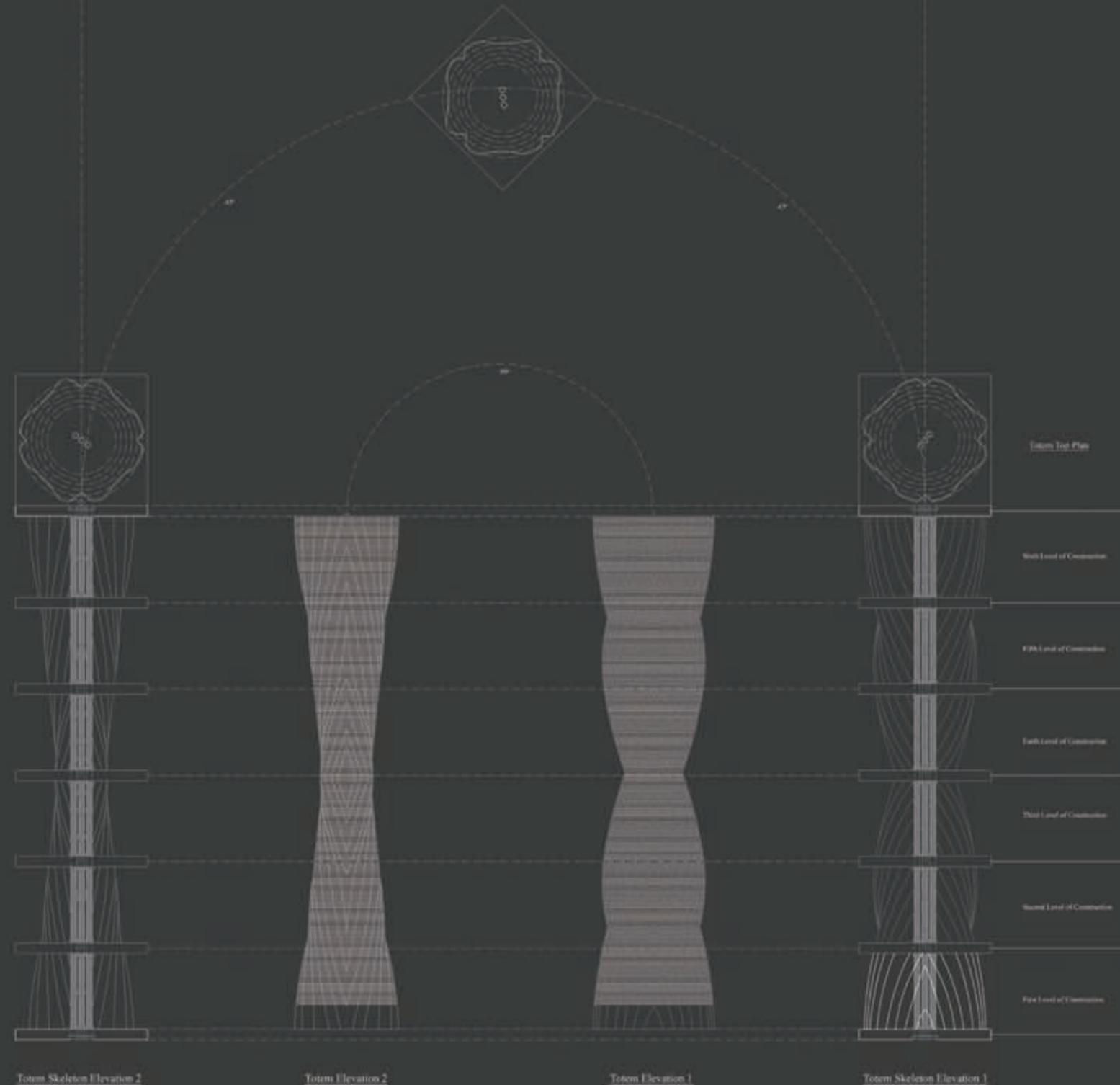
## Technical Drawing

### Totem | Structural Formation

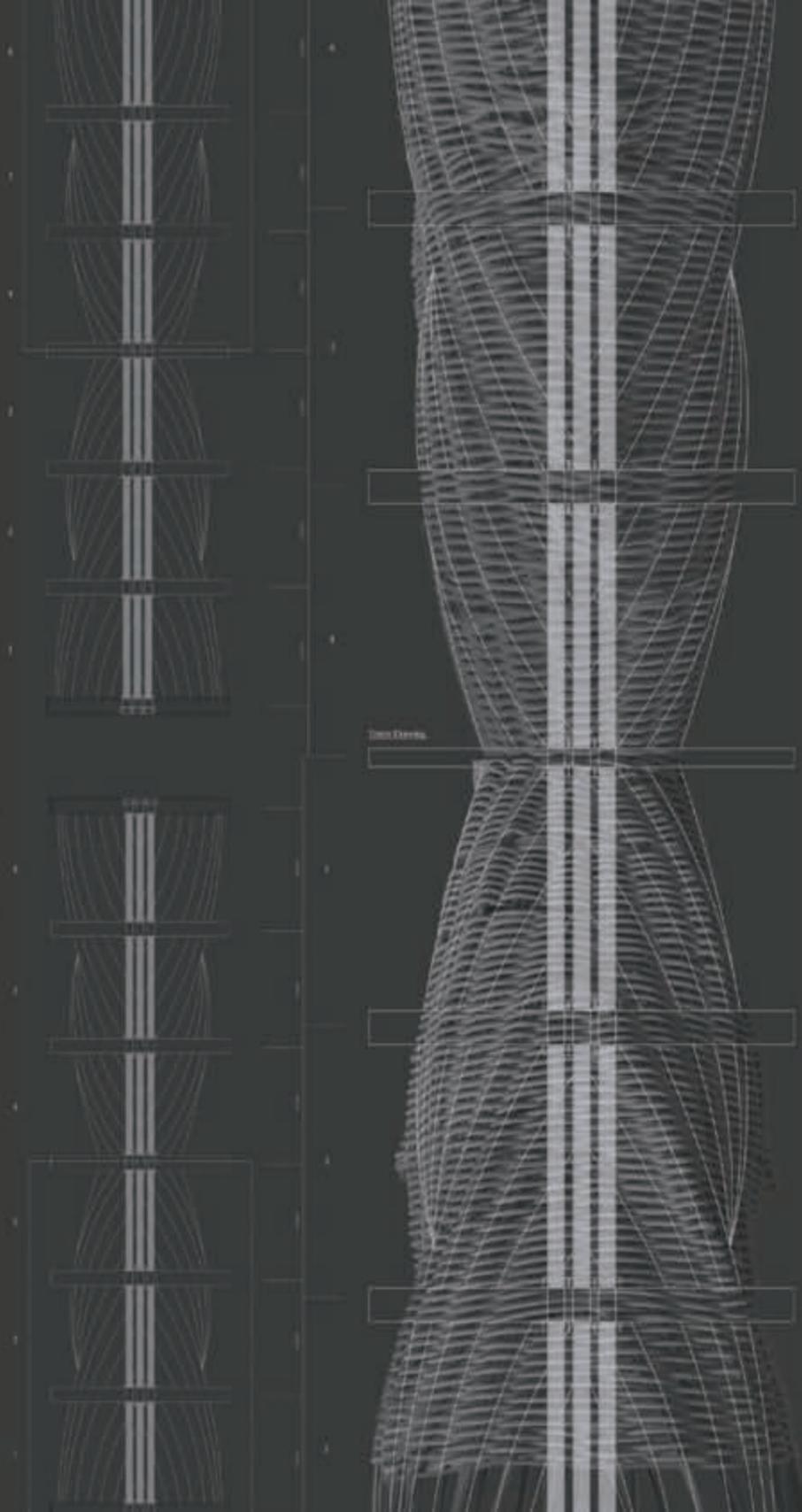
It recaps the structural concept from Zaha Hadid vase form in which I have studied its composition of the geometry is based on repetition the same curvature in two different axis. And they are connected to form a circular geometry to become a vase. The study gave a basic understand of the first geometry that I have investigated. Then I used the 3D software to create my own interpretation of the geometry and form begin to form the basic form of my totem. The difficult part of this study is the curvature part of the surface, which then it also contain two layers, internal and external surface area of curvature.

The material I found to used on weaving is the rattan reed. The prototype of the totem is used to tested on weaving technique on the organic form structure which based on the concept of twisting in four different direction in one axis. The vertical element which I used willow to perform a better strength on the properties withstand the skeleton structure. And the rattan is then weaved around the skeleton form of structure, it then form the organic structure around the based.

With the same methology of building the prototype, the final totem is built with the twisting form of the skeleton. But then it has an accident when building the final totem. When I completed the first half of the totem, I tried to scale down the no. of the skeleton that required to build the structure. But then, the result came out to be straighten and flatten the texture. The hypotheses of the limitation result to be affected by the scale, diameter of the rattan reed, the no. of the vertical structure that form the pixel of the texture



Totem Elevation  
Totem Elevation



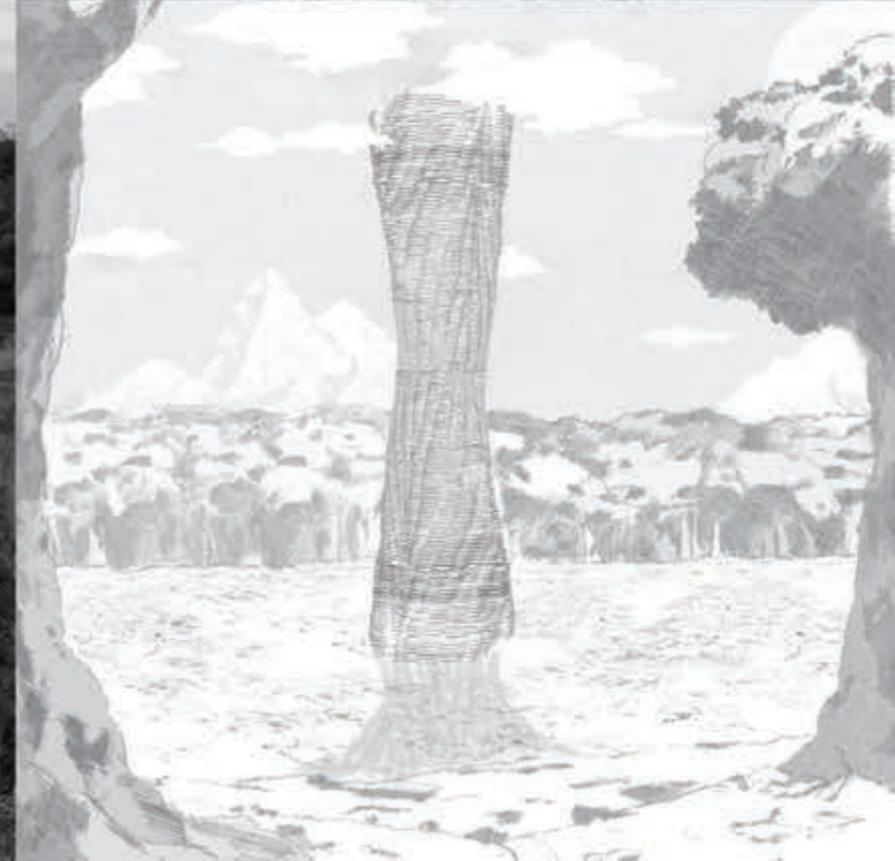
## Habitats for Wildlife

### Totem | Ashdown Forest

The Totem structure on site provides spatial for local species to live within. The structure of a totem is formed as a tree for the growth of the organism, includes plant, Ivy, nest for bird. Soil could put within the hollow tube structure and the plant could grow out of the structure.

The development of the collage shows different scale of the totem that represent different stages. The idea of a cohabitation tower between nature and culture could be a way to develop the program of the proposed design.

What if the tower is developing its own eco-system which human could also inhabit within the space? This could bring a new way of introducing the idea of co-habitation between nature and culture which architecture is always shown as a divide. It is a way of co-working with nature, engaging with the landscape and restore the bio-diversity in the forest.



# ADDITIONAL PRECEDENT STUDY - Elephant House, London Zoo

Year : 1962

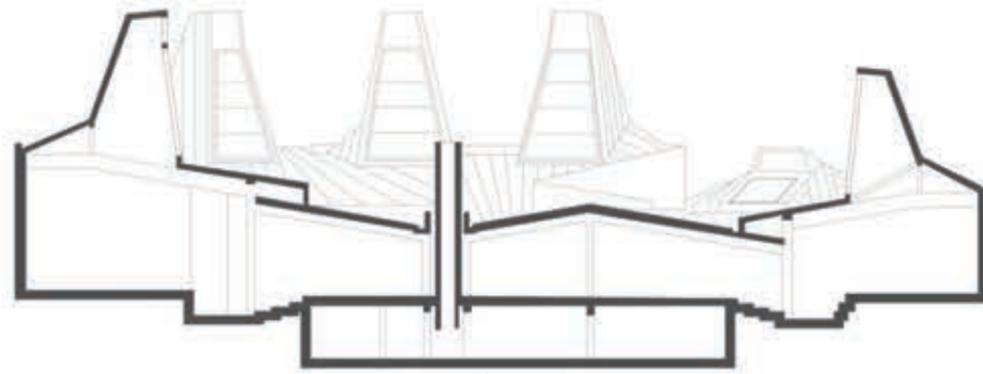
Architect/s: Sir Hugh Casson, Neville Conder and Partners

Address: LONDON ZOO, REGENTS PARK NW1

Reinforced concrete, with ribbed walls in three main pours - the rubbed texture designed to prevent the animals rubbing up against them and injuring either party - and inner brick skin; conical copper roofs. The complex is set within walls, ditch and raised paddock enclosure of purple brick, with purple brick pavours and plinth. Internally the animal pens are lined in mosaic, whilst the public spaces are spanned by laminated wood beams set in metal shoes. The tough finishes are carefully considered, tactile and well detailed, and are an important component of the buildings exceptional quality.

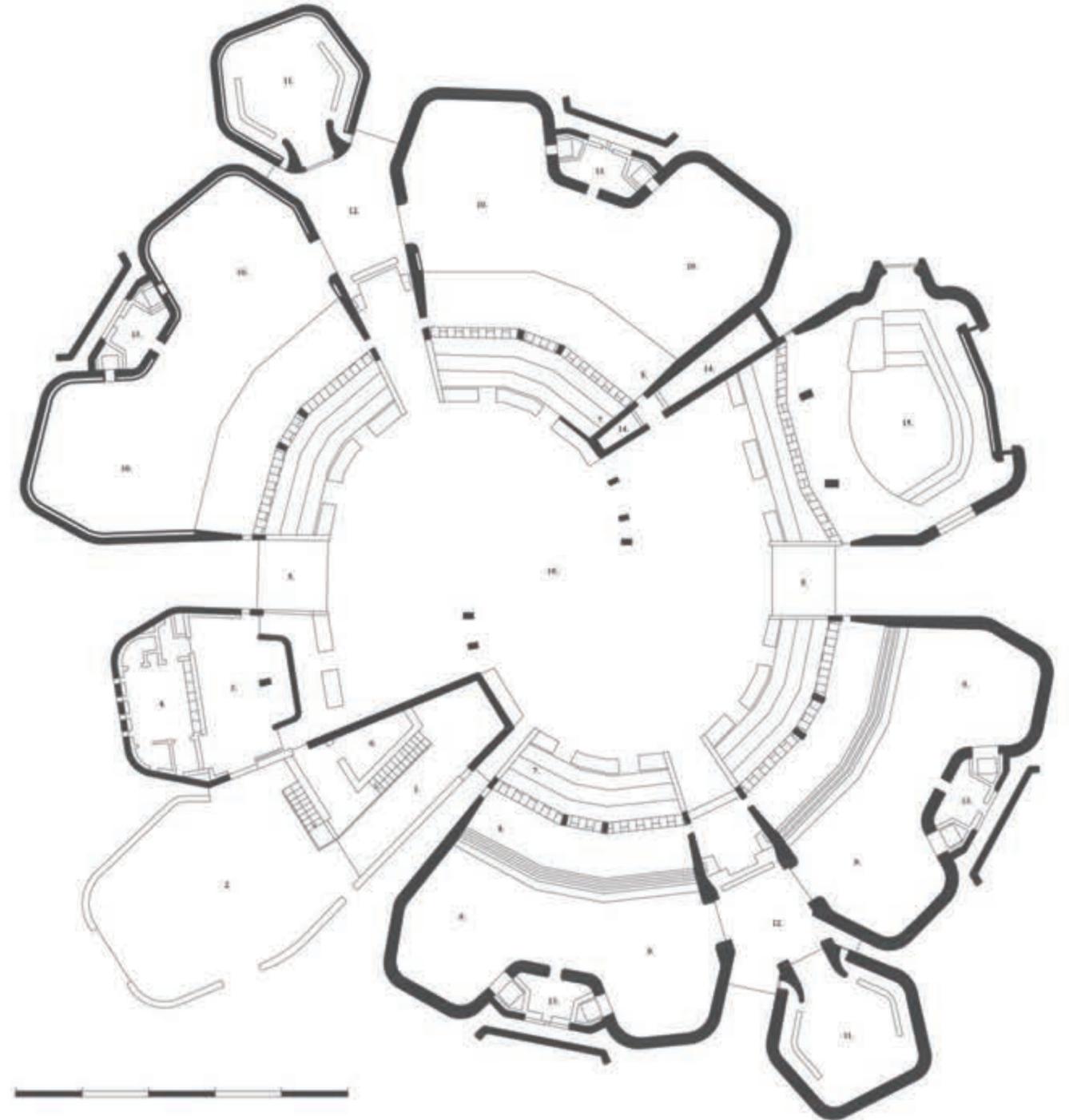
The Elephant and Rhino Pavilion was one of the earliest and most important buildings erected at London Zoo following Stengelhofen and Casson's Redevelopment Plan of 1956 (q.v. Snowdon Aviary), commissioned by Lord Zuckermann. It reflects Casson and Conder's long experience of exhibition design, for it was conceived deliberately 'to display these massive animals in the most dramatic way' (Zoological Societys press release, January 1962). In this the building continues the idiom established so successfully he neighbouring Penguin Pool (Lubetkin and Tecton, q.v), with the architecture of the buildings reflecting the character of the animals they house, and encouraging them to display themselves. 'Elephants are such architectural animals that there is a temptation to look at a building housing them as a kind of analogy of themselves. This building, for example, could be described in terms of its massive curves, its wrinkled hide and its curious silhouette', wrote J M Richards in the 'Architectural Review'. The contrast between this and the featherweight, soaring form of the Snowdon Aviary is telling. No wonder that Ian Nairn likened the Zoo to an 'architectural Tower of Babel'.

