

FROM DUNE TO ARCHITECTURE



Graduation Project
MegaDune EcoLodges in Abu Dhabi

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As architects we have been training to solve problems or in another words we can call them “opportunities”. In my case the threat is ‘desertification’. Desertification is a major threat in all continents, affecting some 120 countries. So, architectural response is to create an oasis in the valley of desert and create sandstone architecture by using sand and bacteria which is called bacillus pecturii. The sandstone architecture that I am proposing essentially does three things. It adds roughness to the dune’s surface, it provides a physical support structure for the trees, it creates physical and habitable spaces inside of the sanddunes and in masterplan the oasis is proposed the food and water storage for all animals in the protected area. The project shows how architecture and nature is working together as loop since while architecture is feeding the oasis, oasis is feeding both architecture and animals.

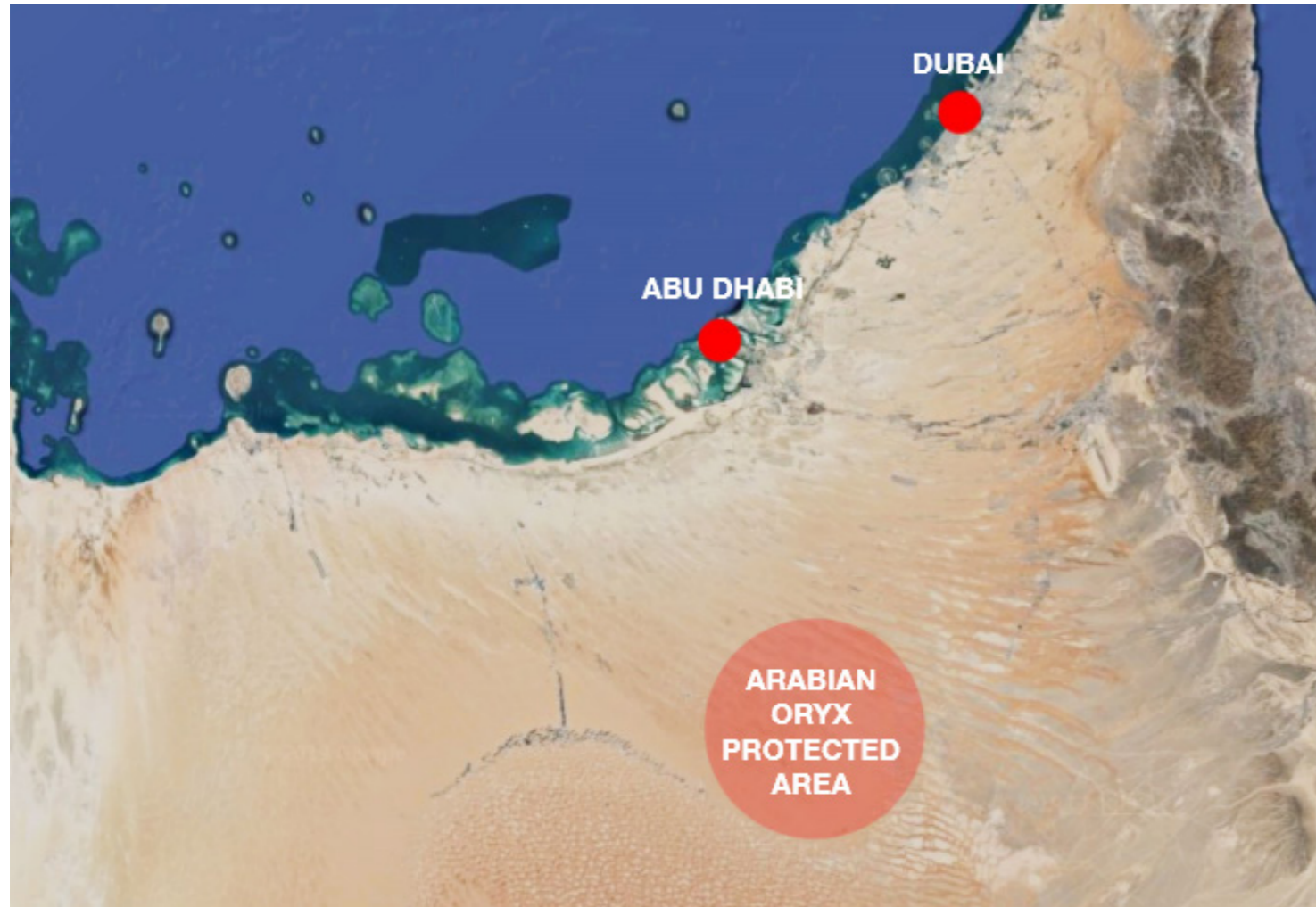


Arabian Oryx Protected Area

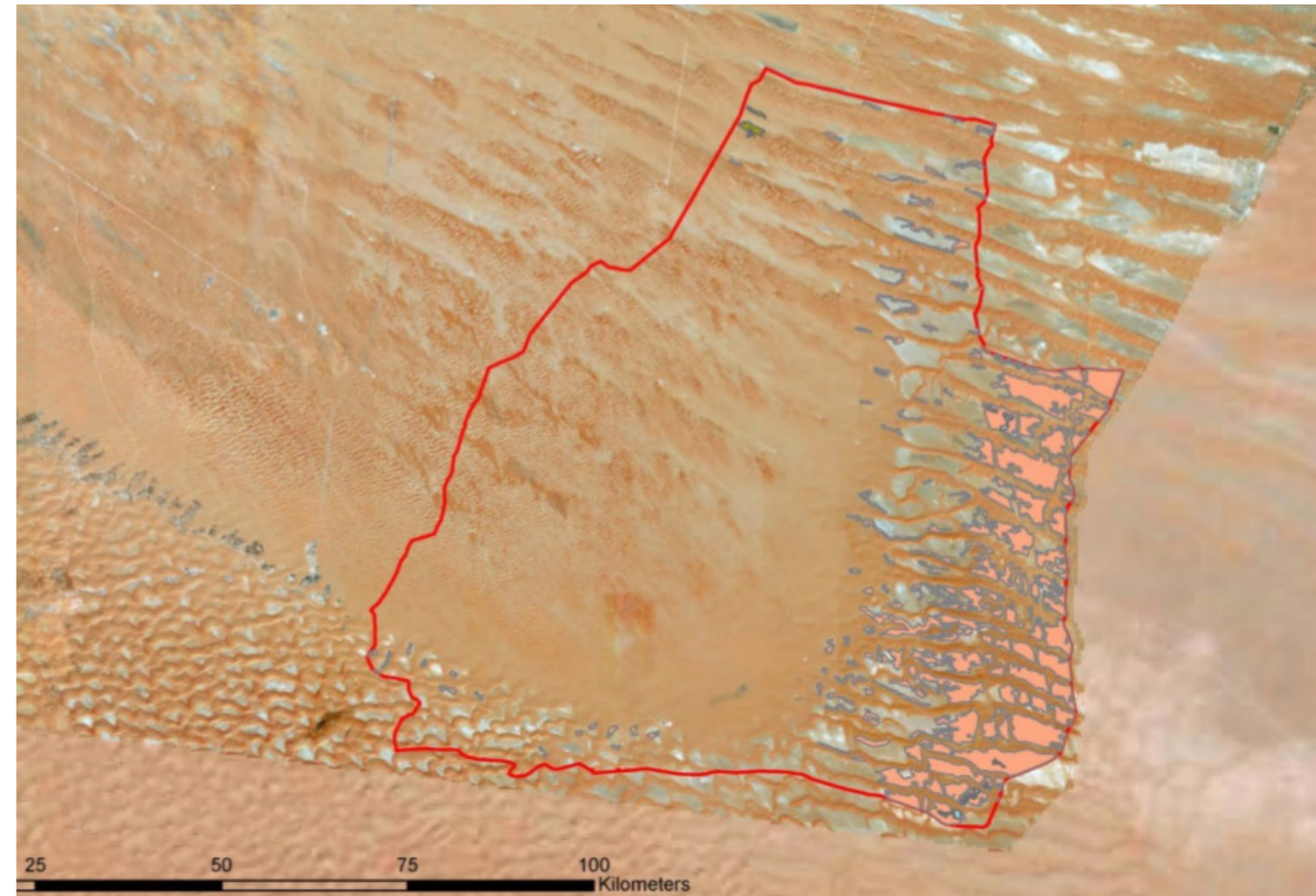
- The Arabian Oryx Protected Area is home to the largest population of Arabian Oryx in the world. Spanning over 5,900 square kilometers, it is located in the southern region of the UAE, bordering Saudi Arabia and Oman.
- The majority of the Arabian Oryx Protected Area consists of sand sheets and dunes ,with some mega dunes and gravel plains with dwarf shrub vegetation located throughout the area.
- In addition to being home to the Arabian Oryx, the protected area supports 92 species of plants, birds, reptiles and mammals. The diversity of some animal groups in the protected area is significantly lower than would be expected of large mammals.

