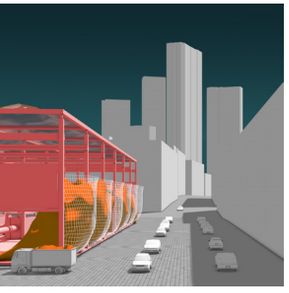
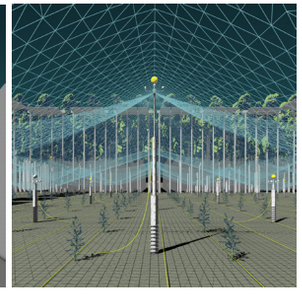
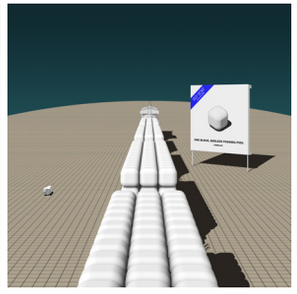
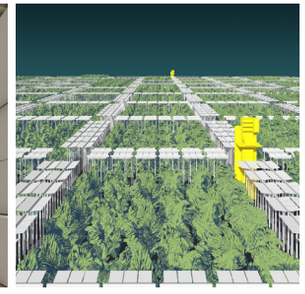
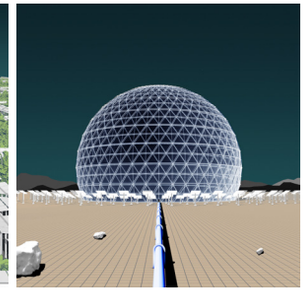
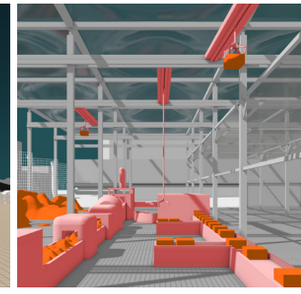
Sensing Domesticity
From Mine to Mine

Lauritz Bohne
Edward Zammit
Lea Scherer

// Design Narrative Book

Delft University of Technology

Sensing Domesticity *From Mine to Mine*

Sensing Domesticity
From Mine to Mine

// Design Narrative Book

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A VISUAL NOVEL

From Mine to Mine

PROLOGUE

The House and the Mine

PROLOGUE

The House and the Mine

From Mine to Mine is a research and design project that confronts the concept of the house and the domestic with its emerging context of data transmission and resource extraction. In the middle of the Atacama desert in Chile, the house of the miner is confronted with the physical outgrowth of our global data industry: Copper, the material underlying any kind of digital connection, is extracted in the world's biggest open-pit mine, while the mining industry is destructing and contaminating a whole territory.

Thinking towards a time of copper depletion, *From Mine to Mine*, envisions in three chapters transitions for these copper landscapes - turning them from destructive into productive ones while giving agency to the house of the miner itself. From there, the miner of the future enters remotely through screens the three chapters - "The Toxic Forest", "The Baquedano Oasis" and "The London Mine" - all mines in their on right, that materially and programmatically feed into the house. This way, the house becomes both consumer and constructor of a context in trans-ition, a context that is being "mined" trans-territorially, trans-temporally and trans-disciplinarily.

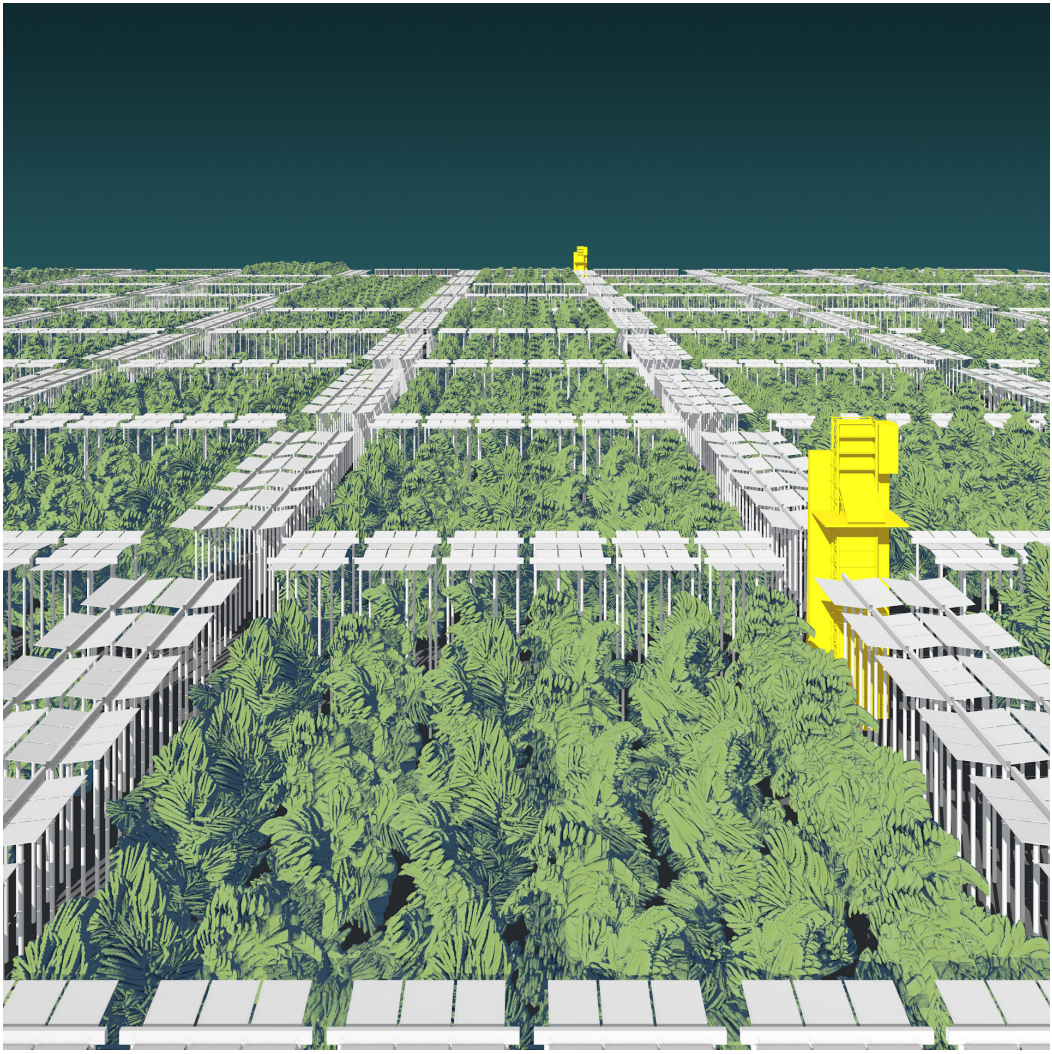
CHAPTER I

Toxic Forest

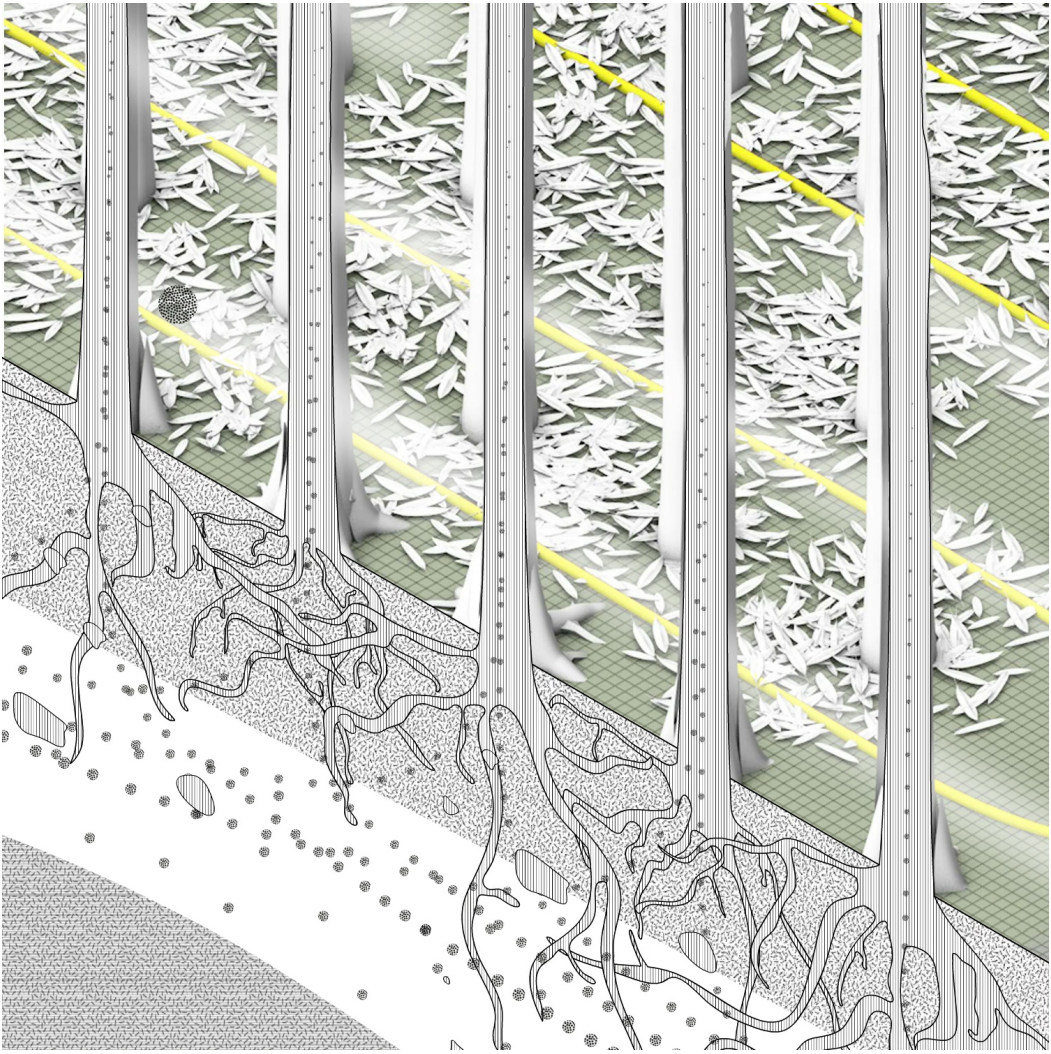
TOXIC FOREST

The First Mine

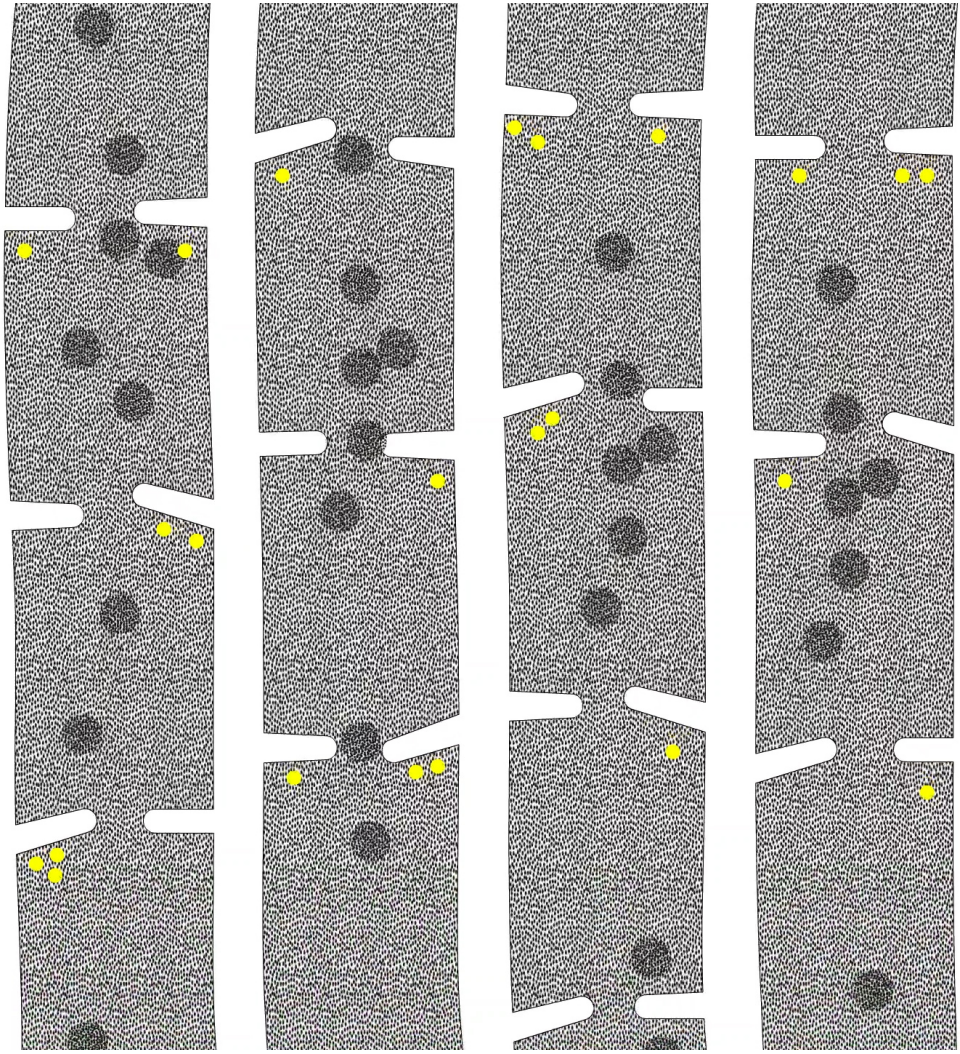
We are in the interior of the miner‘s home. The miner is about to position themselves in the work station to start the first shift connecting them to the *Toxic Forest*.



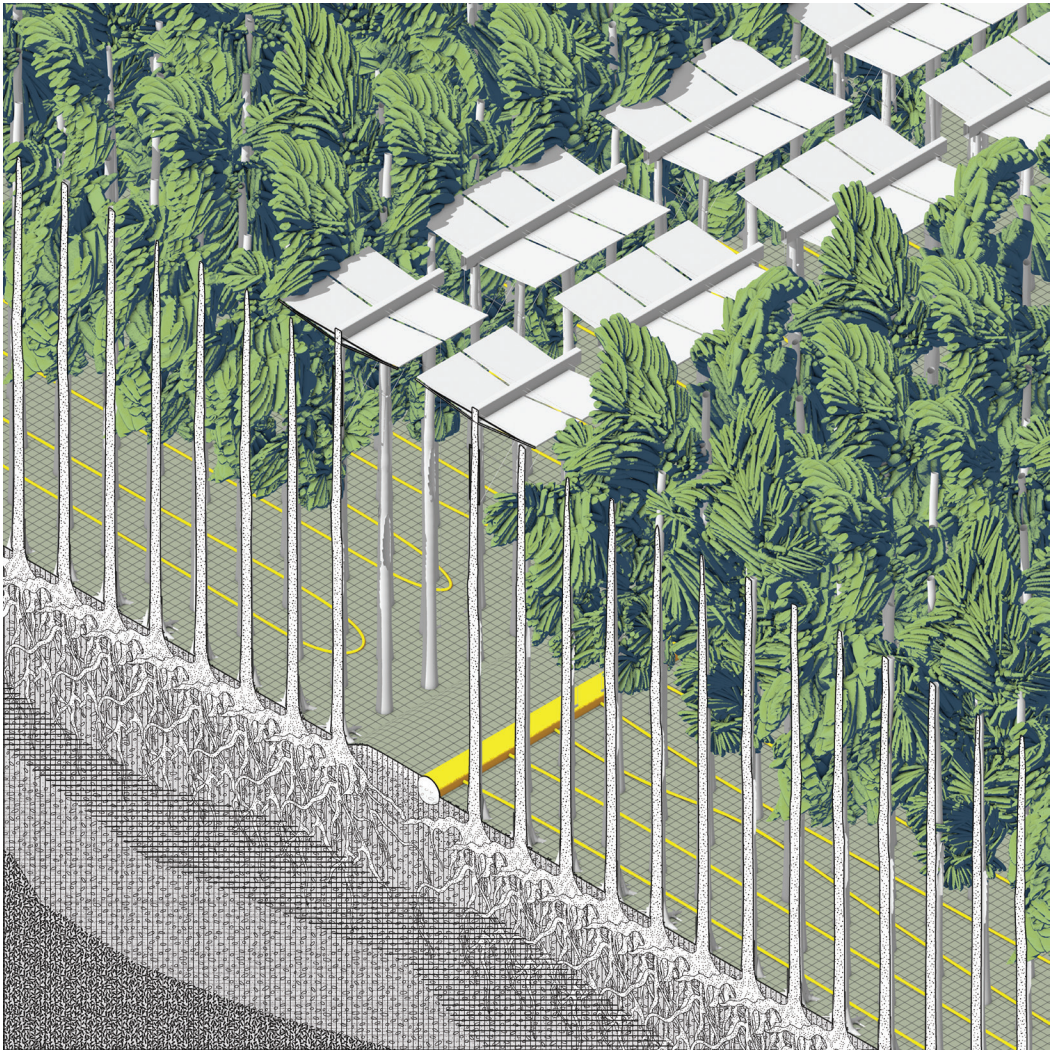
A green hyper sensed and monitored monoculture of 800 000 eucalyptus trees fill an acidic dam in the Atacama Desert. The thirsty forest drinks litres of poisonous water from the copper industry, infused with acids and copper particles.



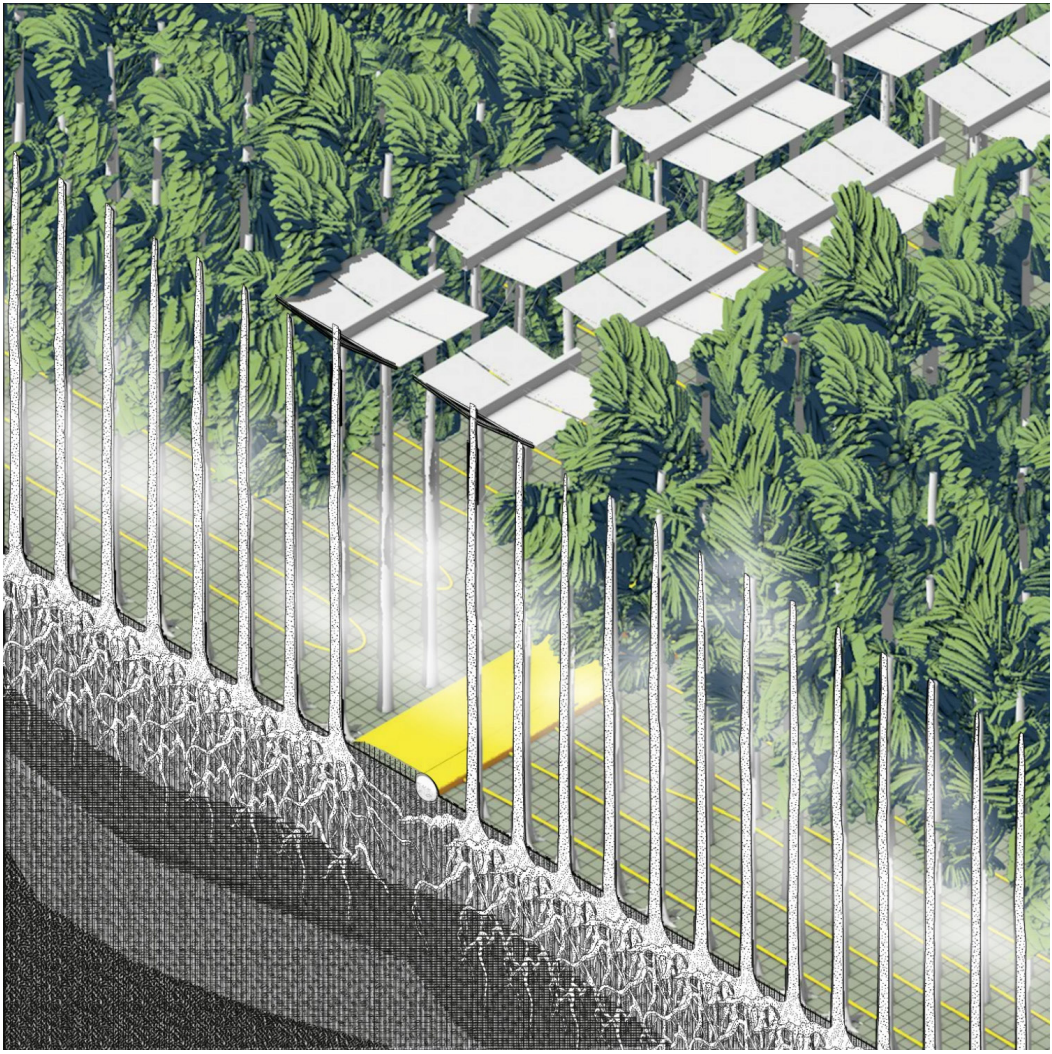
Stretching out its roots tentacular, it fights for every drop. 165 million litres of toxic water per day, 475 litres per second.



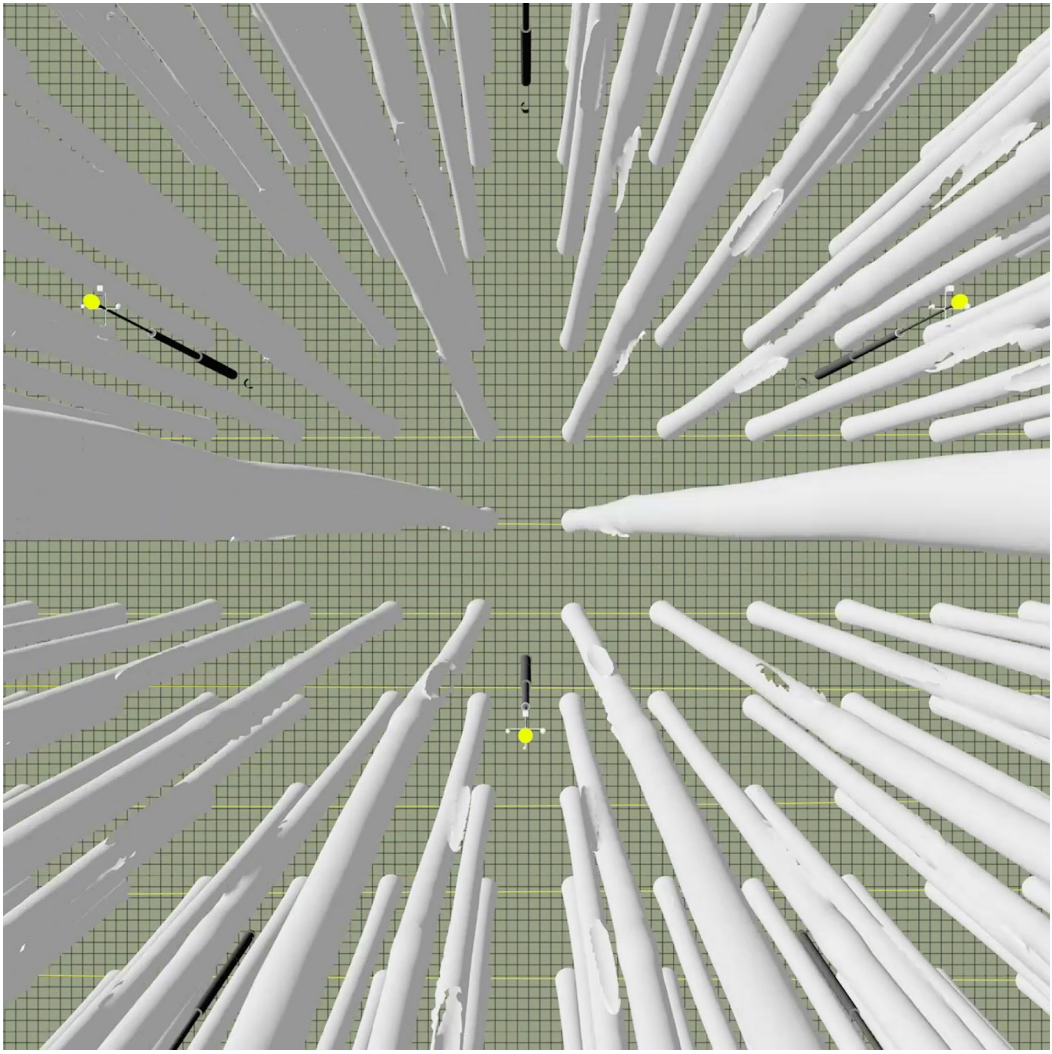
The tree absorbs it into its body, the toxic particles settle in the molecular structures of the wood. It lives, keeping the soil alive, cleansing it, remediating it.
A technology acting as a pump to greenwash a vice from the copper industry.
Evergreen and toxic.