1. Ramp from service Yard
2. Service Yard
3. Mess Room
4. Staff Lavatories
5. Public Entrance
6. Store
7. Observation Tiers
8. Animals Ditches



Section  
Hugh Casson

9. Rhino Dens
10. Elephants Dens
11. Sick Bays
12. Den Lobbies
13. Drinking Trough Areas
14. Main Rising Ducts
15. Elephant Pool
16. Public Space



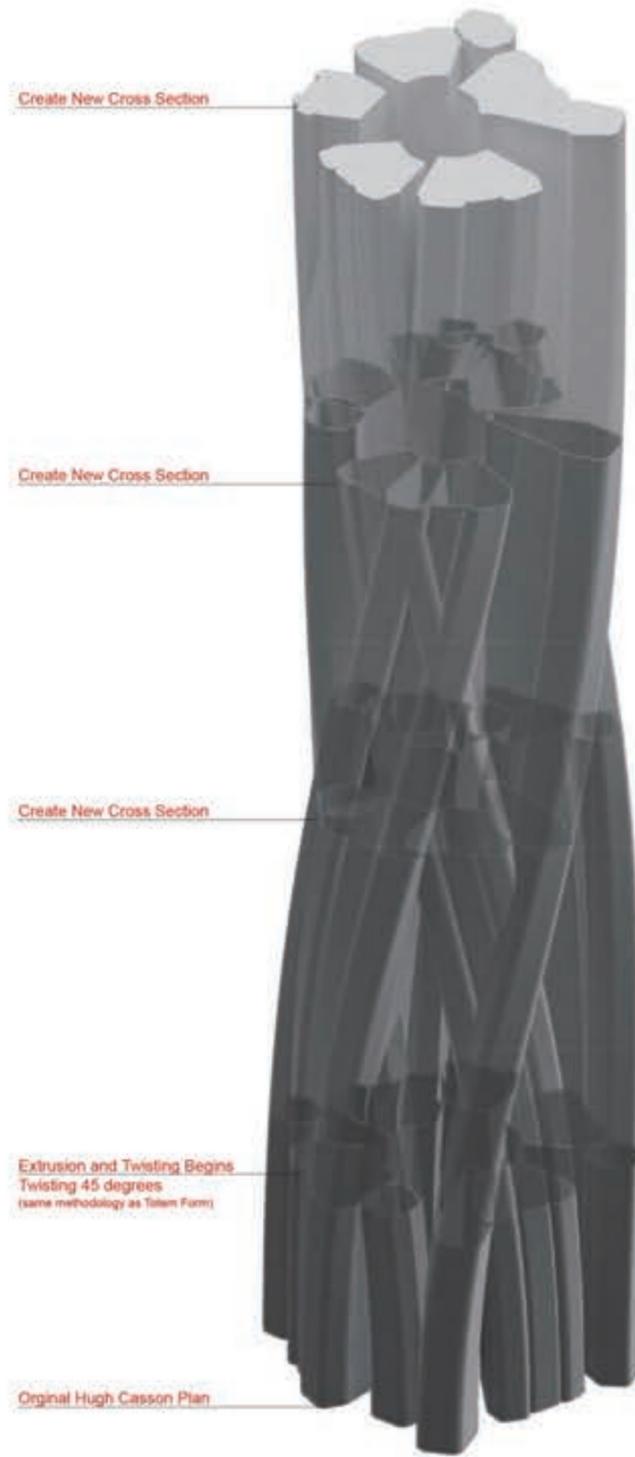
Plan  
Hugh Casson

## Hybrid Tower Structural Formation

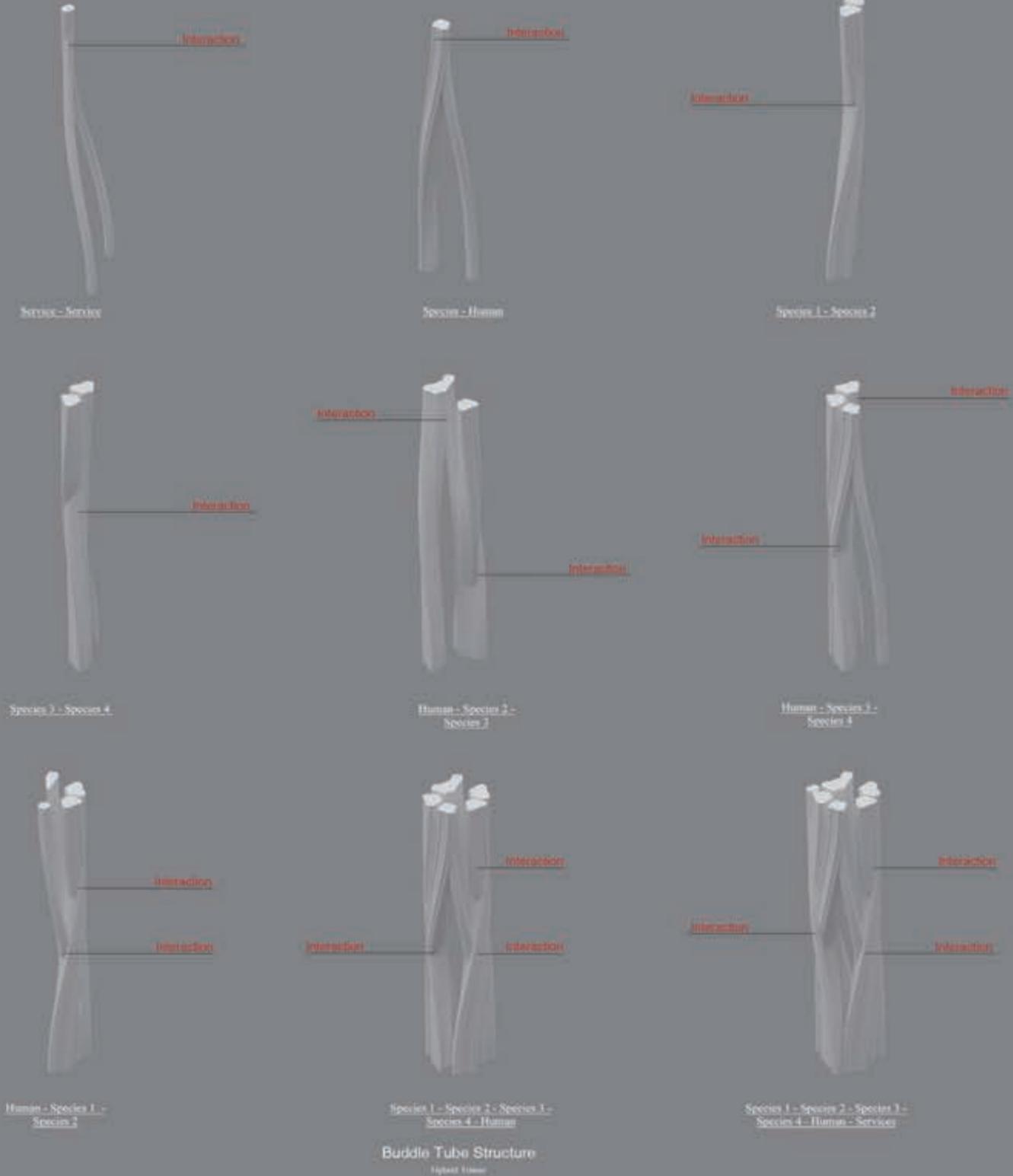
From the information that both precedent studies provide, I was approaching the hybrid tower with the combination of the plan of the elephant house in London Zoo and the structural formation of the totem.

I am extruding the plan of the functional spaces of elephant house and twisted them into 45 degree according to the vertical support of the totem. The purpose of that is to combine the twisting element to the plan of elephant house to create a hybrid tower in the form aspect. The interaction of the twisting of the function spaces is very interesting as in the program point of view. The future program of different inhabitable spaces within the tower are crossing over with one and other to create interesting interaction of the spaces, how different species co-exist with one and other when their spaces / territories are crossing over with one and other.

Then, it links to the thesis of me investigating the human impact on the eco-system when the boarder and boundaries is getting narrower due to the climate change. How do the species react when their territories are crossing over with one and other. The following study will focus on the form and geometric through the extrusion of the vertical form element and the horizontal plate is formed. The intention of this study is to understand the solid and void of the hybrid tower.



Buddle Tube Structure  
Hybrid Tower



Buddle Tube Structure  
Hybrid Tower

With the development of the form being extruded and twist into the hybrid formation, the study is then began to carried out into different level of plate. As tradition way of forming the tower is begun by separated the form into scaled floor level and then developed into a much more complex formation structure. So, I began with splitting the floor into 11 plates, and start to investigate it with a physical model. The prototype of the 11 floor plate is describing the original intention of the totem as the vertical support structures are holding up with tension of the string, and the weaving part is holding up the structure with compression. The prototype of it creates a new perspective of how I am seeing the tower structure. Other element that catches my eyes is the material that used to build the tower.

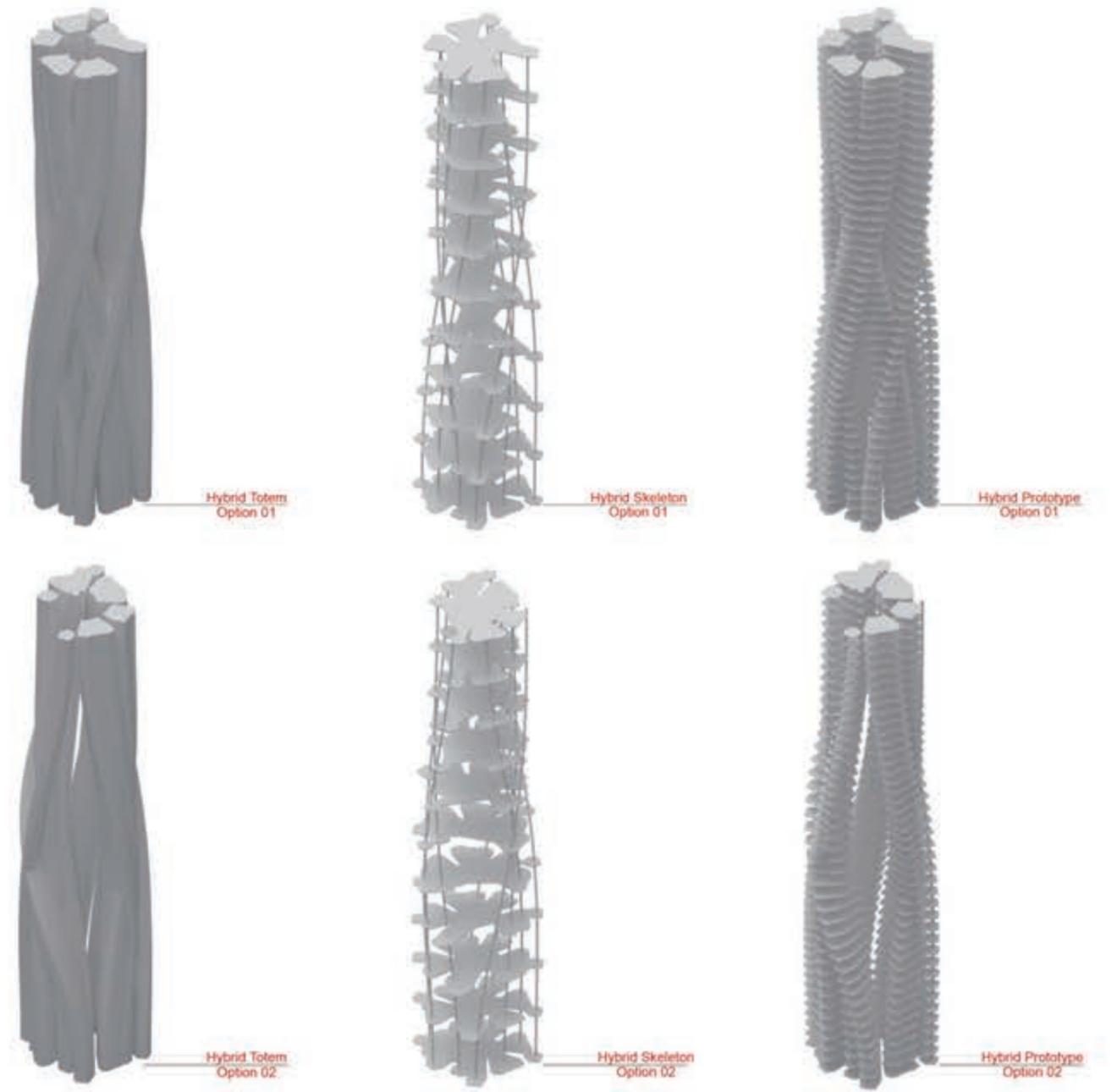
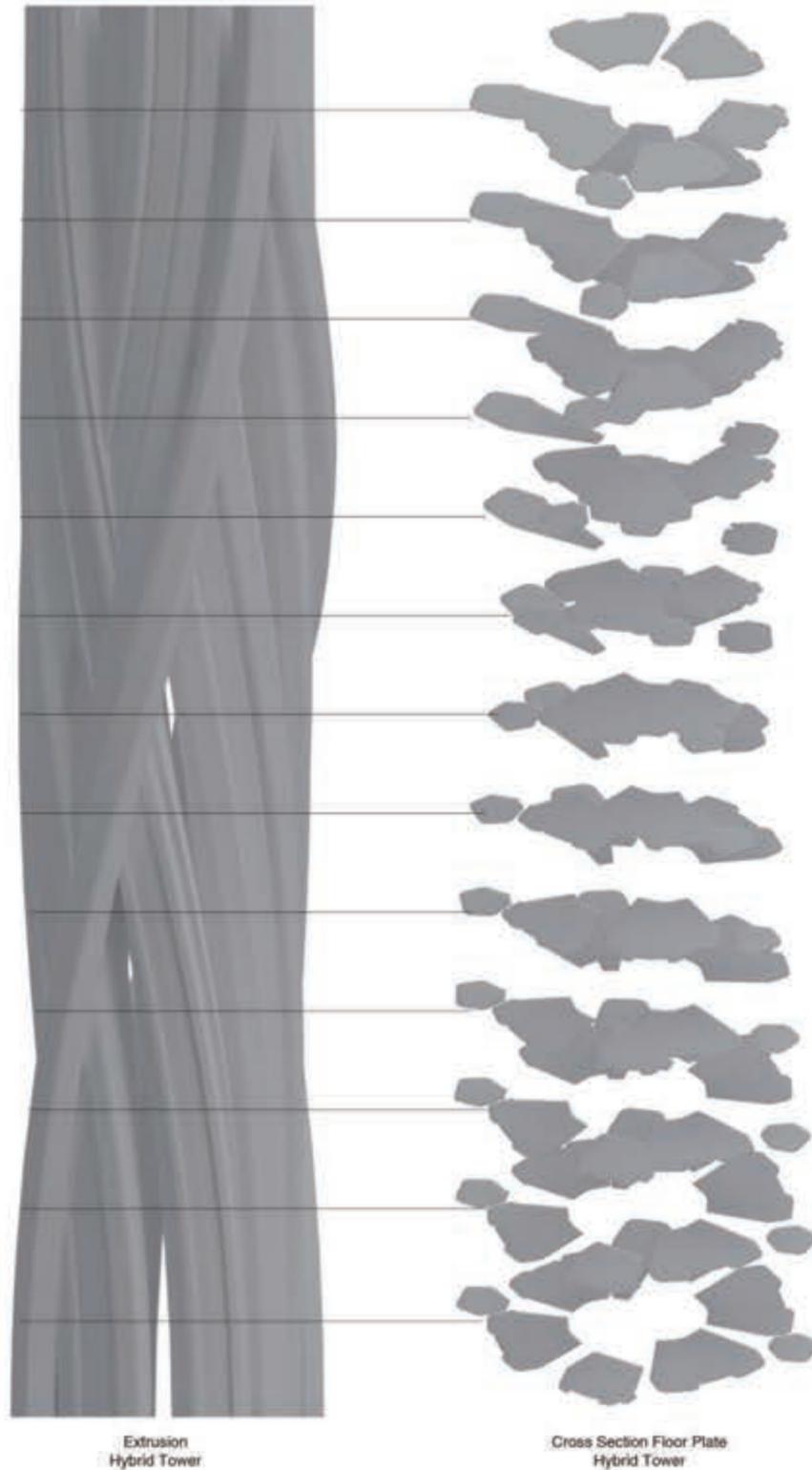
**The criterion of the prototype:**

The structure is amazing. But the central part of the plate is somehow connected to give strength for holding up the structure, which is not necessary. I believe the plate could hold up by itself even though there are no connection with the central part. The interesting and elegance form is in the next stage of the development.

The Prototype study which led me to another stage of creating a better elegance form of the twisting structure. I am going to create the form out of wood for the vertical supporting structure and hold it with the tension of the plate.

**The criterion of the hybrid concept tower:**

The form is very elegance as it reflects the beauty of the plan of the elephant house and the totem itself. But the horizontal plates are very two-dimensional as it does not give out the sense of space within the structure. I would like to see the space that you create after the model has been built. The floor plate form of the hybrid does give a sense of commercial tower building form which could not give a sense of interaction and spatial quality to the design. It is a very beautiful elegance, but could find a better way to design. maybe starting from the investigation of the program of the building? Who are the stakeholders? Could be investigate with more in depth details on the relationship. A very attempt on the first iteration of the hybrid tower, looking forward to the next stage of the research and design thinking/process.



Hybrid Tower Development  
Hybrid Tower



**'Playing'**  
Hybrid Tower Model

With the development of the form being extruded and twist into the hybrid formation, the study is then began to carried out into different level of plate. As tradition way of forming the tower is begun by separated the form into scaled floor level and then developed into a much more complex formation structure. So, I began with splitting the floor into 11 plates, and start to investigate it with a physical model. The prototype of the 11 floor plate is describing the original intention of the totem as the vertical support structures are holding up with tension of the string, and the weaving part is holding up the structure with compression. The prototype of it creates a new perspective of how I am seeing the tower structure. Other element that catches my eyes is the material that used to build the tower.

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Model  
Hybrid Tower



Model  
Hybrid Tower

Void

Wood Support

Polycarbonate Tube

Laser Cut MDF

Void



**'Habitats'**  
Ashdown Forest

With the research of the wildlife eco-system, I wonder what position humans are standing while facing the change of the climate. As the past millennium, human has been conquering the world, being the top of the food chain, building a huge concrete city, isolating ourself from nature. But due to our rapid development of technology, pollutions have caused global warming which leads to serious and extreme climate change. Humans can no longer isolate or separate ourselves from nature when the boundary is getting narrower, and yet we can never live without the natural eco-system. It is the bio-diverse eco-system that provides us the carbon cycle, filtering the air and water system, helping to keep our world in order. Being part of the research of the bio-diverse eco-system, this booklet served as a dialogue for a human's standpoint in this situation.

The diagram has shown the territories of birds around the Ashdown Forest. It is referencing to the official website of Ashdown Forest and data from the RSPB.

The later stage of site finding is based on the hunting zone which I carried out from this mapping. The research is conducted to find which site area could have the most species of bird that are overlapping. The concept of a food chain is considered in this mapping. The map also highlighted different area of the site which tries to identify which area is best for the build of the proposed design.