SITE ANALYSIS

Arabian Oryx Protected Area

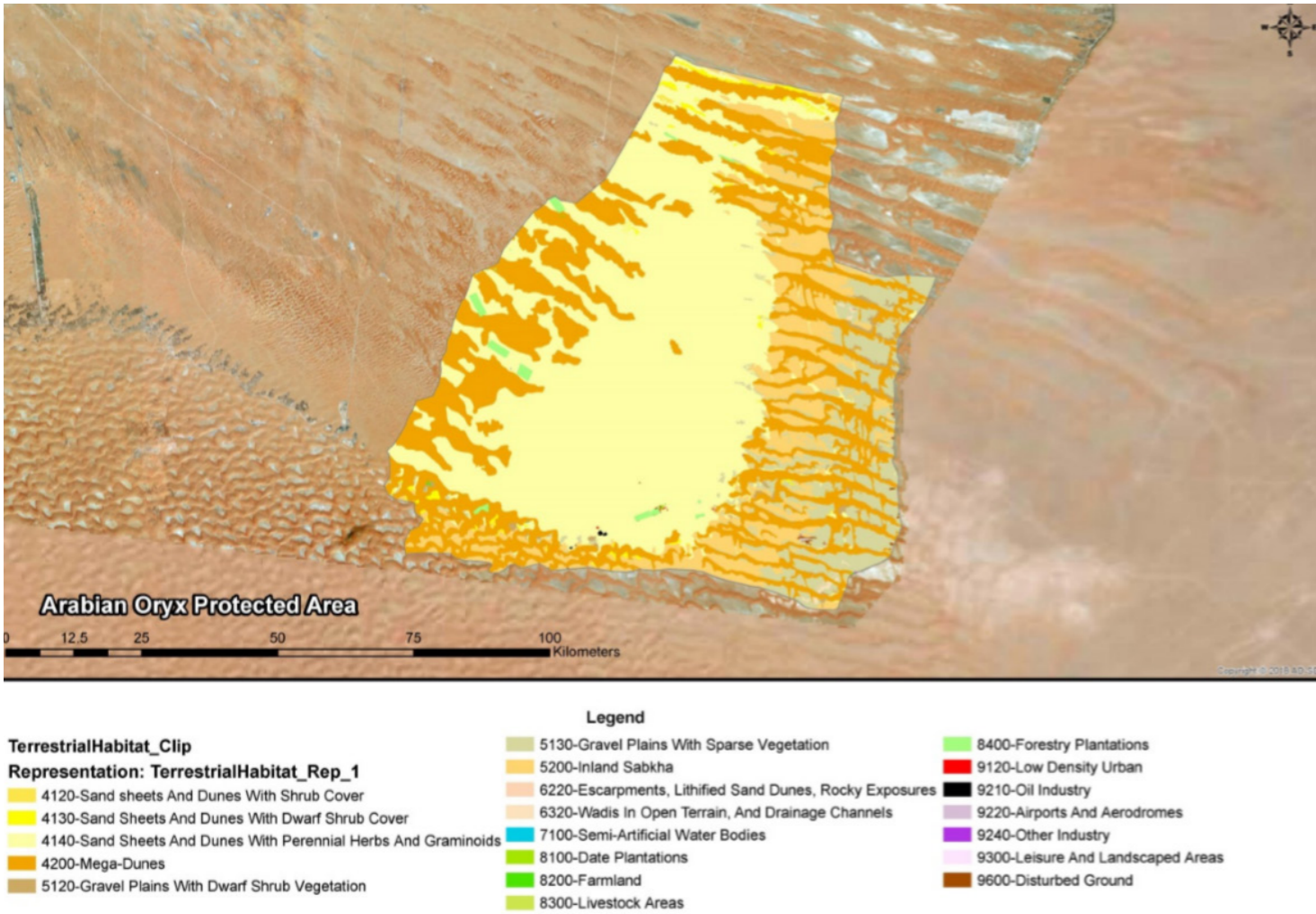


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the "Sheikh Zayed Protected Areas Network" consists of 13 terrestrial protected areas and covers over 15% of Abu Dhabi's territory. The Qasar Al Sarab Protected Area covers 1304 square kilometers in which the Arabian Oryx roams freely; and the Arabian Oryx Protected Area, which covers 5975 square kilometers, is home to the largest population of Arabian Oryx in the world.

Site Description



Unique habitats that support 92 species of plants, birds, reptiles and mammals including and species such as Arabian Oryx and Sand Gazelles. The diversity of some animal groups in the protected area is undoubtedly lower than would be expected, especially so for large mammals.

Habitat Description

The majority of the protected area is sand sheet and dunes with perennial herbs and graminoids. There are some mega dunes and gravel plains with dwarf shrub vegetation, and a few forestry plantation

Mammals	Reptiles	Invertebrates	Plants
1. Red Fox (<i>Vulpes vulpes arabica</i>)	1. Arabian Sand Gecko (<i>Stenodactylus arabicus</i>)	1. Bush Crickets (<i>Conocephalus maculatus</i>)	1. ghaf trees
2. Arabian Oryx (<i>Oryx leucoryx</i>)	2. Arabian toad-headed Agama (<i>Phrynosoma arabicus</i>)	2. Blue Shinned Grasshopper (<i>Sphingonotus rubescens</i>)	2. <i>Prosopis cineraria</i>
3. Cheesman's gerbil (<i>Gerbillus cheesmani</i>)	3. Dune Sand Gecko (<i>Stenodactylus doriae</i>)	3. Ant-lion (<i>Tomatares hoelzeli</i>)	3. <i>Tetraena qatarensis</i>
4. Sand Gazelle	4. Schmidt's fringe-toed Lizard (<i>Acanthodactylus schmidtii</i>)	4. Wolf Spider (<i>Wadicosa fidelis</i>)	4. <i>Cyperus conglomeratus</i>
		5. Ground Spider (<i>Pterotricha loeffleri</i>)	5. <i>Dipterygium galucum</i>
		6. Camel Spider (<i>Othoes Sp.</i>)	

Eco-Tourism Potential

The protected area has a great deal of space and so there are plans to incorporate ecotourism after the introduction of infrastructure, such as a camping area, caravan park, and galaxy shooting.

Accessibility Diagram

- The main access will be provided by cable car, also service.
- This also provides users to take a tour of that great environment.
- Eventually because of those places it will be easier to take WATER from underground.

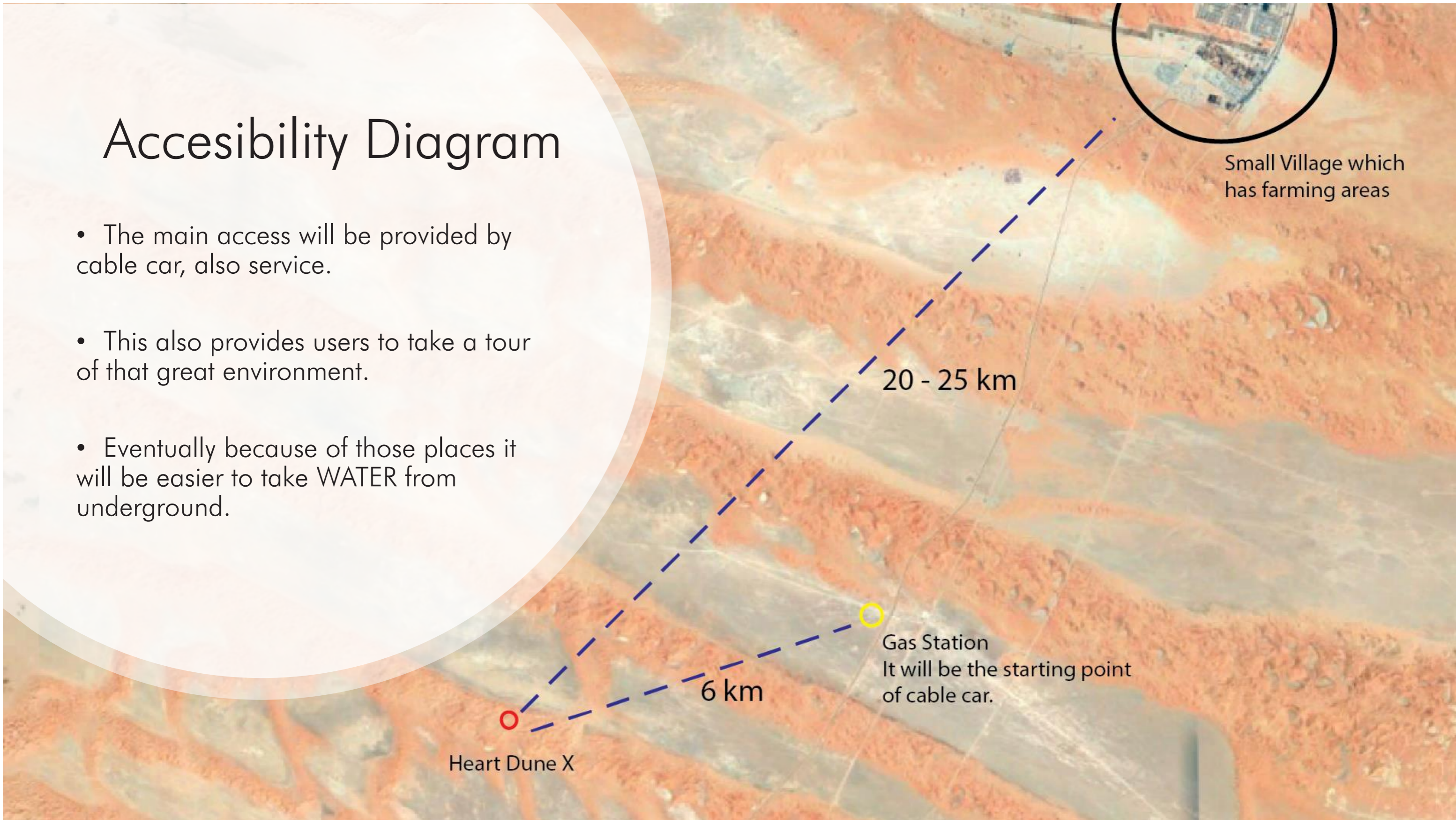
Heart Dune X

6 km

Gas Station
It will be the starting point
of cable car.

20 - 25 km

Small Village which
has farming areas



PROGRAMME

Standard Lodge

50 sqm floor area;

- 3m height
- Off the grid solutions for water, electricity and plumbing
- Comfortably accommodate 2 people
- Sustainable Design
- Small outdoor terrace
- Skylight to comfortably observe Milky Way.