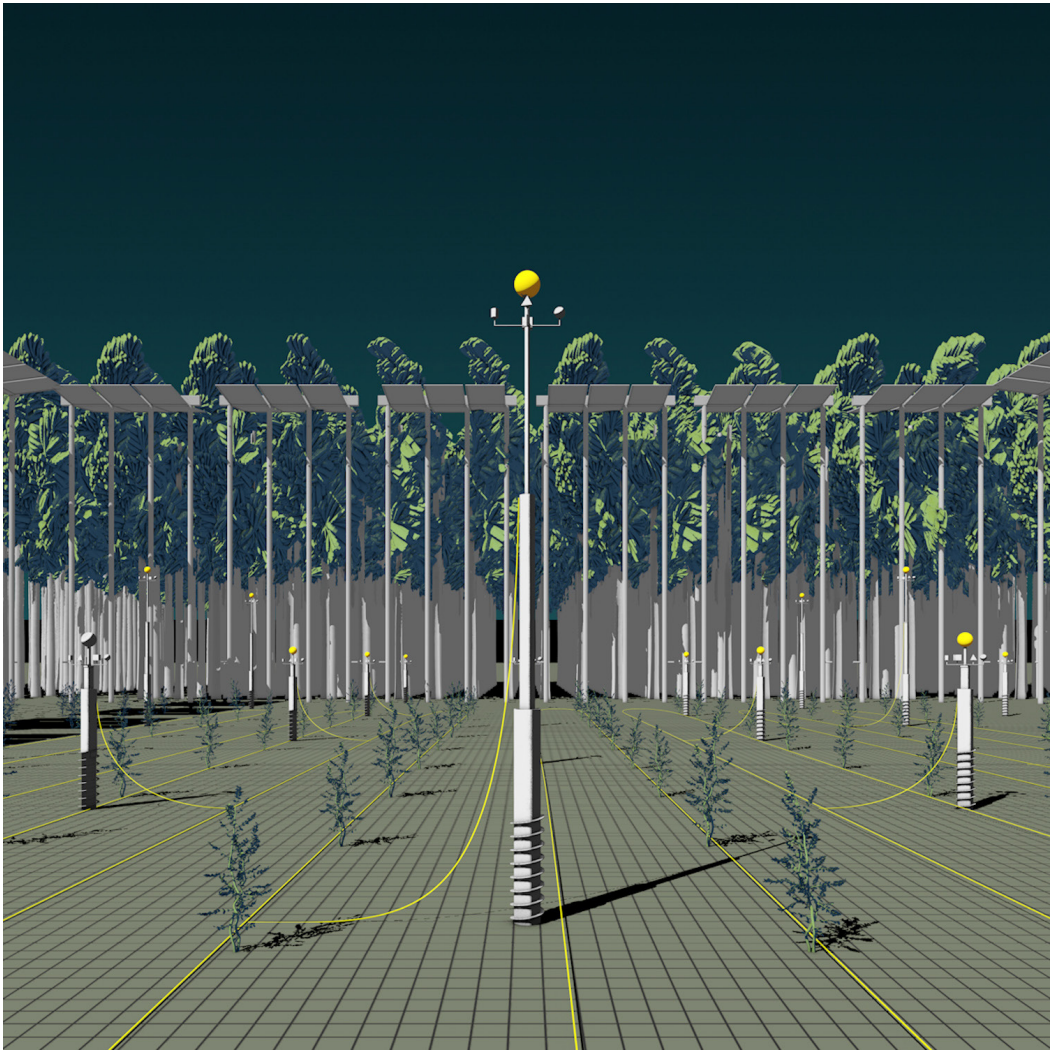
When it has drunk, the tree transpires. It retains the poison and sweats the water. Toxic water in, clean water out. The forest cools down. The moisture in the air is no longer retained, fog rises.



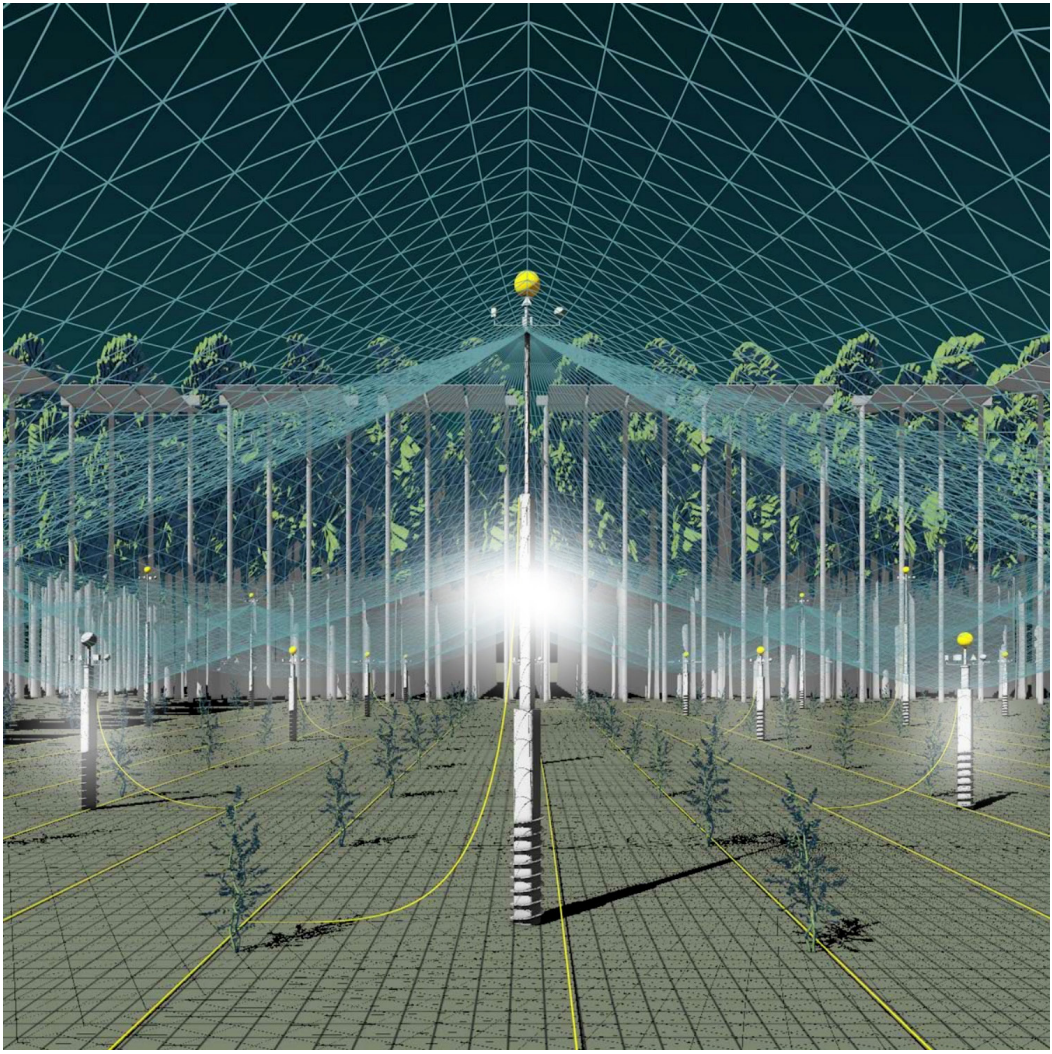
“Water recycling-plants“ frame hectare after hectare. Their textile panels are perched on tree trunks. Opening and closing, they regulate heat corridors and thermal differences in the forest. The panels catch the water. They drain it in. The recycled water is pumped back to the mine.



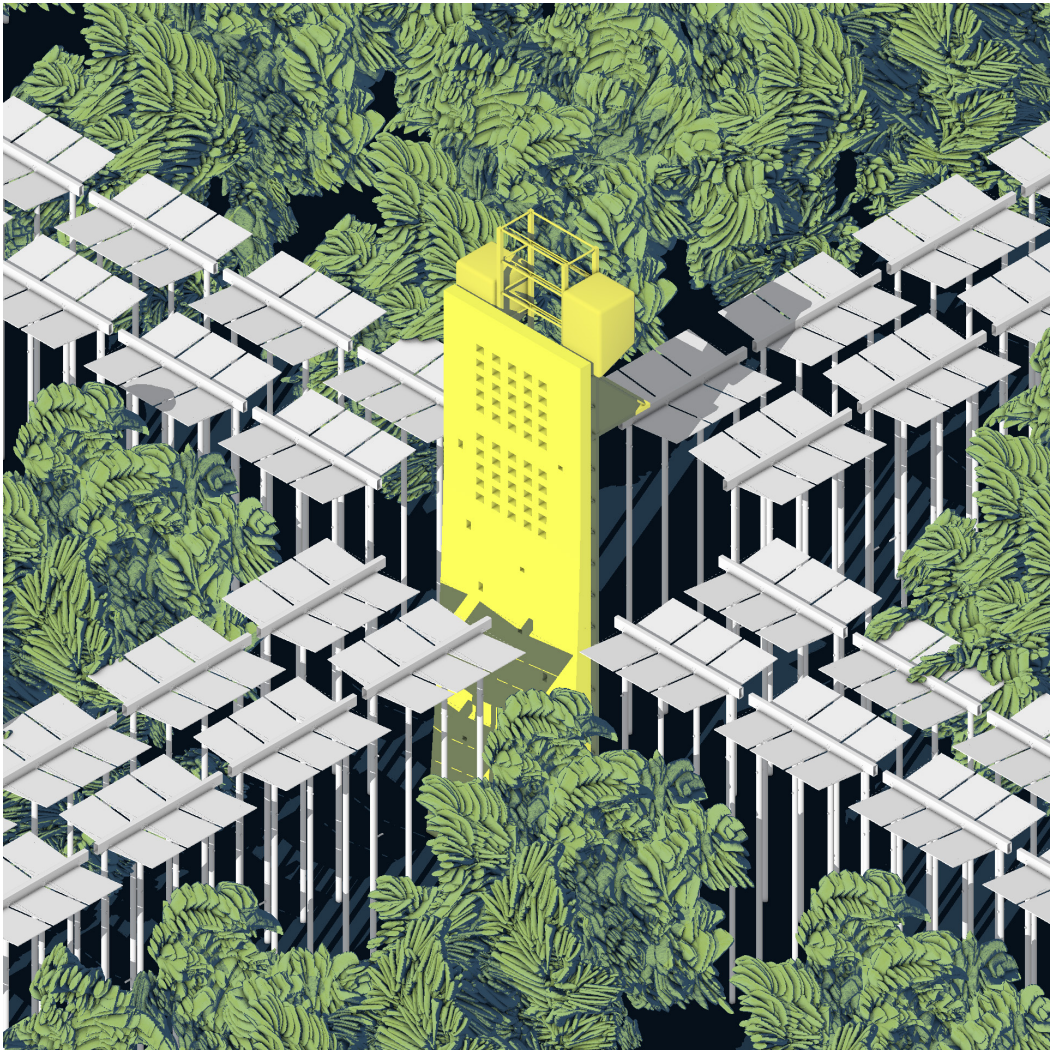
We fly over the monoculture, selectively grown, planted and fertilised by drones. Remotely navigated from the Miners‘ home, they scan the landscape, create its digital twin. They capture what can be captured optically. Their quartz eyes are calibrated by perfect spheres. White volumetric targets form a new pattern within the grid of trees.



Next to the trees, metallic trunks stretch vertically towards the sky. Sensing Piles keep not only the eyes of the drones but also the artificial climate in balance. Their screw foundations anchor themselves punctually between the roots in the ground. Like leaves, sensors in plastic bodies frame the trunk.

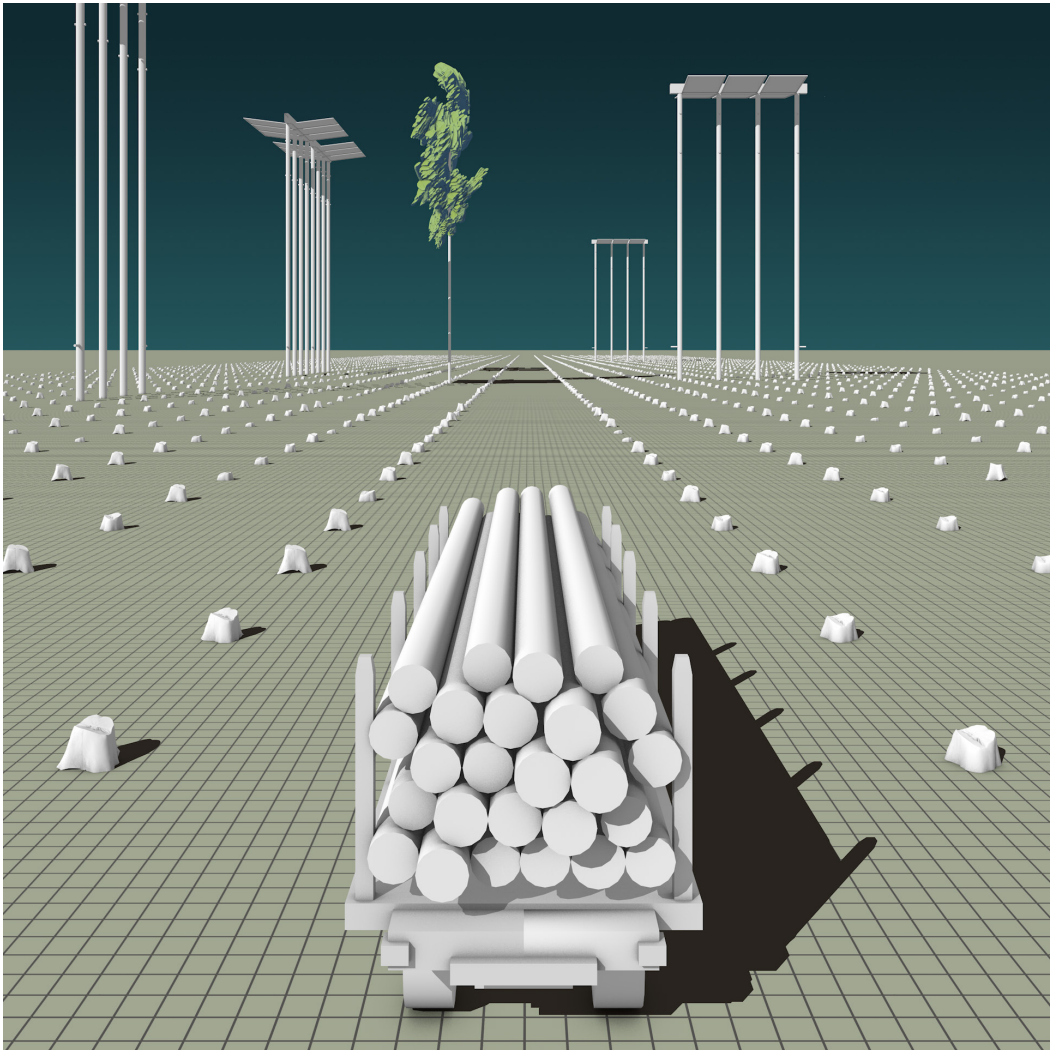


Connected to the mine‘s water system, the piles generate toxic rainfall. Drop by drop, they adjust the humidity. The temperature falls. Young trees find shelter under the roof that is spanned. The architecture imitates a mother forest that provides shade.

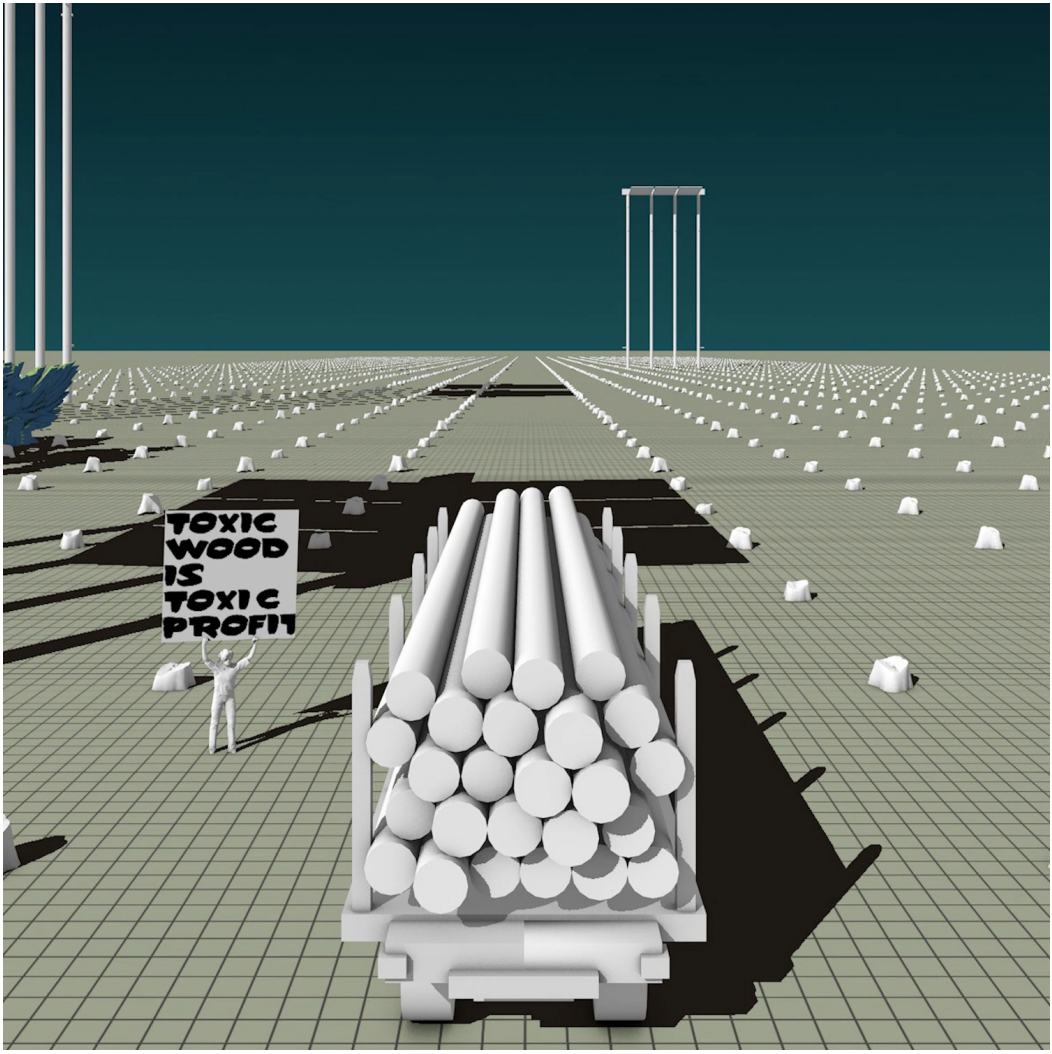


The structure of the drone tower houses the forest‘s seeds and fertiliser. The loaded tanks, ascend the steel scaffolding beyond the treetops, from where their cargo finds its way back to the ground.

Drones, which together with desert birds inhabit the clay wall of the tower, fly out to feed the forest, shift by shift. Seeds and fertiliser are fired into defined locations, making use of pneumatic firing devices.



Once the copper deposits in the Atacama Desert are exhausted in 2060, no more toxic water will flow from the treatment plant to the forest. The thirst of the trees can no longer be quenched. The red eucalyptus wood is cleared. It becomes a valuable resource. The industry has found a new market.

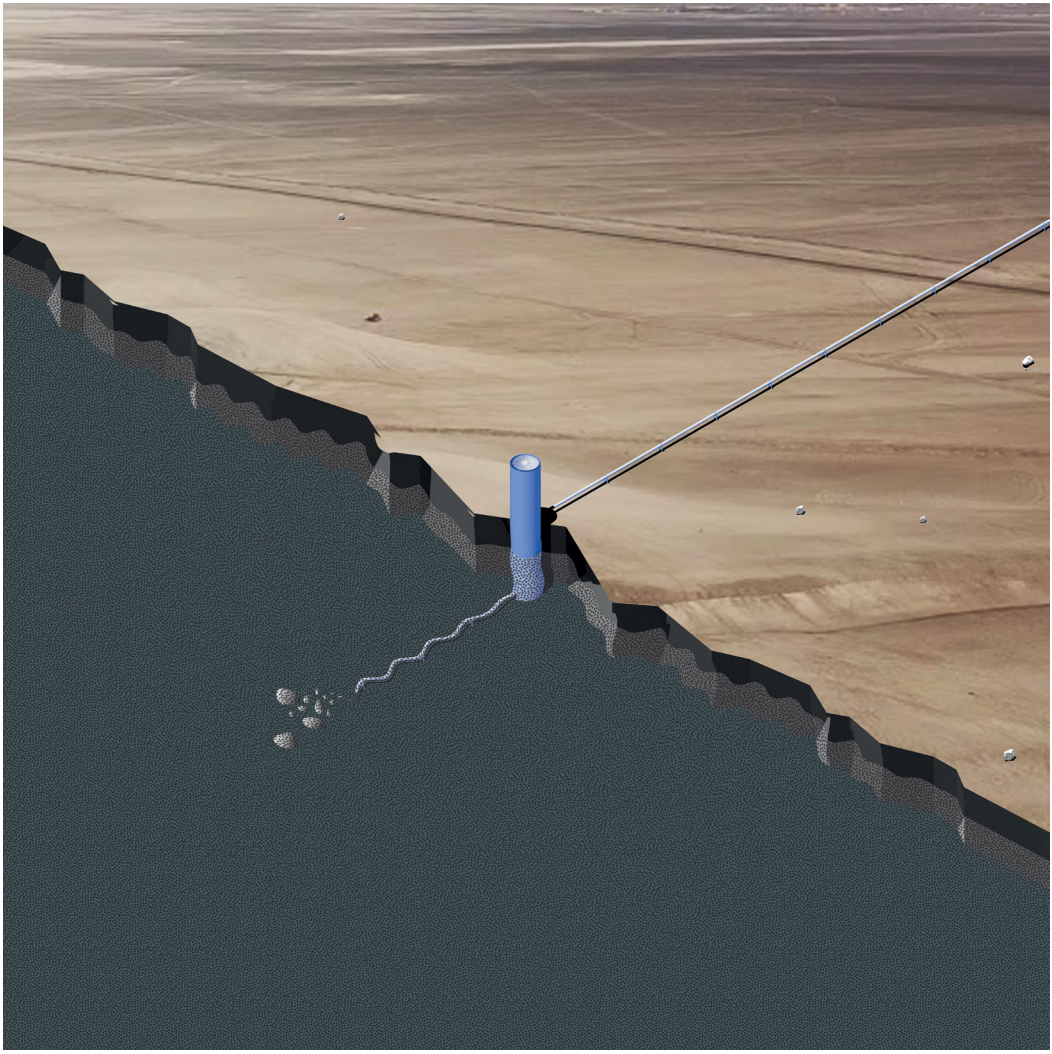


The wood finds its way from the mine to the miner's home.

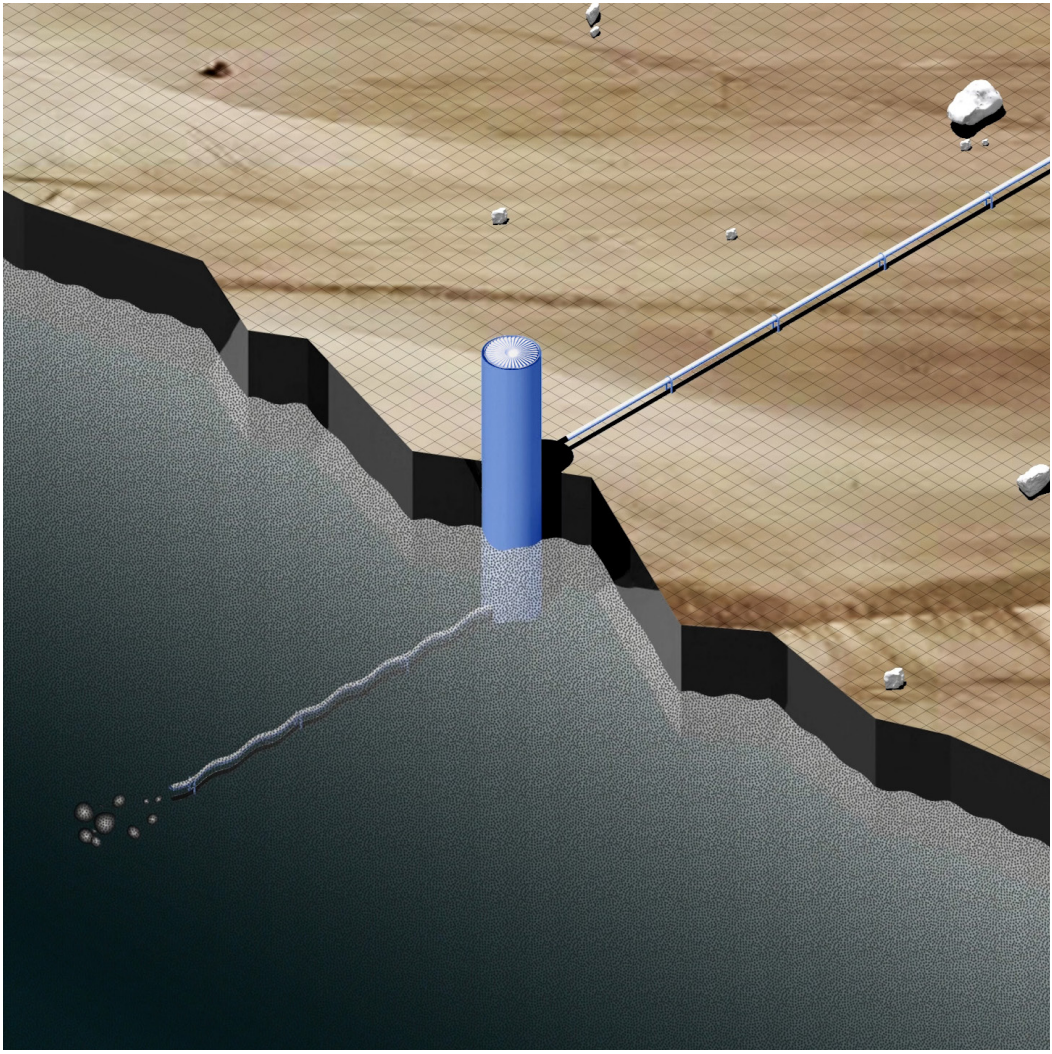
Above the red eucalyptus tiled floor, we find the wooden panels that frame the view to the outside, a land made accessible again.