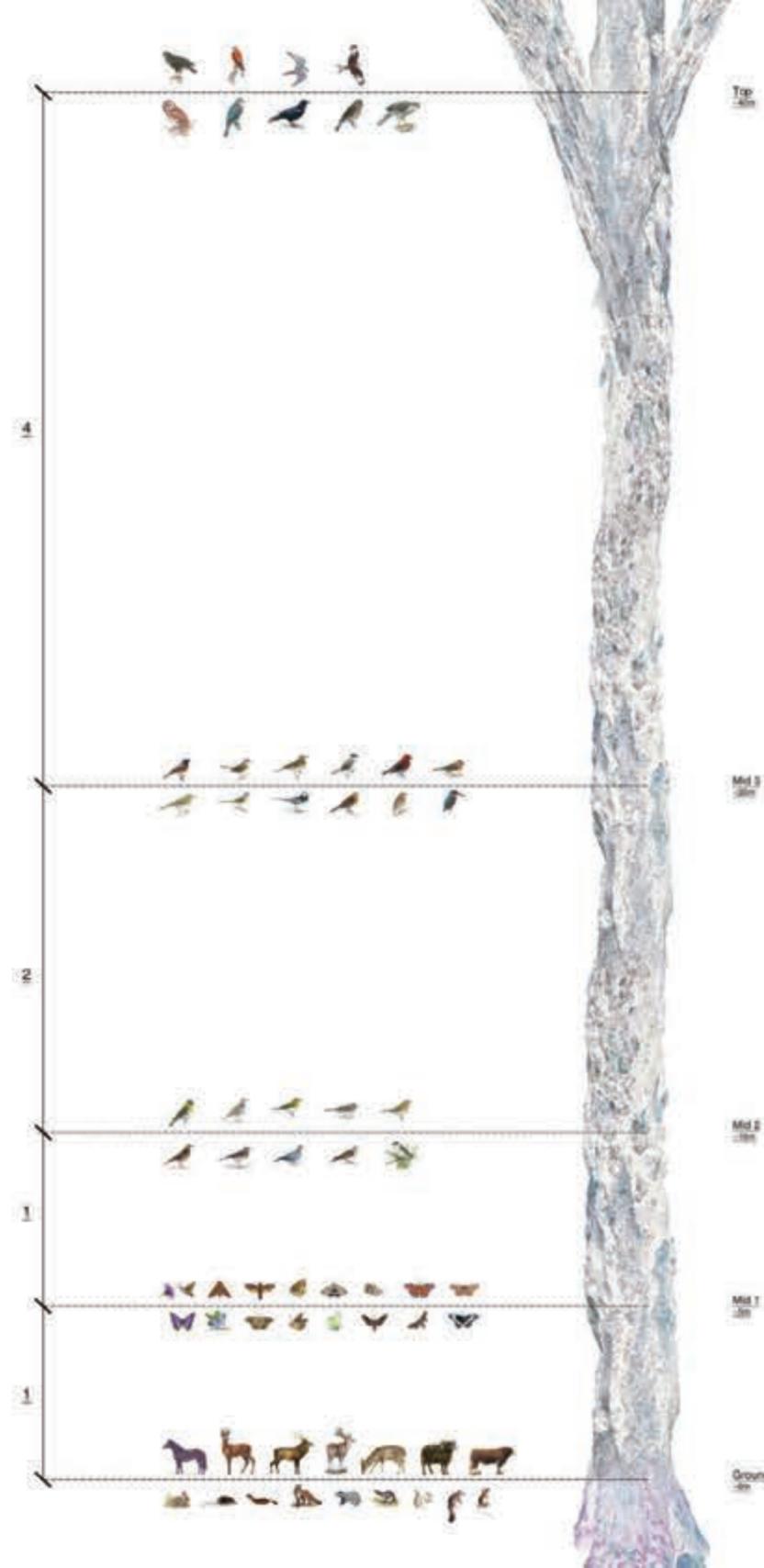


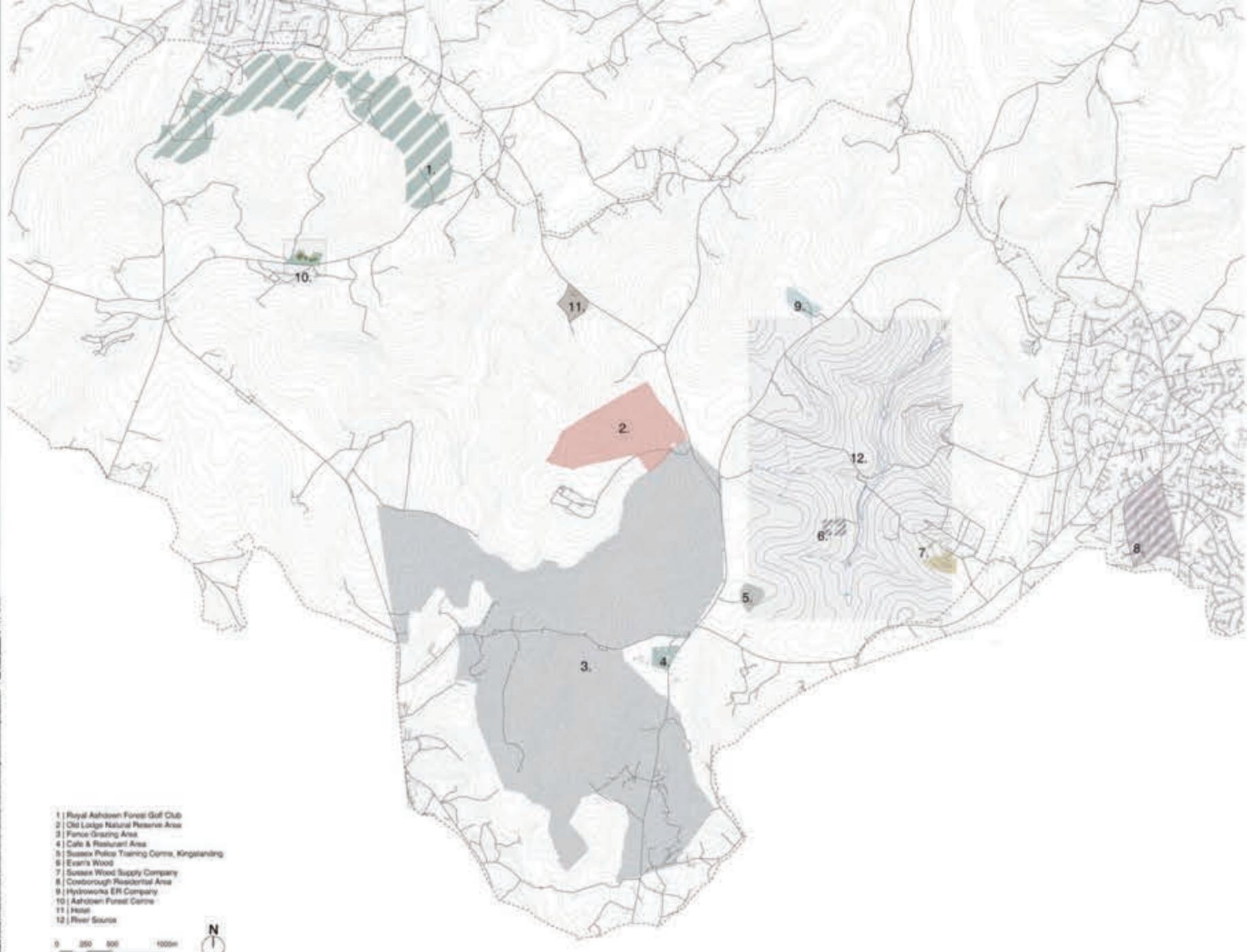
**'Old Lodge Nature Reserve'**  
Site Finding | Ashdown Forest

Different territories of the bird inhabitation of around Ashdown Forest. As mammals are very hard to track where the most habitats would be because they will move around the site to look for food. So, the relationship of the mapping is based on the bird hunting territories within the Ashdown Forest and the most overlapping zone that they will most likely be around.

Two potential site are located through the analysis and mapping around the Ashdown Forest. Ashdown Forest Centre and Old Lodge Nature Reserve Area. These are included Terrain mapping, Contour mapping, Connection between the Hunting Zone, Heathland and Woodland Area.

The habitat of different species are varies different height which could also be defined within the each level as response to the height of the tree.

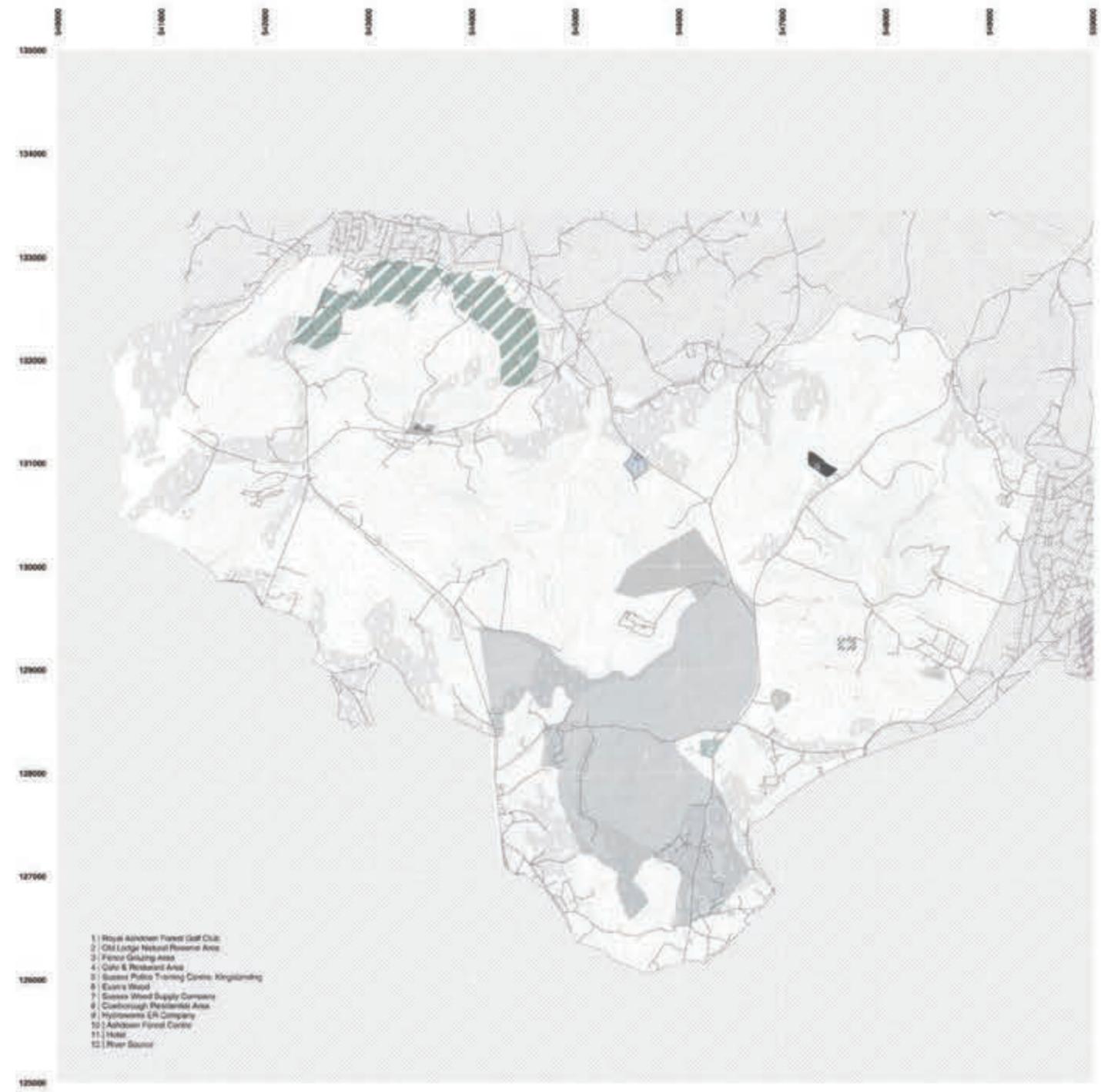




- 1 | Royal Ashdown Forest Golf Club
- 2 | Old Lodge Natural Reserve Area
- 3 | Pines Grazing Area
- 4 | Cafe & Restaurant Area
- 5 | Sussex Police Training Centre, Kingaloring
- 6 | Egan's Wood
- 7 | Sussex Wood Supply Company
- 8 | Cowborough Residential Area
- 9 | Hydroworks ER Company
- 10 | Ashdown Forest Centre
- 11 | House
- 12 | River Source



Site Analysis  
1:1000 | Ashdown Forest

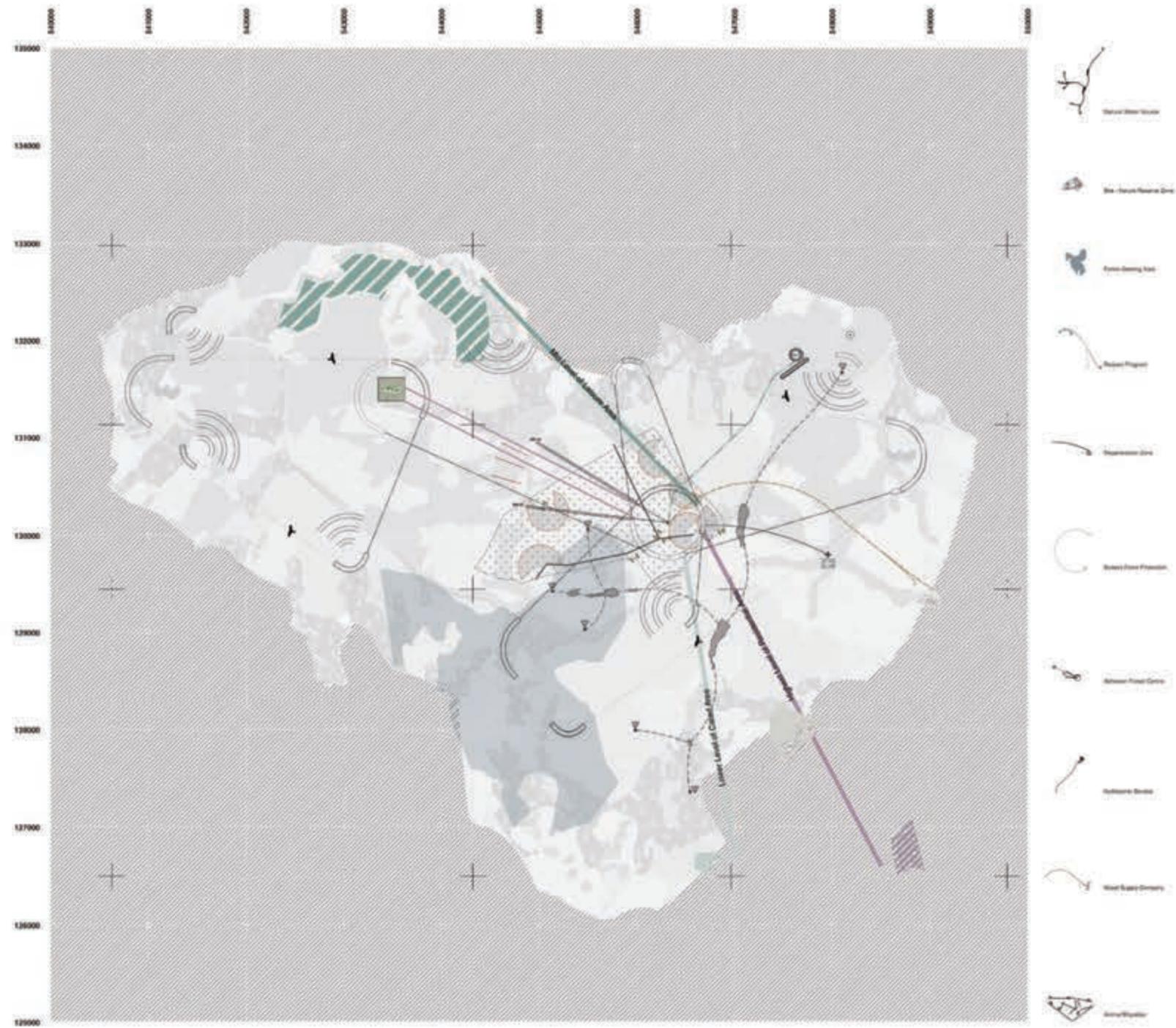


- 1 | Royal Ashdown Forest Golf Club
- 2 | Old Lodge Natural Reserve Area
- 3 | Finesse Grange Area
- 4 | Cafe & Restaurant Area
- 5 | Sussex Public Training Centre, Kingsland
- 6 | Sussex Wood
- 7 | Sussex Wood Supply Company
- 8 | Cuckoo's Nest Area
- 9 | Myrtles & Co. Company
- 10 | Ashdown Forest Centre
- 11 | Hotel
- 12 | River Stream

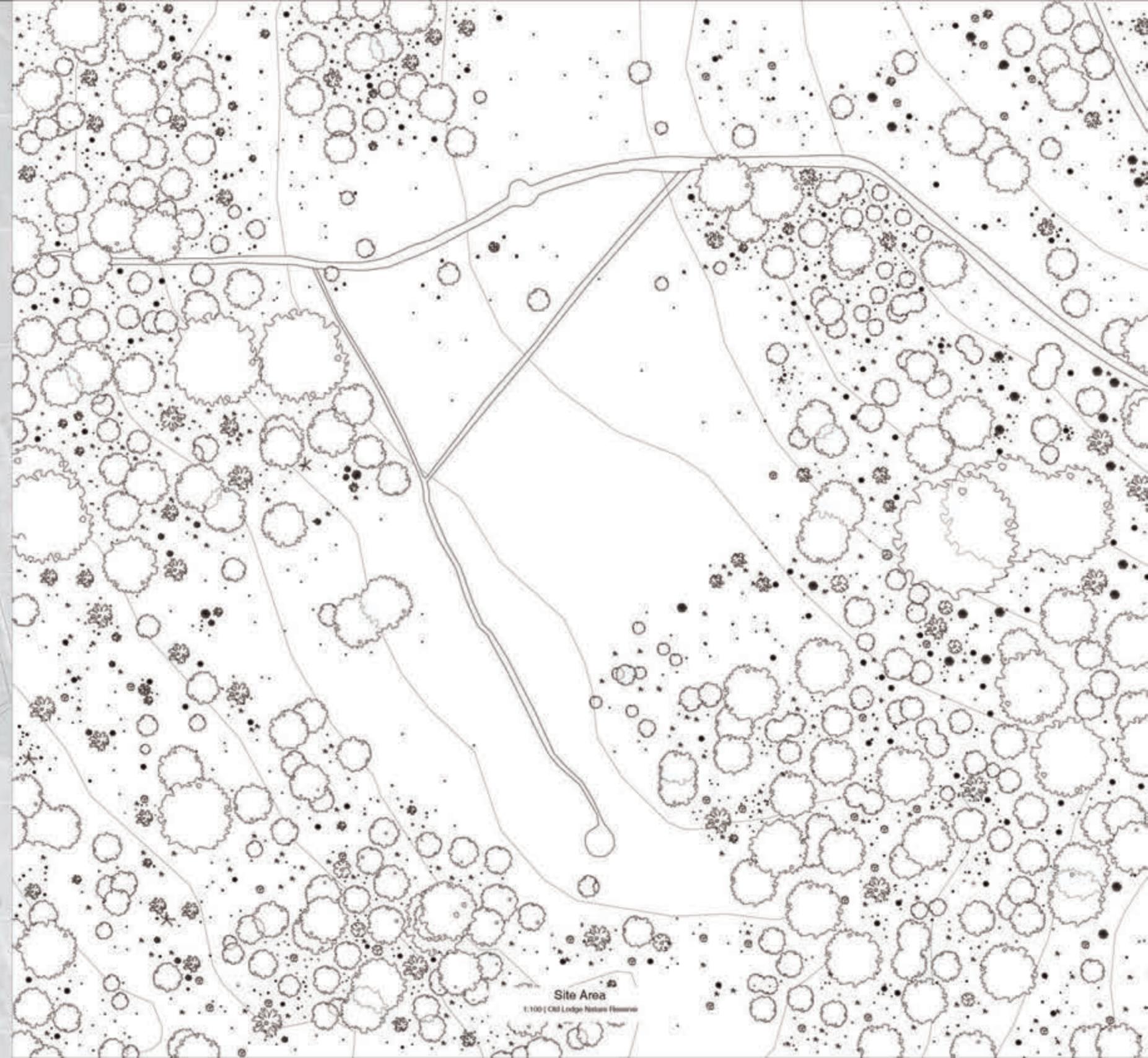
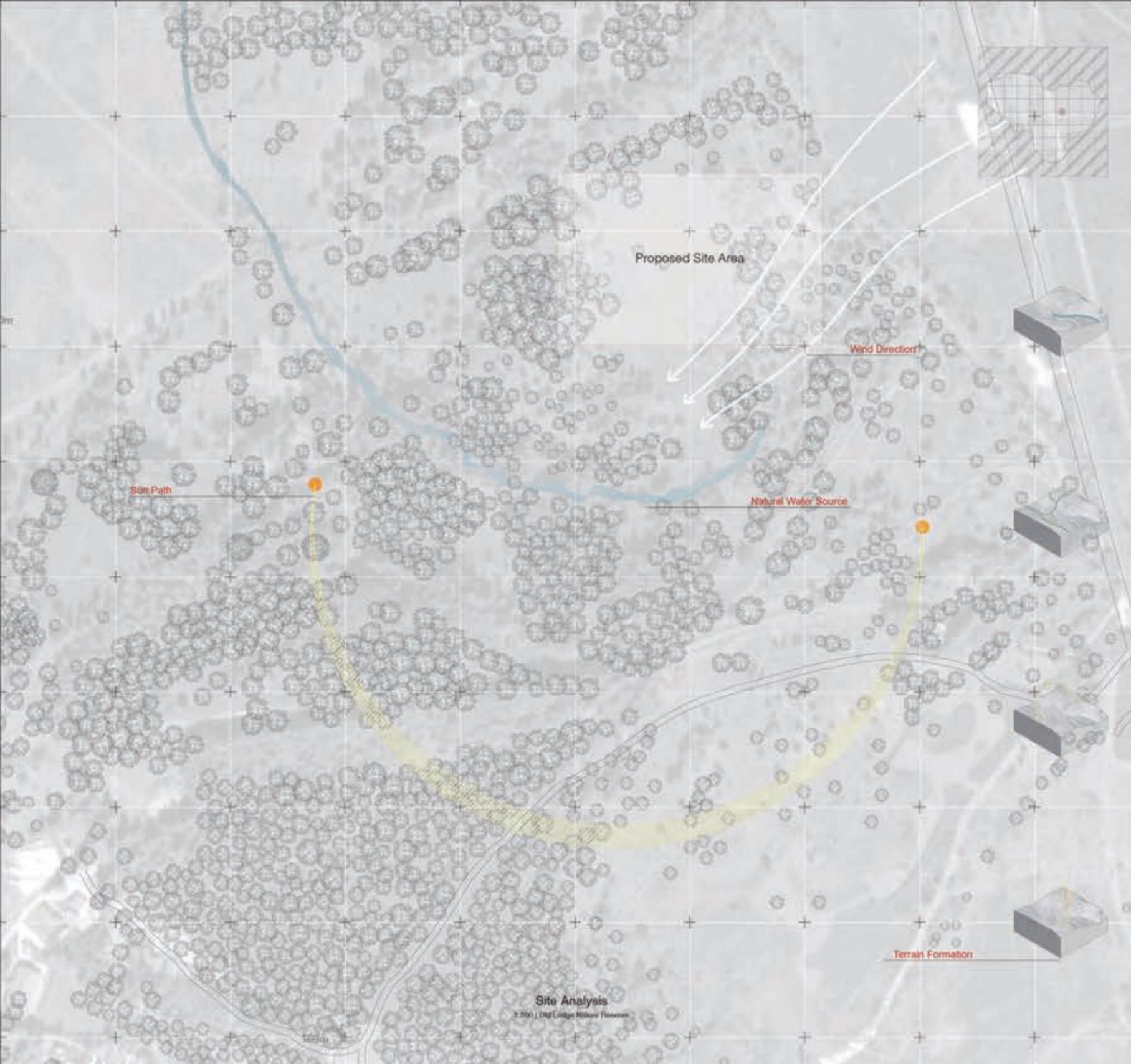
Site Analysis  
1:1000 | Ashdown Forest