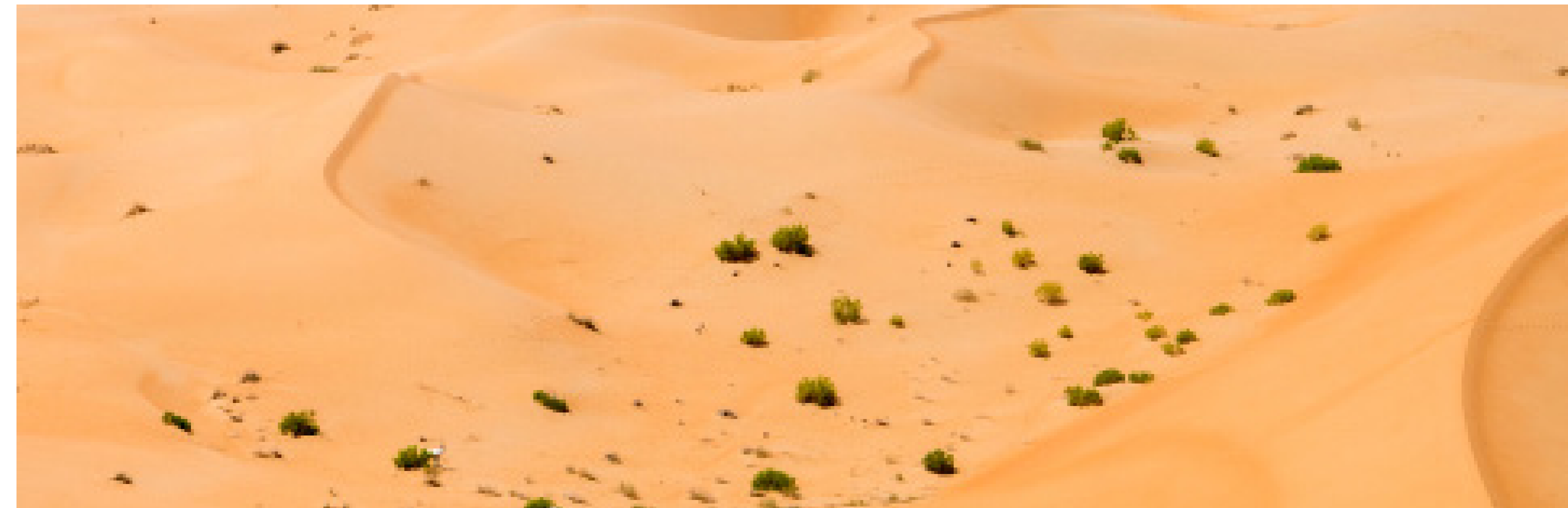
VIP Lodge

80sqm floor area;

- 4.5m height
- Off the grid solutions for water, electricity and plumbing
- Comfortably accommodate 2 people
- Sustainable Design
- Small outdoor terrace
- Higher standard interior finishes and furniture
- Skylight to comfortably observe Milky Way.

Common Hub

- 4.5m height limit
- Off the grid solutions for water, electricity and plumbing
- Workspace for 1-2 receptionists
- Sustainable Design
- Gathering/waiting area for 50 people
- Kitchen and dining area for 40 people.

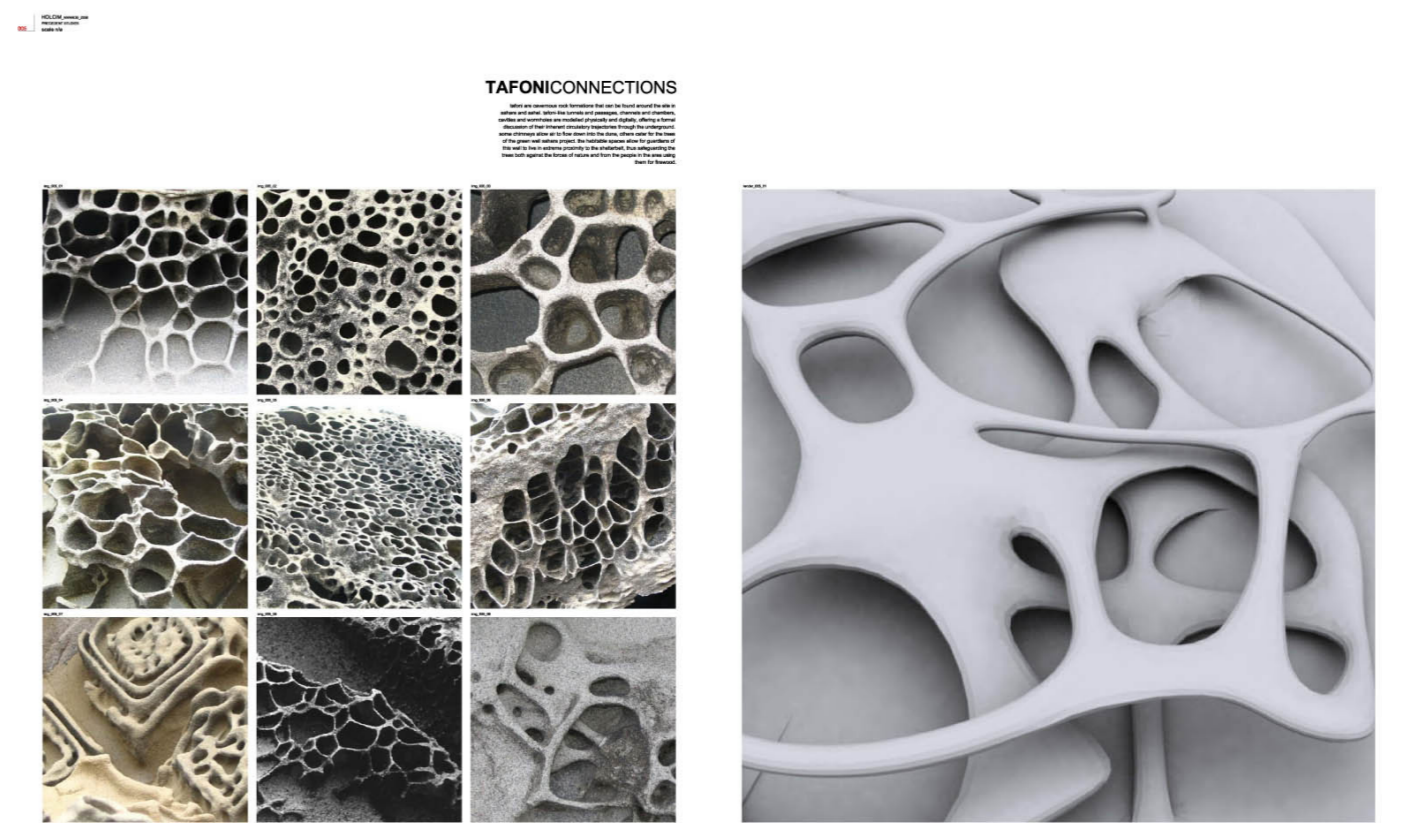


CASE STUDIES

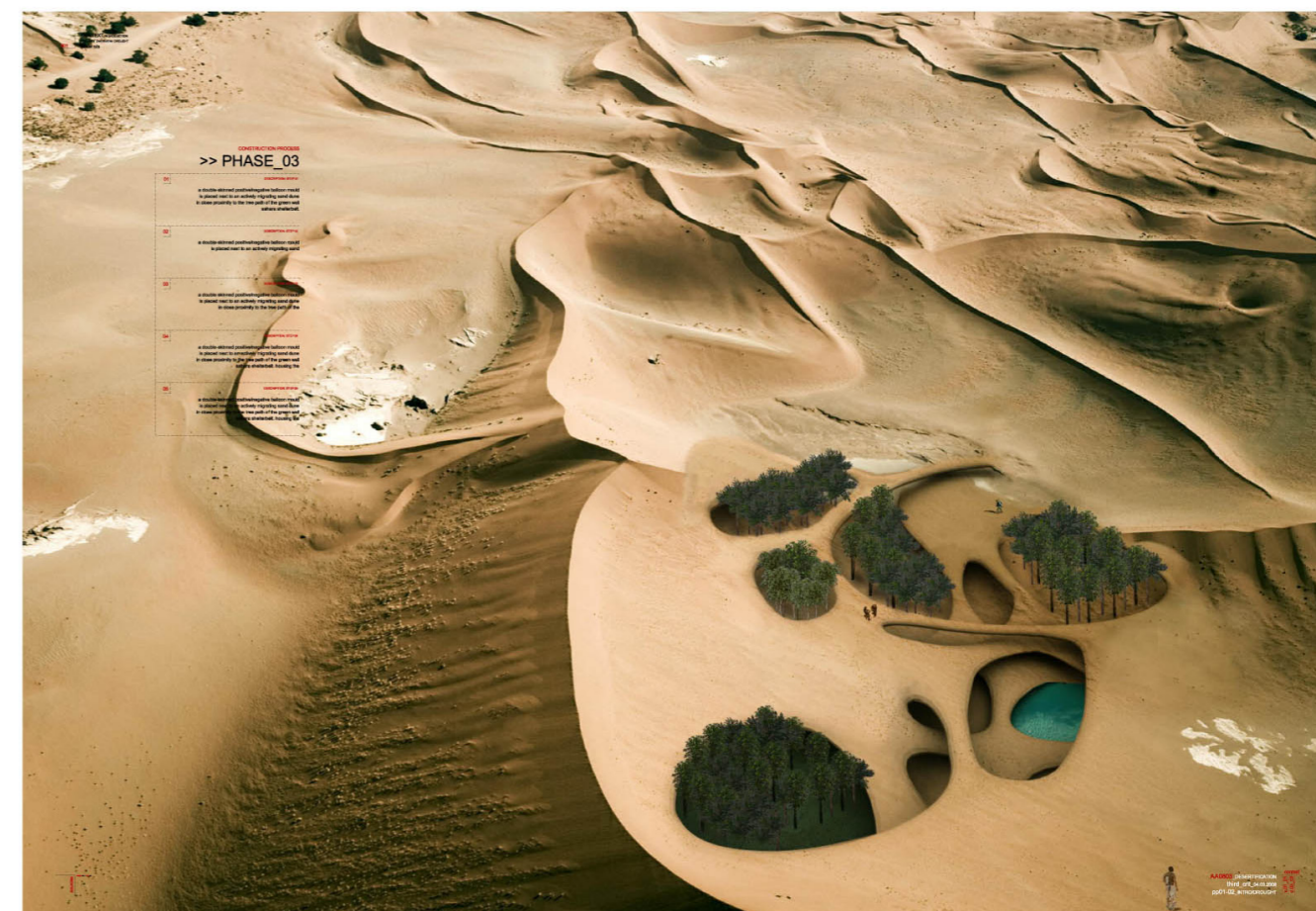
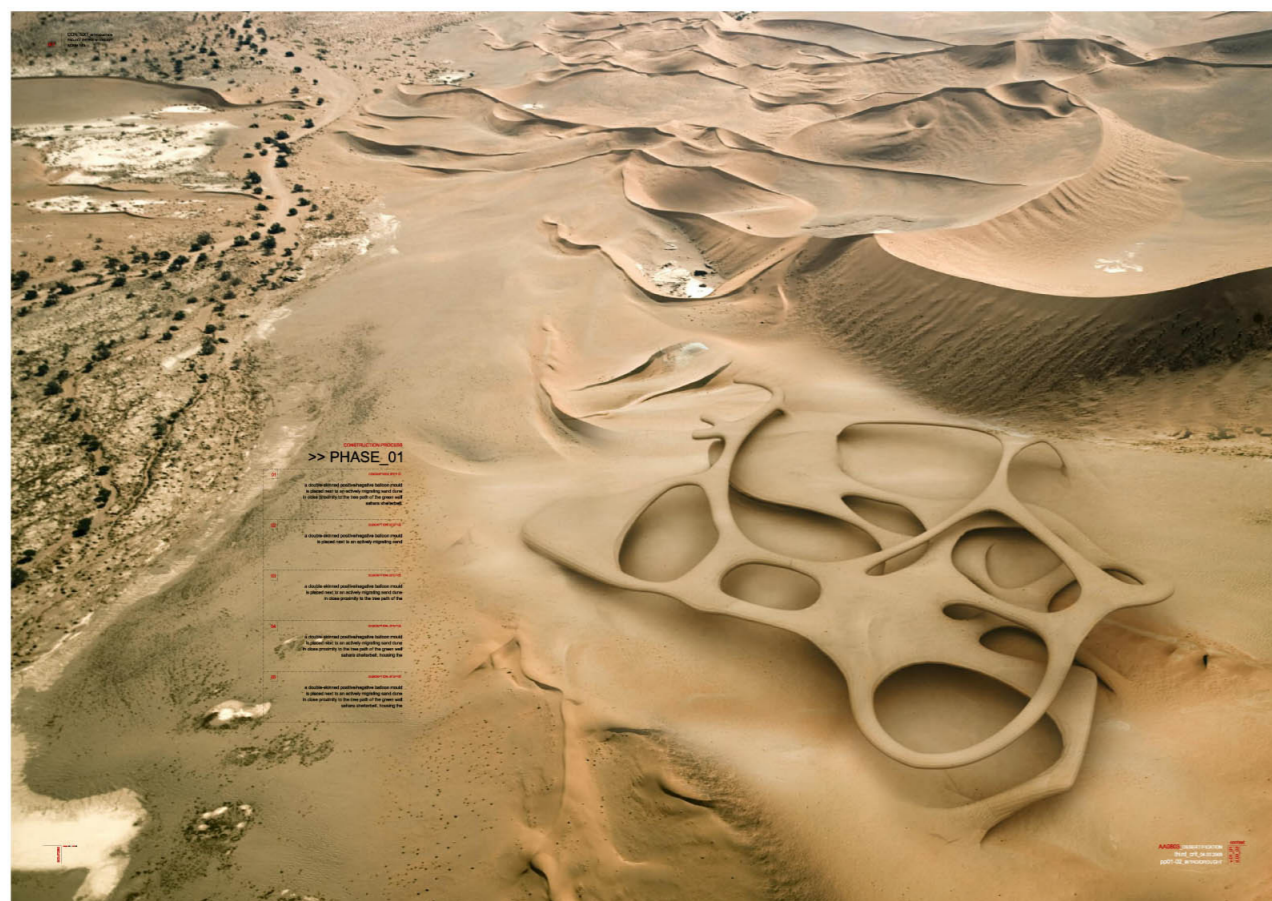
DUNE: Arenaceous Anti-Desertification Architecture