CHAPTER II

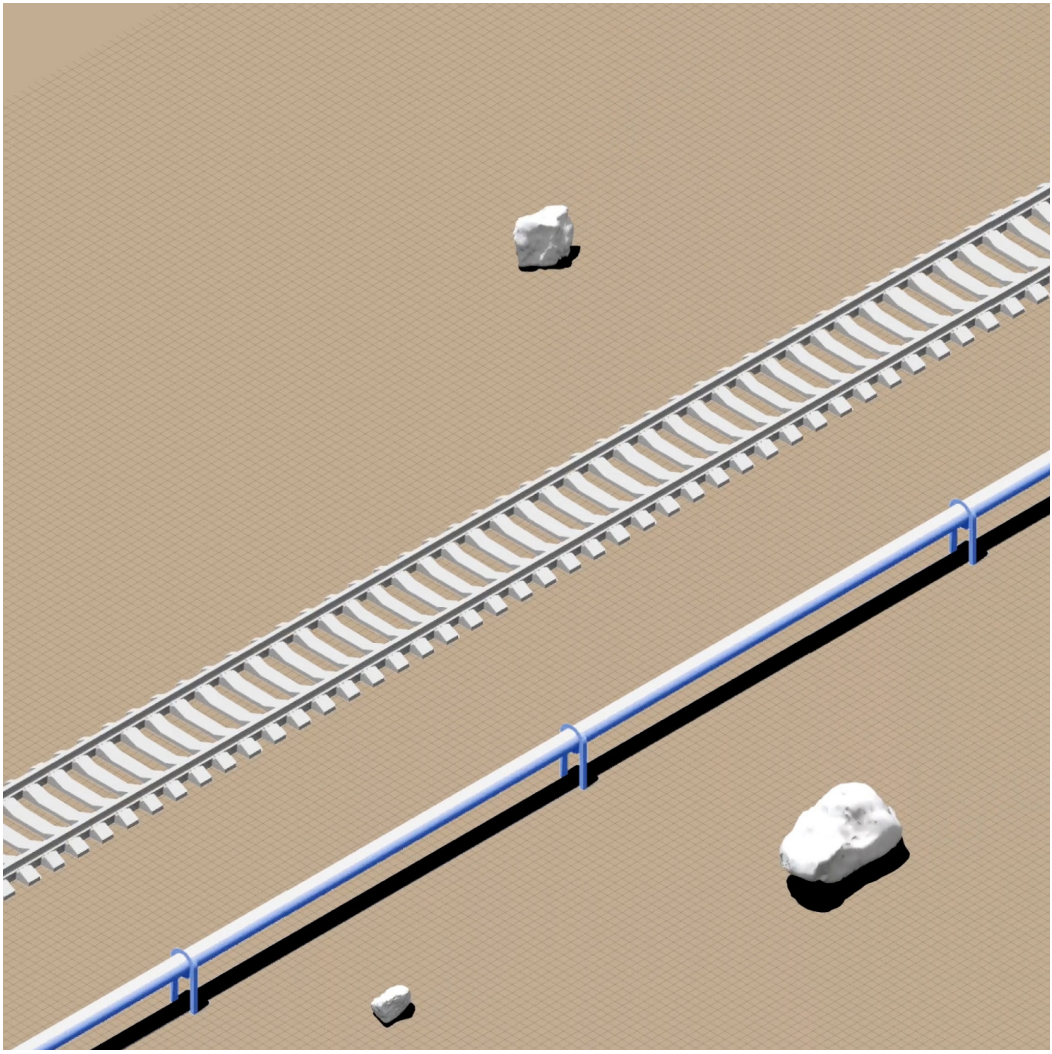
Baquedano Oasis



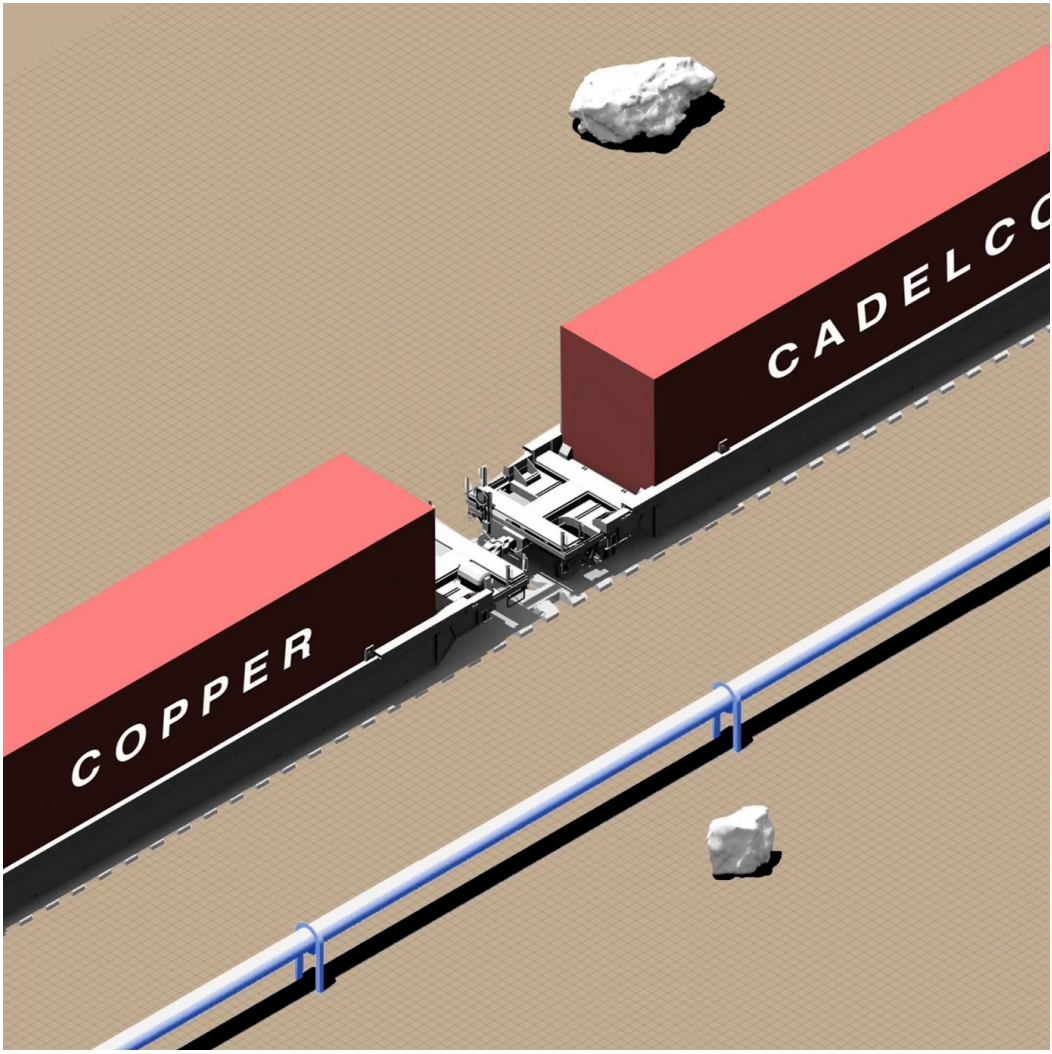
After years of depleting the water supplies of the Atacama Desert, its copper territory has reached to the Pacific Ocean.



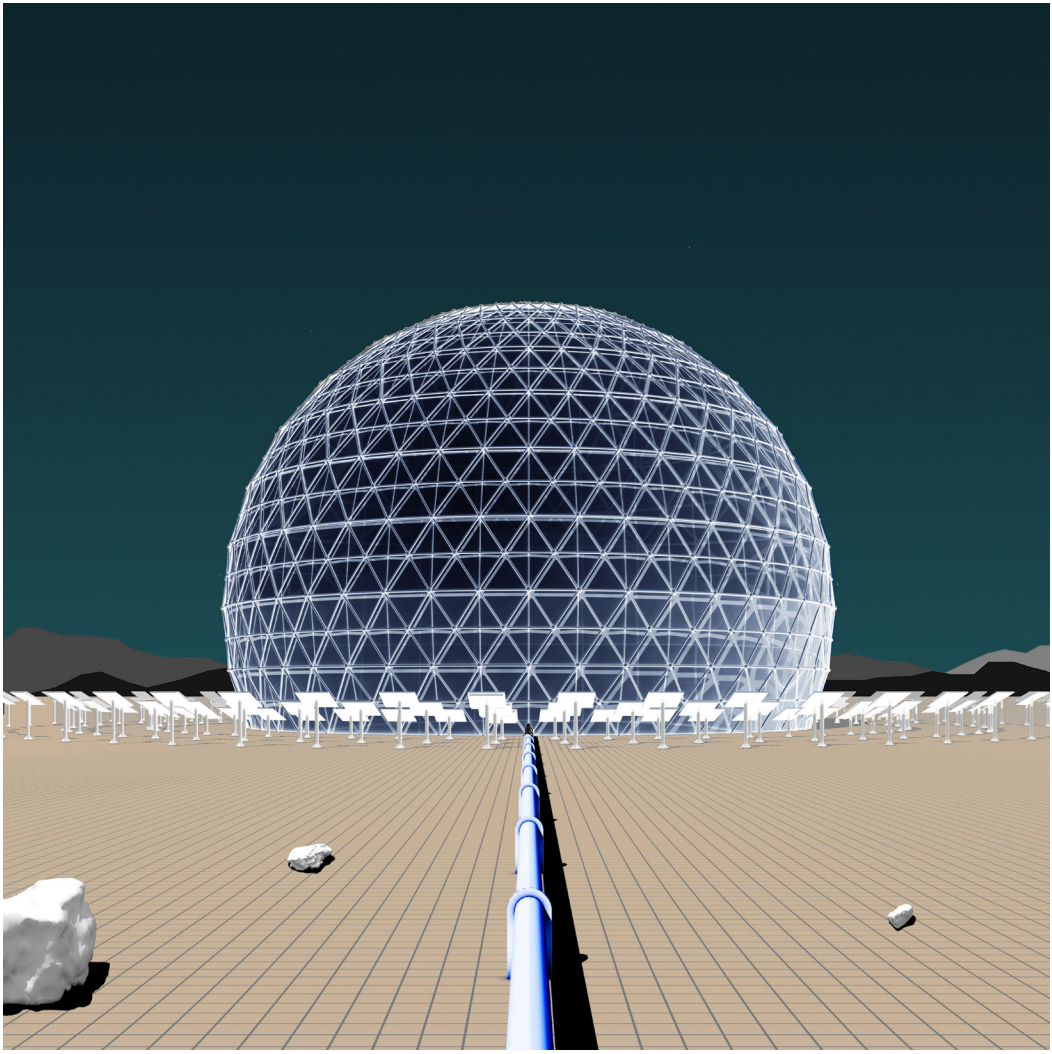
The sea is the last sensible source to be extracted. The industry is under pressure.



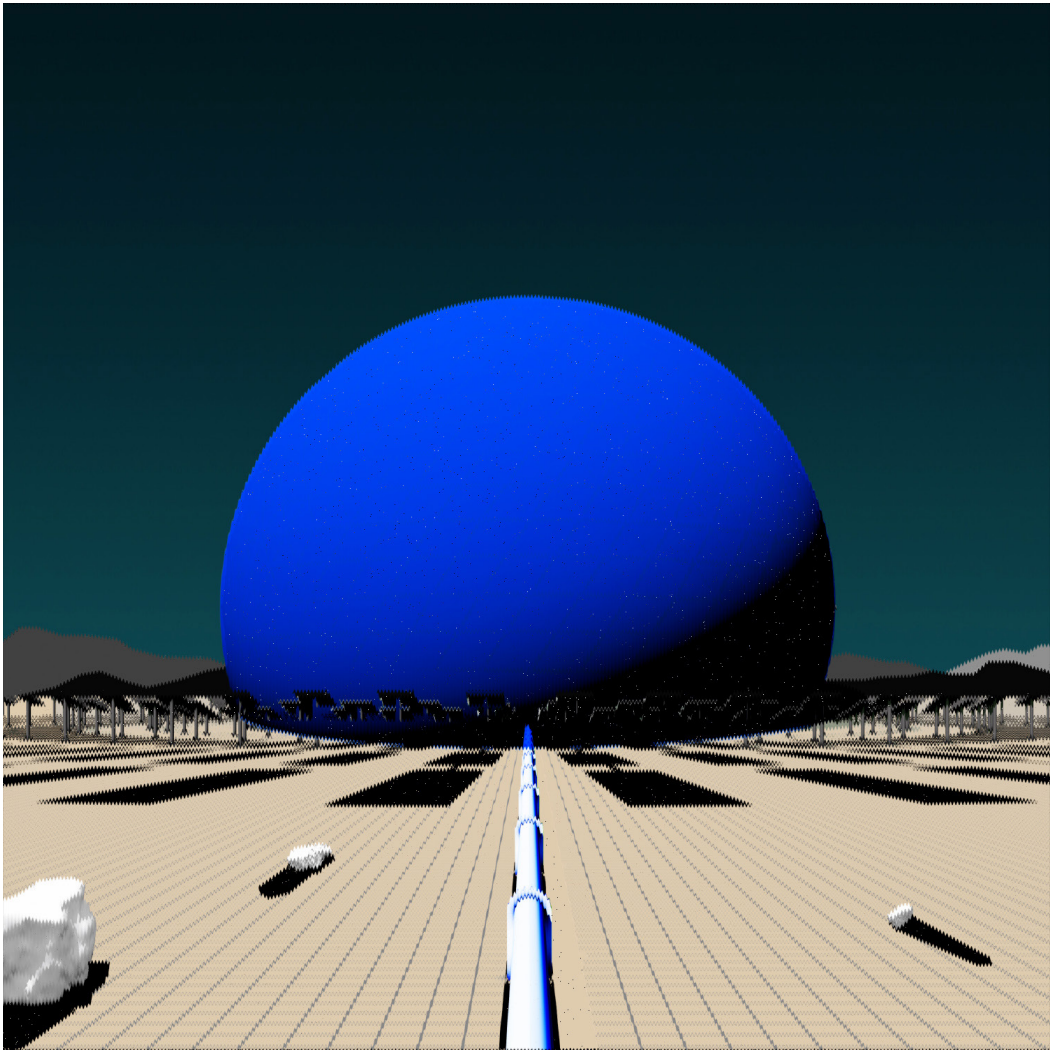
Sea water is pumped into land.



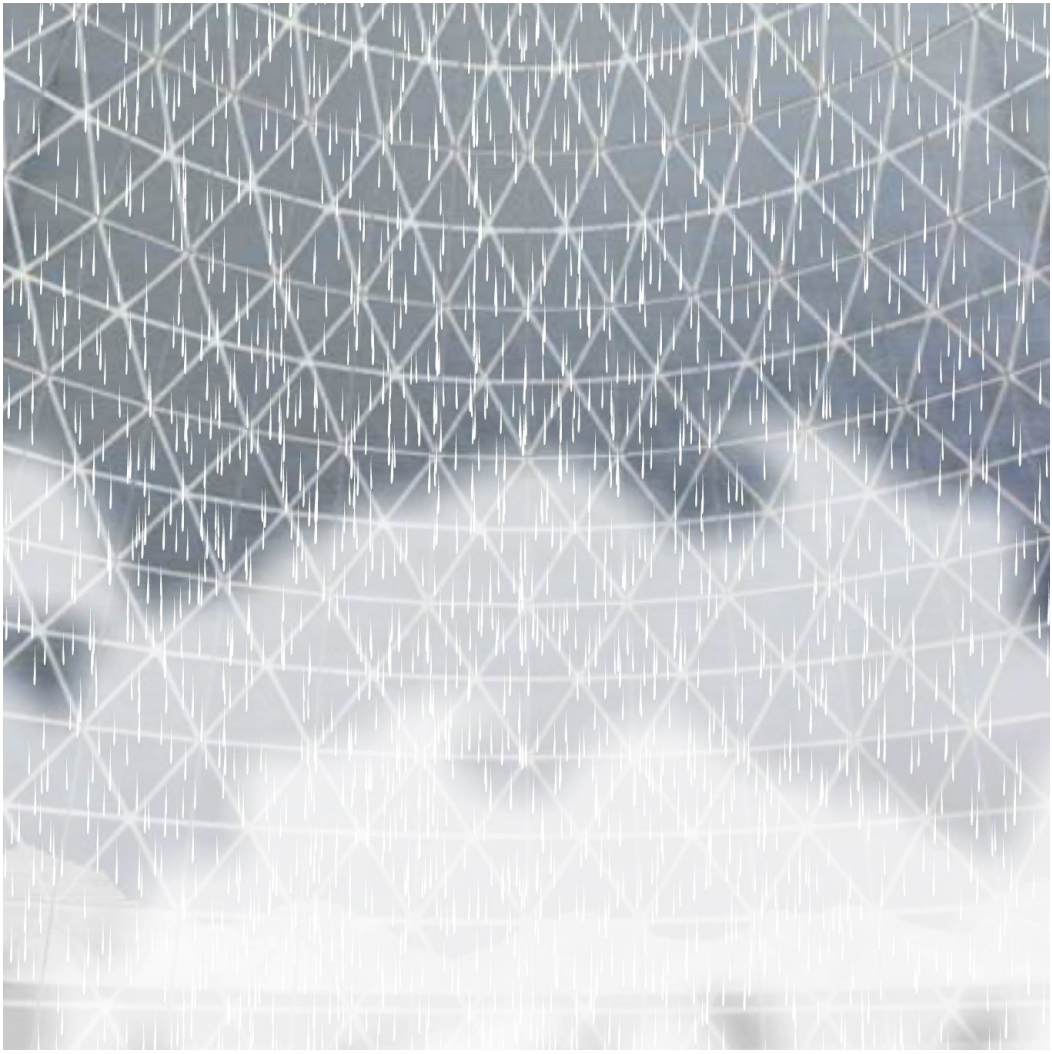
It follows the routes of copper cathodes that cross the country along rails from the mines to the ocean. Copper out - sea water in.



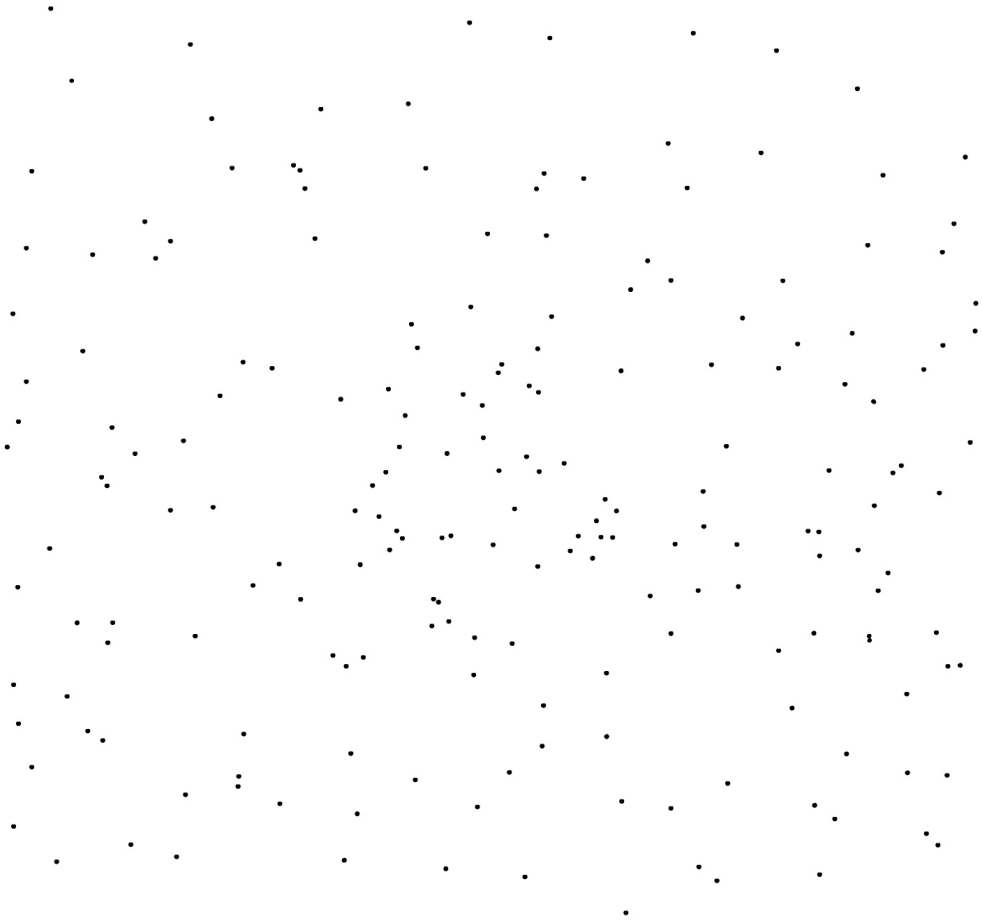
A gigantic dome sits in the landscape. Every day, it converts 80 000L of seawater into fresh water, making use of the desert‘s most abundant energy source: the sun.



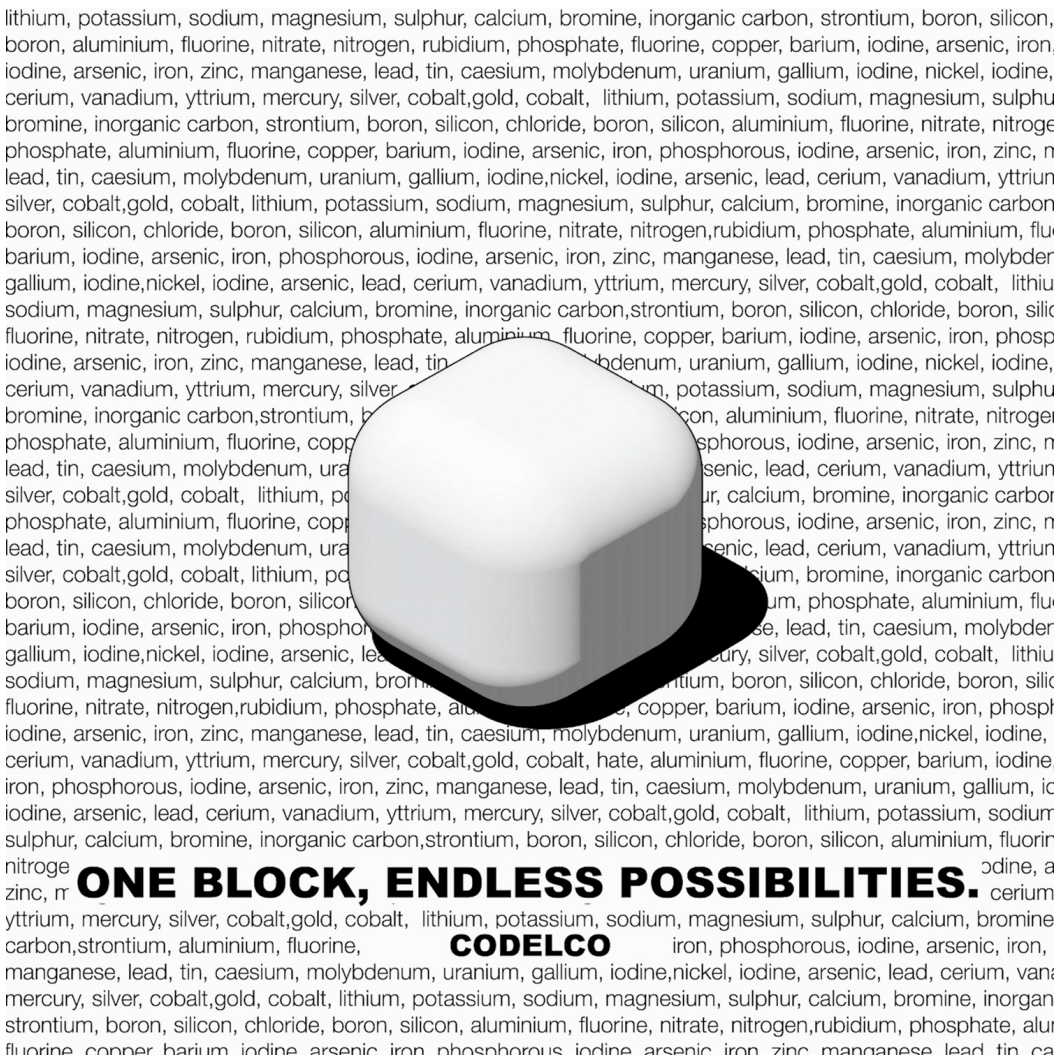
120 mirrors tilt towards it. Constantly adapting to the angle of incidence, they reflect sun rays onto the central structure of the dome. It becomes a beaming energy ball.



Inside the dome, the temperature rises. At far more than 100°C Celsius, the water begins to evaporate rapidly. In the middle of the driest non-polar desert on earth, dense rainfall separates water from salt.

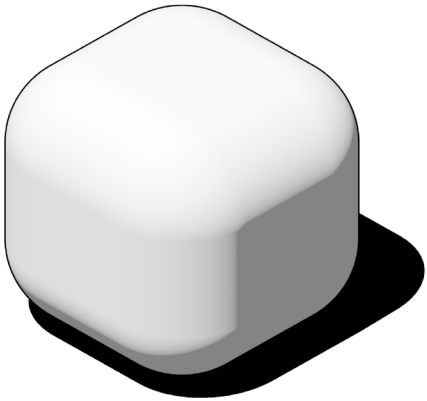


While fresh water is pumped out, the industry‘s focus shifts to what is left behind: Brine, a compact mixture of salt and other rich minerals from the oceans.



Compressed into a block, Lithium, calcium, gold, magnesium, potassium, {...} convert into a sellable product both container and content at the same time.