Conceptual Deep Mapping  
Site Analysis



Site Analysis  
1:1000 | Ashdown Forest



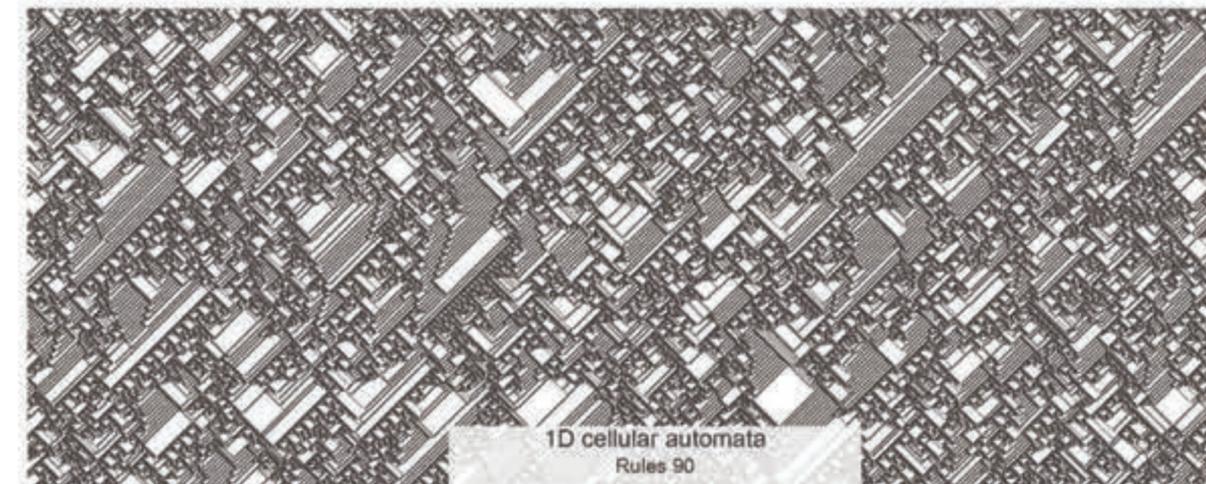
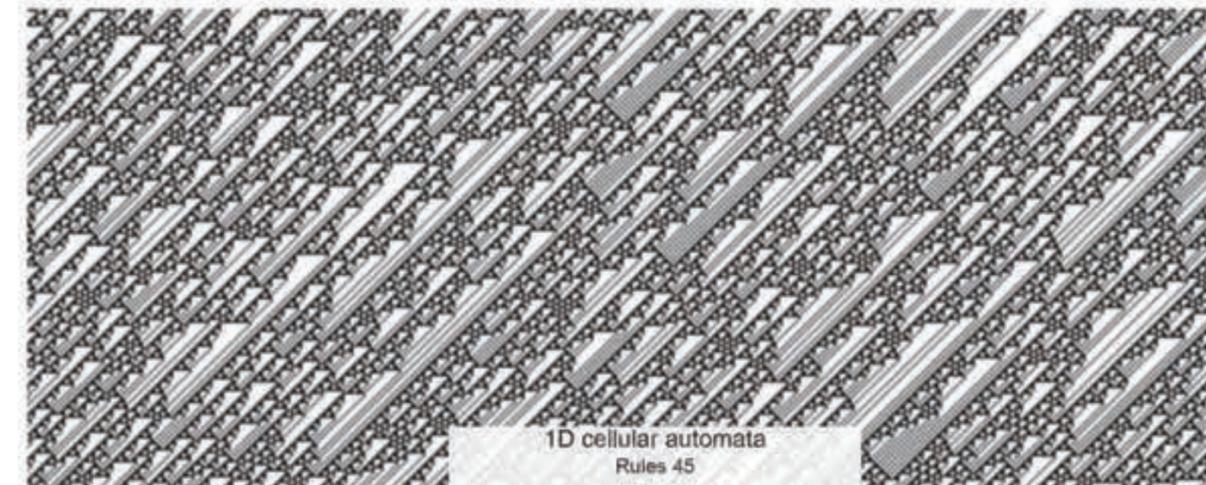
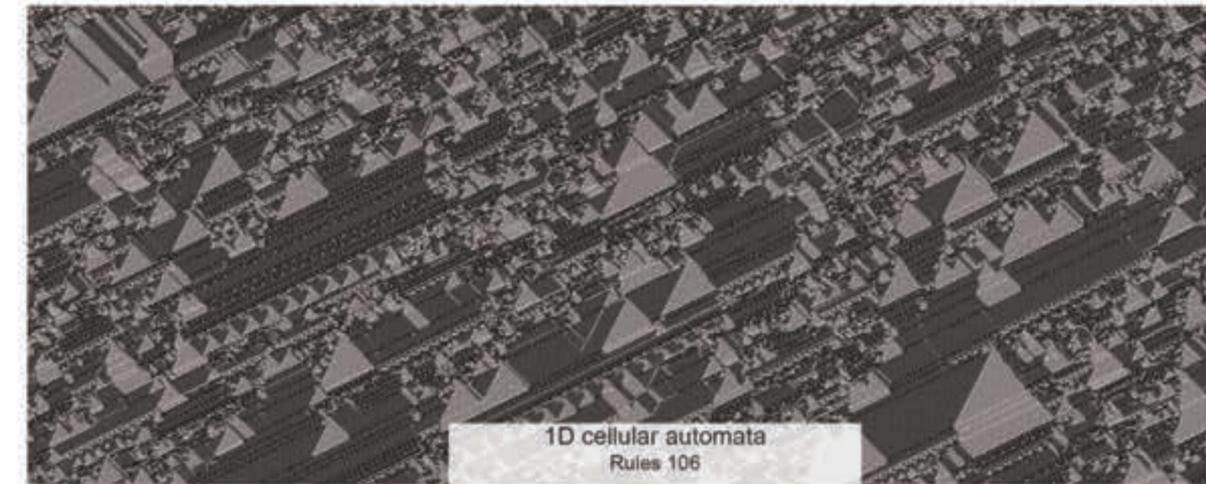
# PRECEDENT STUDY - Cellular Automata - The Nature of Code

Year : 1950s

Developer: Ulam and von Neumann

Rules : 256 (Wolfram code)

The concept was originally discovered in the 1940s by Stanislaw Ulam and John von Neumann while they were contemporaries at Los Alamos National Laboratory. While studied by some throughout the 1950s and 1960s, it was not until the 1970s and Conway's Game of Life, a two-dimensional cellular automaton, that interest in the subject expanded beyond academia. In the 1980s, Stephen Wolfram engaged in a systematic study of one-dimensional cellular automata, or what he calls elementary cellular automata; his research assistant Matthew Cook showed that one of these rules is Turing-complete. Wolfram published A New Kind of Science in 2002, claiming that cellular automata have applications in many fields of science. These include computer processors and cryptography.<sup>1</sup>



<sup>1</sup> "Cellular Automata." Wikipedia, the Free Encyclopedia. Last modified May 31, 2002. [https://en.wikipedia.org/wiki/Cellular\\_automata](https://en.wikipedia.org/wiki/Cellular_automata)

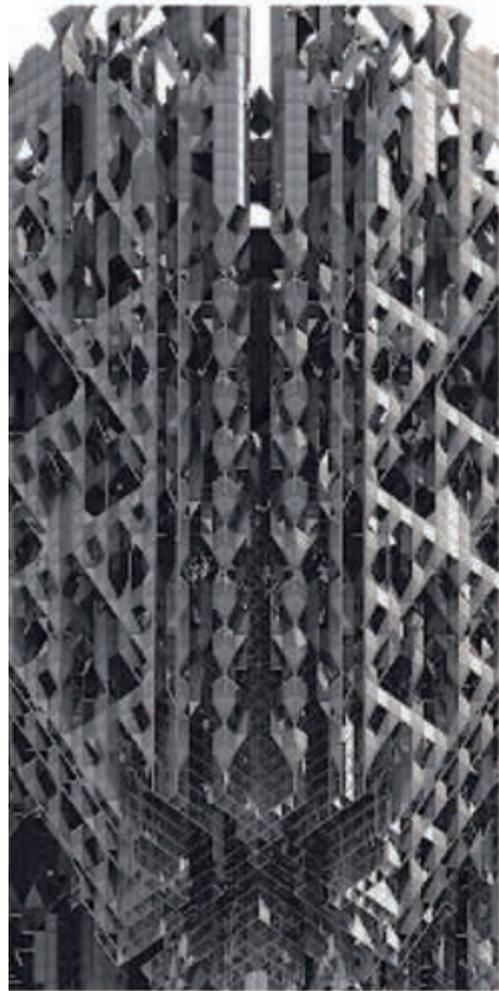
# Cellular Automata - AA DRI Computational Architecture

Year : 2013

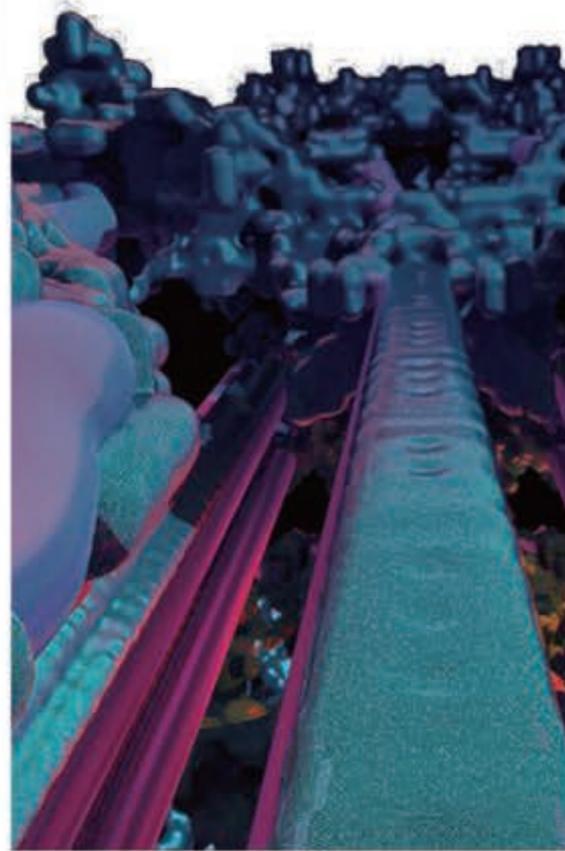
Program: PROGRAM: First part of MArch, algorithmic and software workshop

University: AADRL (Architectural Association, Design Research Laboratory), London, UK

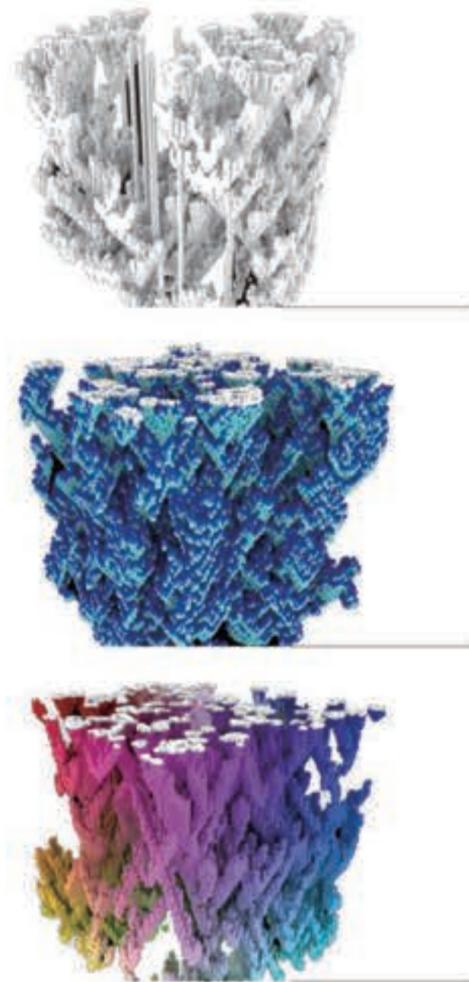
THEME: Self-organizing and self-assembly systems, cellular automata, game of life



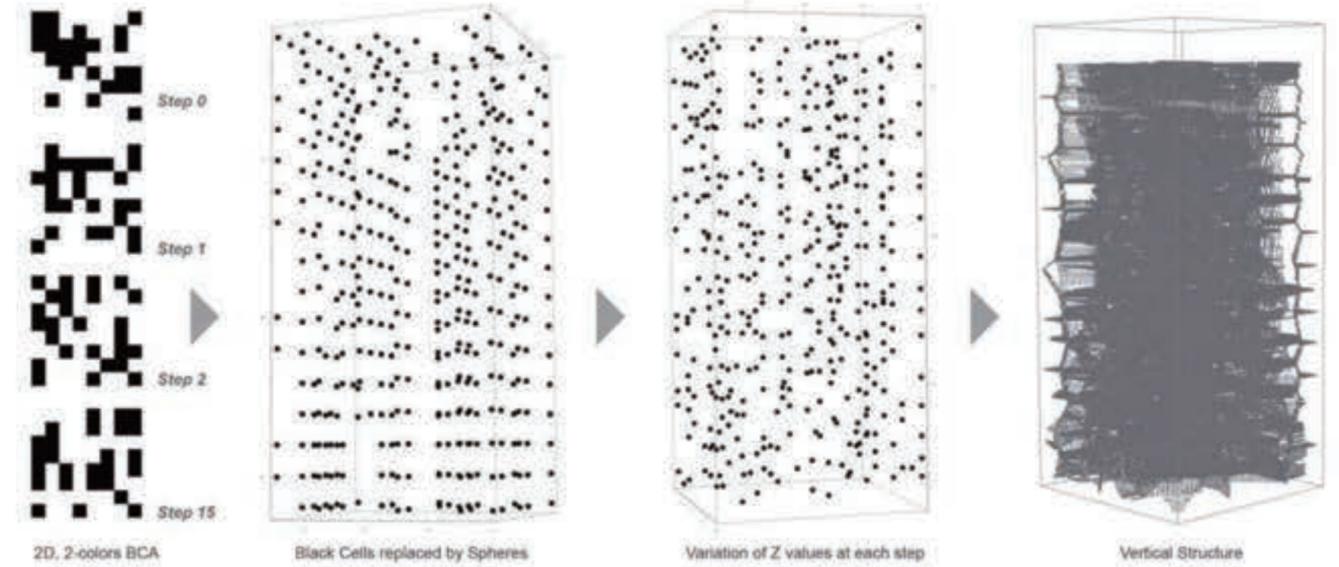
3D cellular automata  
Computation Simulation



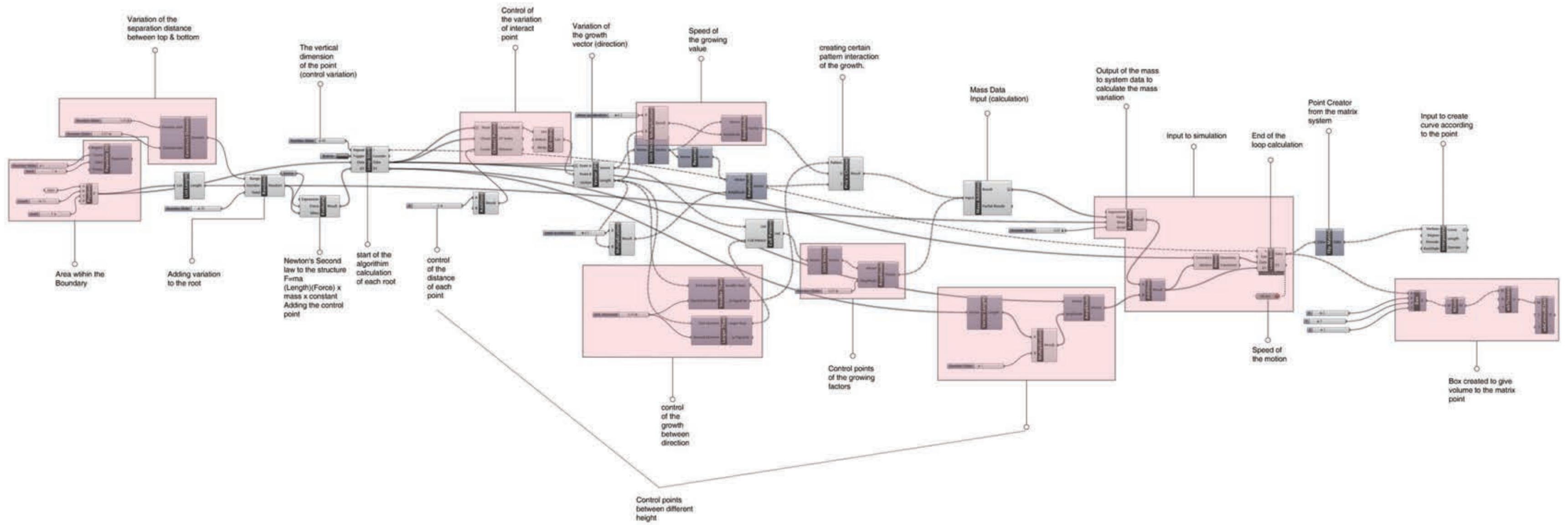
3D cellular automata  
Computation Simulation



Growing Pattern  
Computation Simulation



3D cellular automata  
Computation Simulation

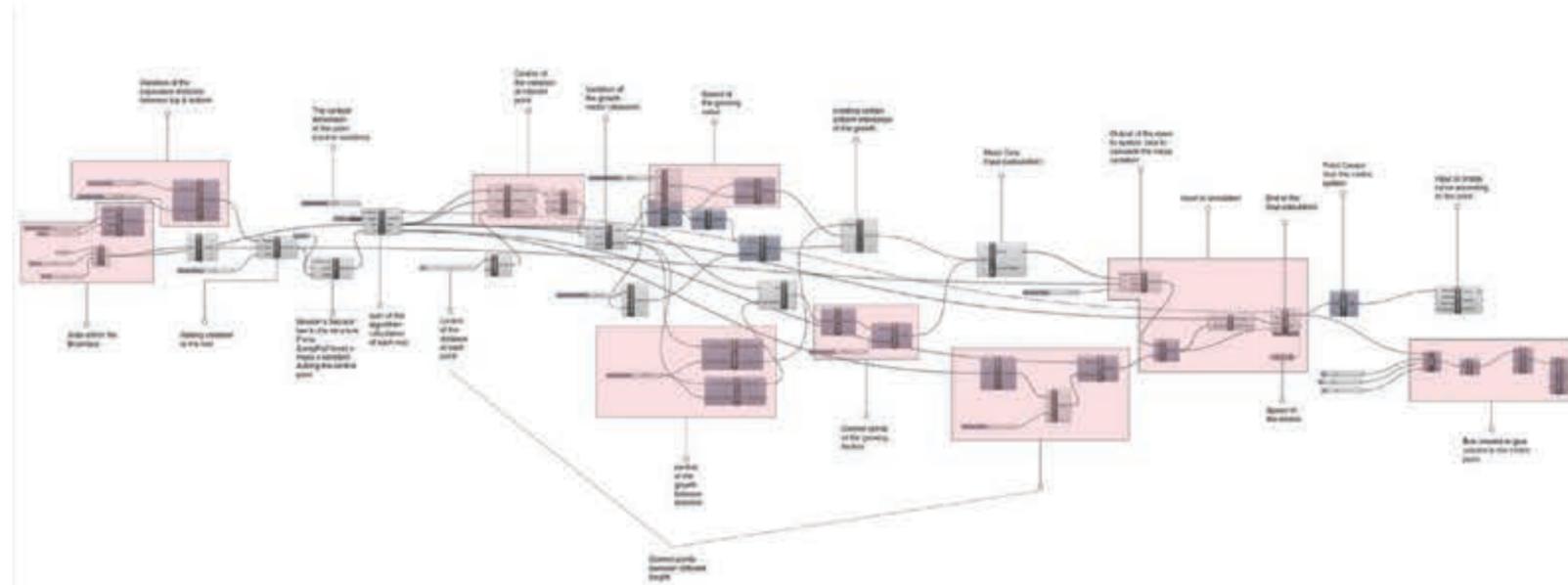
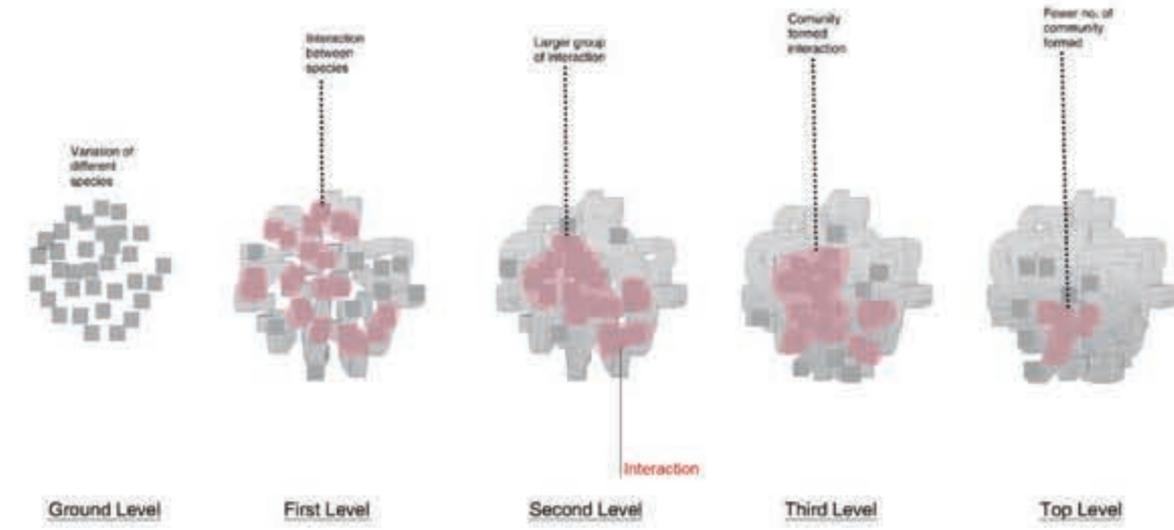