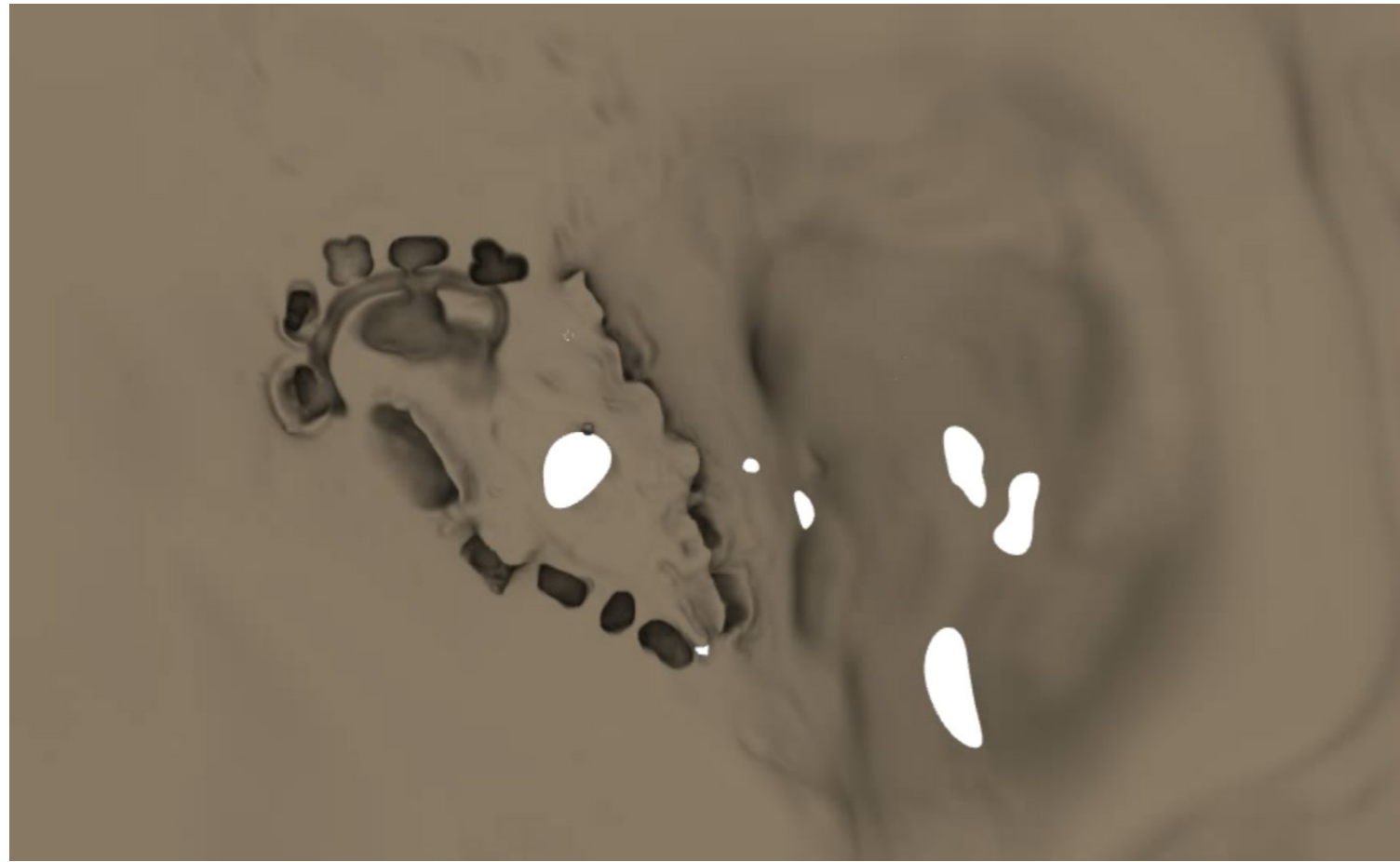
swedish architect magnus larsson teams up with the most unlikely partner to create a 6,000 kilometer-long inhabitable green sandstone wall along the saharan desert, presented at the exhibition 'sahara surreal' at the empty quarter gallery. with the help of bacillus pasteurii, a bacterial microorganism abundantly available in marshes and wetlands, the loose sand will be transformed into a fibrous porous structure that will sustainably control desertification while housing thousands of refugees.



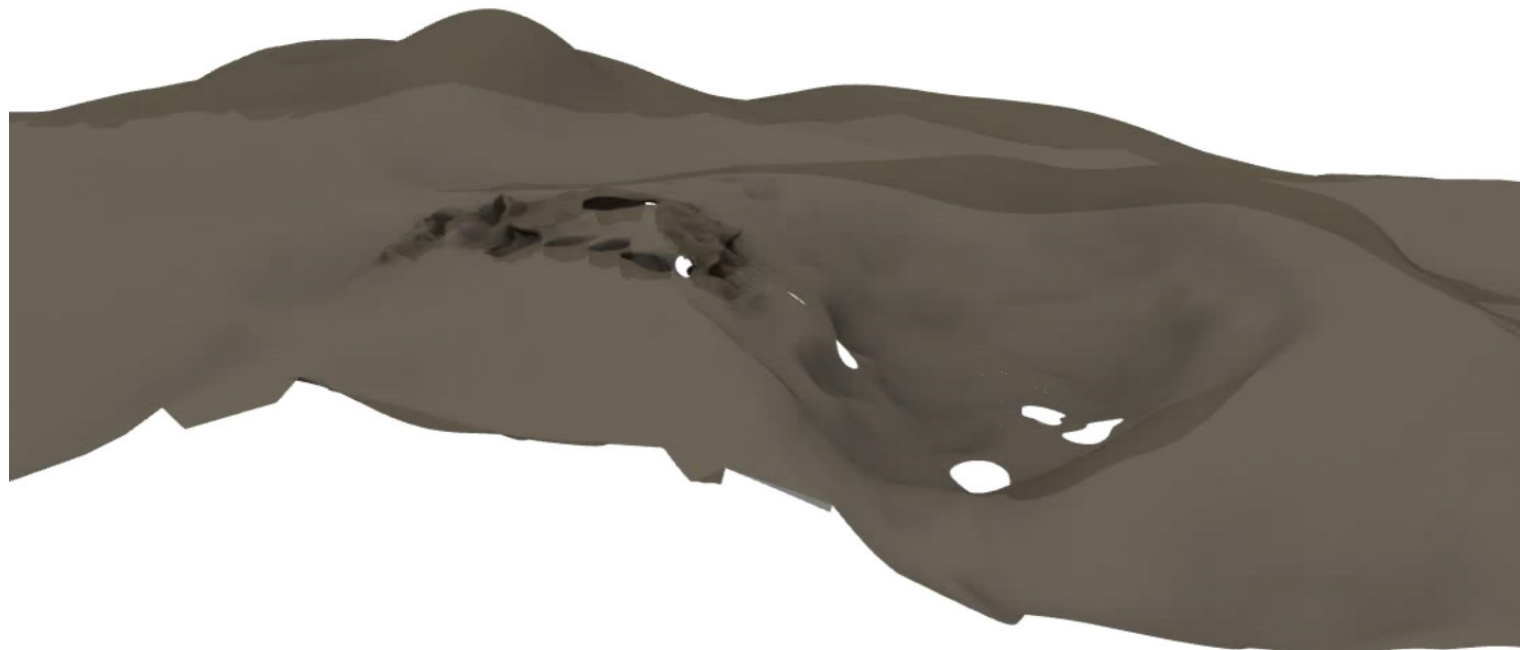
the crux of the project however lies in the natural microbial reaction of the bacteria with the sand particles that turn them into organic dunes of structurally-sound sandstone, a process that has been studied at UC-davis using the rock formations in utah that follow the same principle albeit on a much smaller scale. her explains that his 'structure is made straight from the dunescape by flushing a particular bacteria through the loose sand...which causes a biological reaction whereby the sand turns into sandstone; the initial reactions are finished within 24 hours, though it would take about a week to saturate the sand enough to make the structure habitable.'