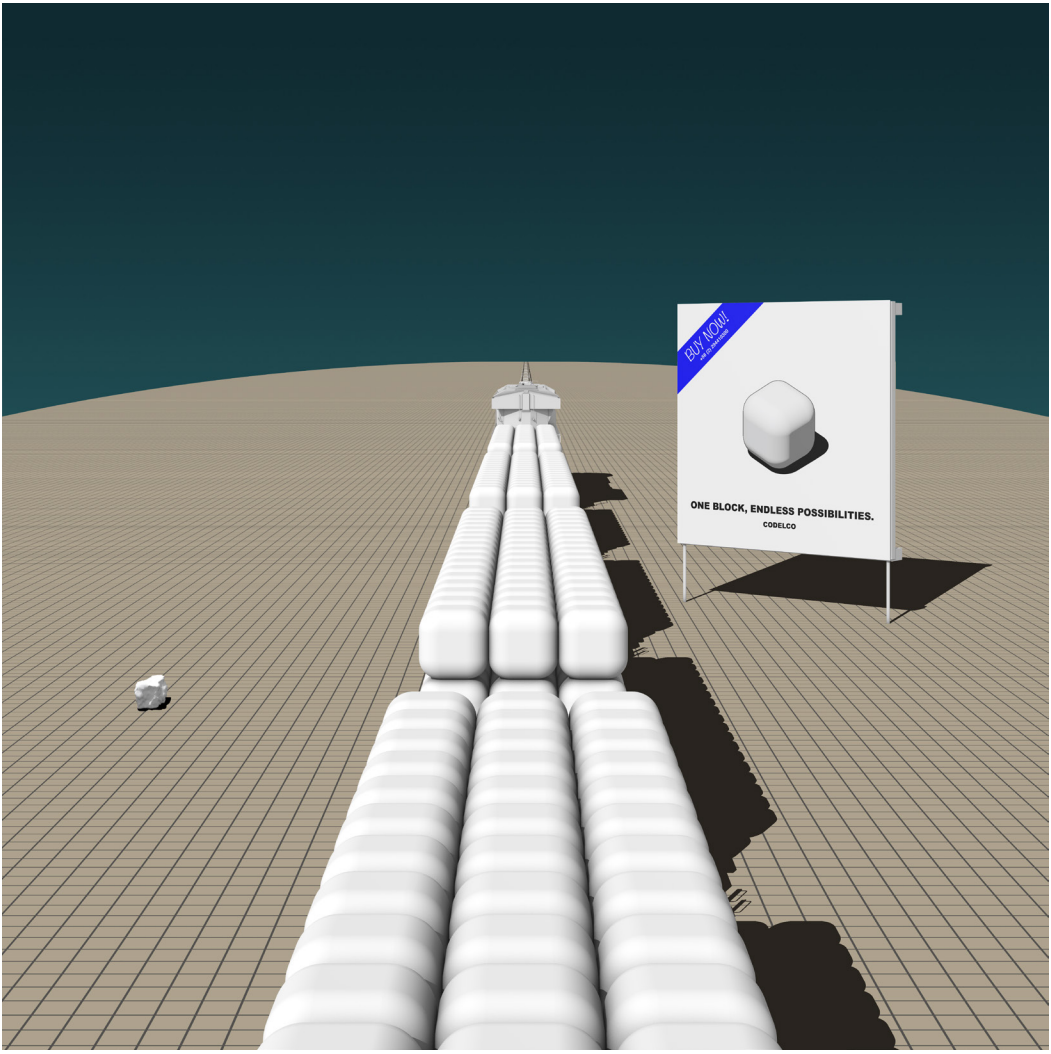
BUY NOW!
+56 (2) 294410300



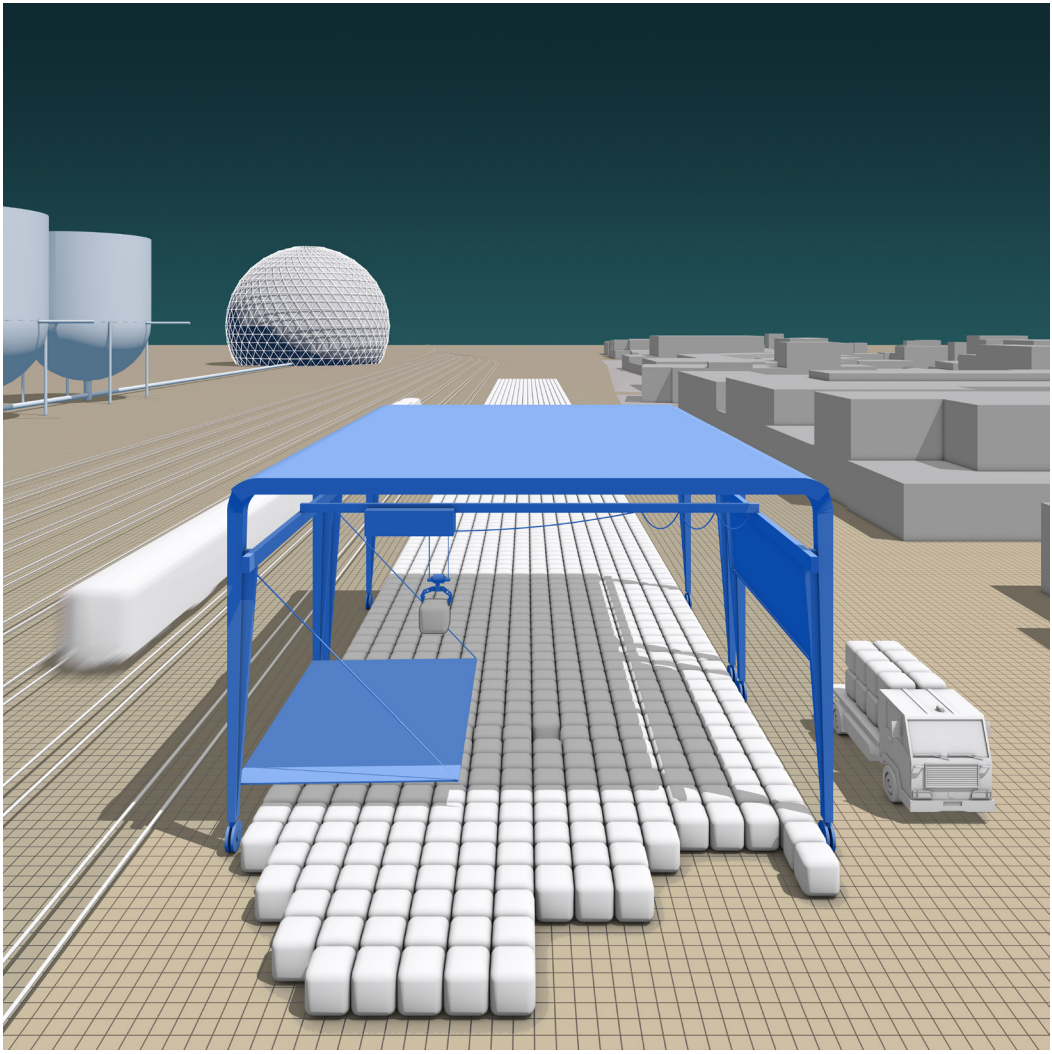
ONE BLOCK, ENDLESS POSSIBILITIES.

CODELCO

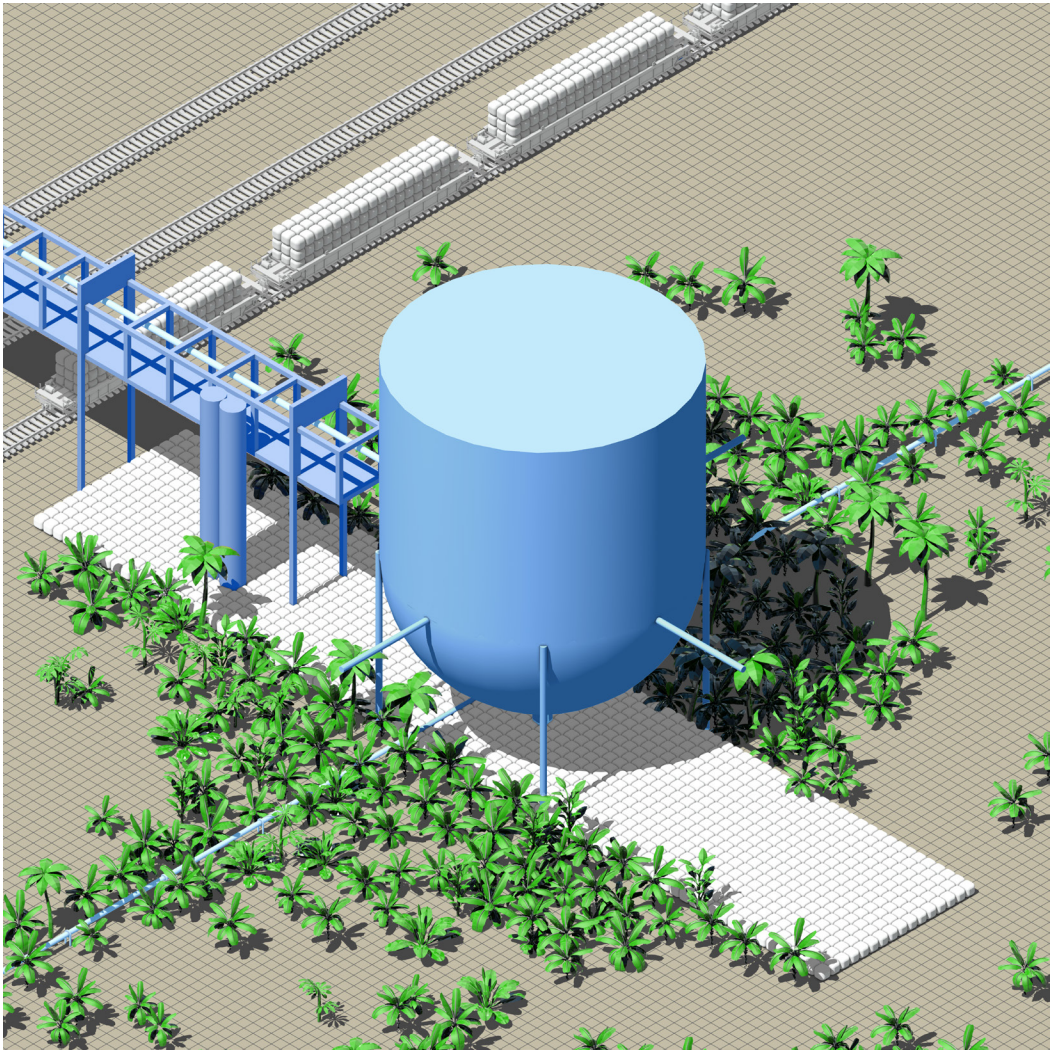
“One Block, endless possibilities“, they say.
Salt becomes the new promise of water.



Brine blocks travel down old copper routes. Along the rails, they build up into salt structures.



As a walkable platform, their architecture forms both storage and station. It mediates different states of material and flows of people, different speeds of becoming. Train and truck run parallel. Pick up, drop off. The moving factory operates at its centre.

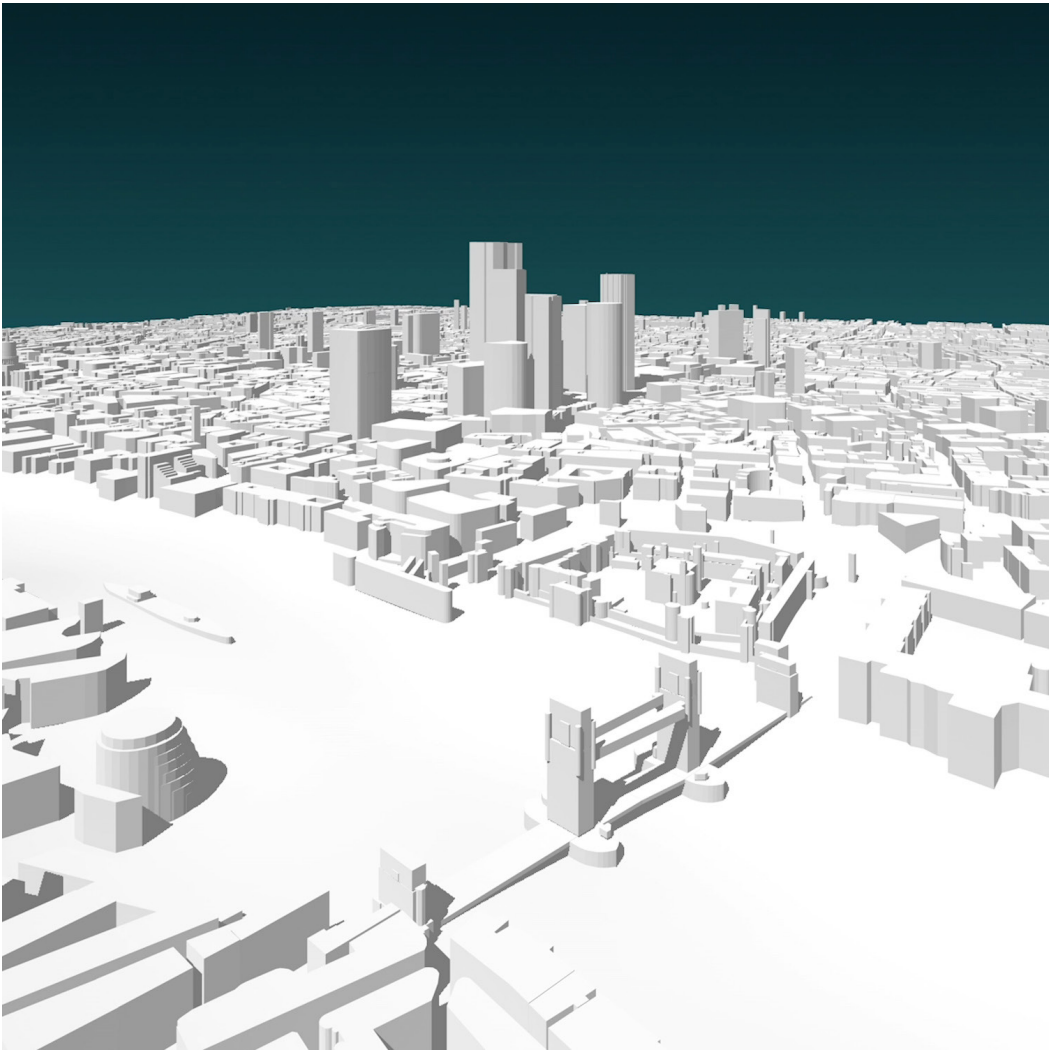


Do you remember the dry years, when the copper drank away the water?
The brine industry has taken over, making water an abundant bi-product. Around its tanks and pipes, water encounters the fertile desert soil. Nature conquers the land that has been taken from it.

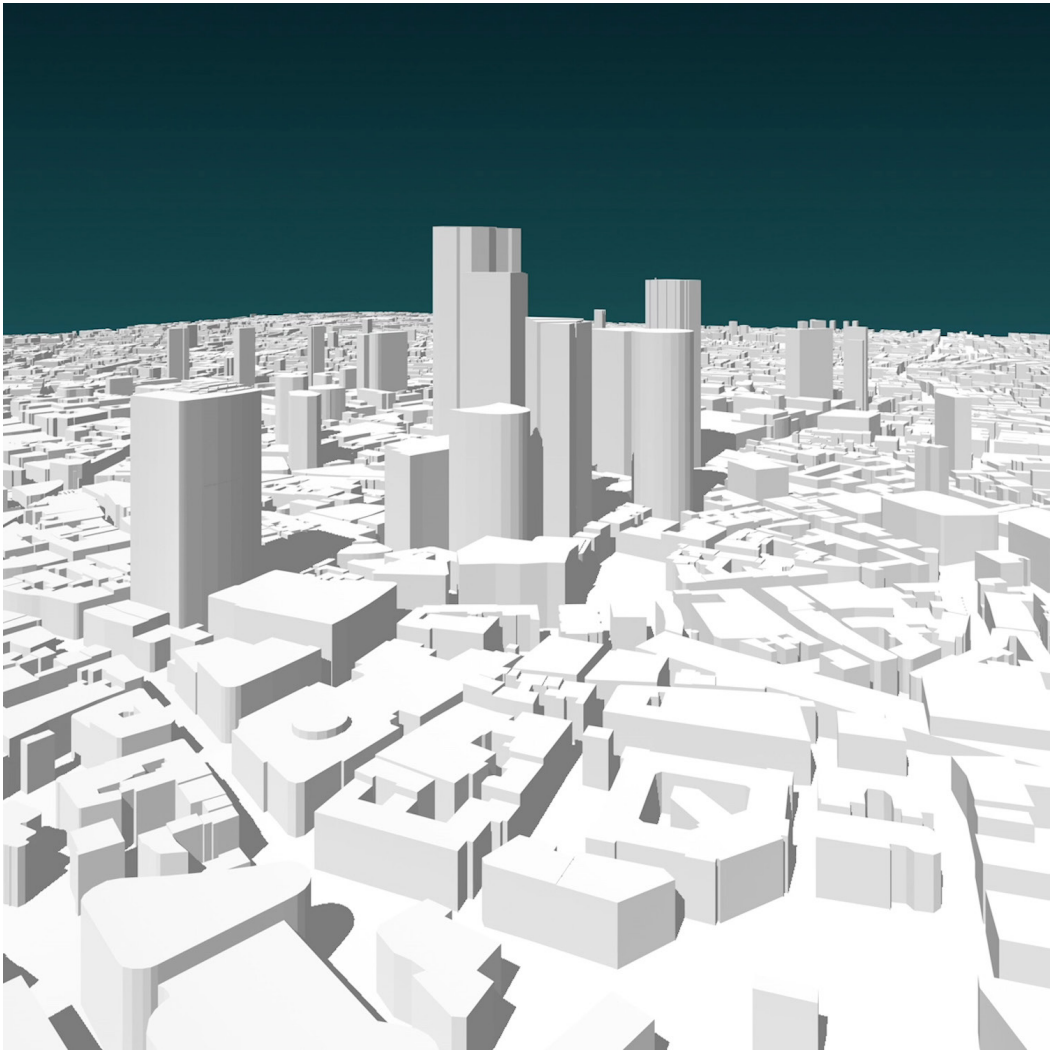
After the shift, the miner turns around to find both fresh water and salt block re-united: Once separated, they together construct the miner‘s interior.

CHAPTER III

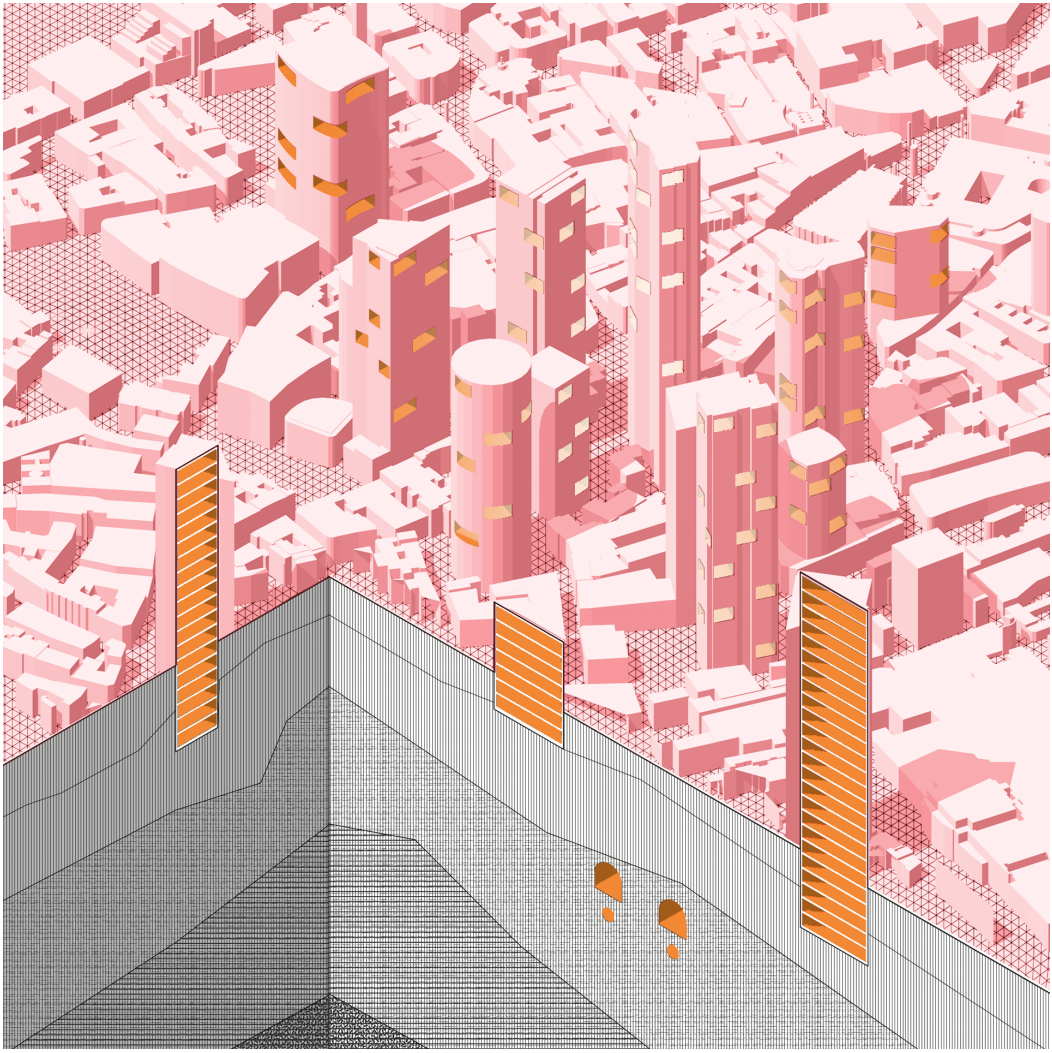
London Mine



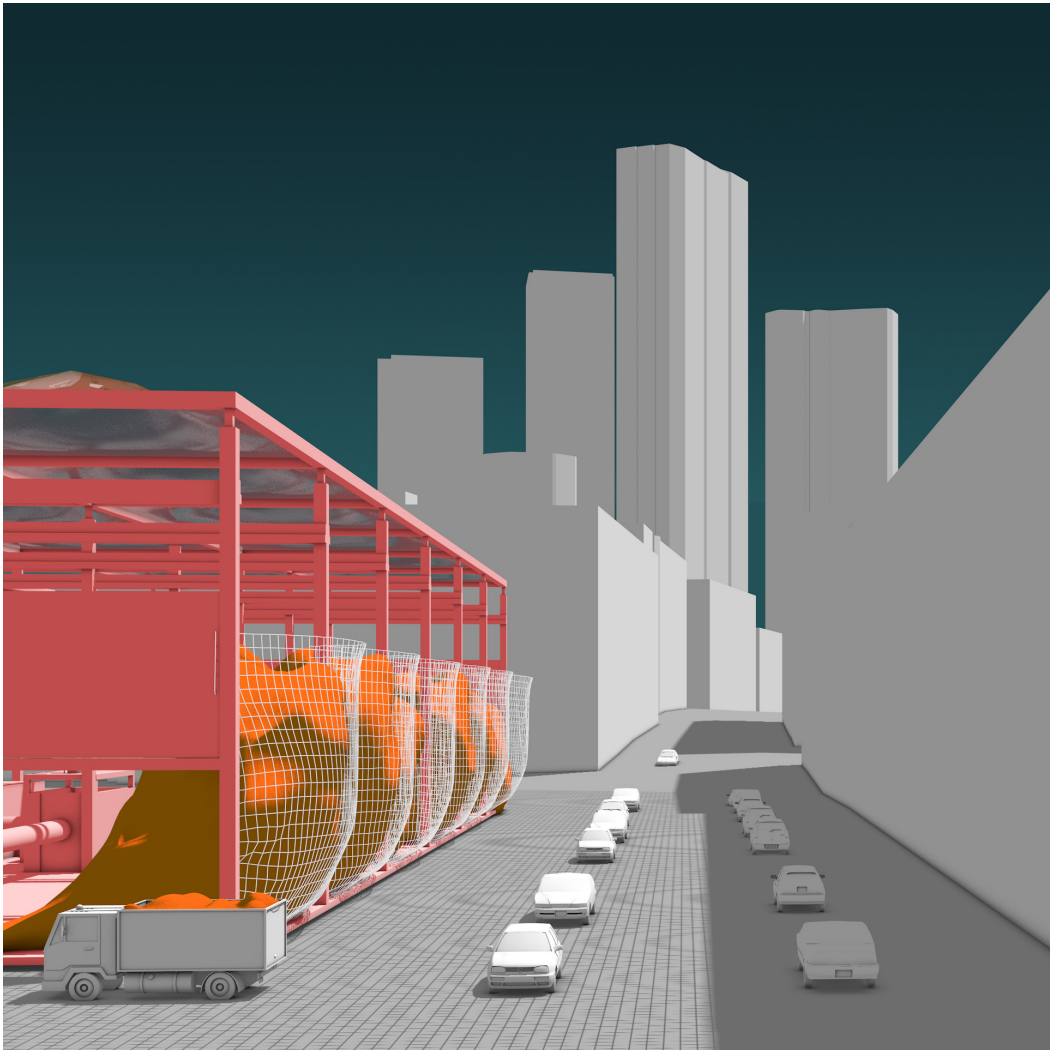
As the earth‘s copper reserves are exhausted, the city has become the new site of extraction. London, formerly the copper’s virtual site of trade and economic transaction, is attracting new attention:



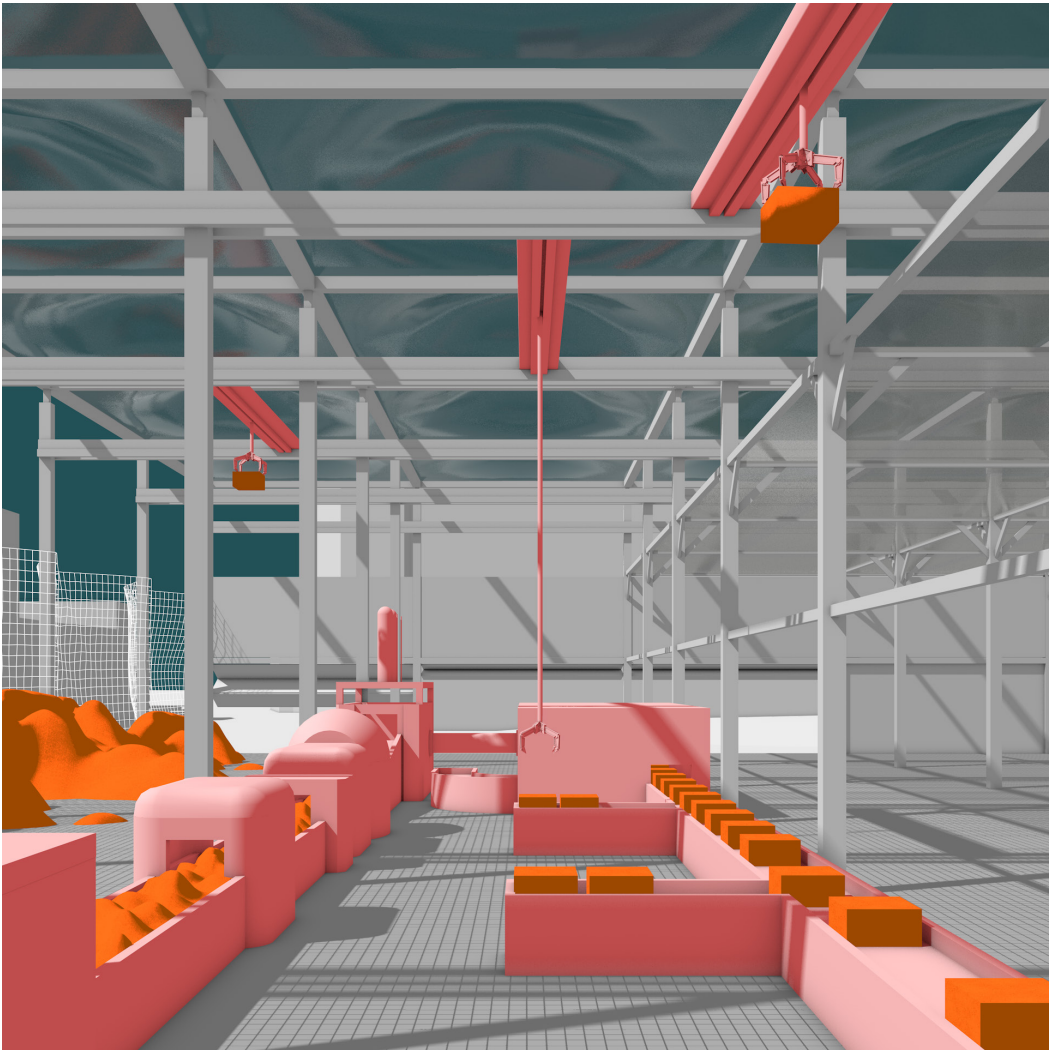
With almost 50% of all copper being implemented in buildings, its lush skyline represents a rich material deposit. It is waiting to be mined to quench the thirst for copper.