# Algorithm Coding : Growth of Vertical Forest

Concept :

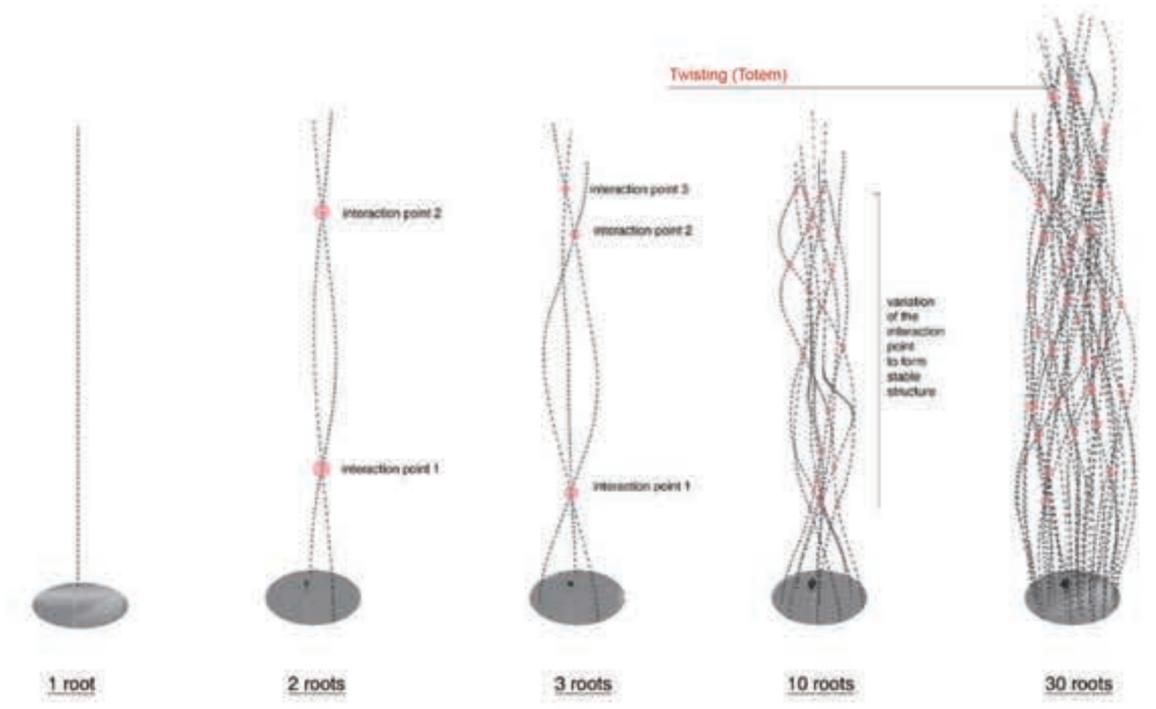
Design Strategy :

1. Structural Formation of Totem | Hybrid Tower Prototype - **Twisting**
2. Interrelationship between different Species - **Interaction**
3. Cellular Automata - **Growth**



The investigation based on the previous hybrid tower studies of how space interact with each other. Initially, extrusion and twisting the form is the technique that I used to generate my totem and hybrid form. The form of the hybrid model and the site analysis created a conceptual idea of how the cellular automata that the growing algorithm could provide a concept idea of how the proposed tower to be grown instead of finding a form and extrude.

Growing algorithm - Precedent Study - Cellular Automata  
Generate my own root to structure algorithm.



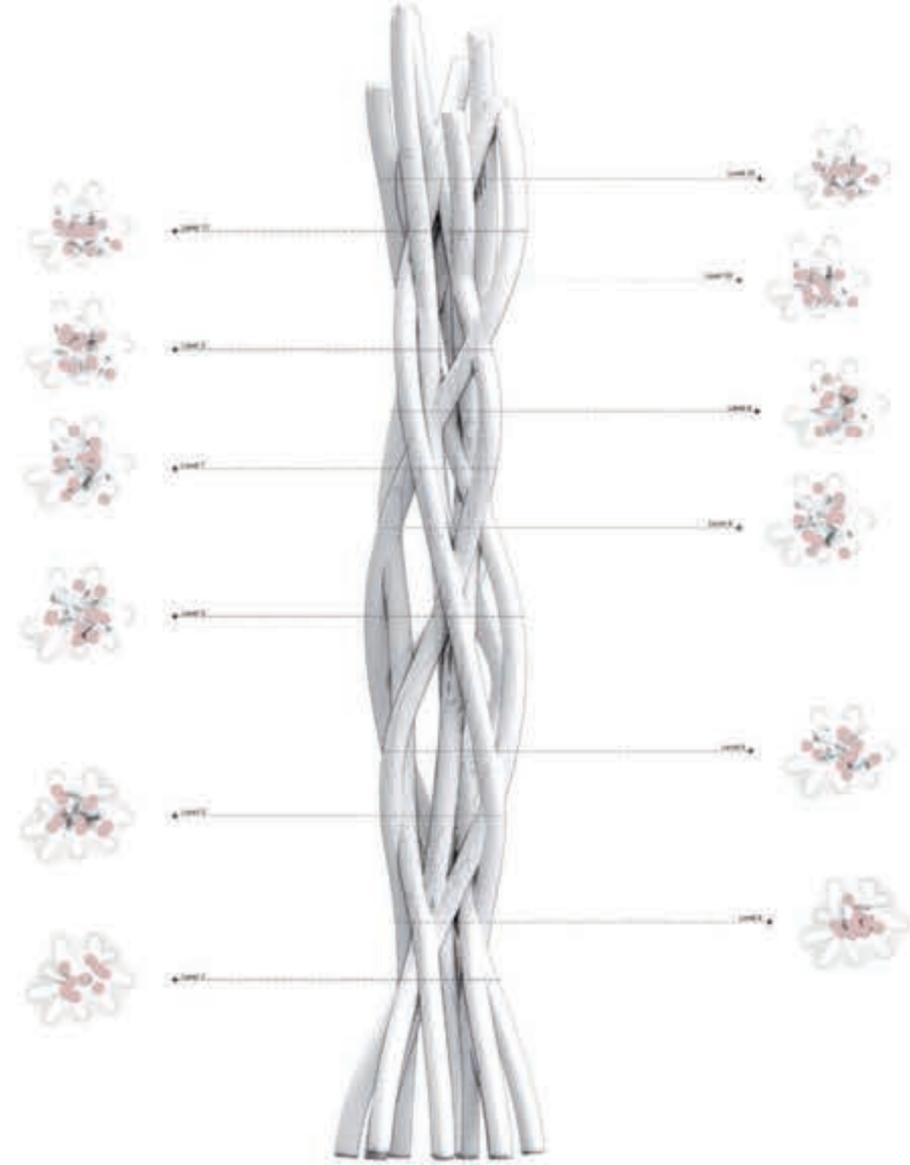
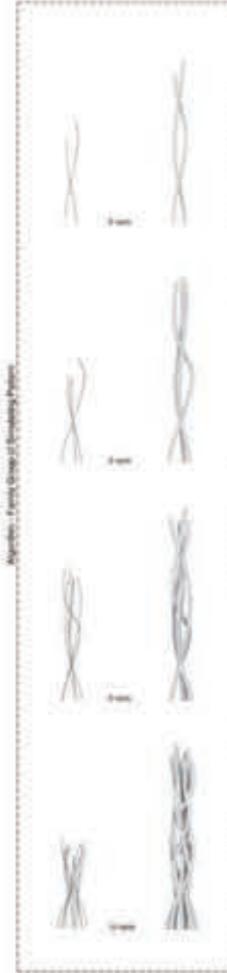
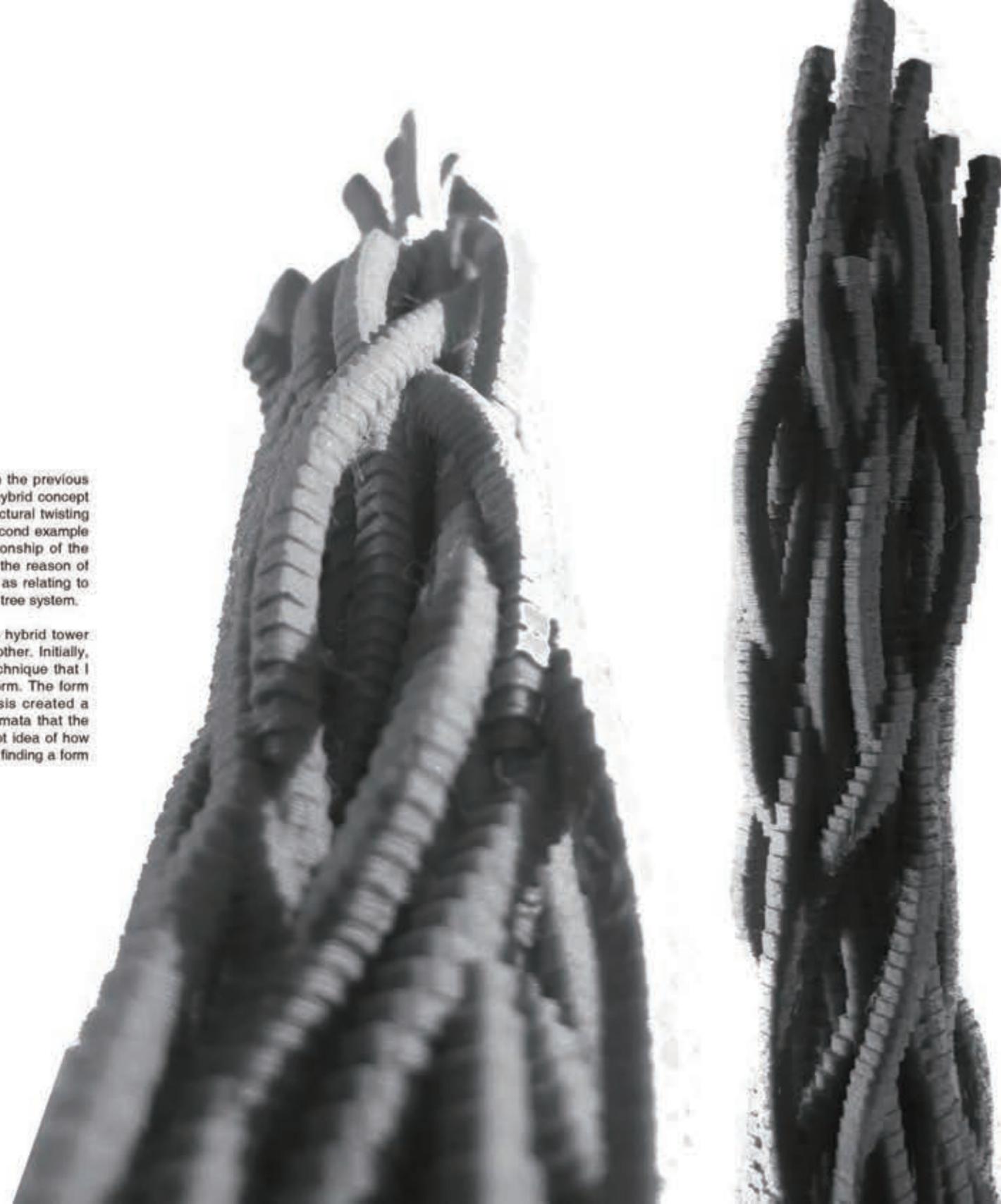
Algorithm Coding  
Growing Structure



### The 'Nest' Tower Form

The concept of combining two strategy in the previous sections of my investigation. One is the hybrid concept model of development, extracting the structural twisting and interaction of the buddle tube. The second example was extracting the idea of the interrelationship of the species within Ashdown Forest to act as the reason of interacting in differnt level of the building as relating to the level of habitat of the species within a tree system.

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Form Structure | Algorithm  
Growth of Tree | Interaction of Species

### Generative Design Structural Analysis

The investigation based on the previous hybrid tower studies of how space interact with each other. Initially, extrusion and twisting the form is the technique that I used to generate my totem and hybrid form. The form of the hybrid model and the site analysis created a conceptual idea of how the cellular automata that the growing algorithm could provide a concept idea of how the proposed tower to be grown instead of finding a form and extrude.

Generative Design of the node based on the data obtained from the software.

After a few Simulation of the Force rearrangement of the combined block form. It turns into a few version of the force disturbance. At the end, I have combined a few version of the result obtained from the data and create my own version of generative design which give a minimum amount of material but maximum force that could provide the best performance to the structure.

Furthermore, the interesting part of the optimization would be on spatial quality within the structure. By adding sub-structure to it, space could be created in some sense. The skeleton could be weaved around to form space and like a nest. The weaving technique could be found in the totem exploration from the first semester. The initial attempt of creating the facade like form. But in this one, surface could be formed to create floor plane and even furniture to certain extent.



# MATERIAL | STRUCTURAL SYSTEM

Three Layers:

1. 3D printing Wood Filament - **Core Structure**
2. Weaving Willow Structure - **External/Skin Structure**
3. Living Soil - **Soil Reinforcement**

Details Please Refer to Specialisation Essay



3D printing Wood Filament



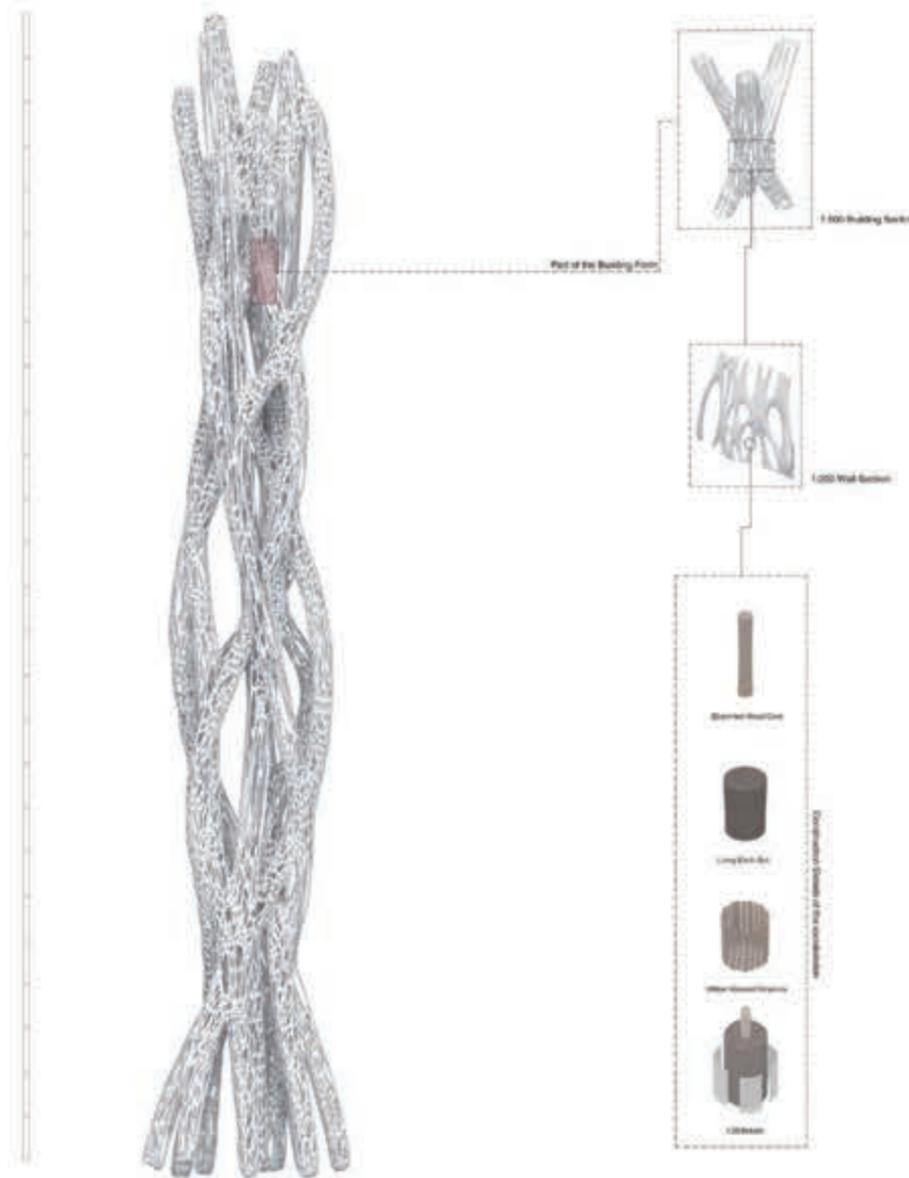
Biological Nutrient Dome



3D printing Structure



Willow Weaving Structure



Growing Structure | Living Wall  
Examination of the form



3D printing Core Wood Filament (Growlay)



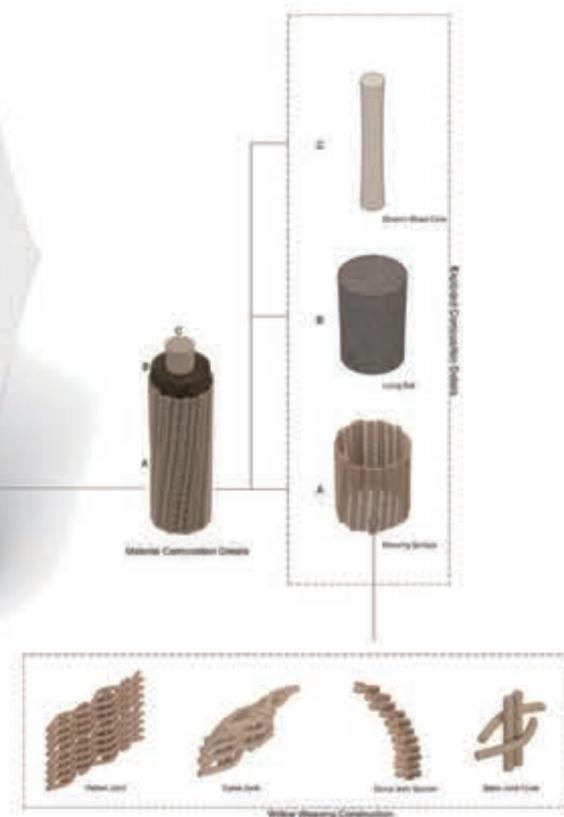
Weaving External Skin Traditional Weaving (Willow/Rattan)



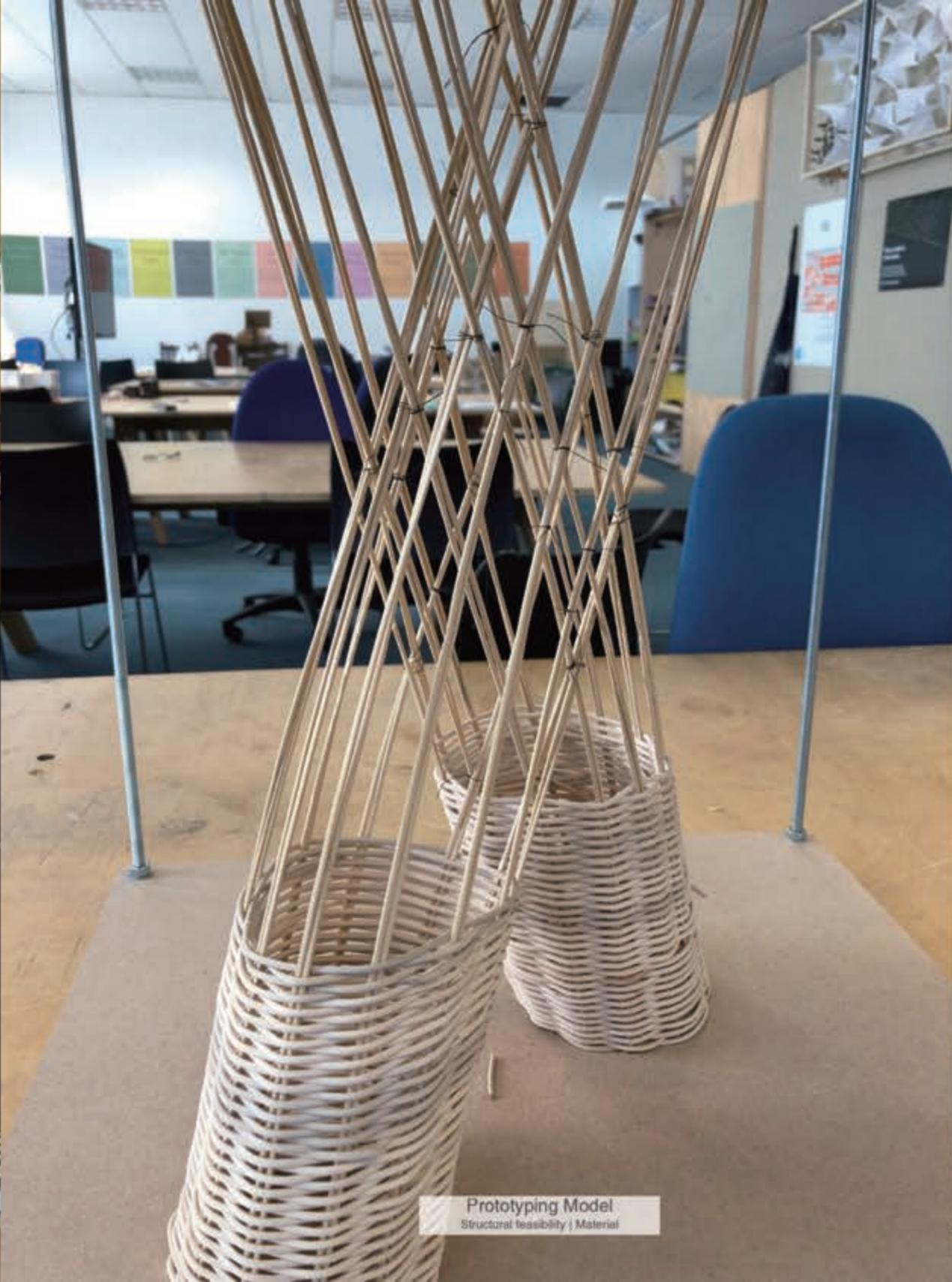
Soil Reinforcement  
Rammed Earth Construction (Living Soil)



Component Structure



Growing Structure | Living Wall  
Examination of the form



Prototyping Model  
Structural feasibility | Material



**Winter**  
**Stage 1, Sowing**

There are different stages of the structure growing to become a well-developed eco-skeleton. From the algorithm, it simulate the grow of a tree and provide habitats for nature. But there is an important question in asking 'how do we provide habitat for the nature to inhabit with?' It then link back to the concept of harvest festival 'about we sow the seed of the crops in winter season, which we allow the natural growth of the crops and then we harvest in Autumn. Inbetween the time of sowing and harvesting, we are are providing care and water to the structure to grow the vegetation.