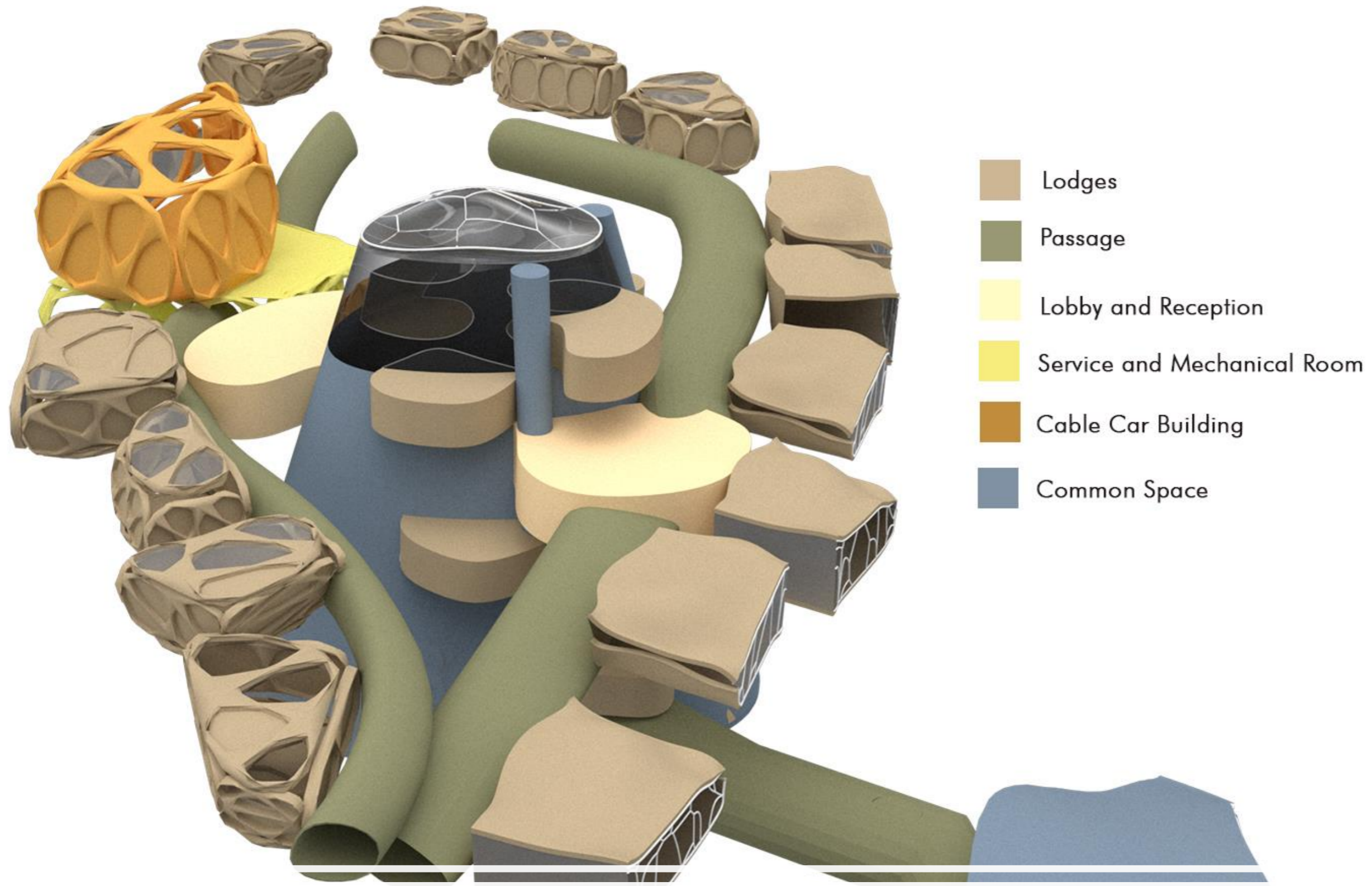
MasterPlan Strategy from now to the Future



Response to The Threat/Creating Oasis in the Desert





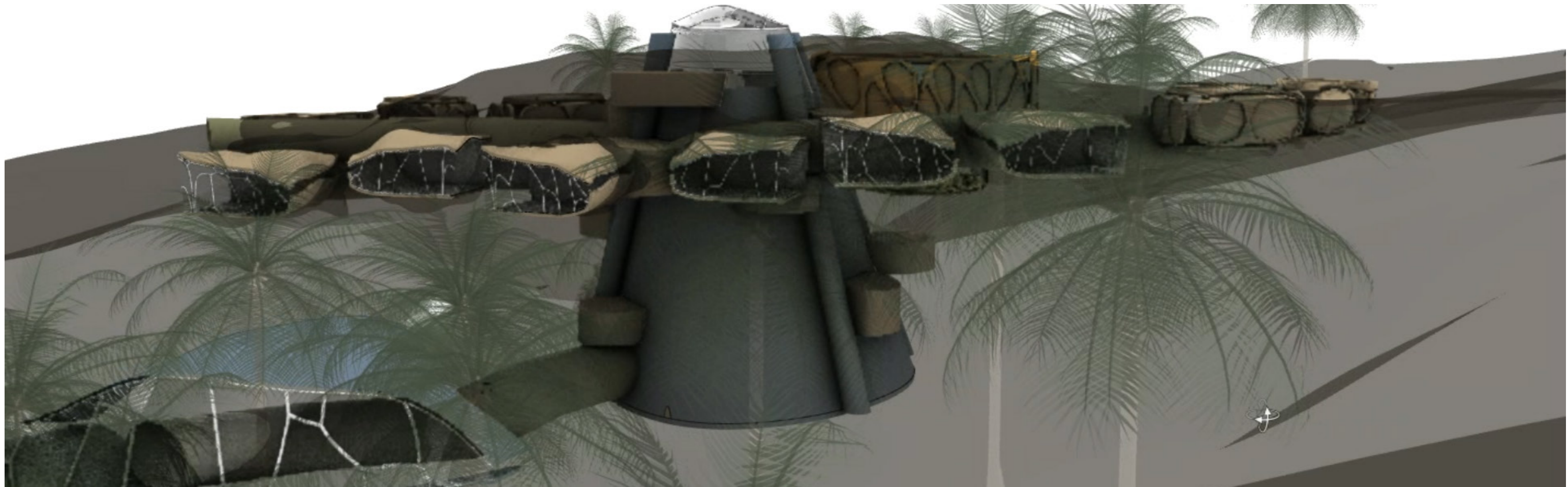


Function Diagram

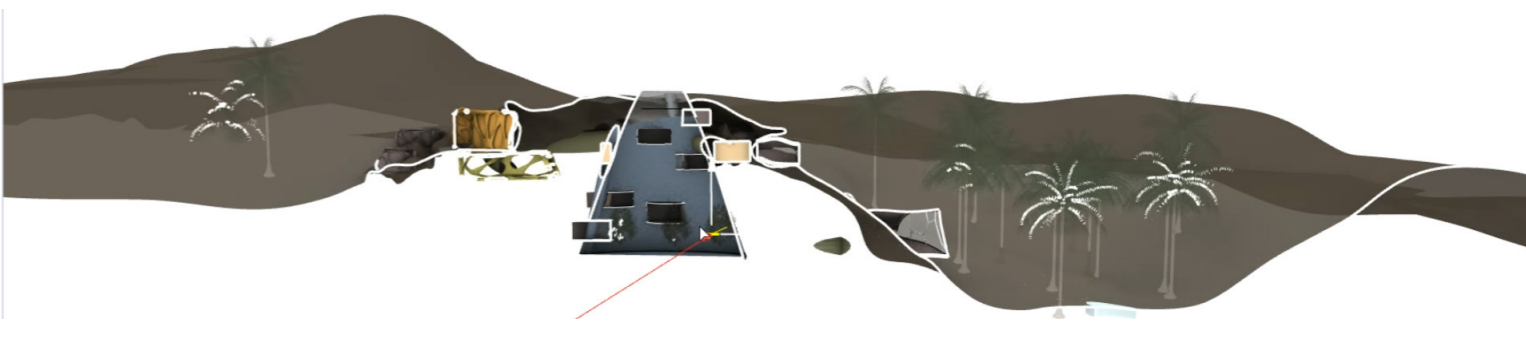
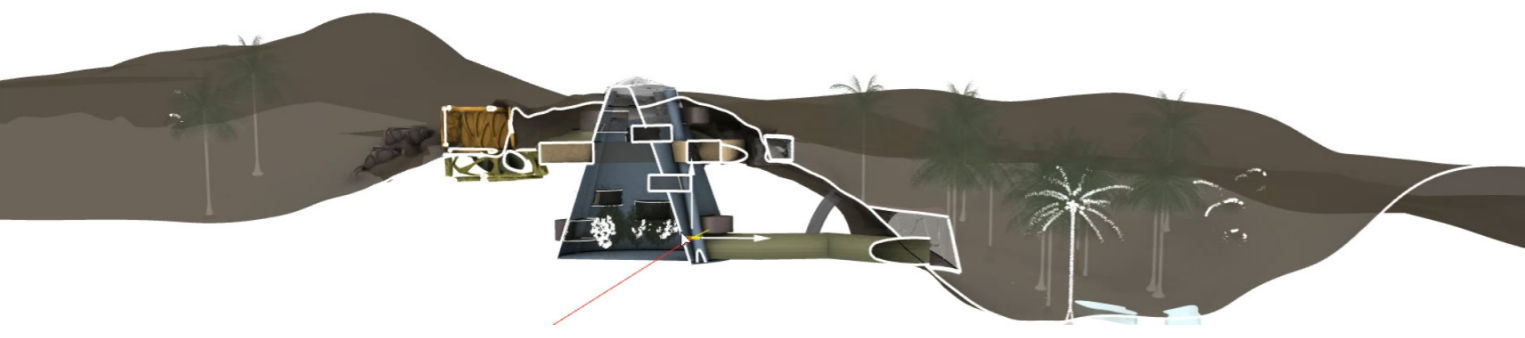
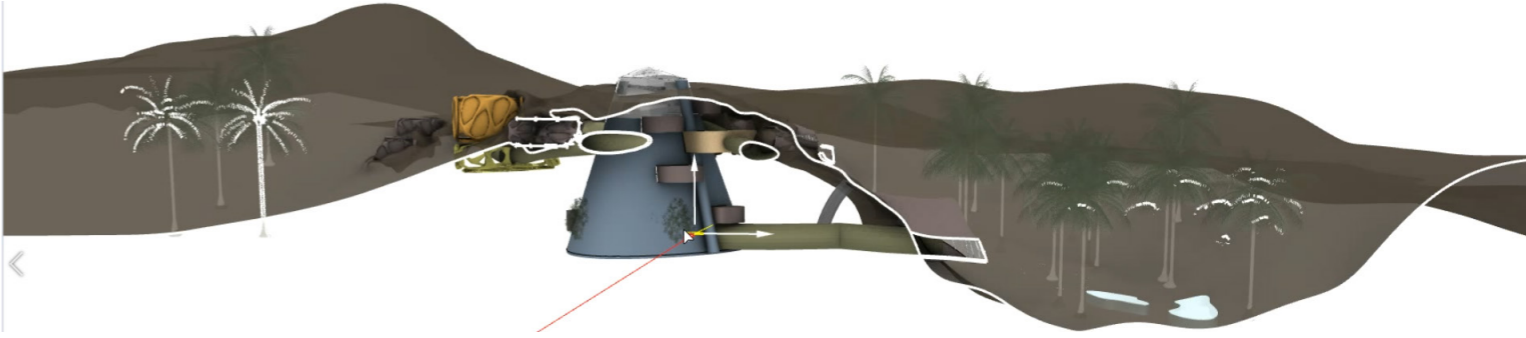
Articulation Diagram