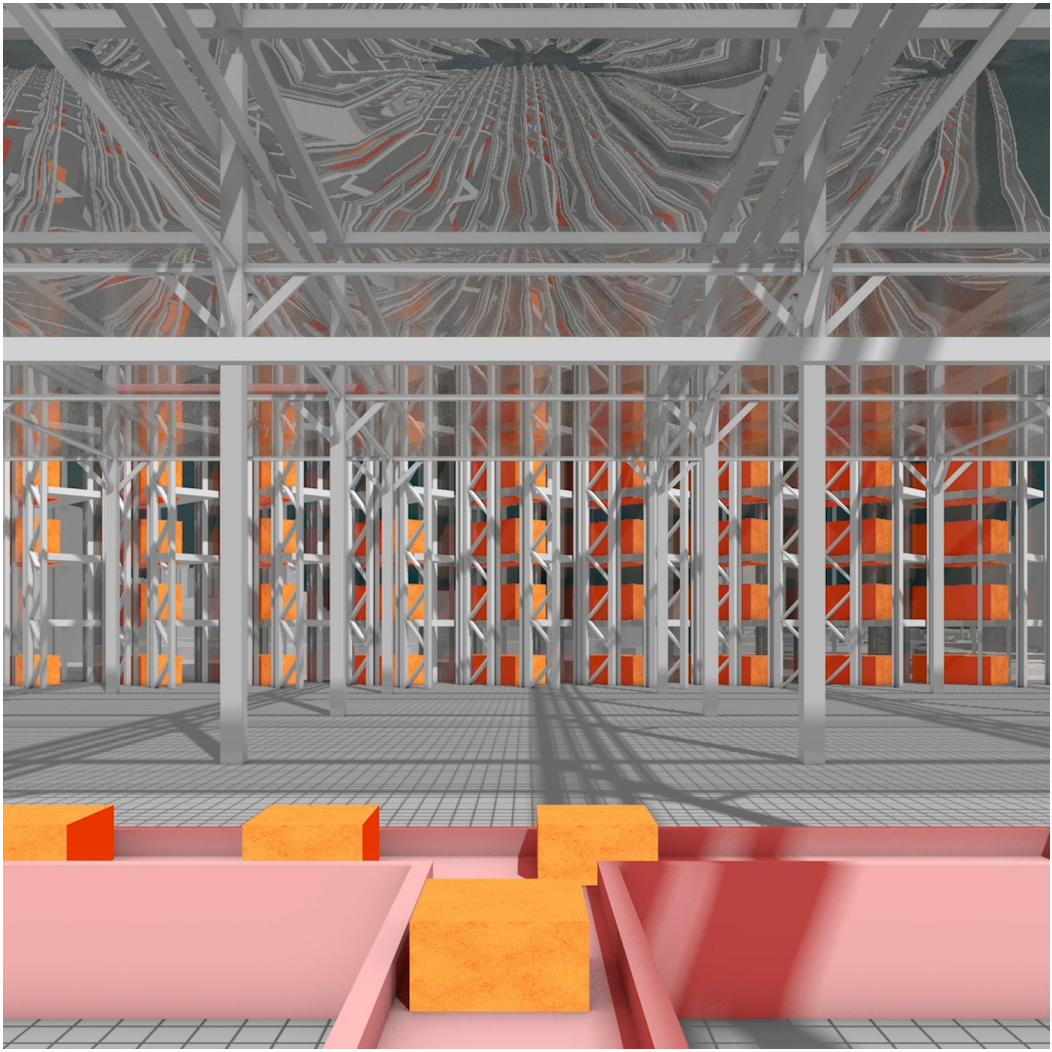
Once the Chilean miner physically dug out raw copper ore from depths of open-pit mines, now they remotely gather the Copper guts of London's interiors.



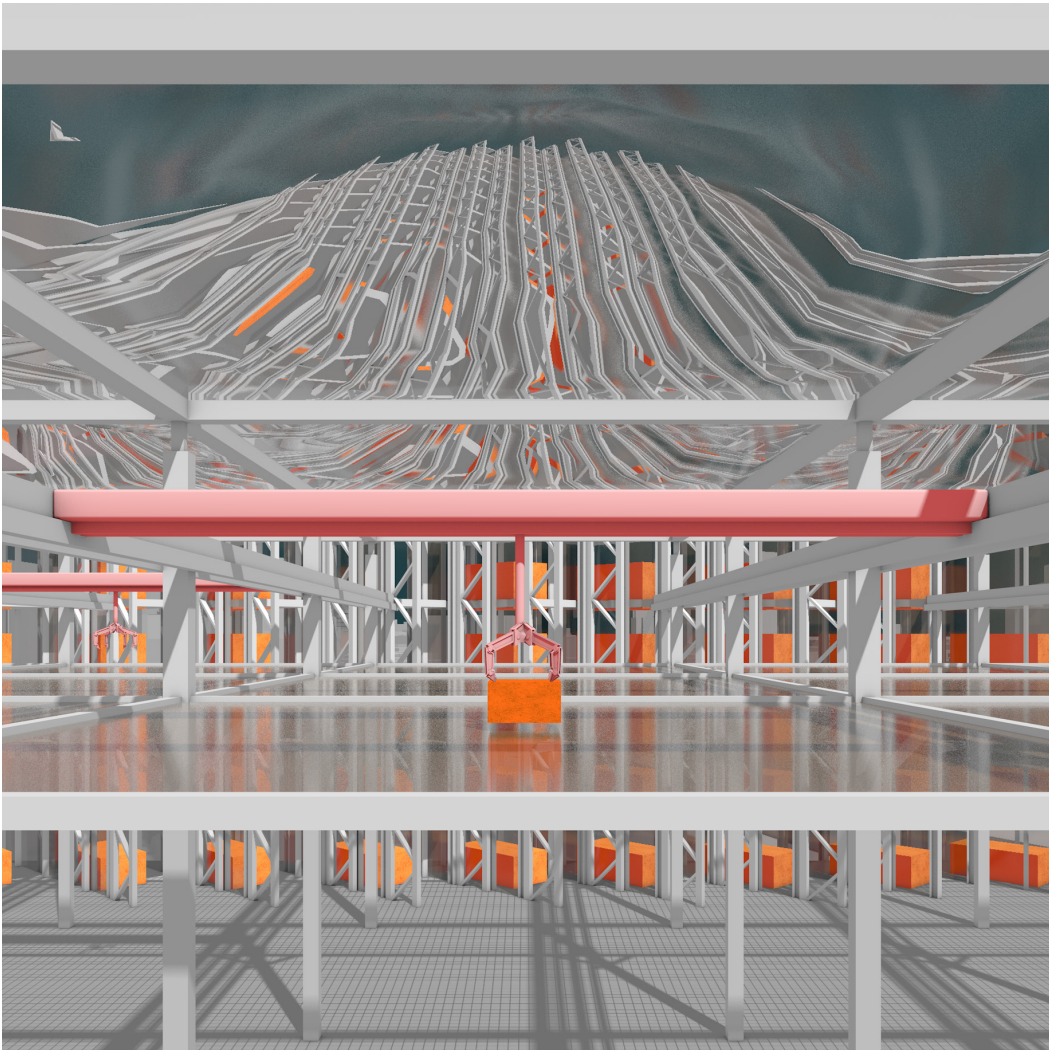
Copper piping, roofing, cladding, and wiring - 130 tons of copper daily pile up in front of the London Metal Exchange Market, confronting it head-on. While the Market is mining capital, the London Mine has started mining the financial district.



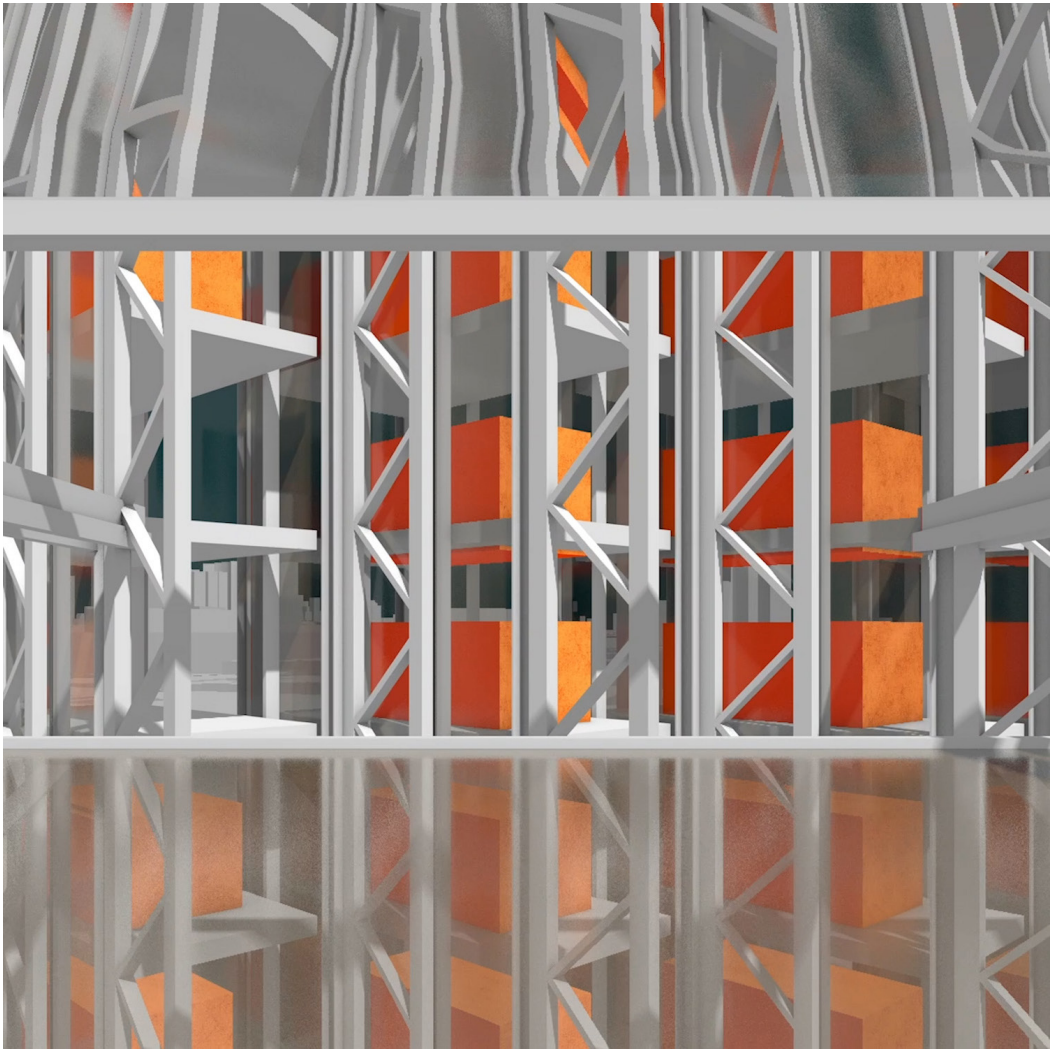
It exposes what is taken from the most intimate spheres to the public, promoting both value and transparency of the process.
Its skeleton structure is host to all different states of scrap.
Steadily, the machinery cuts and compresses the incoming material.



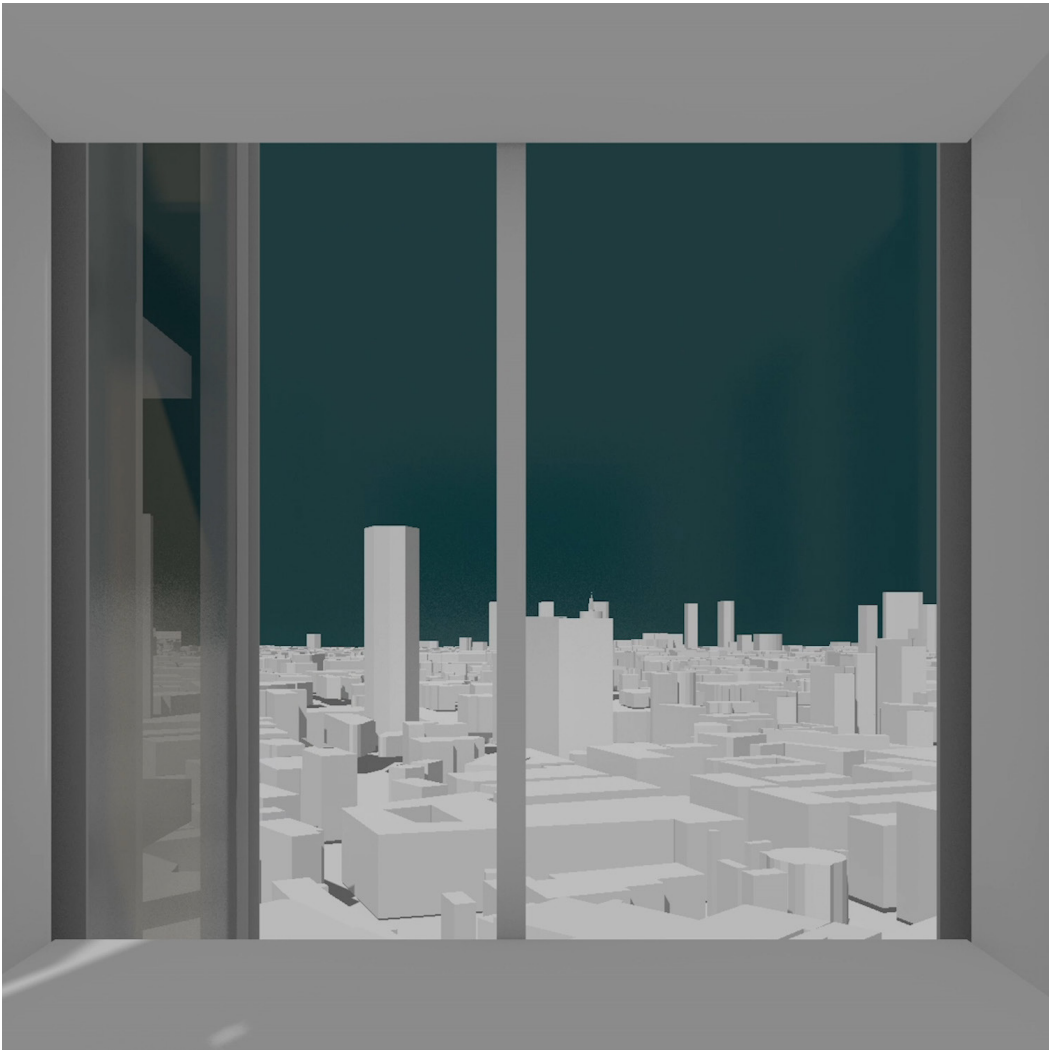
Standardised bales become the new currency: A new product to be sold on the London Metal Exchange market.



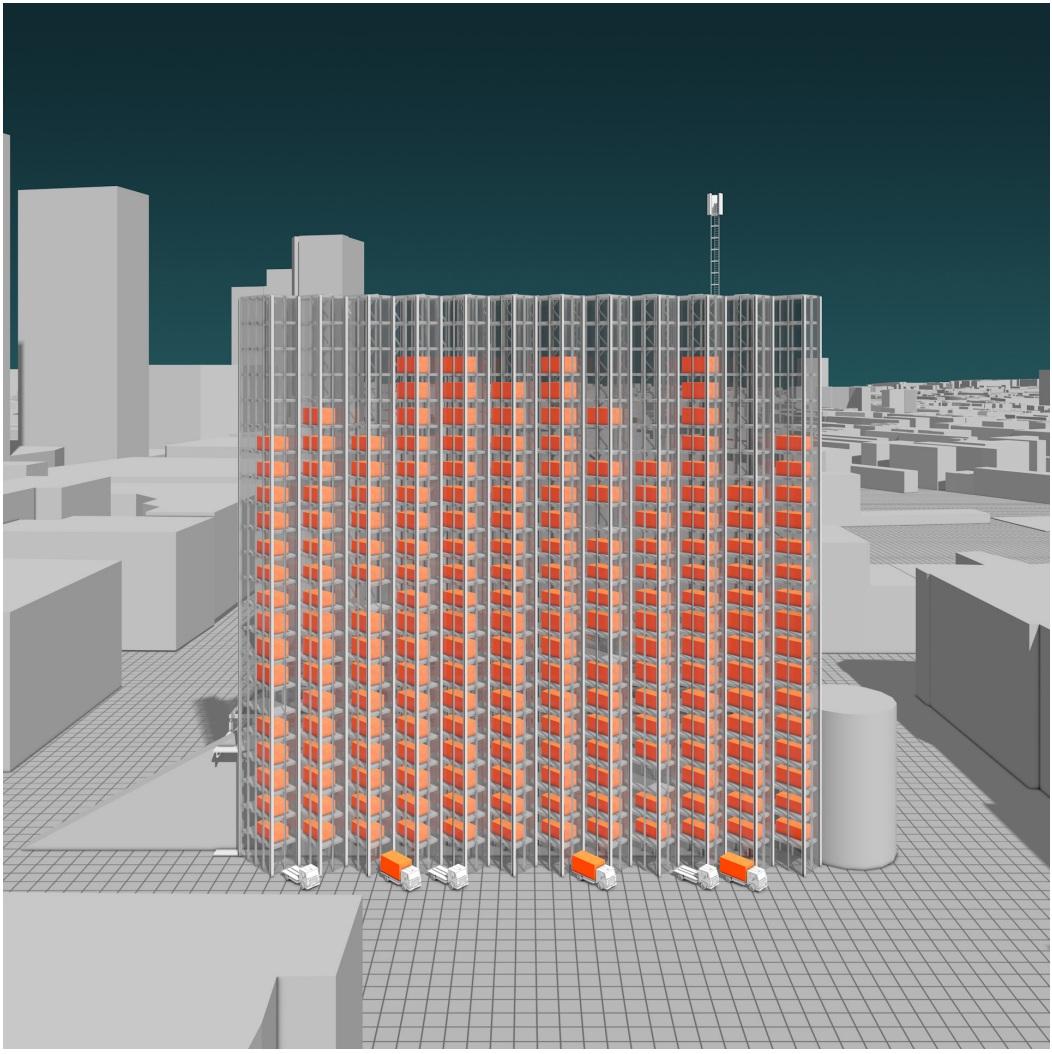
456 bales per day, 19 bales per hour, travel along the building's ceiling towards their designated place of display.



Lift per lift, the cargo is pulled up into the vertical -



where like a billboard, the architecture advertises its content.



The gleam of the copper bodies pervades the façade. A new star on the skyline depicts what has been taken from it. Trucks greedily wait for the new goods. London Copper Cargo is ready to be loaded.

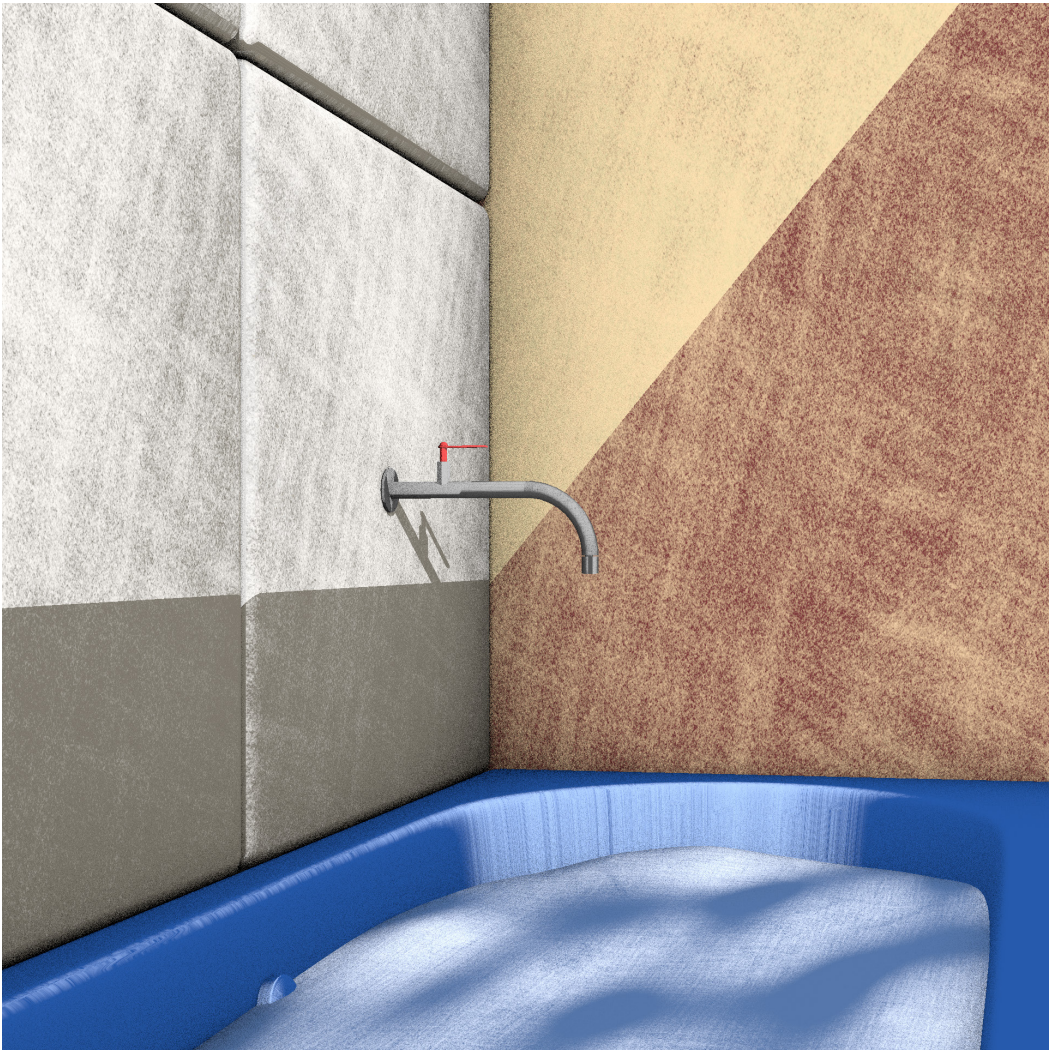
Implemented in the building‘s antenna the materiality of London‘s copper connects back to the miner‘s house.

EPILOGUE

The Miner's House

Walking through the house the miner finds an assembled articulation of the three chapters and their mines.