It then link to what I am investigating in Specialisation module of what type of soil and how we begin to sow the structure. The most important question 'how do we introduce or 'grow' the eco-system within the space of the skeleton.



Sowing  
Winter | Summer

**Spring**  
**Stage 2, Growing**

As the eco-system would need times to develop, in the 'Spring' Season which I define as one years after sowing, some of the vegetation are growing out of the structure and create spatial within the skeleton. Natural Species begin to nest around the structure and feed on the food source that the vegetation is providing. Eco-system is not yet formed in this stage as the species only begin to nest around the area. Water source is not yet formed naturally within the tower structure. This is also one of the investigation of how to maintain water cycle if eco-system is meant to be created as vegetation would need water cycle and nutrients to grow.



**Summer**  
**Stage 3, Growing**

Eco-system begins to formed in the 'summer' stage which I describe as five years after the sowing, water cycle is developed naturally within the tower structure. Variety of vegetation are developed within the tower structure, so as the natural species. The tower is meant to sustain biodiversity which the eco-system is formed within the tower structure. The species begins to define the structure as their habitats where they give birth to their offsprings. The proposed structure begins to become a permanent location recognized by the species. Migration also begins to happen within the tower and create a eco-cycle.



Growing  
Summer | Summer

**Autumn**  
**Stage 4, Harvest**

In the final stage of the growth of the tower, Harvesting would be the word that I use to define the autumn stage where we, human, could begin to inhabit the tower. A well-developed eco-system after 10 years of evolution is formed within the tower. The concept of providing a home for nature first is truly demonstrated in the drawing which we human as the creator is inhabiting the fully-grown structure after years of progression.

How do we develop our own method in creating our 'nest'? Are we using latest technology in helping with the construction? Robot weaving technology could be one of the exploration in further discussion of the project. But this drawing shows the conceptual outcome of the growth of the proposed tower is a good way to explore in depth of the ecology formation.



Harvest  
Autumn / Harvest

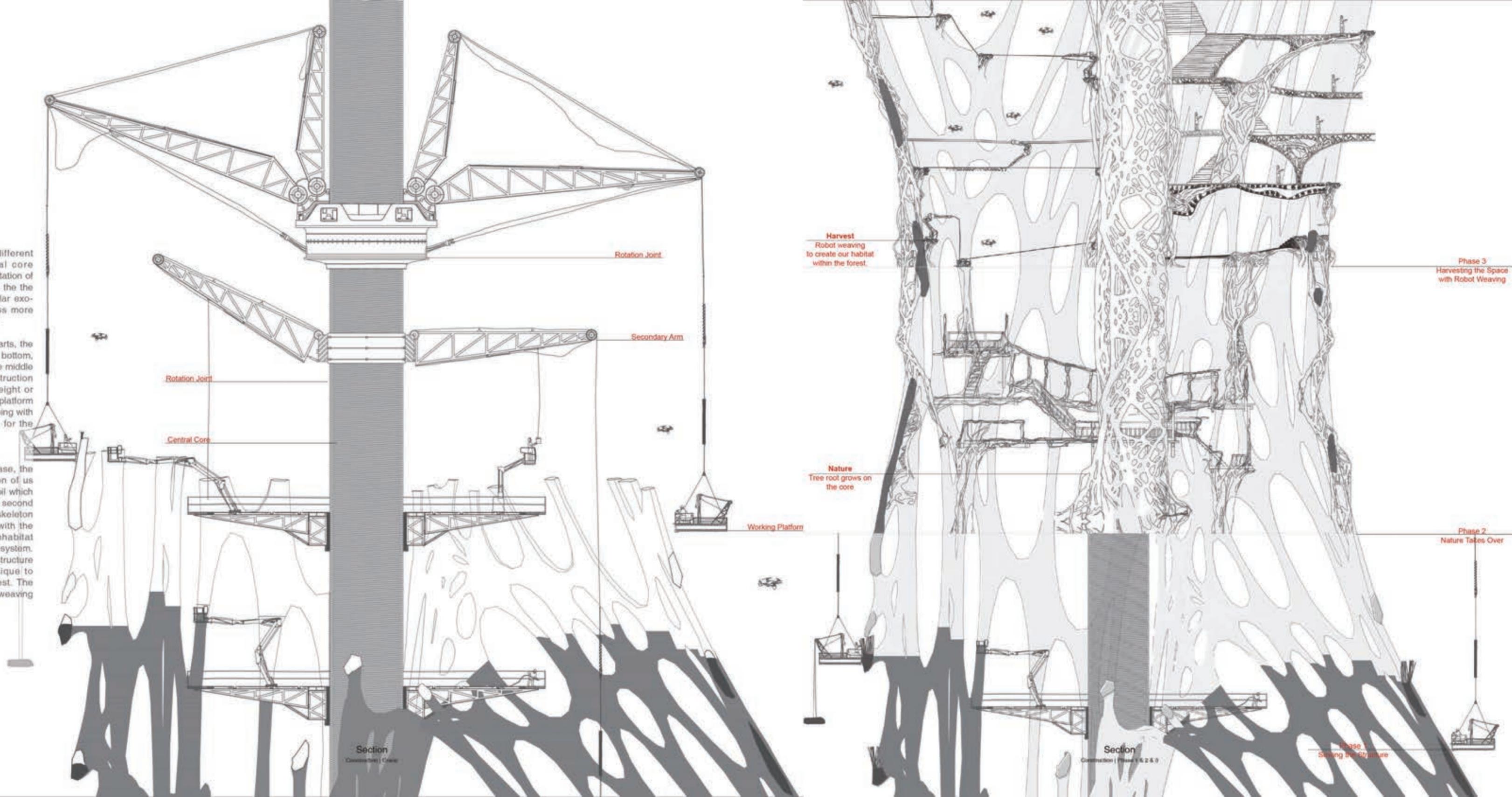
## Section Drawing Construction

The Construction Method includes different equipment as crane and a central core structure which help the support and rotation of the uprising Platform. This encourages the movement structure around the circular exo-skeleton structure which could access more easily to the construction area.

The crane is separated into different parts, the first one is the working platform in the bottom, it could extend up to 5m if needed. The middle part of the crane is the secondary structure which helps to support the heavy weight or delivery of the material to the working platform below. The upper crane is a spinning joint with three arms which mainly responsible for the external working platform.

### Concept-Construction

The construction separates into 3 phase, the first phase is the Sowing Construction of us building the skeleton using the living soil which allow the growth of the nature. In the second phase, the nature will grow into the skeleton and become a permanent structure with the skeleton. Different species would inhabit within the structure and create an eco-system. The third phase is us harvesting the structure which use the robot weaving technique to create our own habitat within the forest. The weaving also includes the concept of weaving habitat of birds and totem.



Section  
Construction | Crane

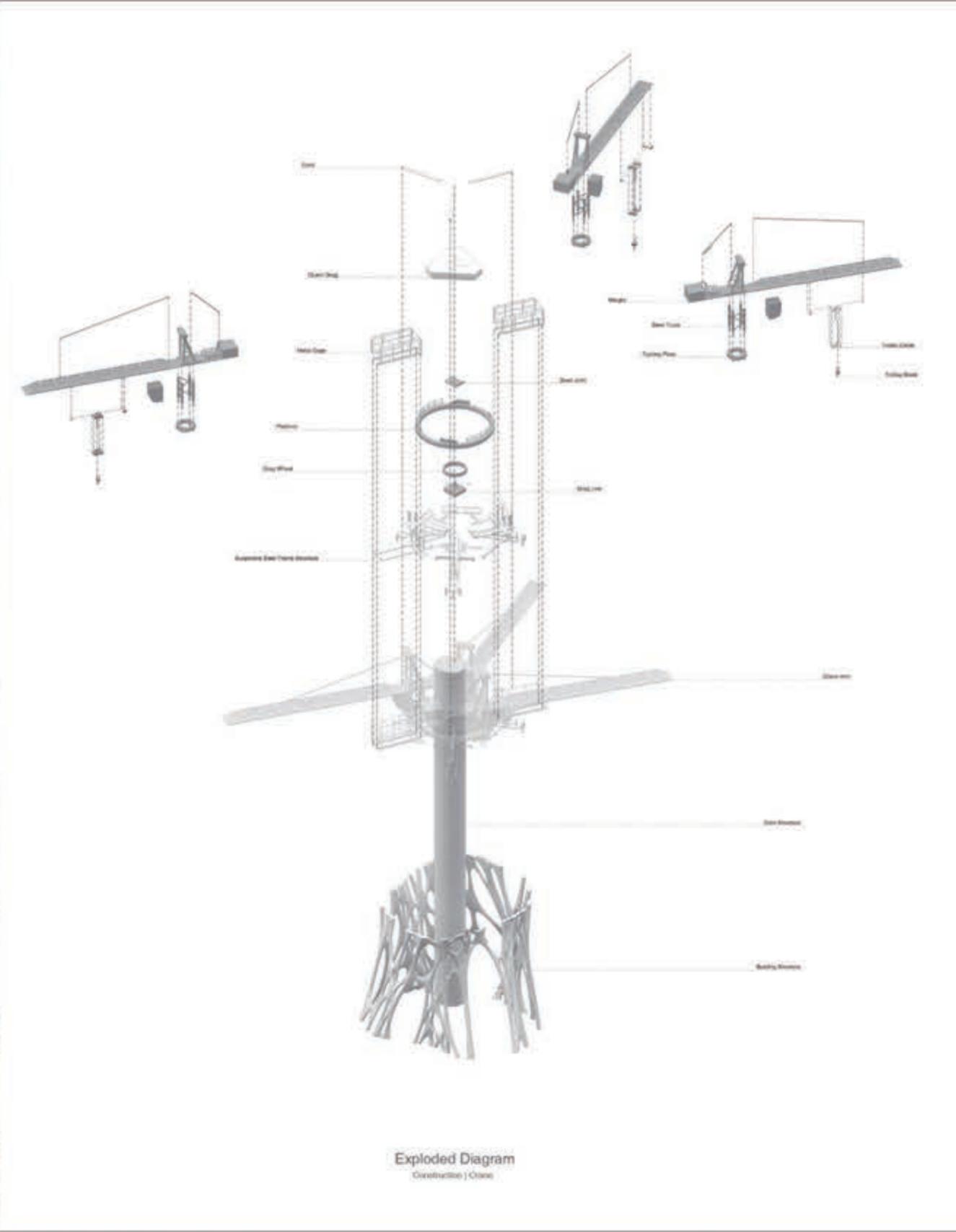
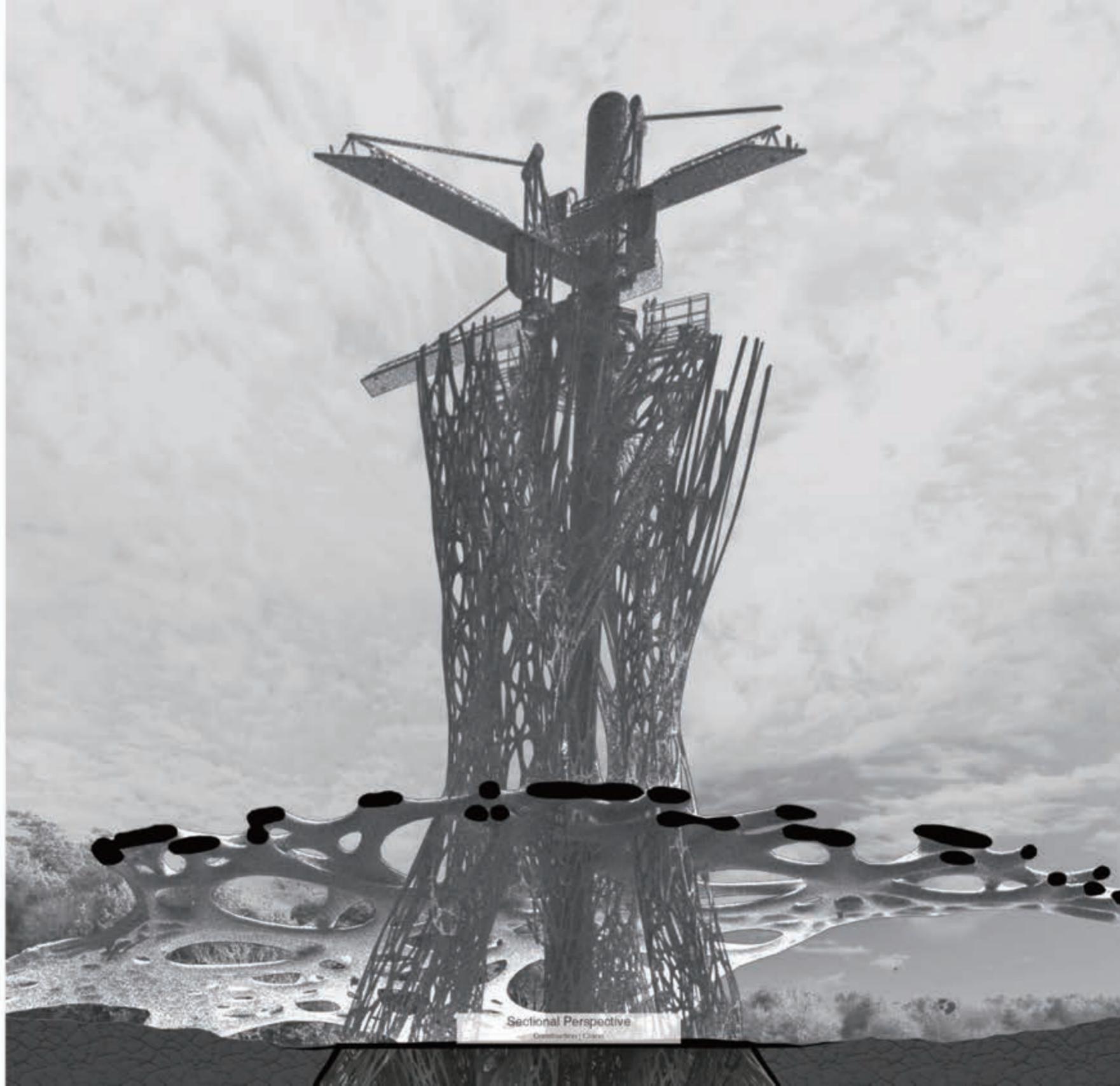
Section  
Construction | Phase 1 & 2 & 3

Section  
Construction | Phase 1  
Sowing the Structure

### Mechanical Drawing Construction | Crane | Exploded Diagram

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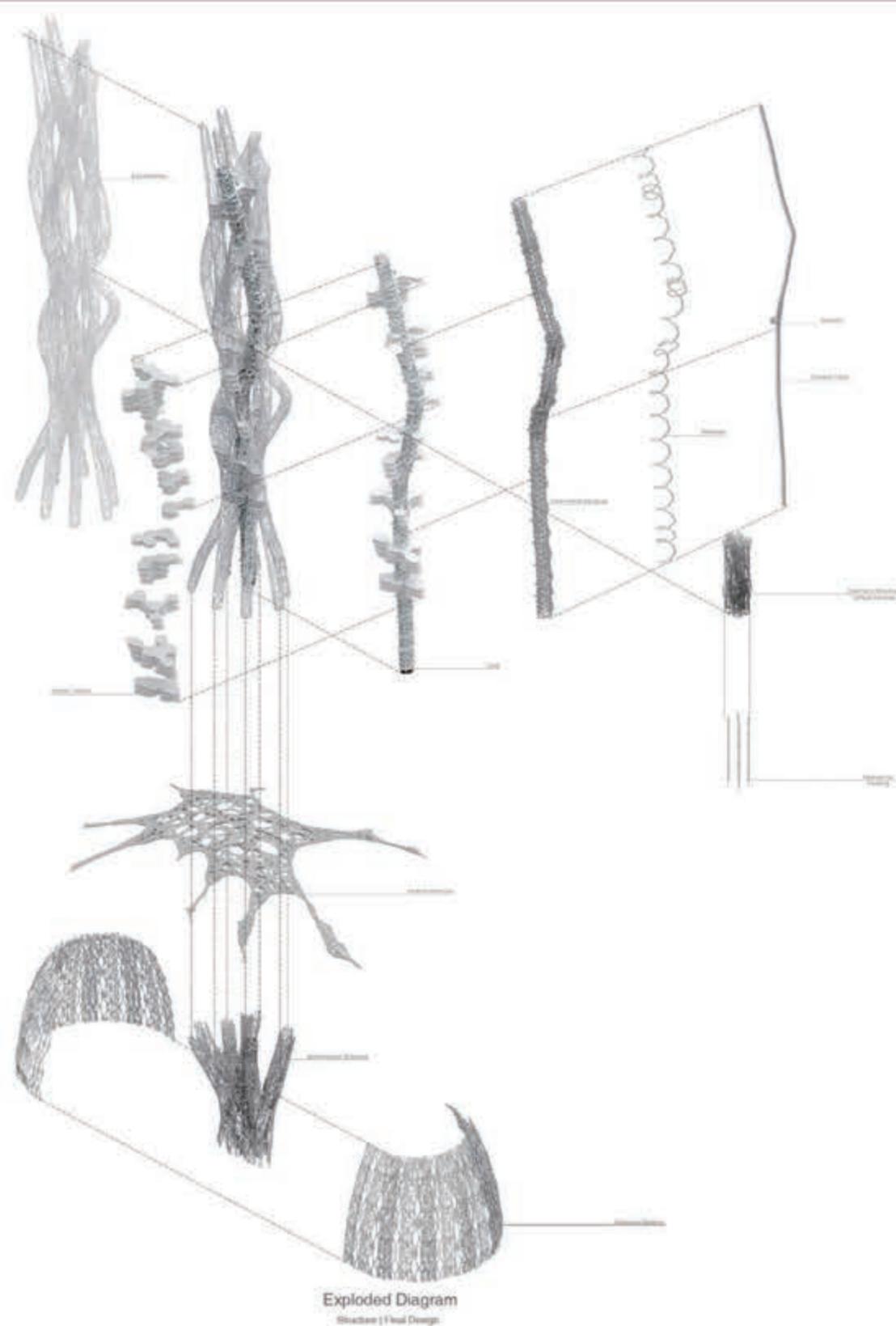
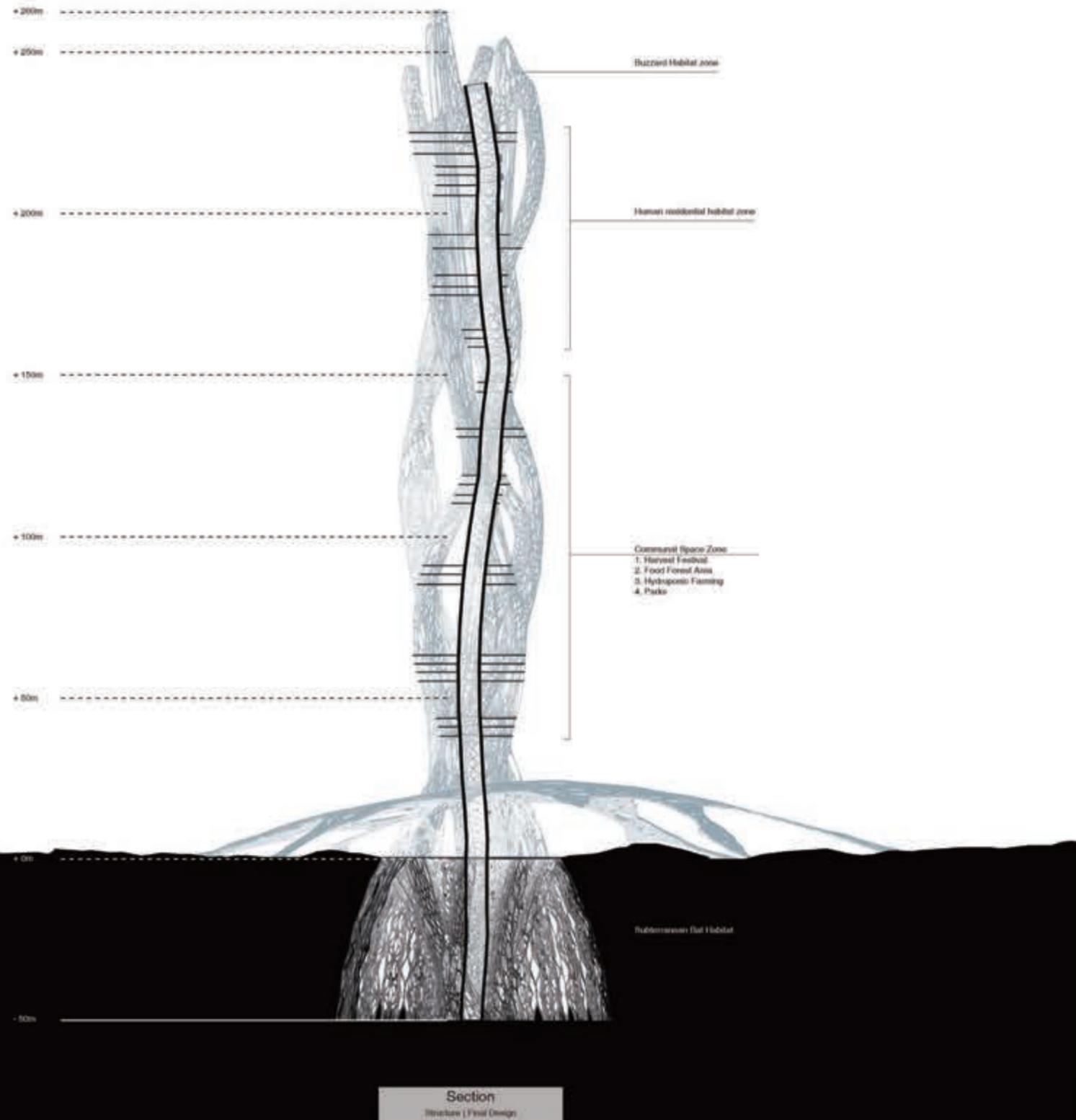
Concept Garden