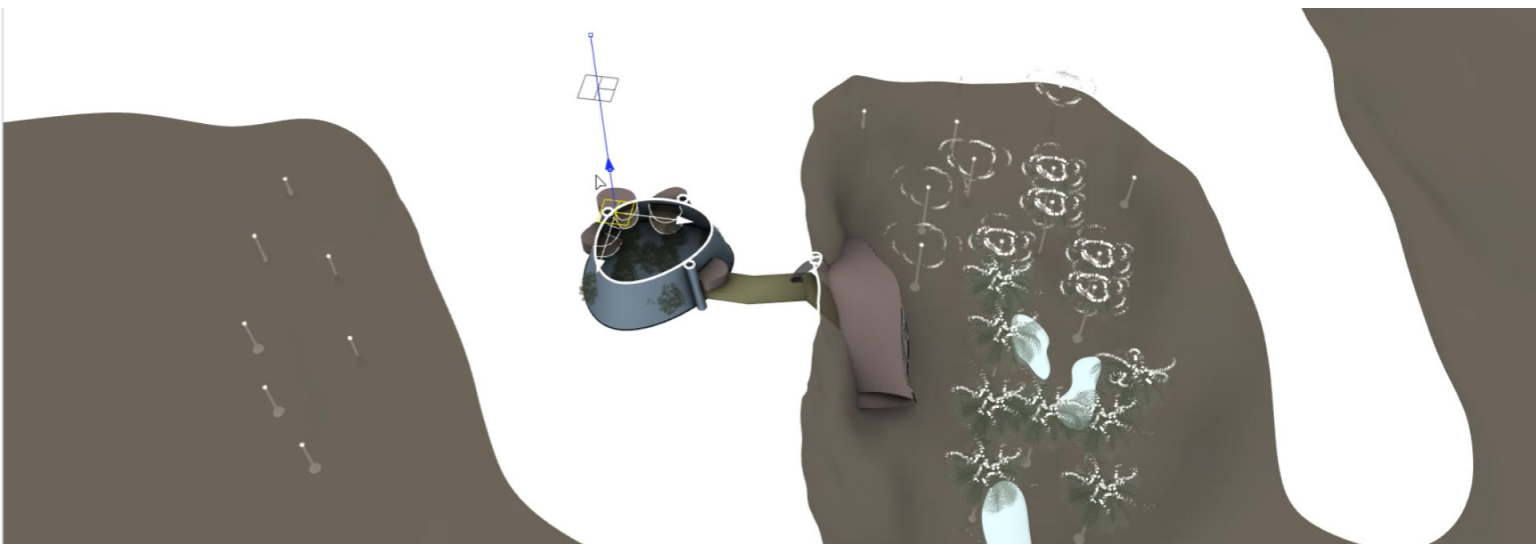
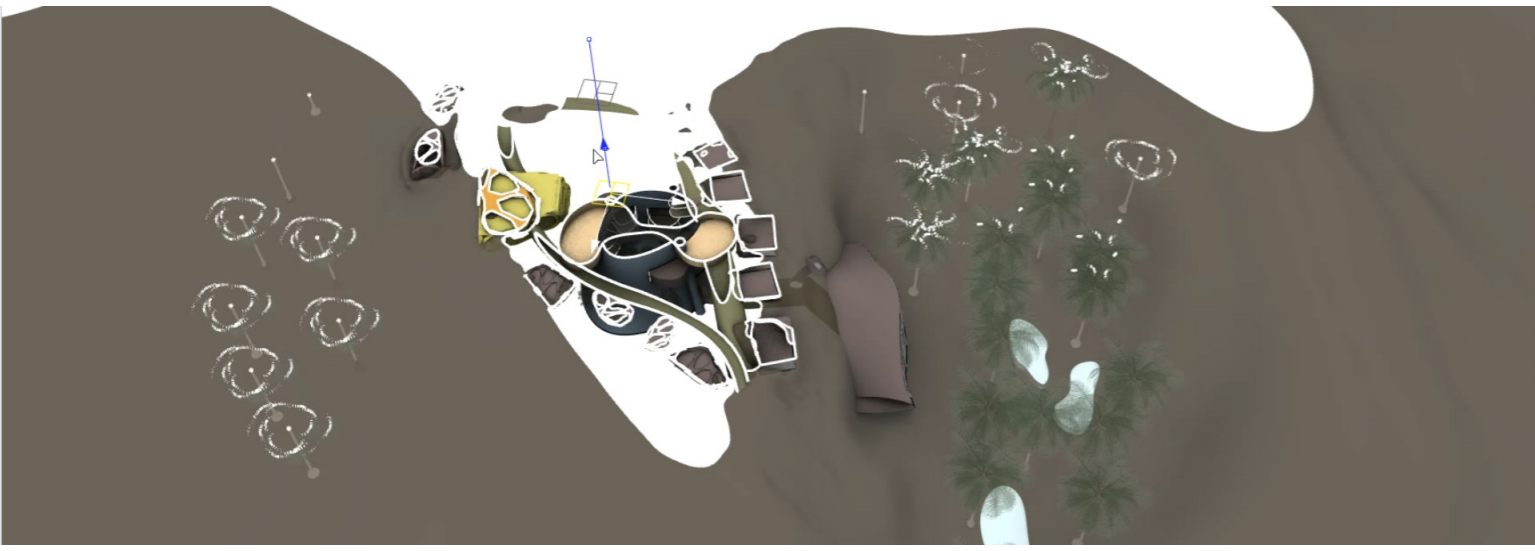
Inside The Dune