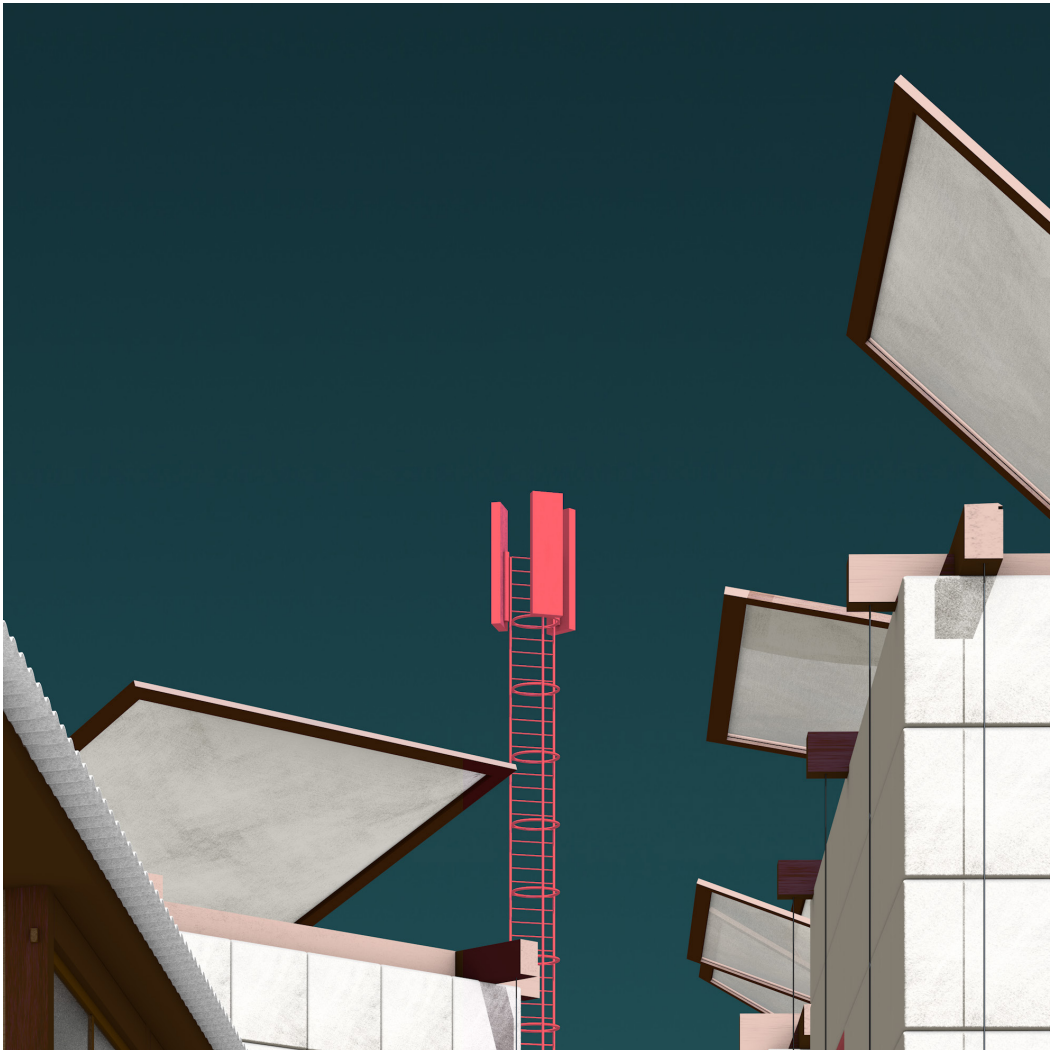
A section through the house is a section through the mines, that is, a section through the context they have created and the materials they yield.



Water, mined in the Baquedano Oasis fills the miner‘s bathtub. The miner consumes what they have constructed.

Step by step, the “toxic“ wood guides them to the earth it has cleared.

{...courtyard breeze...}



{...antenna sounds....}

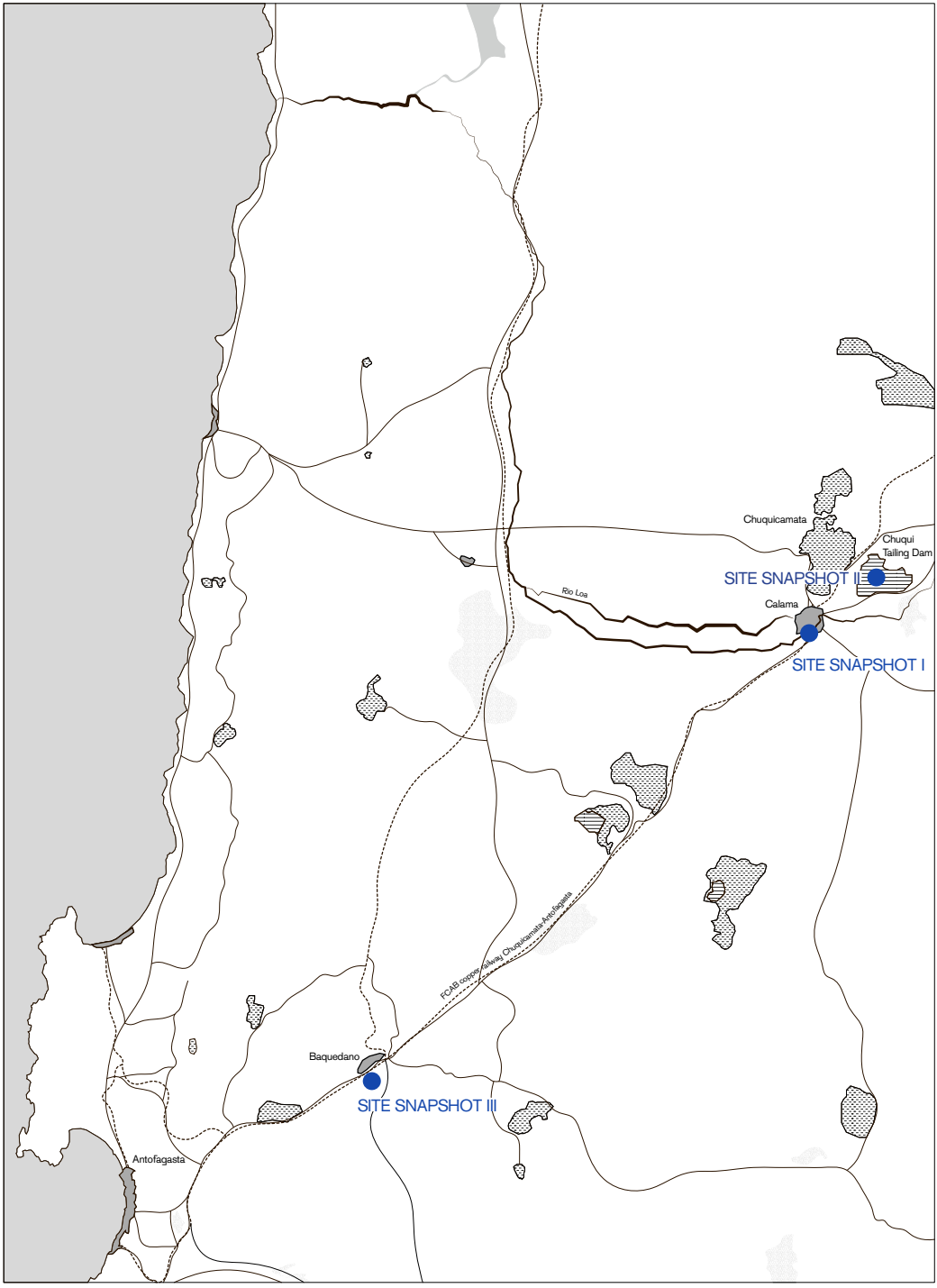
BEHIND THE SCENES

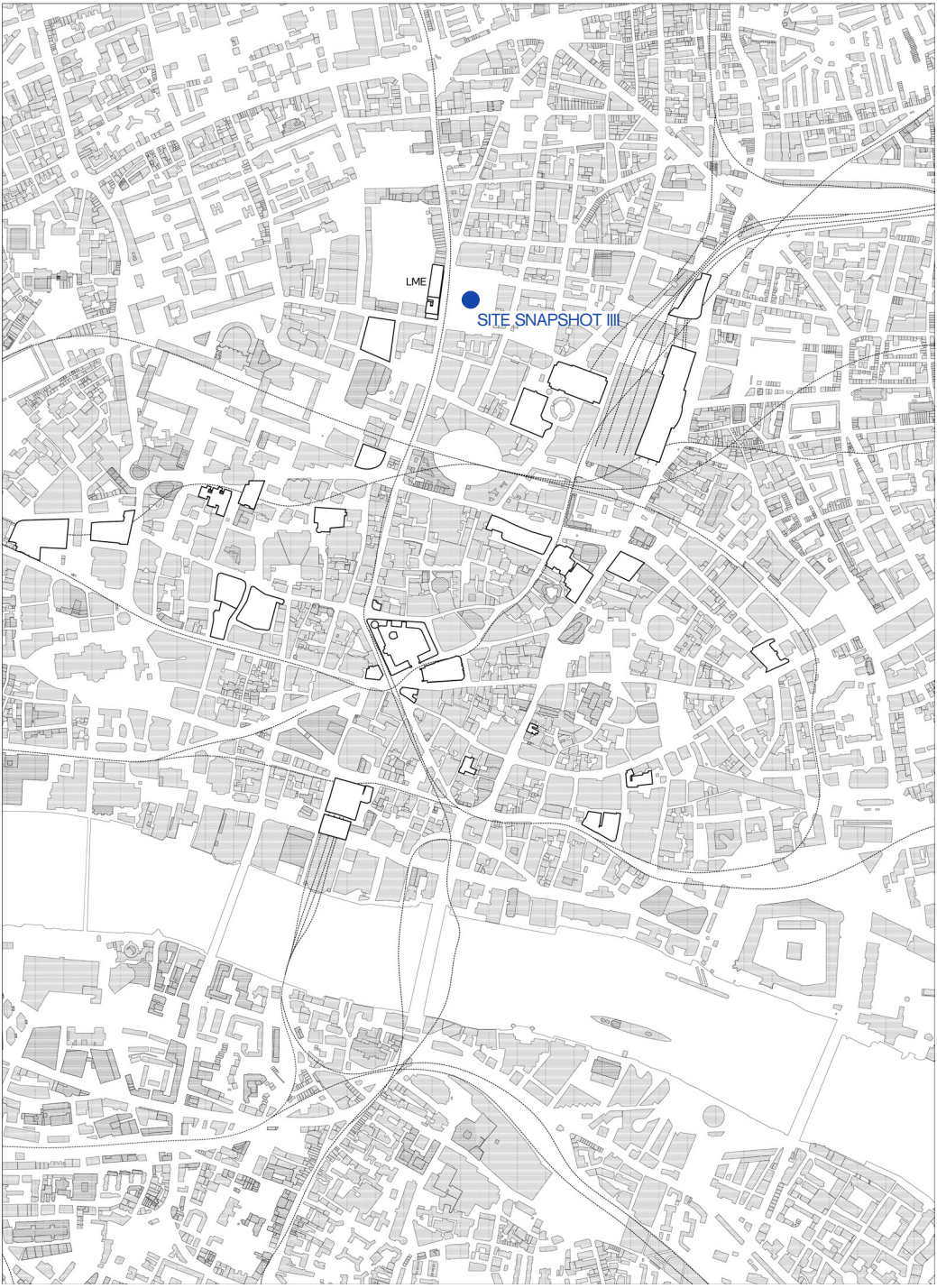
The Copper Landscapes‘ Site Snapshots

COPPER LANDSCAPES

While copper changes not only from one state of being into another - from raw material to capital; through ore, smelted commodity, stock market exchange value, assembled material and waste - it also travels, destructs and constructs various geographic locations - from copper extraction sites in Chile to its virtual site of economic transaction, the London Metal Exchange Market. Every change in state creates new architectural agencies and forms of living.

Site Snapshots give brief outlines of the sites from which the stories evolved and describe their momentary challenges.
The “Design Research Book“ provides a deeper analysis of the sites and the problems they encounter.


Chuquicamata
Chuqui
Tailing Dam
SITE SNAPSHOT II
Rio Loa
Calama
SITE SNAPSHOT I
FCAB copper railway Chuquicamata-Antofagasta
Baquedano
SITE SNAPSHOT III
Antofagasta
copper mine
tailing dam
railway network
salt desert
main and side streets
settlement
rio


LME
SITE SNAPSHOT IIII
copper mine
London Metal Exchange + Banks
railway network

SITE SNAPSHOT I

Prologue and Epilogue: The House and the Mine

In the middle of the Atacama Desert, just next to the world's biggest open-pit copper mine *Chuquicamata,* the miner's house is eaten up. It is subject to its employer - to the consequences of the extractivist actions of a globally operating copper industry. Each blasting takes away habitat, each copper refining poisons fresh water, but also consumes the last reserves of the driest non-polar desert. Meanwhile, the extracted copper feeds into our communication infrastructures: one of the most conductive metals allows our global data society to run - and its demand is increasing. The landscape's destruction is also what keeps it economically alive, constructing capitalist dependencies controlled by the world's financial centers: London, headquarter of the Metal Exchange Market regulates copper prices and allows the movement of copper products between extraction and implementation. But the red gold of the desert is diminishing: while the demand is rising and the landscape is being destroyed, the underlying material is threatened by total depletion. How can we design a transition for this territory that embraces its global implications while reinforcing the agency of the miner's house itself?

City of Chuquimata
© Ignacio Acosta

2km

Calama and
Chuquimata copper mine,
Atacama Desert, Chile

SITE SNAPSHOT II

Chapter 1: Toxic Soil and Tailing Dams

Situated close to the Chuquimata mine, one finds huge ponds forming a tailing dam - a structure where almost 170 Million L of acidic water from the copper production is pumped every day. There, it is stored until the acidic particles sink to the soil and the remaining water can be pumped back to the mine.
Over the last decade, the increasing activity of the mine lead to an increasing size of the dam, which contaminates not only the soil on site but also threatens to pollute the groundwater and the nearby river Loa that brings water to the whole region of Antofagasta.

Thinking towards copper depletion, the first chapter *Toxic Forest* makes this dump site of the copper industry accessible again, by cleaning and remediating the soil while speculating on new economic values that can be gained from this transition.

>> see Design Research Book p.8

Tailing Dam Structure,
Atacama Desert, Chile

SITE SNAPSHOT III

Chapter 2: Water Scarcity and Copper Distribution

In the driest non-polar desert in the world, the mining industry consumes the last water resources. The water of the rivers, as well as the groundwater reserves, have drastically decreased in the last decades, which has significantly weakened another important economic sector for the region: Agriculture.
Along the rails on which the finished copper cathodes are shipped from the mines to the coast stretches a parched and thirsty territory.

The second chapter *Bauedano Oasis* connects the flow of copper with the flow of water, by designing a water infrastructure along the rails. The process of desalination and the different states of seawater it encounters, meet different states of copper. As a transition design, the chapter also tells of a future in which brine, the bi-product of desalination, replaces copper as a saleable product while the extracted freshwater abundantly drenches the landscape. >> see Design Research Book p.62

Baquedano Railway Station,
FCAB railway,
Atacama Desert, Chile

SITE SNAPSHOT IIII

Chapter 3: London, Copper and Capital

Finsbury square forms a large public plaza in the financial district of London, directly facing the London Metal Exchange Market. This location is the global base for the trading of copper.

Today, this site has already a direct virtual connection with the site of copper extraction in Chile. In the last couple of years, strikes at the Chuquicamata mine have seen a drastic fluctuation in the copper prices on the other side of the world at the London Metal Exchange.
London is where copper is turned into capital, the one and only source of the miner's income. However, while the metal is set to become even more in demand, geological deposits in Chuquicamata face depletion by 2060.

The third chapter turns the city itself into a site of copper extraction: Mining the buildings, the *London Mine* can keep up with an increasing demand for copper while turning the existing economic and material dependencies of two continents around.

>> see Design Numbers Book p.116

Finsbury Square,
London Metal Exchange Market,
Atacama Desert, Chile

PLAN MATERIAL

Plan Elaboration on Different Scales

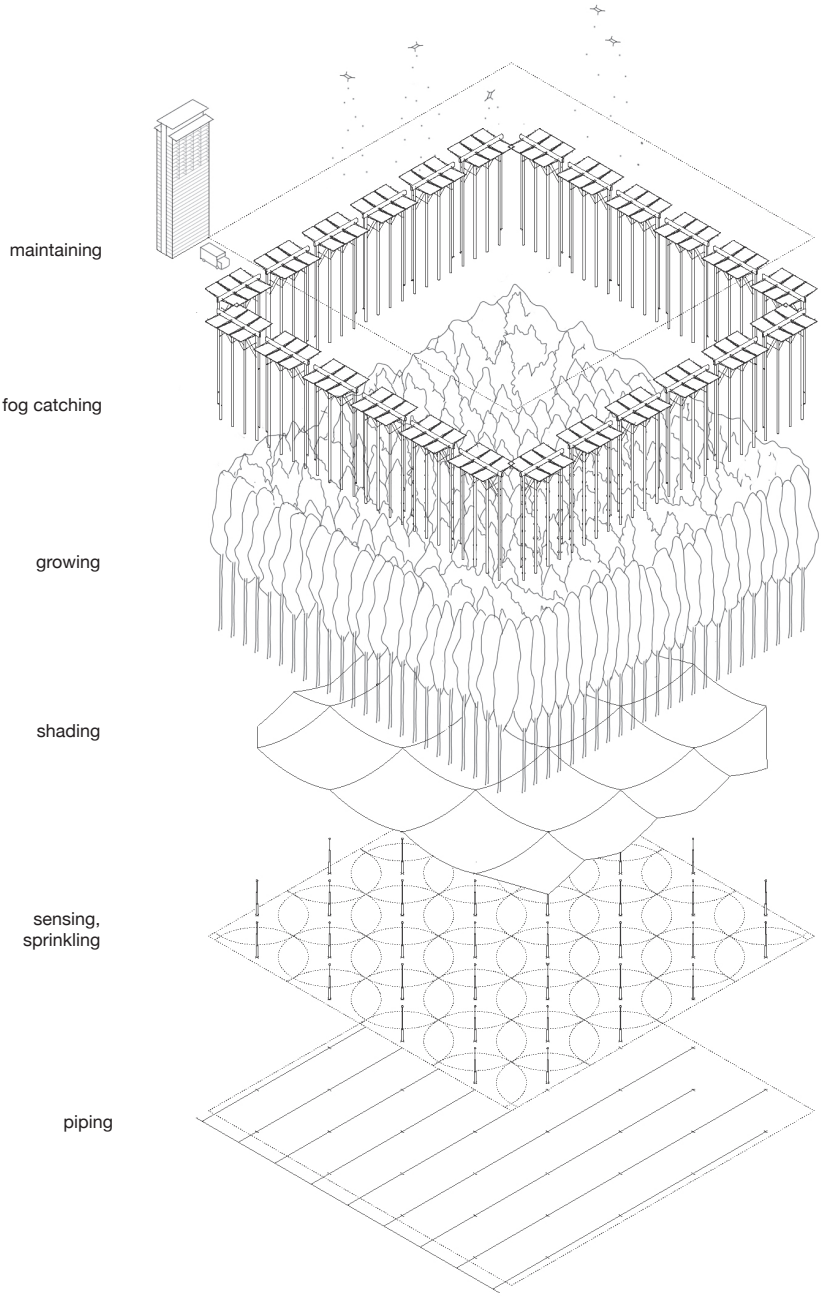
THE TOXIC FOREST

Plan Material Chapter I


Phase 2 SEEDING
seeddrones plant seeds
heat corridor
Agent Seed Drone
Phase 3 SHADING
simulation of a forest,
creating conditions to grow
Phase 6 HARVESTING + REWORKING
Agent PROTECTIVE FABRIC
4 m
cleared soil
Phase 1 SENSING
monitoring and adjusting
the environment
heat corridor
Phase 5 ABSORBING
maximal absorption of 200L
of toxic water/tree/day
11m
Agent Sensing Pile
Agent Seed, Watering and Fertilizing Drone
Agent Eucalyptus Globulus
Agent Drone Tower
Agent Fog Catcher
Phase 4 GROWING
forest fire
Agent Pipe
Phase X BURNING
Agent Eucalyptus Camaldulensis
4.5m to 6.5m