Cladding Strategy

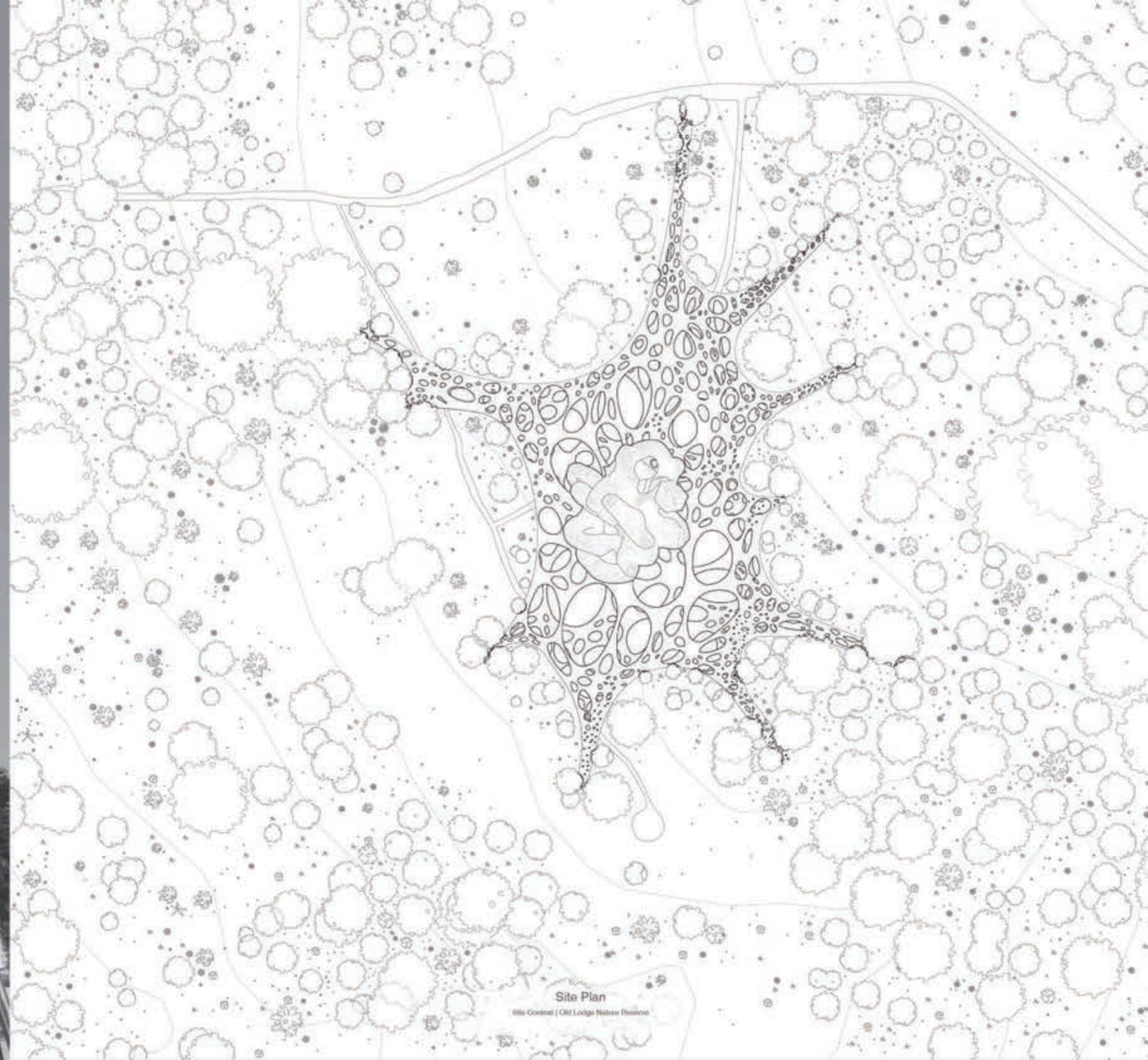


Living Structures



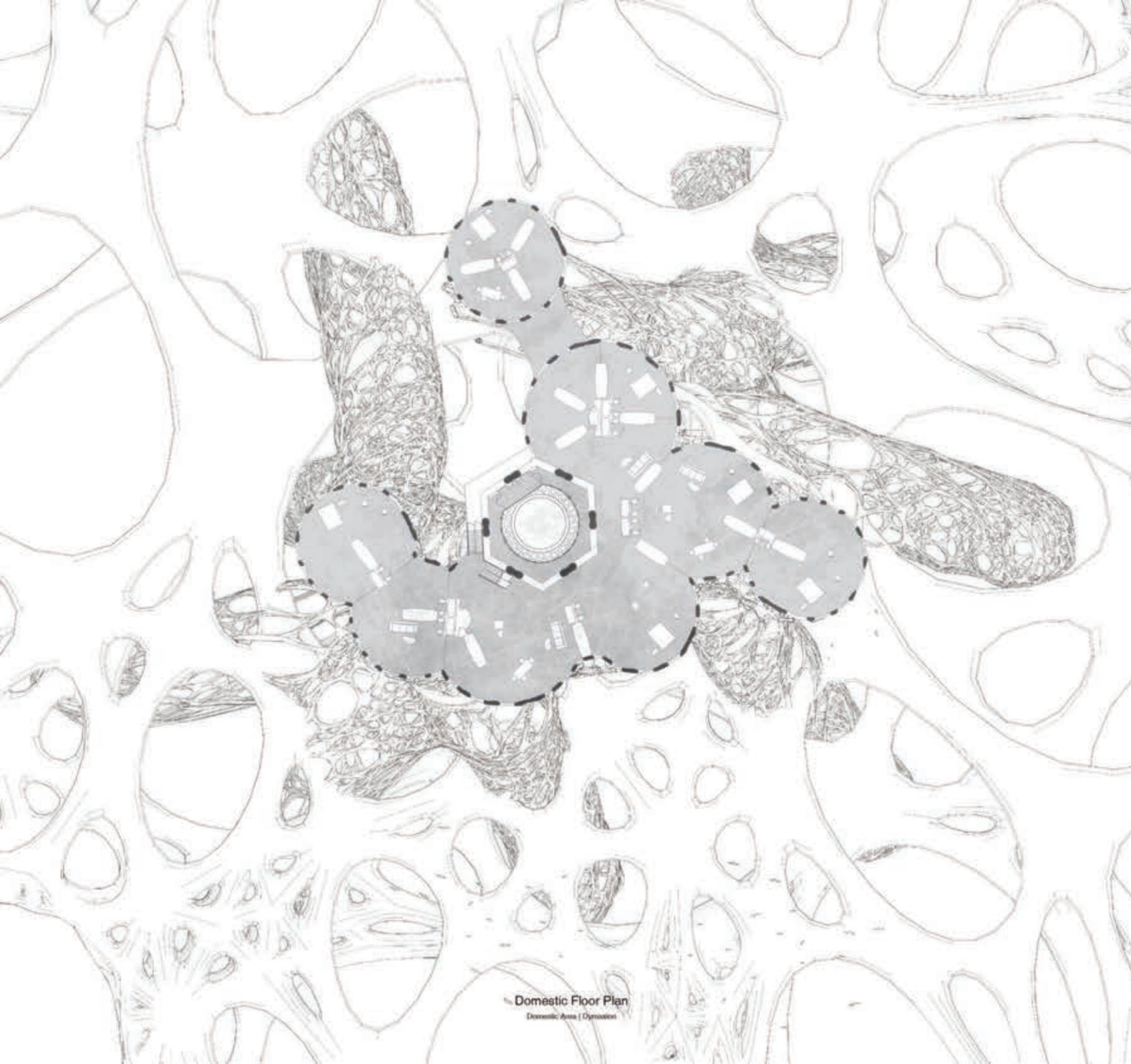


Perspective

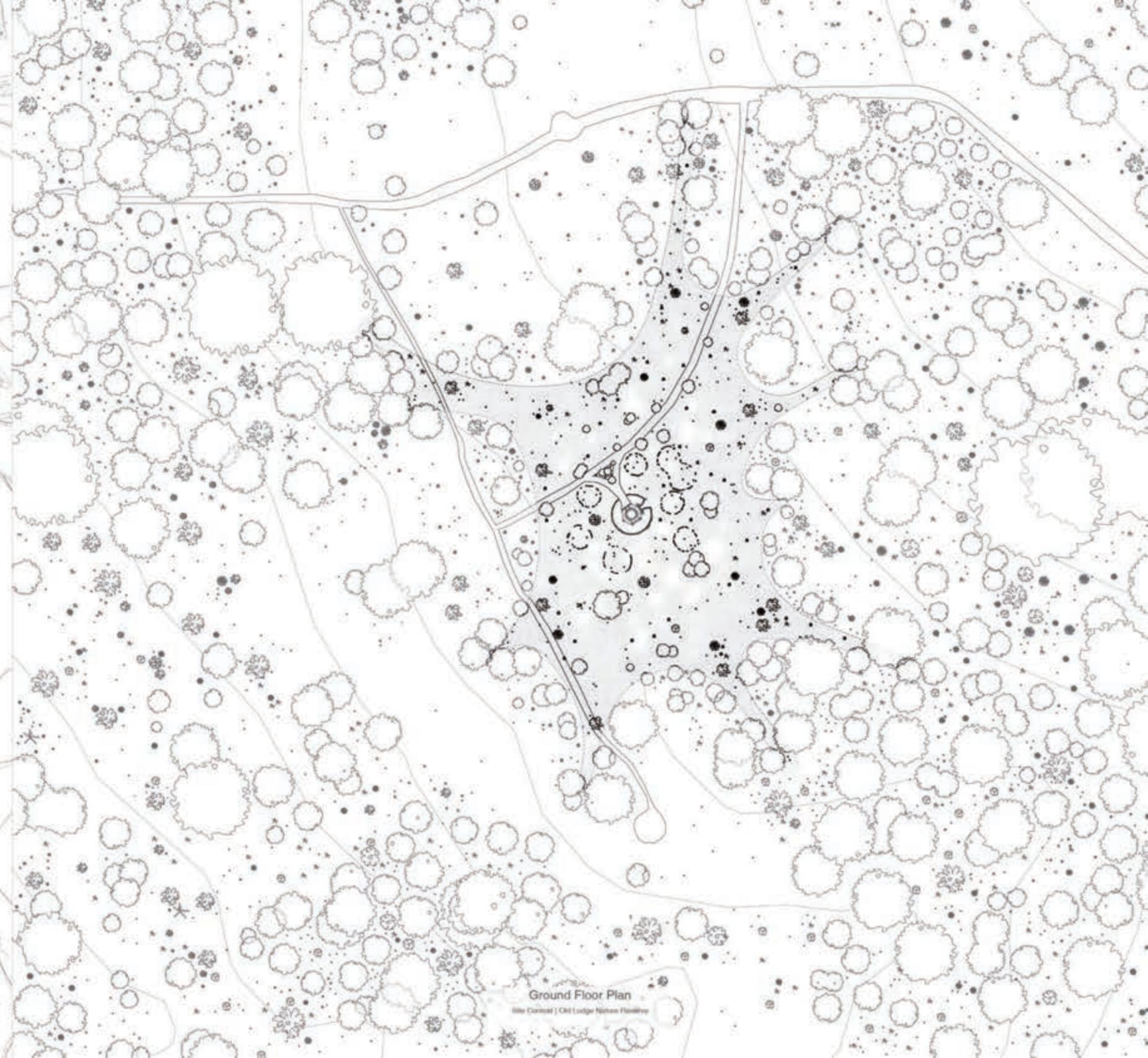


Site Plan

Site Context | Old Lodge House Terrace



Domestic Floor Plan  
Domestic Area | Orientation



Ground Floor Plan  
Site Context | Old Lodge Niche Planning

## Hydroponic Farming

Harvest | Sharing | Giving

Farming is an important program in my proposed design as response to the concept of harvest festival. In a vertical structure as tower typology, hydroponic farming is one of the method of growing plants without soil and could be achieved within a limited area. The farm provides food source for human and the natural species.

(Sharing & Giving)

Over populace are giving raise to the nourishment frailty of the world. Uneven distribution of resource will become a major issue. Program of hydroponic farming is addressing the question raised in the beginning of the investigation of the thesis which 'balance between populace and food are my key interests in this proposition which I would like to examine the concept of vertical agricultural tower with livable space.'



## Food Forest

Bio-diversity | Sharing | Giving

In order to achieve the concept of bio-diversity in the vertical forest, food forest is one of the method of growing a variety of vegetation. A diverse vegetation provides a variety of food sources to different natural species. This create a solid foundation to support the eco-system.

In the research of my thesis project, the fundamental elements of a land-based eco-system begins with the "living soil".

The definition of living soil, according to ecologist Tom Snow, is that it should contain 25% of air, 25% of water, 45% of soil and 5% of living organism.<sup>1</sup> The living organism in the soil is the key to make everything happen. Nutrients like nitrogen and phosphorus that are essential for the growth of plant are generated from the decomposition of the living organism, for instance, bacteria and fungi. The growth of the plant provides food and shelter for the insects which attracts higher predators. A food web is then created which is essential for the formation of the eco-system. Living soil then becomes the major environmental element that integrated into my design strategy as a material and structural investigations.



**Communal Area**  
Co-habitation | Sharing | Giving

The communal area is designated as a park area located in the mid level of the tower. Additional structure is added to the existing exo-skeleton with the concept of the annual celebration of harvest festival. The celebration of weaving structure also provides additional enclosure to the internal communal area provide usability of us both human and nature.

The design structure is inhabited with different species as bees, bramblings, etc. Nature and culture is combined into one contrivance. The vignette shows the area where nature and culture meet each other as a communal area. The interior decoration of also provide habitation to the natural species as the concept of sharing and giving of the harvest festival.



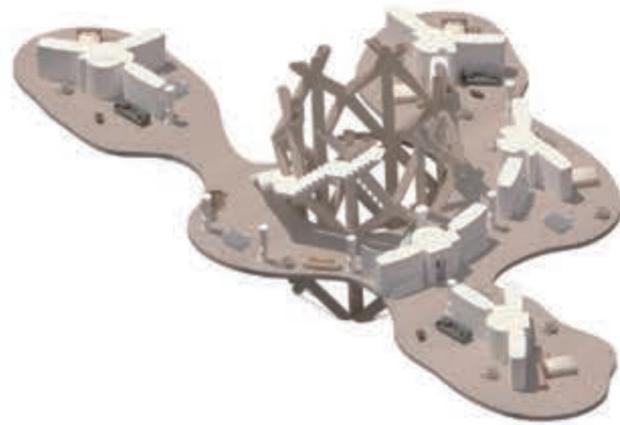
Communal Area  
Co-habitation | Sharing | Giving

## Domestic

Co-habitation | Sharing | Giving

The domestic layout is reference to the concept of dymaxion housing designed by architect Buckminster Fuller in 1920s. The idea is to create in a circular mass-produced, affordable, easily transportable and environmentally efficient house. The term dymaxion is made by three words: DY (dynamic), MAX (maximum), and ION (tension).

I reinvented the concept of the diagonal separation of the circular division to create different spatiality. The concept is to create a small livable Flat within the limited space inside the skeleton structure. The cross section shows the connection between each accommodation joined as a community. The domestic area shows the interior furniture like lamp and chair could provide as a sharing habitation with the wildlife. The growth of the vegetation in the domestic area provides a understanding of combining nature and culture.



## Bat Habitats

Co-habitation | Subterranean | Sharing

The designated subterranean space is located below the ground level. The inverted structure is designated as a root supporting the above tower structure. The 'root' structure is made in reinforced concrete as foundation. Generative system also applies to the design of the root structure to minimise the amount of CO2 emission in construction process.

The subterranean space is perfect for the inhabitation of bat. In the wild life research booklet, the bat is recorded to live in a dark and humid cave environment. The aim of creating a bio-diverse environment should not abandonment the existing of the bat even disease are seldom carried between.

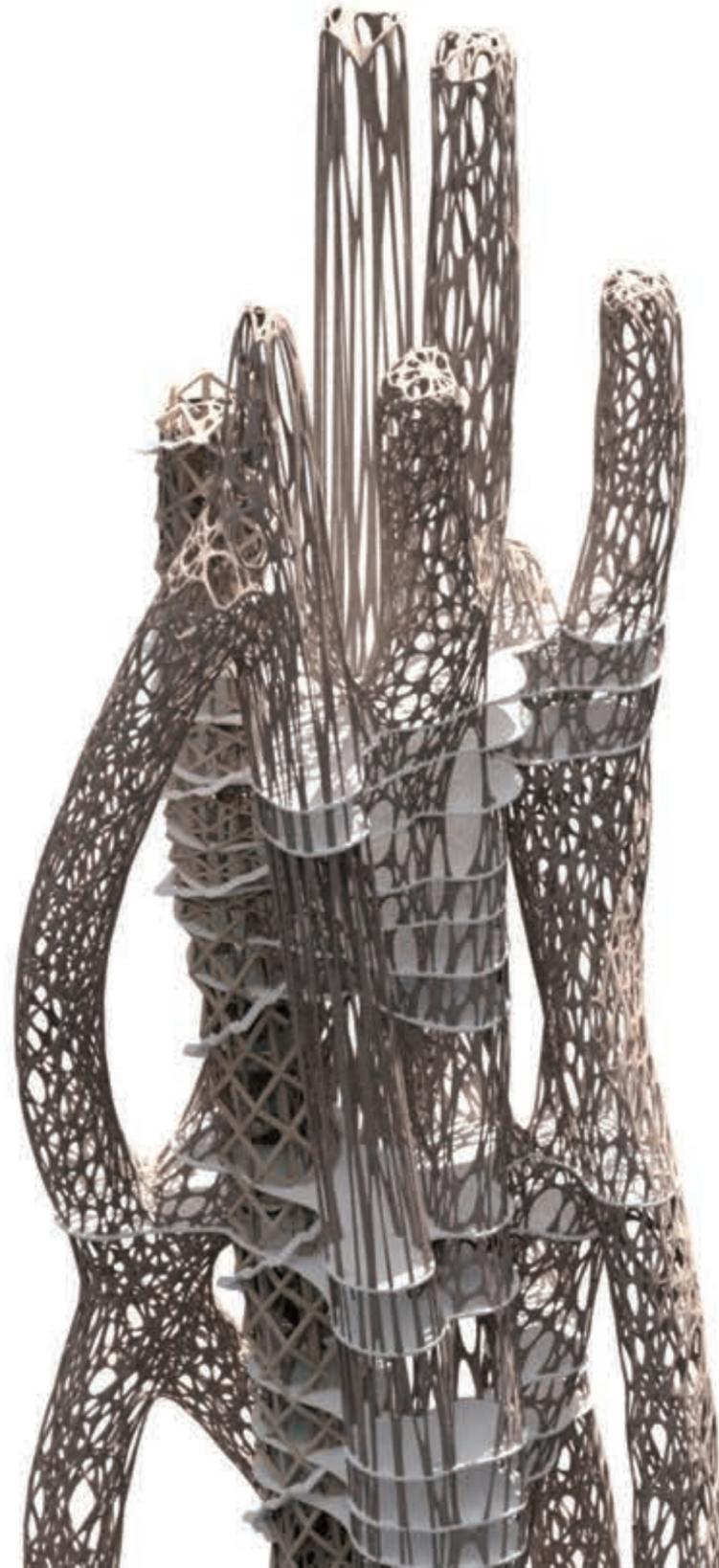


Subterranean  
Co-habitation | Sharing | Giving

### **Buzzard Habitat** Co-habitation | Sharing | Giving

The top part of the proposed design are inhabit with the buzzard. In the research of the wildlife in Ashdown Forest, buzzards and kestrel are found nesting in the top of the tree/cliff as they like to overlook the forest.