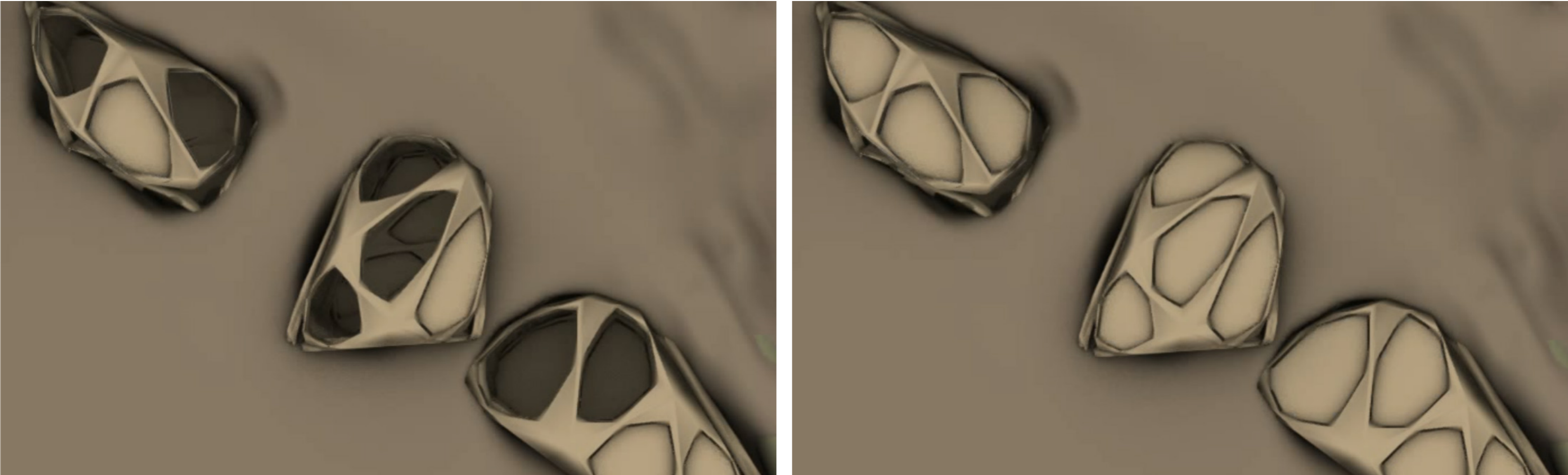
Vertical Section Series



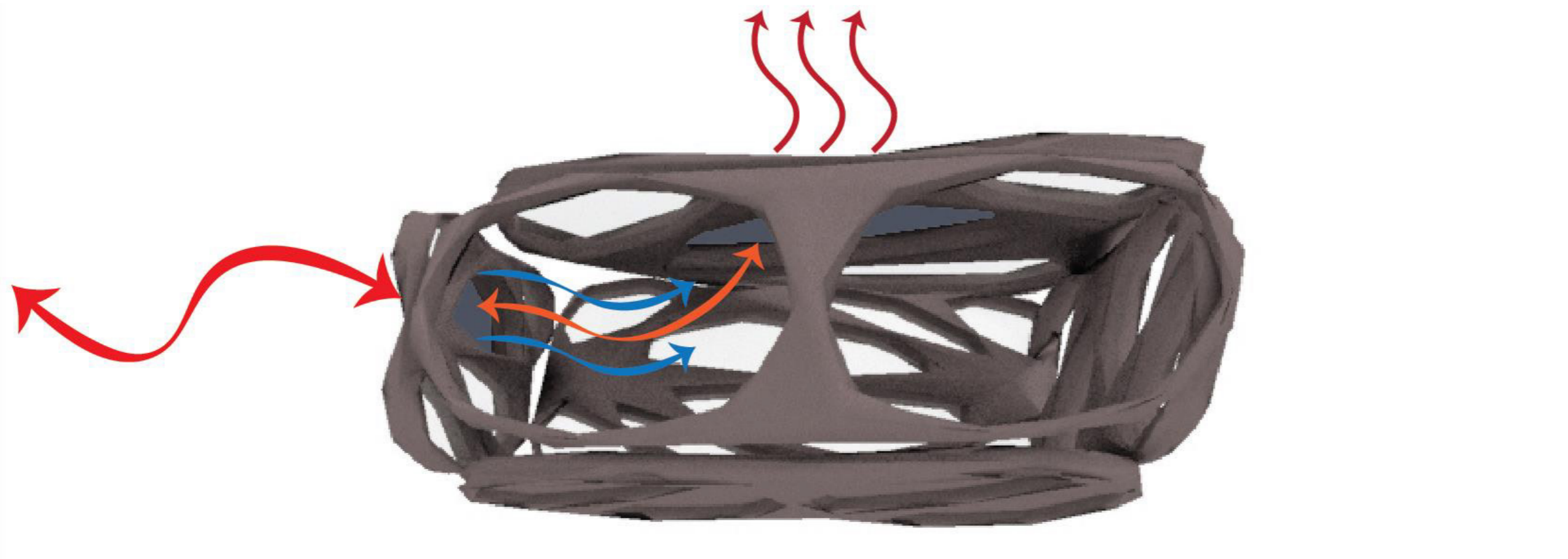
Horizontal Section Series



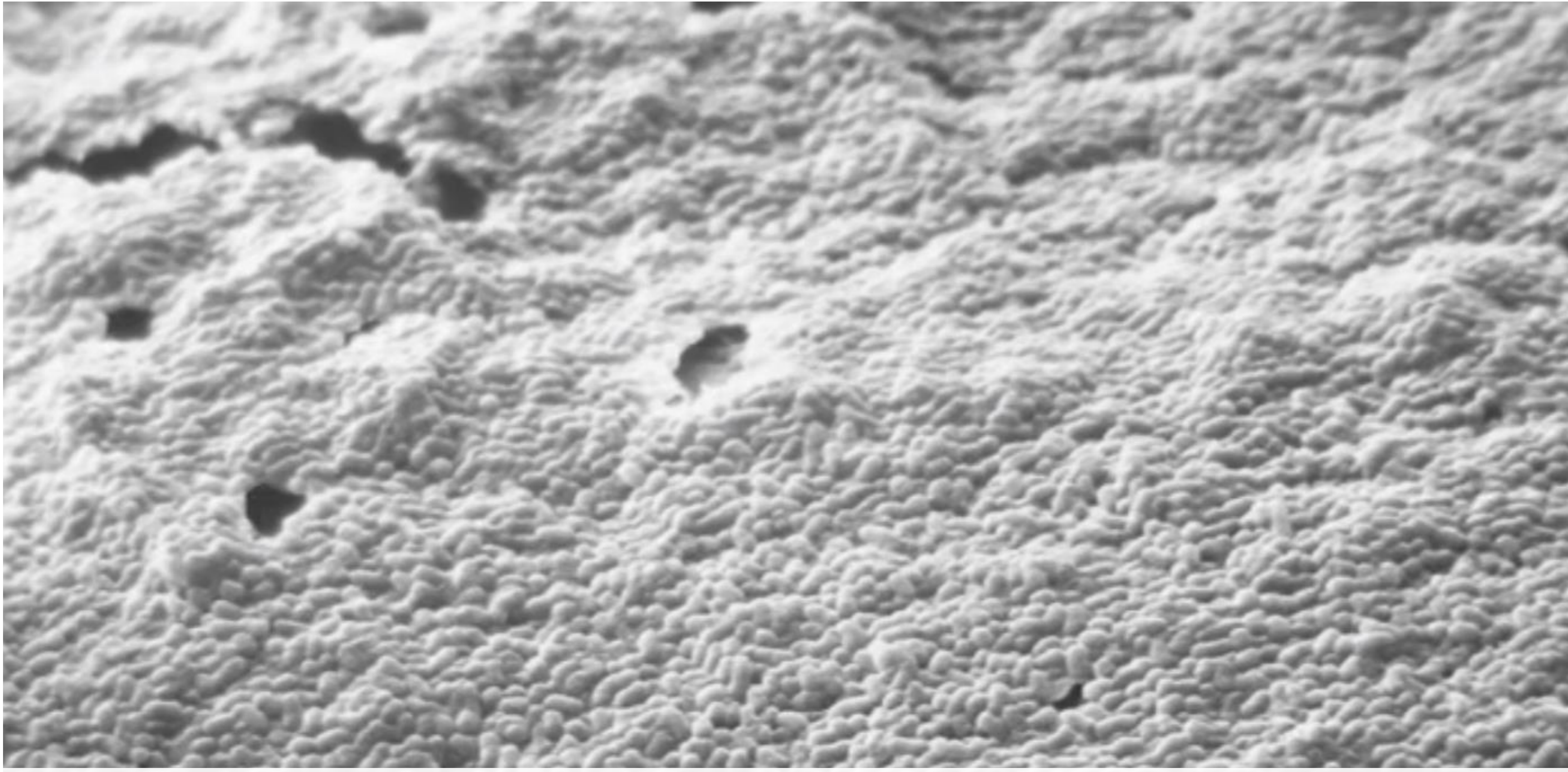
Some Ventilation Strategies



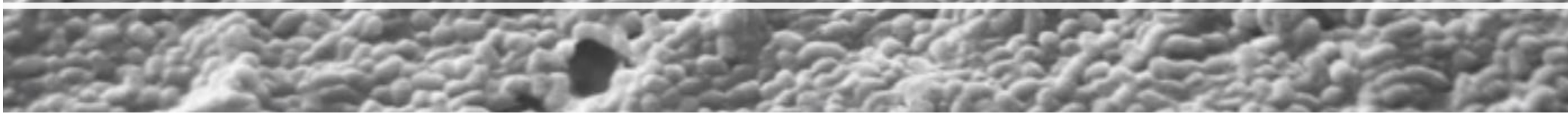
The rooftop of the voronoi shaped lodges will be magic glass so that it can be openable during the night for ventilation and great milky way sky.