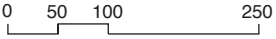
Exploded Axo

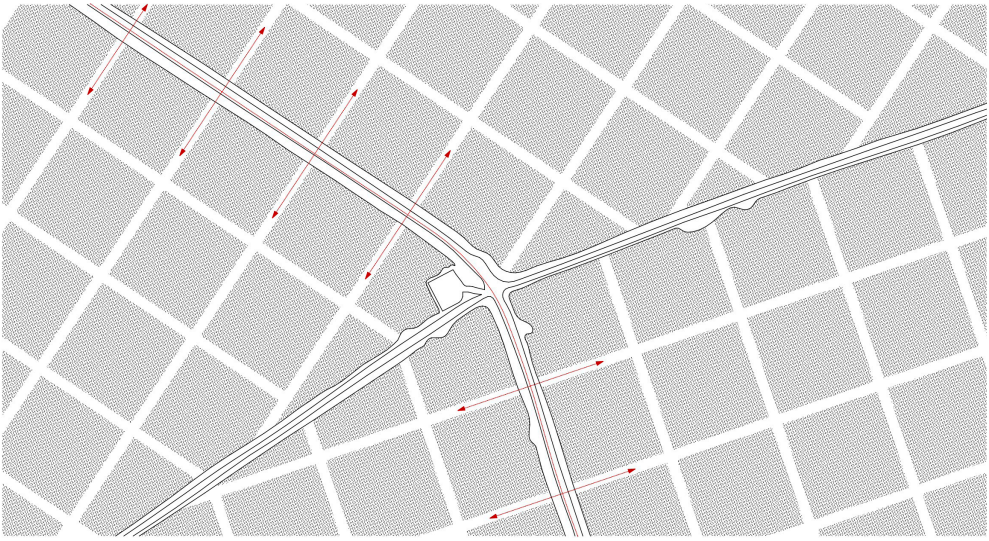
1 hectare
of the toxic forest

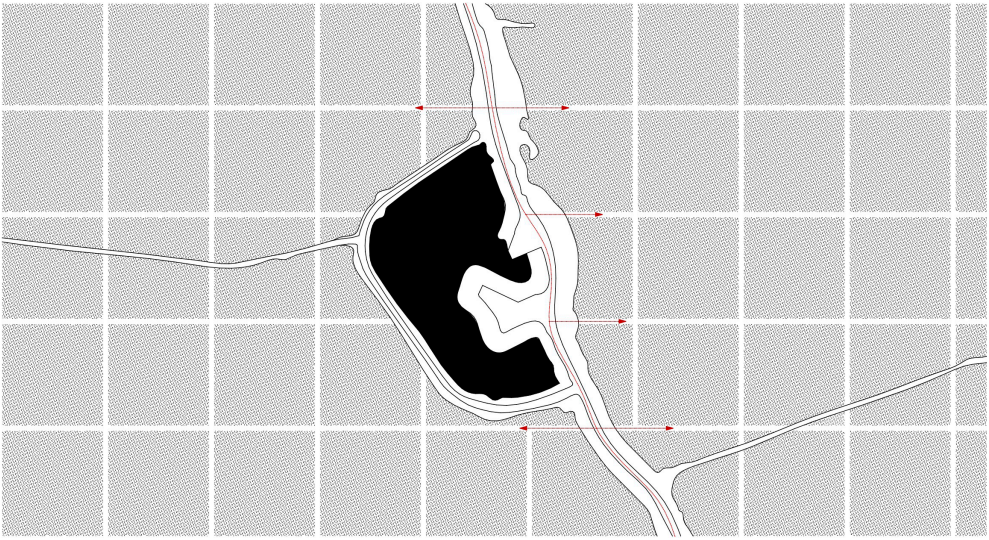

maintaining
fog catching
growing
shading
sensing,
sprinkling
piping

Site Overview

forest hectare
and water distribution

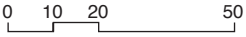


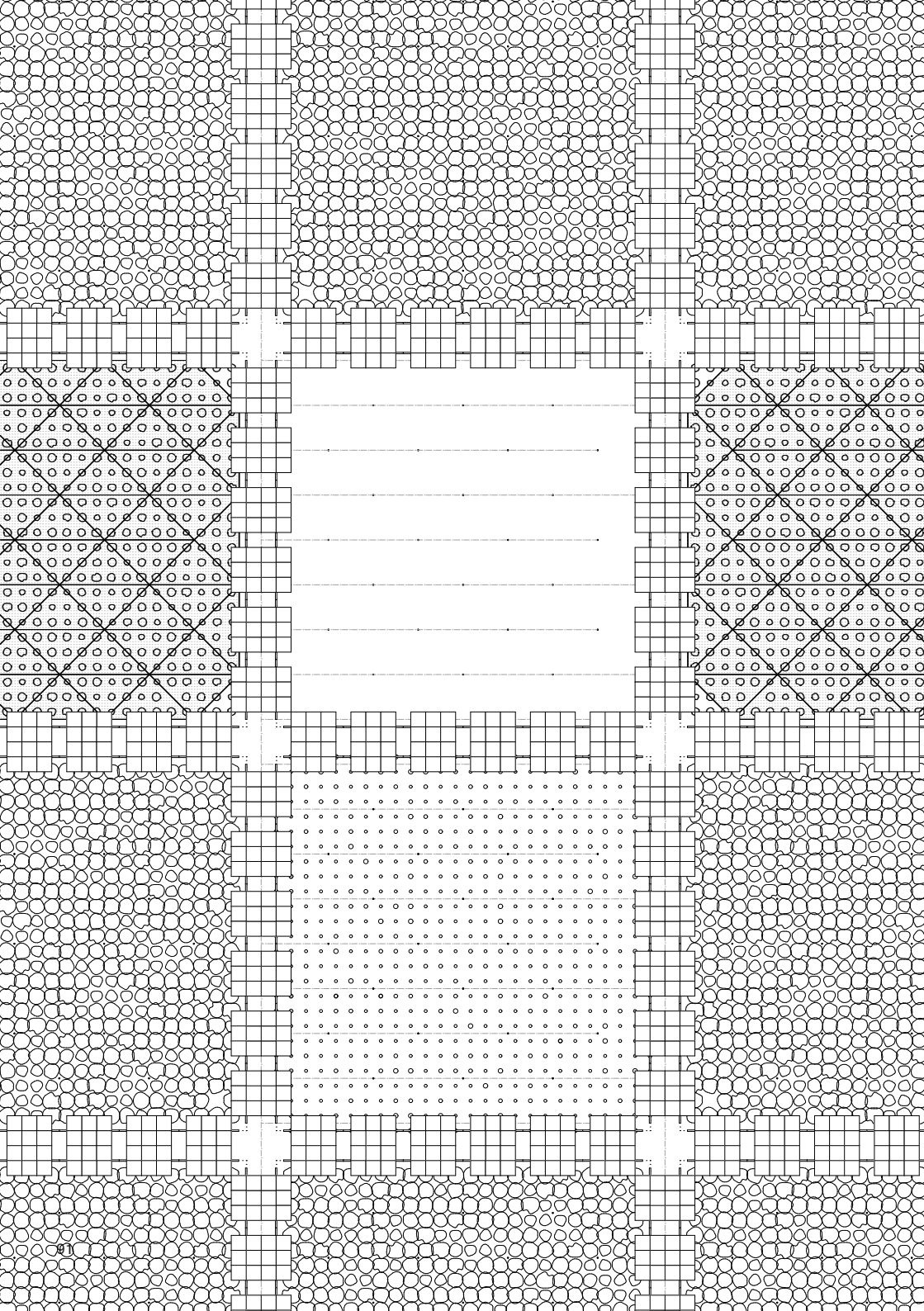




Site Plan

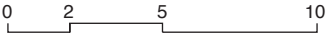
forest hectare and different phases

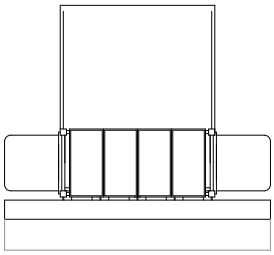




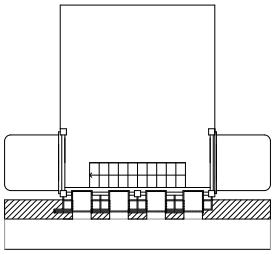
Drone Tower

floorplans alone and in context
Toxic Forest

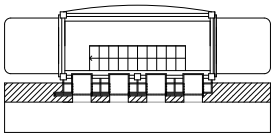




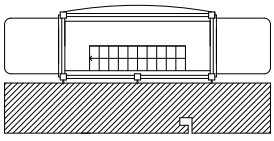
solar roof



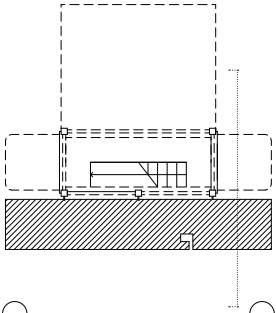
platform



drone parking

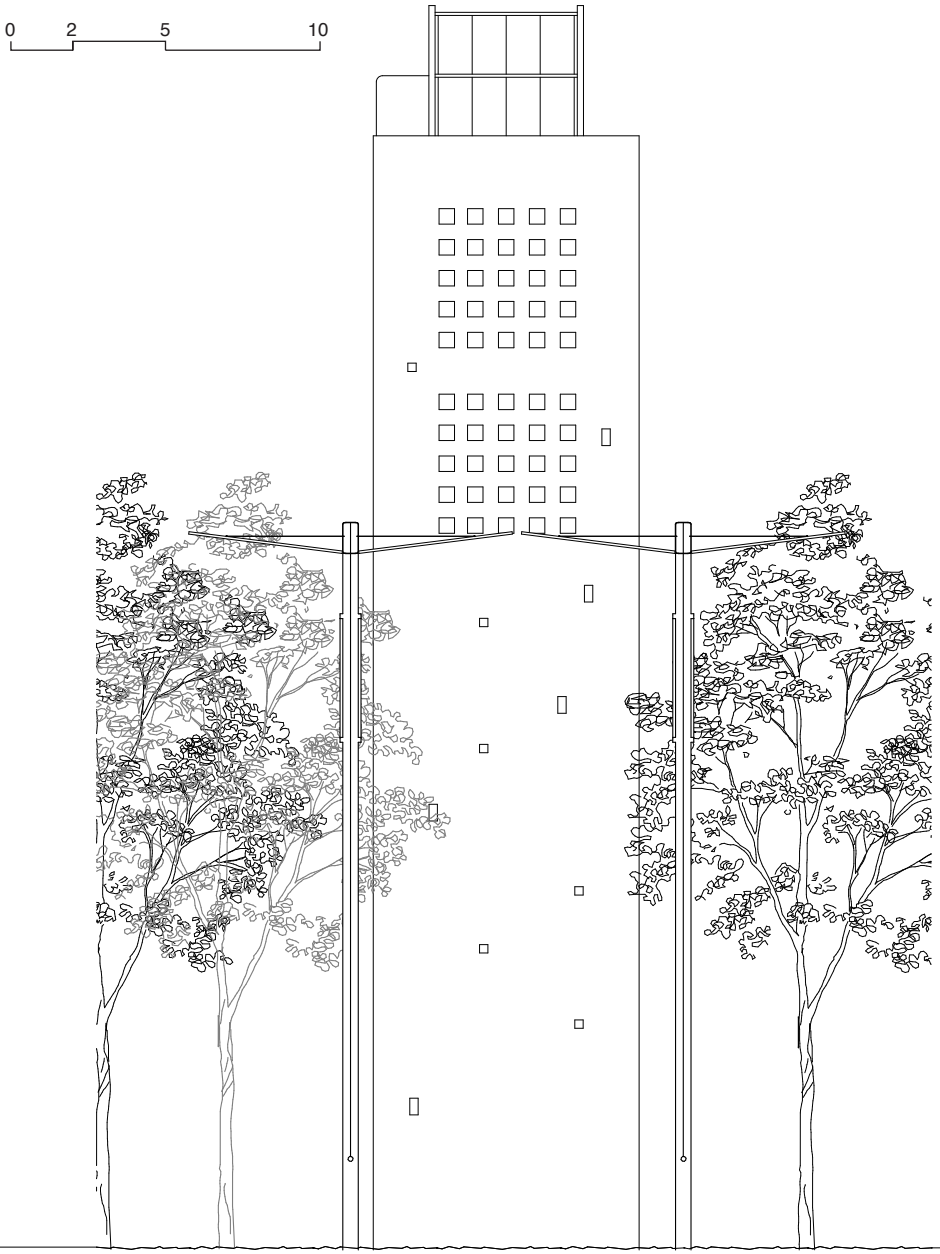


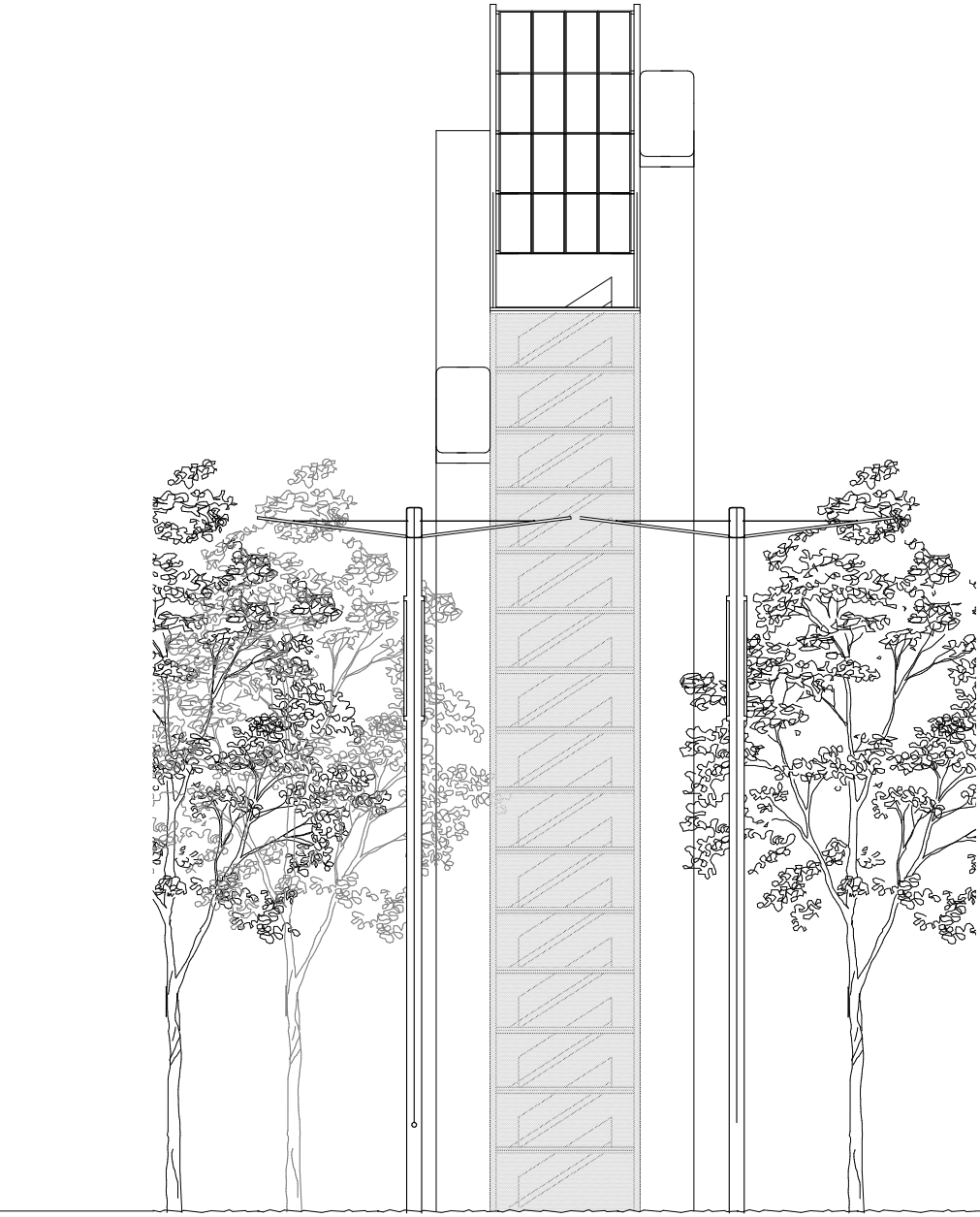
ground floor



Drone Tower

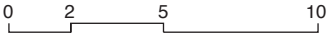
elevation front • elevation back
Toxic Forest

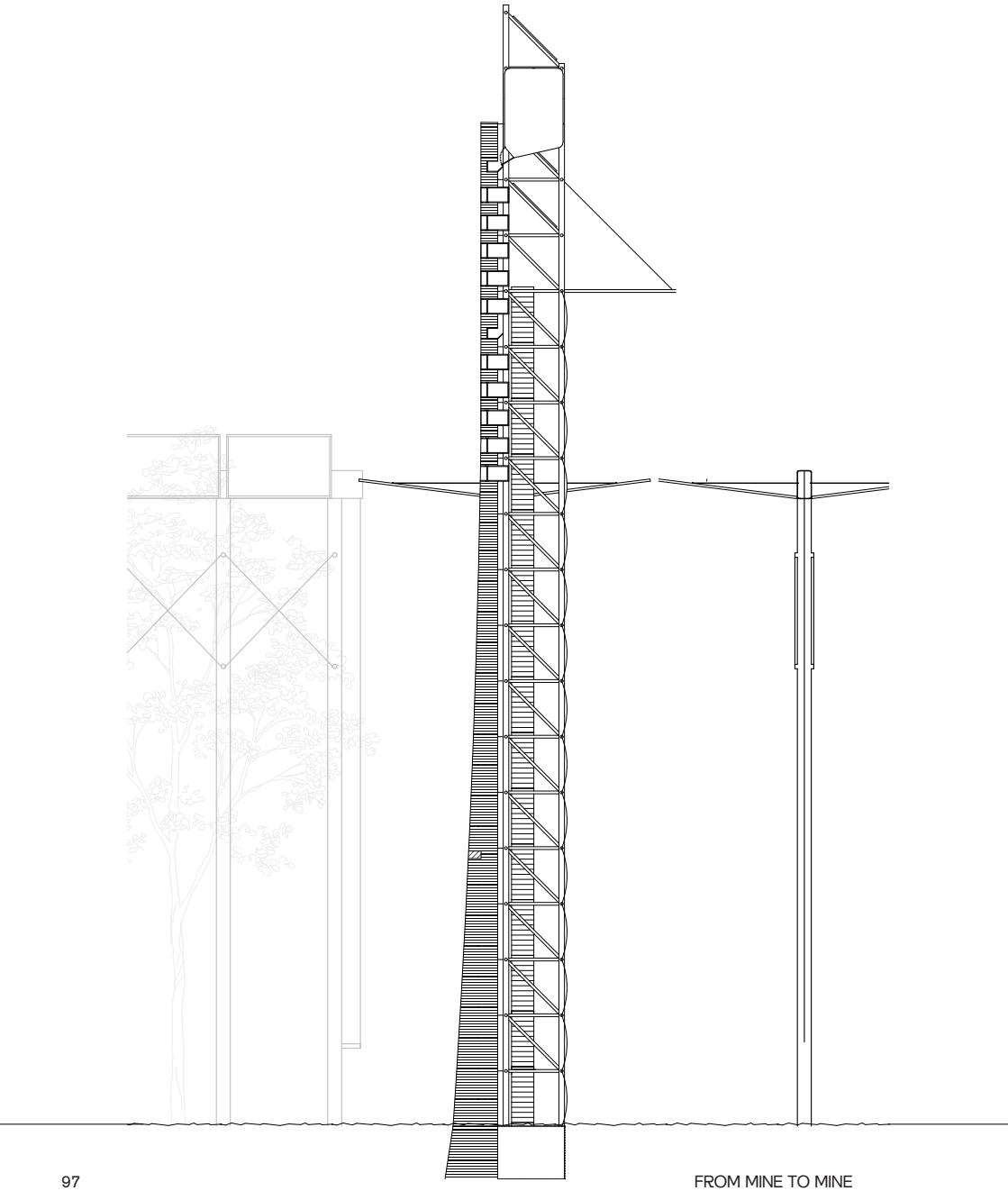




Drone Tower

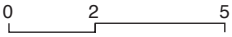
section
Toxic Forest

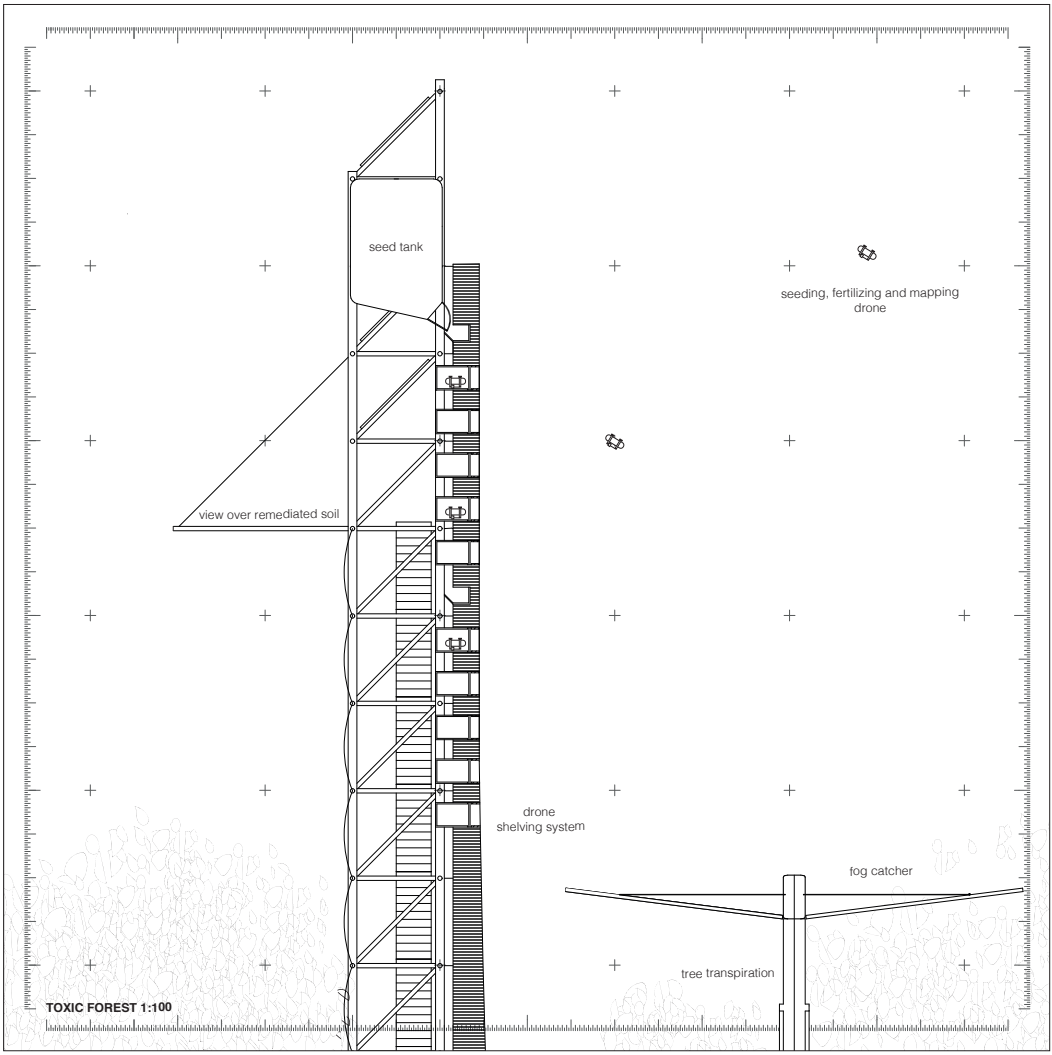




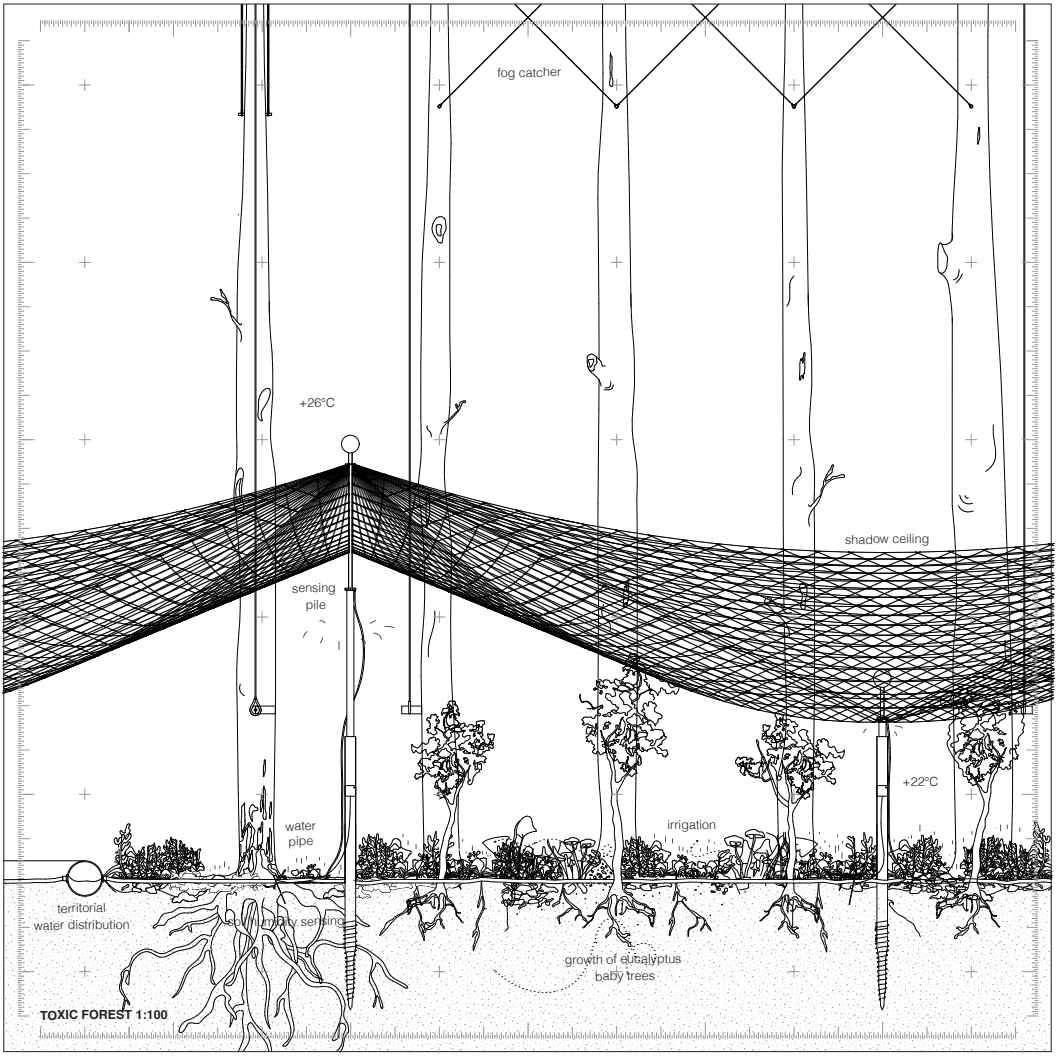
Zoom-In

plans and section
Toxic Forest

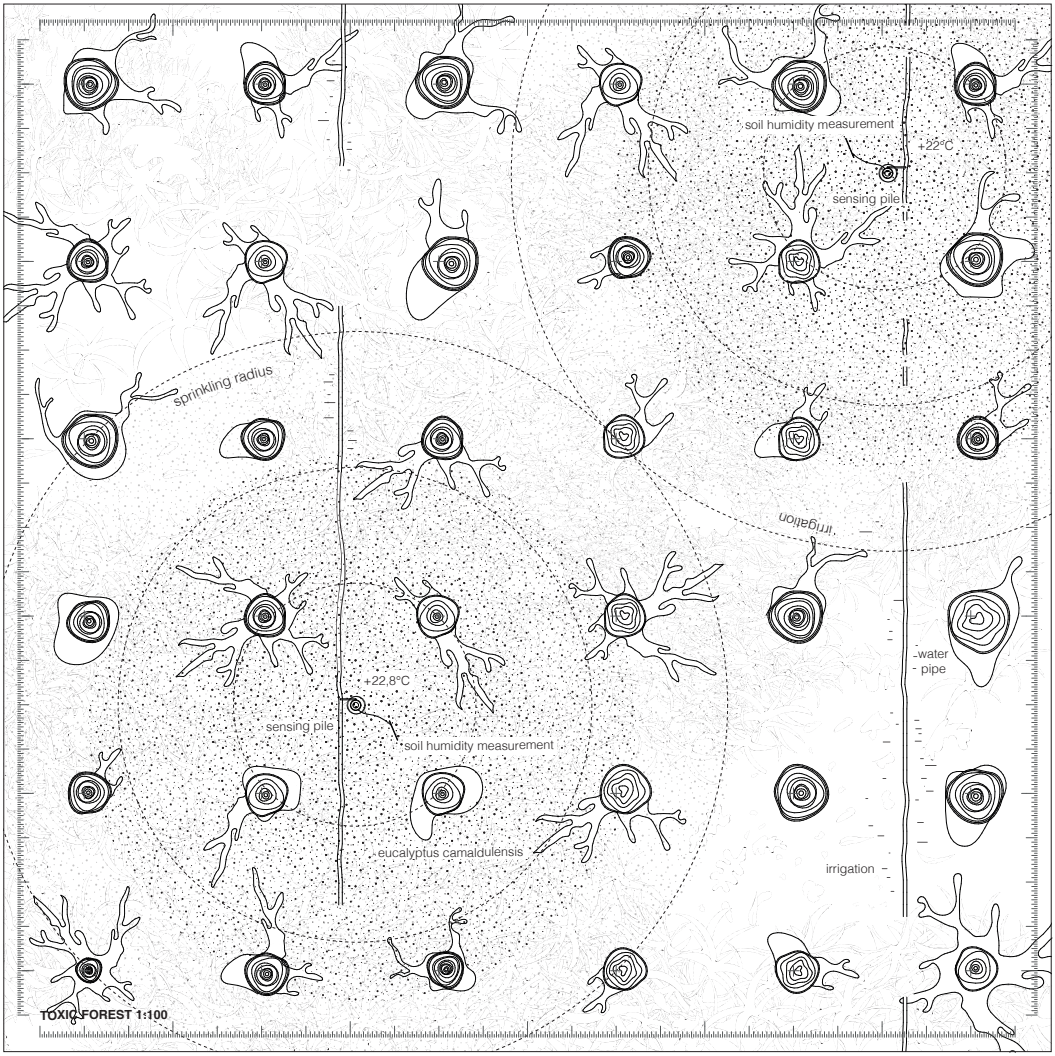




Drone tower with seed tank and drones



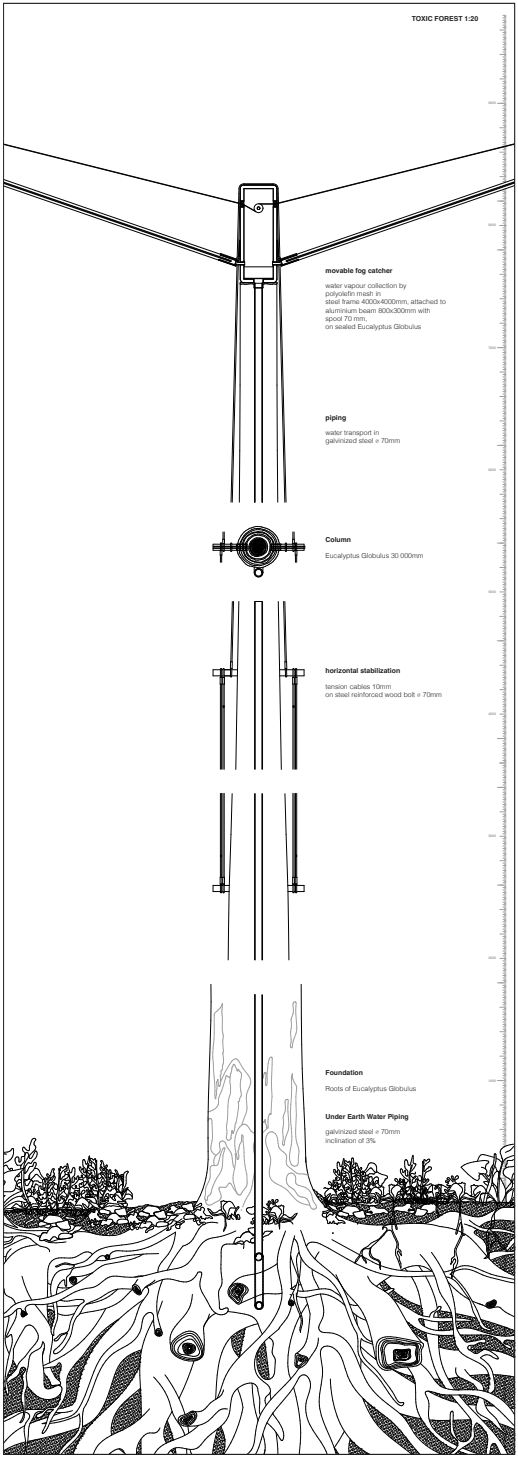
Sensing pile with attached protective fabric creating an artificial climate for baby trees.