The designated structure are the formed by a series of outstanding poles which vegetation are grew across the skeleton. It creates a perfect habitat for the buzzards to nest within. The concept are embedded with the idea of cohabitation. We create a structure that suitable for the species to inhabit with which it demonstrates the idea of harvest festival.  
( Sharing & Giving )





Sunset View  
+100.0m | Habitat

Sunset View  
+200.0m | Habitat



Internal View  
Forest Space | Helsinki



Sunset View  
+200m | Helsinki



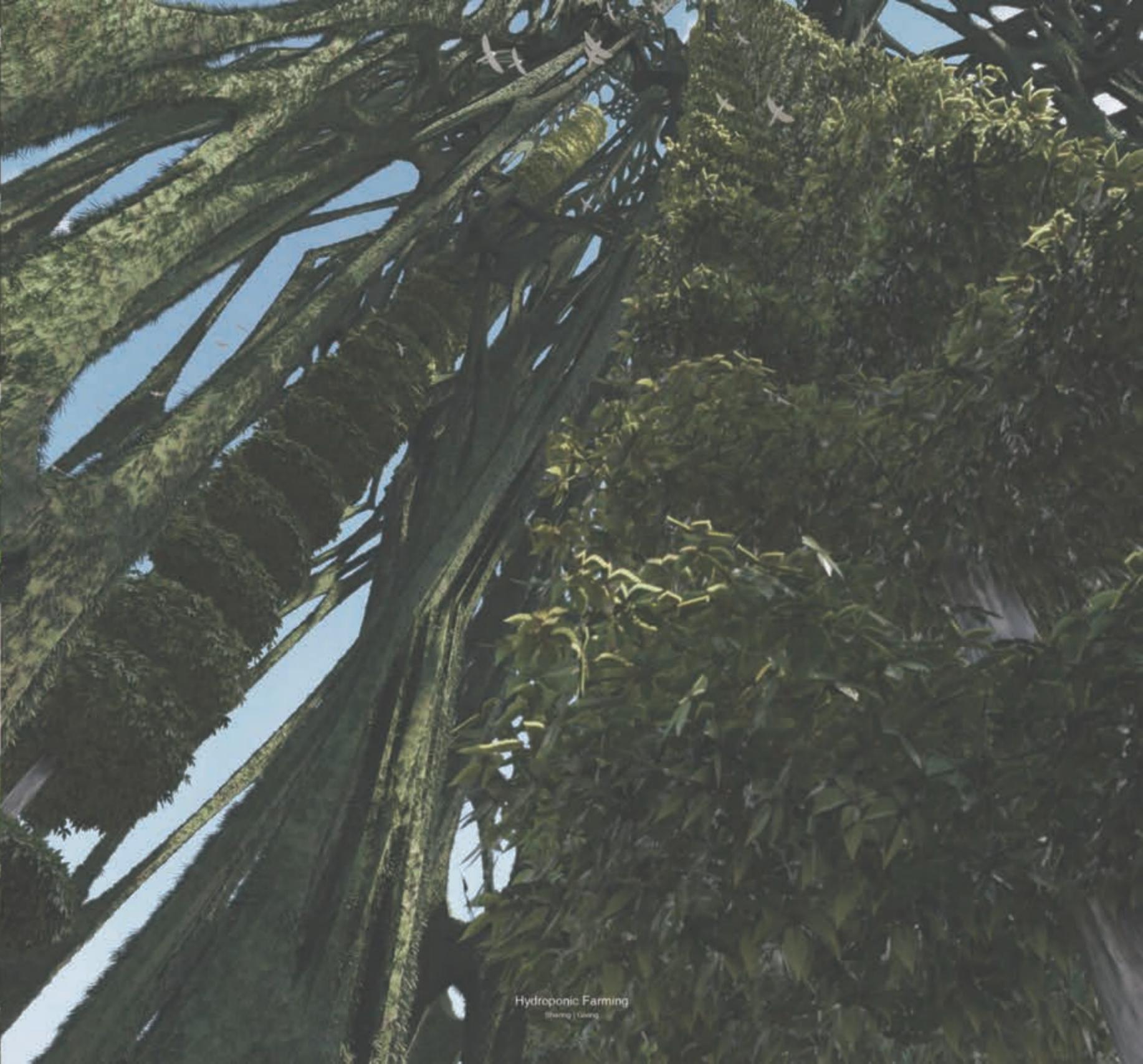
Food Forest  
The University of Queensland



Food Forest  
The University of Queensland



Hydroponic Farming  
Shining | Growing



Hydroponic Farming  
Shining | Growing



Bird Eye View  
Vertical Forest | Habitat



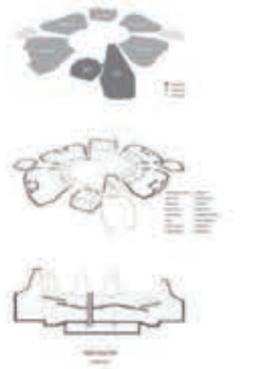
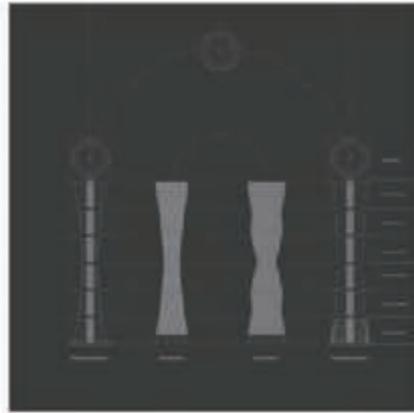
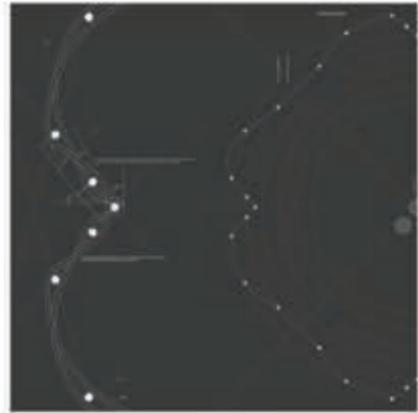
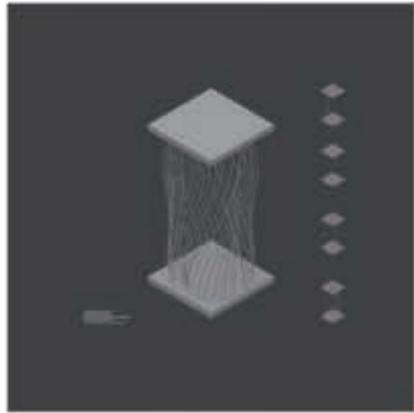
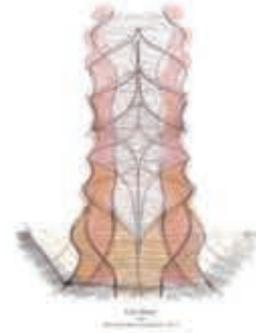
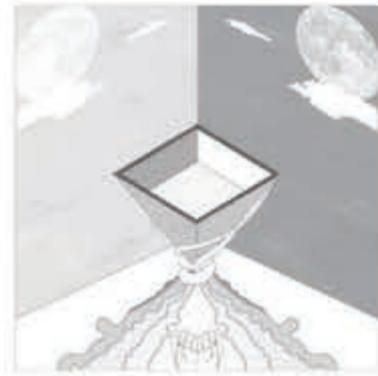
Bird Eye View  
Vertical Forest | Habitat

## Gift of Nature

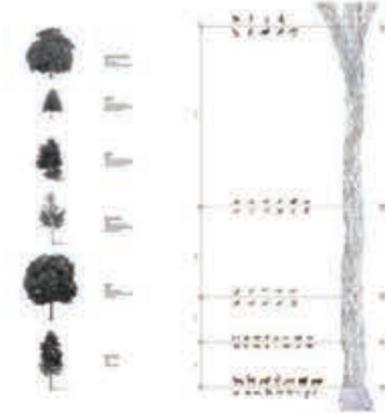
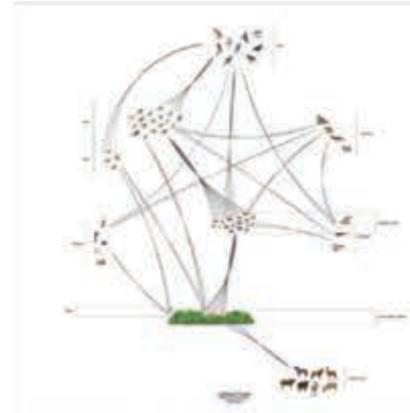
Rhythm | Physical | Complexity

In ancient english word, harvest means haerfest - Autumn, which it states the season for gathering the food for both land. This crucial time of the year is exceptionally extraordinary within the past when the success was a honest to goodness matter of life and passing. The total community/life cycle includes creatures, would depends on the harvest of the crops to outlive through the cold winter. Food market and stall is one of the conventional celebration within the harvesting festival. Individuals would give out and share their nourishment with others. Eating geese is one of the convention because it was said to bring financial protection for the following year. Corn dolly is made in several shape as a social representation of the goddess of the grain, and put within the cultivate as a sense of luckiness to the another collecting season.

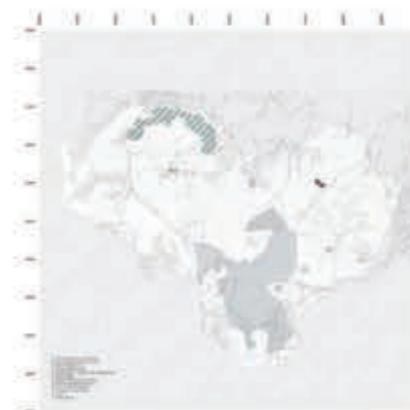
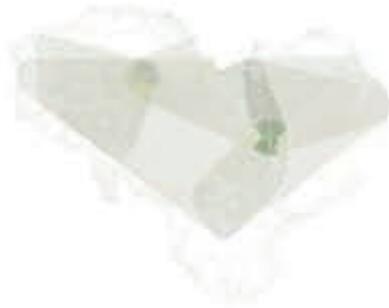
With the development of the innovation, less and less man-power was contributed to the collections/harvesting of the crops. Genetic modified crops were created to resist the extraordinary climate conditions caused by the climate alter. The food we gotten not gather in harvest time. Ready to purchase varies sort of food in year round. We are taking the harvesting item for granted. With the climate alter, rural arrive would certainly be influenced. Over populace are giving raise to the nourishment frailty of the world. Uneven distribution of resource will become a major issue. Balance between populace and food are my key interests in this proposition which I would like to examine the concept of vertical agricultural tower with livable space.



**Nature Reserve**  
Ashdown Forest | Wildlife | Habitation

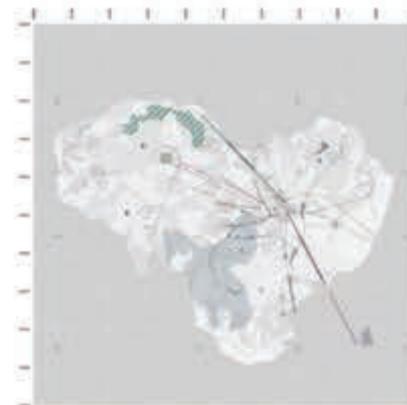
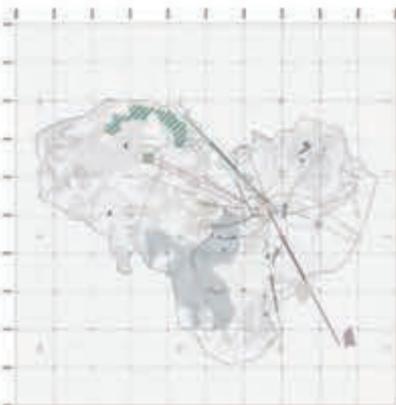
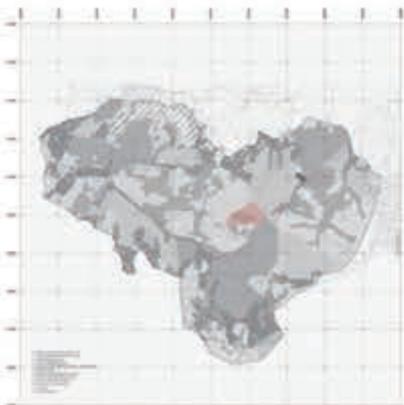


With the research of the wildlife eco-system, I wonder what position humans are standing while facing the change of the climate. As the past millennium, human has been conquering the world, being the top of the food chain, building a huge concrete city, isolating ourself from nature. But due to our rapid development of technology, pollutions have caused global warming which leads to serious and extreme climate change. Humans can no longer isolate or separate ourselves from nature when the boundary is getting narrower, and yet we can never live without the natural eco-system. It is the bio-diverse eco-system that provides us the carbon cycle, filtering the air and water system, helping to keep our world in order. Being part of the research of the bio-diverse eco-system, this booklet served as a dialogue for a human's standpoint in this situation.



The diagram has shown the territories of birds around the Ashdown Forest. It is referencing to the official website of Ashdown Forest and data from the RSPB.

The later stage of site finding is based on the hunting zone which I carried out from this mapping. The research is conducted to find which site area could have the most species of bird that are overlapping. The concept of a food chain is considered in this mapping. The map also highlighted different area of the site which trys to identify which area is best for the build of the proposed design.

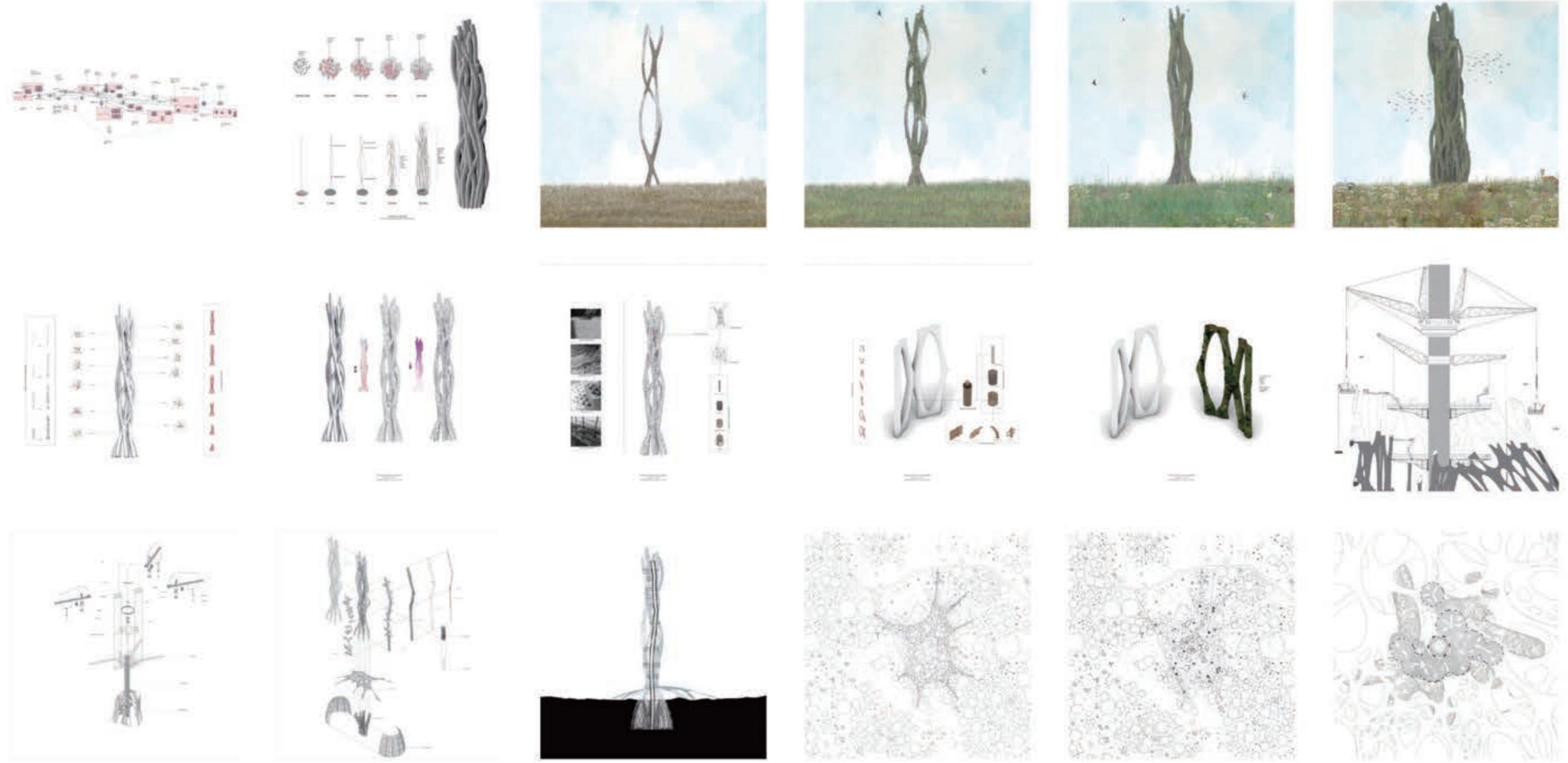


**Code of Nature**  
Algorithm | Growth | Development

The concept of combining two strategy in the previous sections of my investigation. One is the hybrid concept model of development, extracting the structural twisting and interaction of the buddle tube. The second example was extracting the idea of the interrelationship of the species within Ashdown Forest to act as the reason of interacting in different level of the building as relating to the level of habitat of the species within a tree system.

The investigation based on the previous hybrid tower studies of how space interact with each other. Initially, extrusion and twisting the form is the technique that I used to generate my totem and hybrid form. The form of the hybrid model and the site analysis created a conceptual idea of how the cellular automata that the growing algorithm could provide a concept idea of how the proposed tower to be grown instead of finding a form and extrude.

Furthermore, the interesting part of the optimization would be on spatial quality within the structure. By adding sub-structure to it, space could be created in some sense. The skeleton could be weaved around to form space and like a nest. The weaving technique could be found in the totem exploration from the first semester. The initial attempt of creating the facade like form. But in this one, surface could be formed to create floor plane and even furniture to certain extent.



## Vignette

### The Nest | Seed to the City | Cohabitation

My proposed design tower is interpreted as a vertical forest extending from the existing landscape. The proposal is addressing the question mentioned in part 1 which architecture could, indeed, create positive impact to the environment. The idea of extending the forest ecosystem vertically is important in fighting the climate change and restoring the biodiversity in the proposed site area. There are three narratives articulated in this project within the aspects of environment, architecture and human.

In the research of my thesis project, the fundamental elements of a land-based eco-system begins with the "living soil". The definition of living soil, according to ecologist Tom Snow, is that it should contain 25% of air, 25% of water, 45% of soil and 5% of living organism.<sup>1</sup> The living organism in the soil is the key to make everything happen. Nutrients like nitrogen and phosphorus that are essential for the growth of plant are generated from the decomposition of the living organism, for instance, bacteria and fungi. The growth of the plant provides food and shelter for the insects which attracts higher predators. A food web is then created which is essential for the formation of the eco-system. Living soil then becomes the major environmental element that integrated into my design strategy as a material and structural investigations.