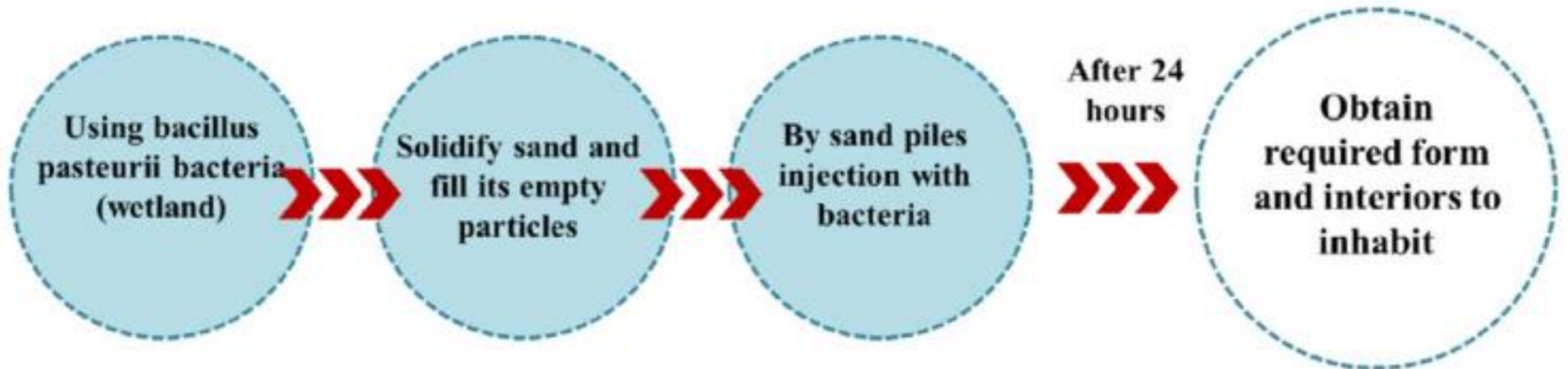
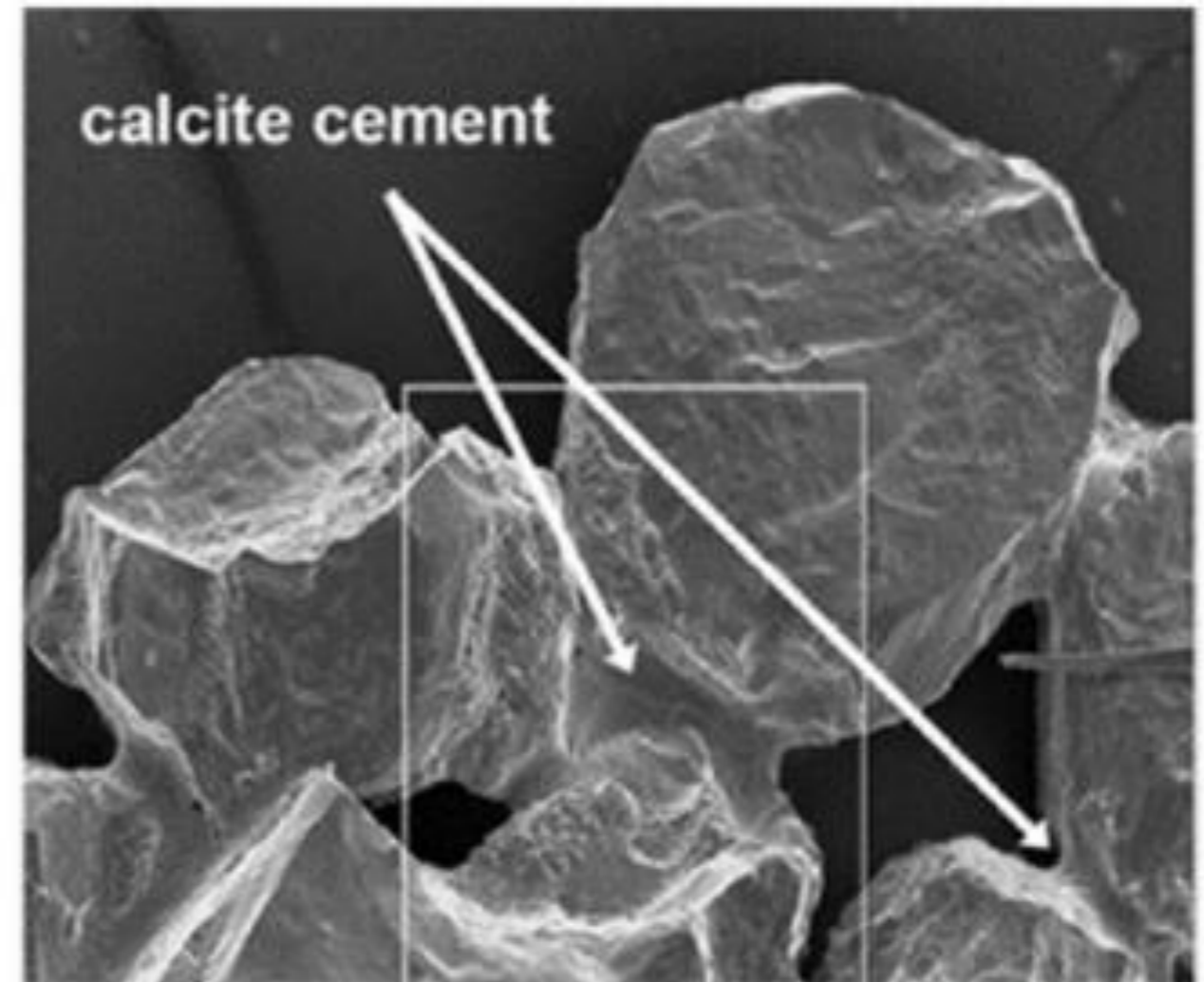
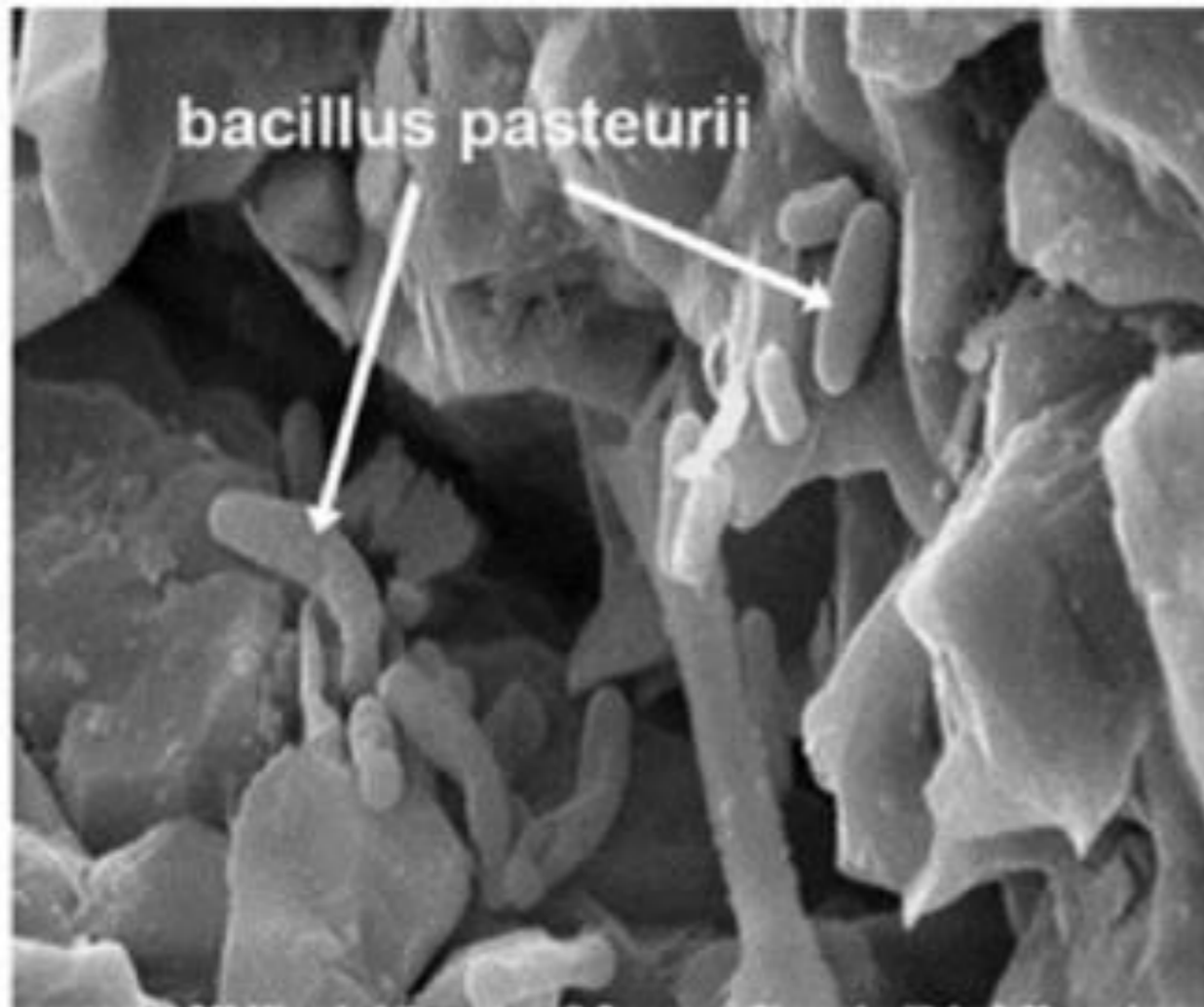


How Sand can be turned into SandStone?



Bacillus Pasteurii

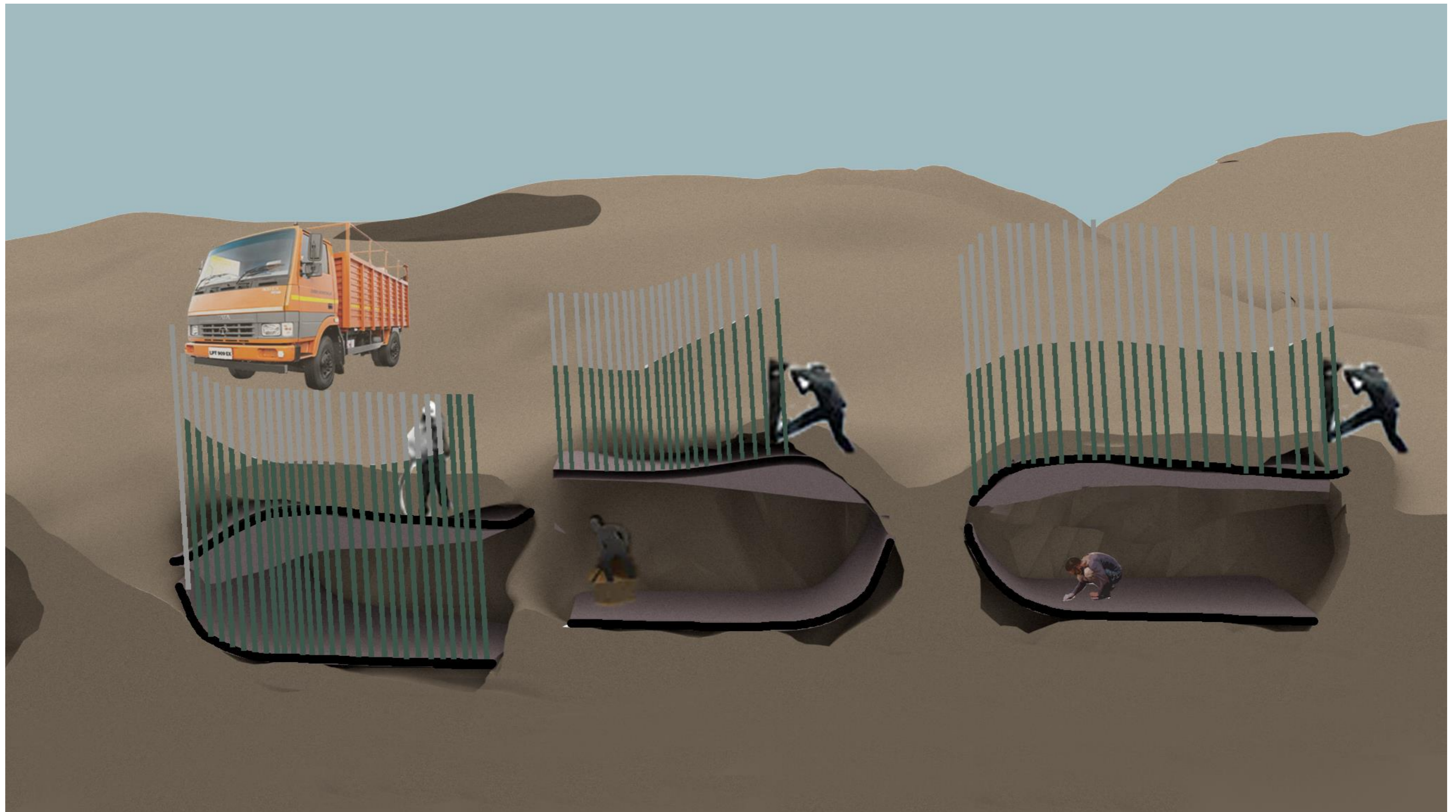




How it can be constructed?

Injection the Bacteria

The injection Piles which are filled with the bacteria helps creating any kind of forms.





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4

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1

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