Irrigation pipes running through the forest and providimg the sensing piles with water.

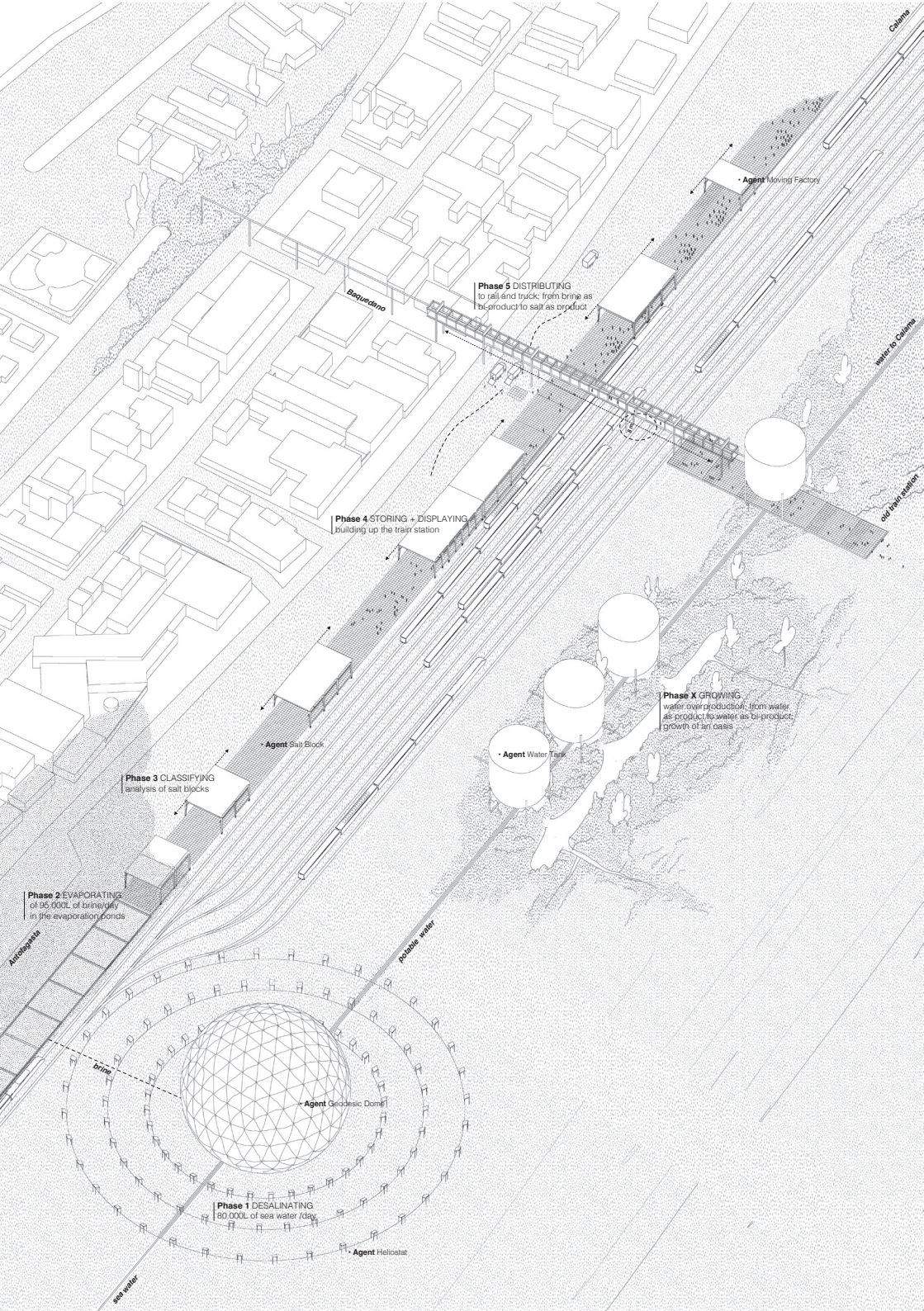
Detail

the fogcatcher:
a water recycling plant,
fabric panels on eucalyptus tree



THE BAQUEDANO OASIS

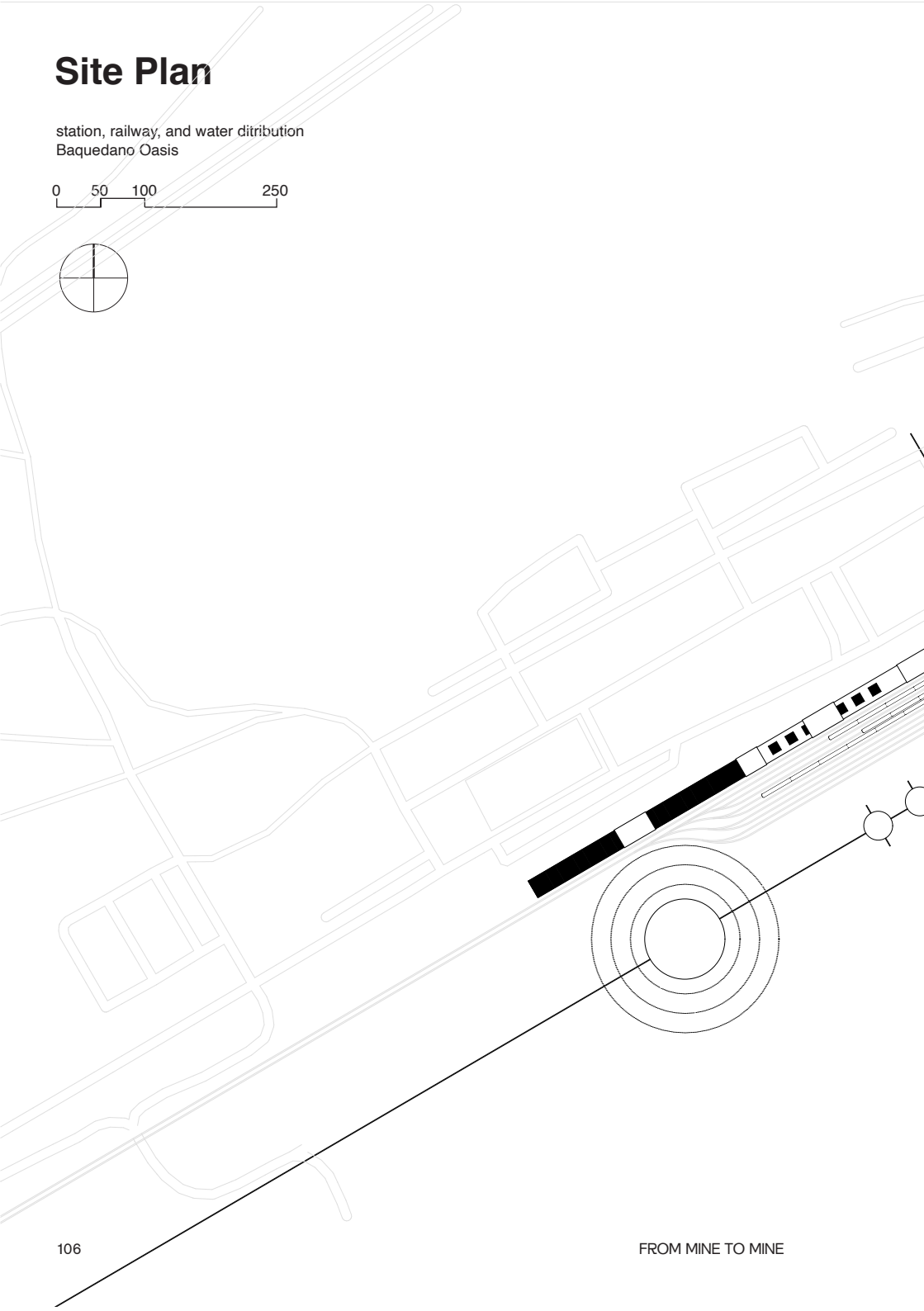
Plan Material Chapter II


Calama
Baquedano
Antofagasta
sea water
brine
potable water
water to Calama
old train station
Phase 1 DESALINATING
80.000L of sea water /day
Agent Heliostat
Agent Geodesic Dome
Phase 2 EVAPORATING
of 95.000L of brine/day
in the evaporation ponds
Phase 3 CLASSIFYING
analysis of salt blocks
Agent Salt Block
Phase 4 STORING + DISPLAYING
building up the train station
Phase 5 DISTRIBUTING
to rail and truck; from brine as
bi-product to salt as product
Agent Moving Factory
Agent Water Tank
Phase X GROWING
water overproduction; from water
as product to water as bi-product;
growth of an oasis

Site Plan

station, railway, and water ditribution
Baquedano Oasis

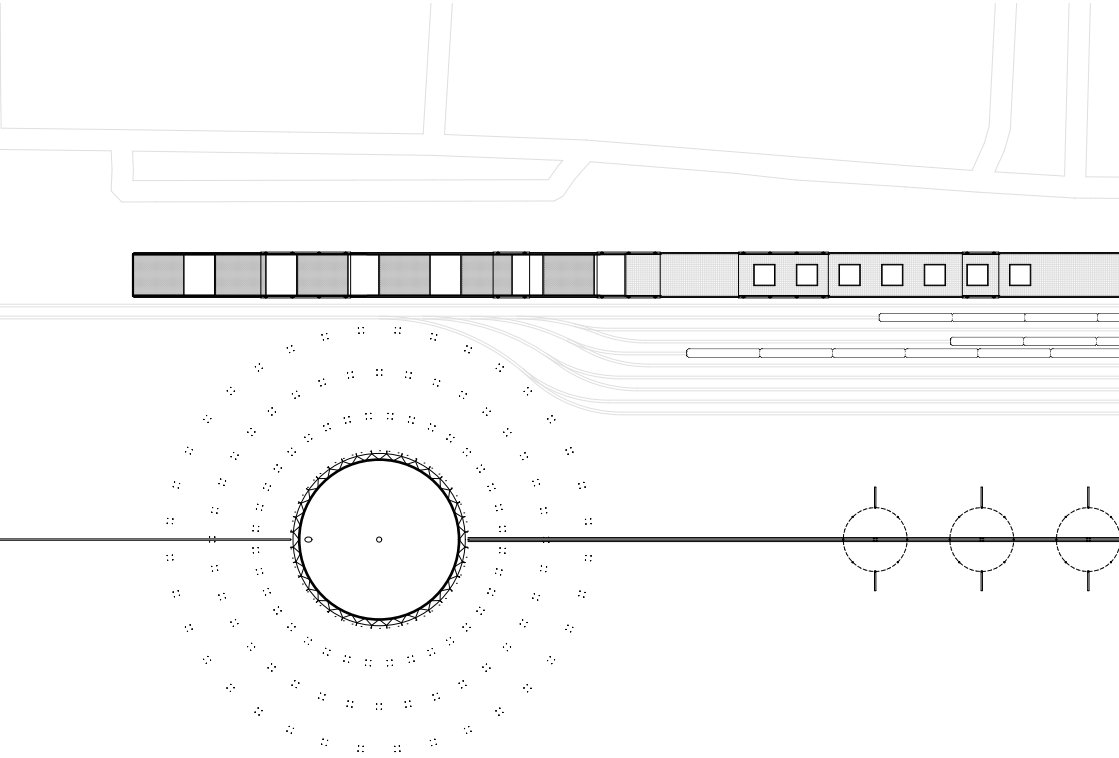
0 50 100 250

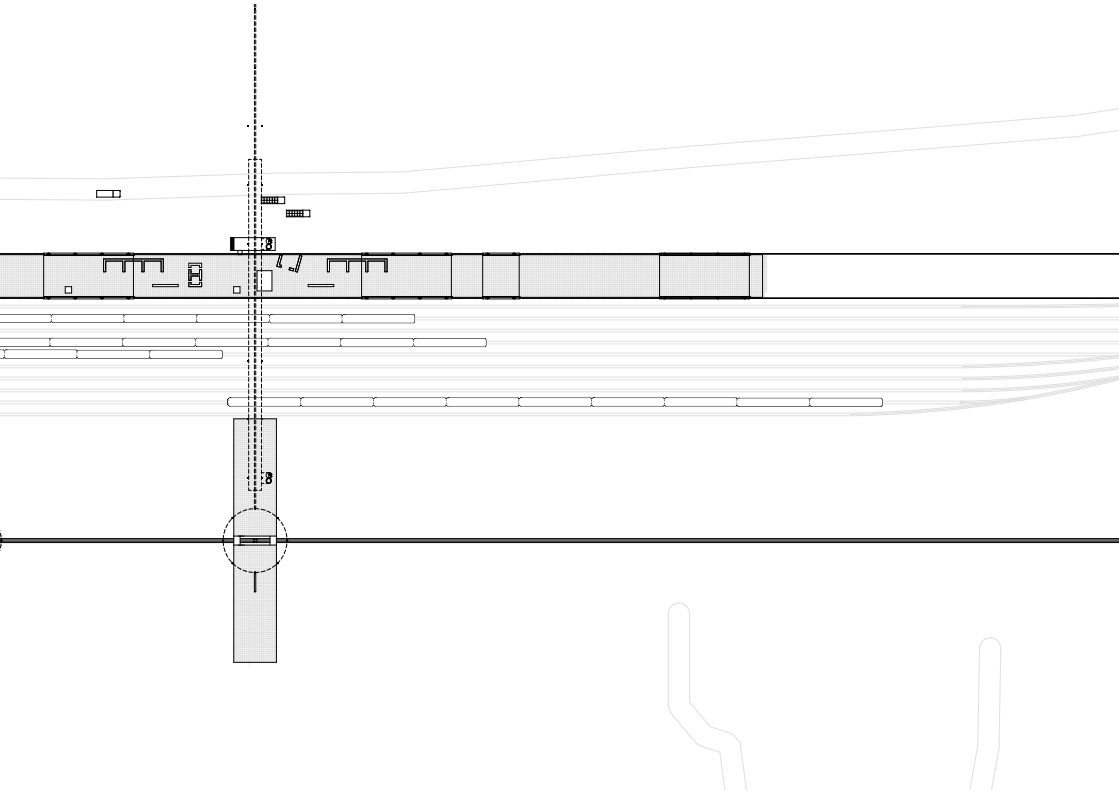


Floor Plan

ground level
Baquedano Oasis

0 10 50

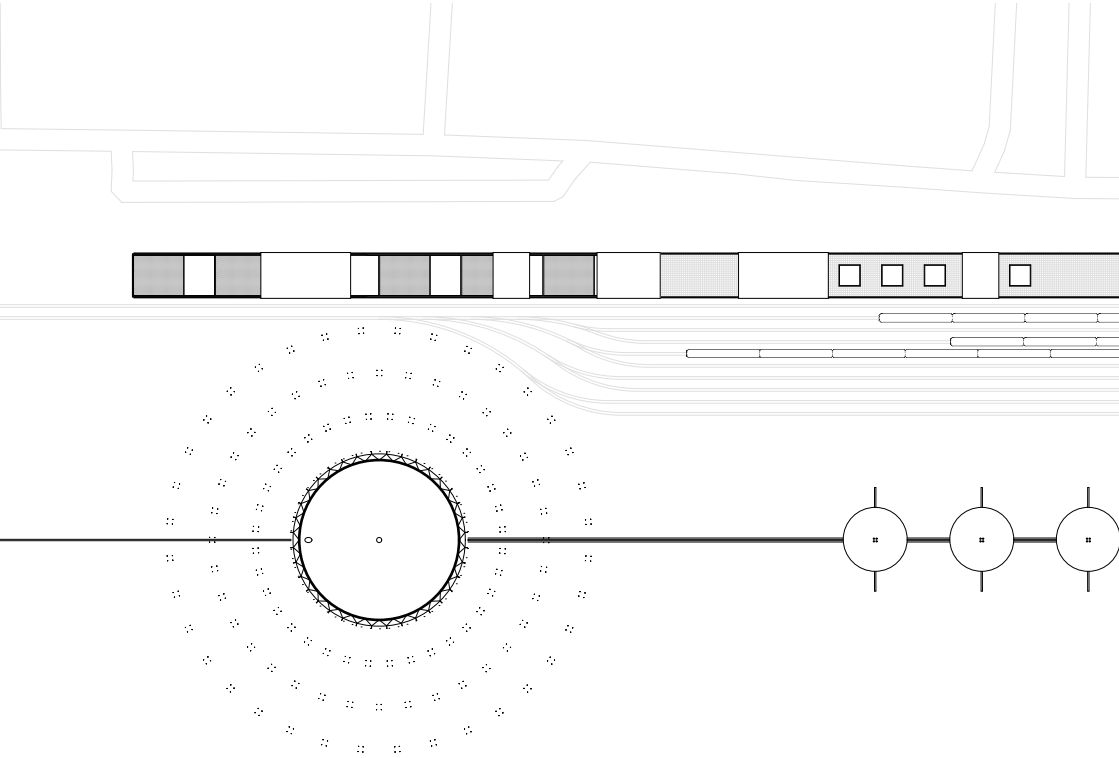


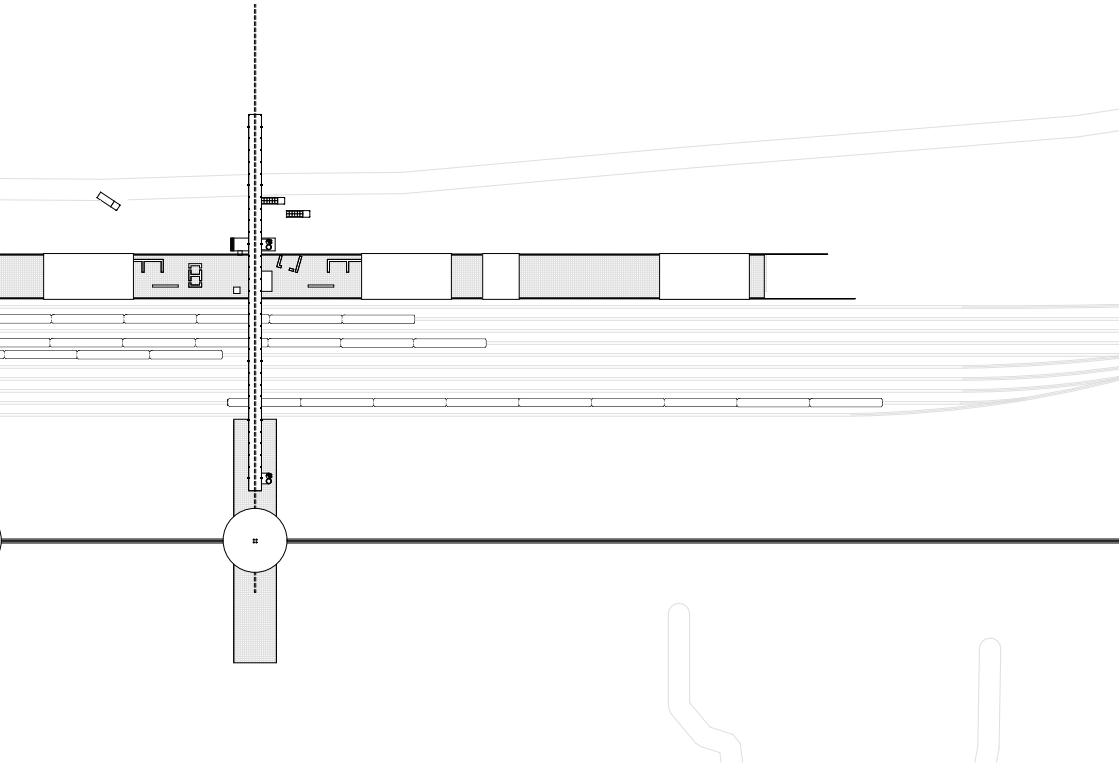


Floor Plan

first floor
Baquedano Oasis

0 10 50

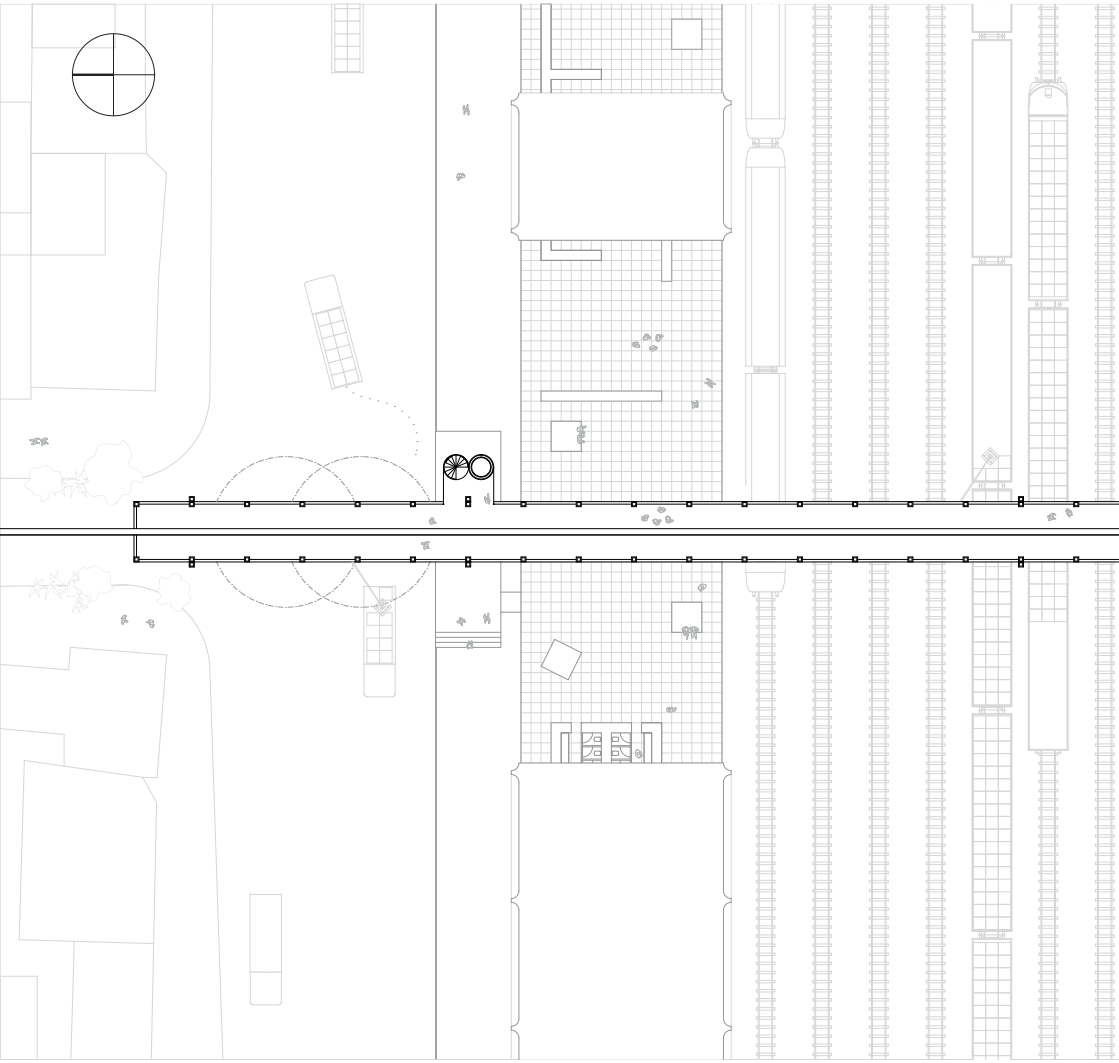


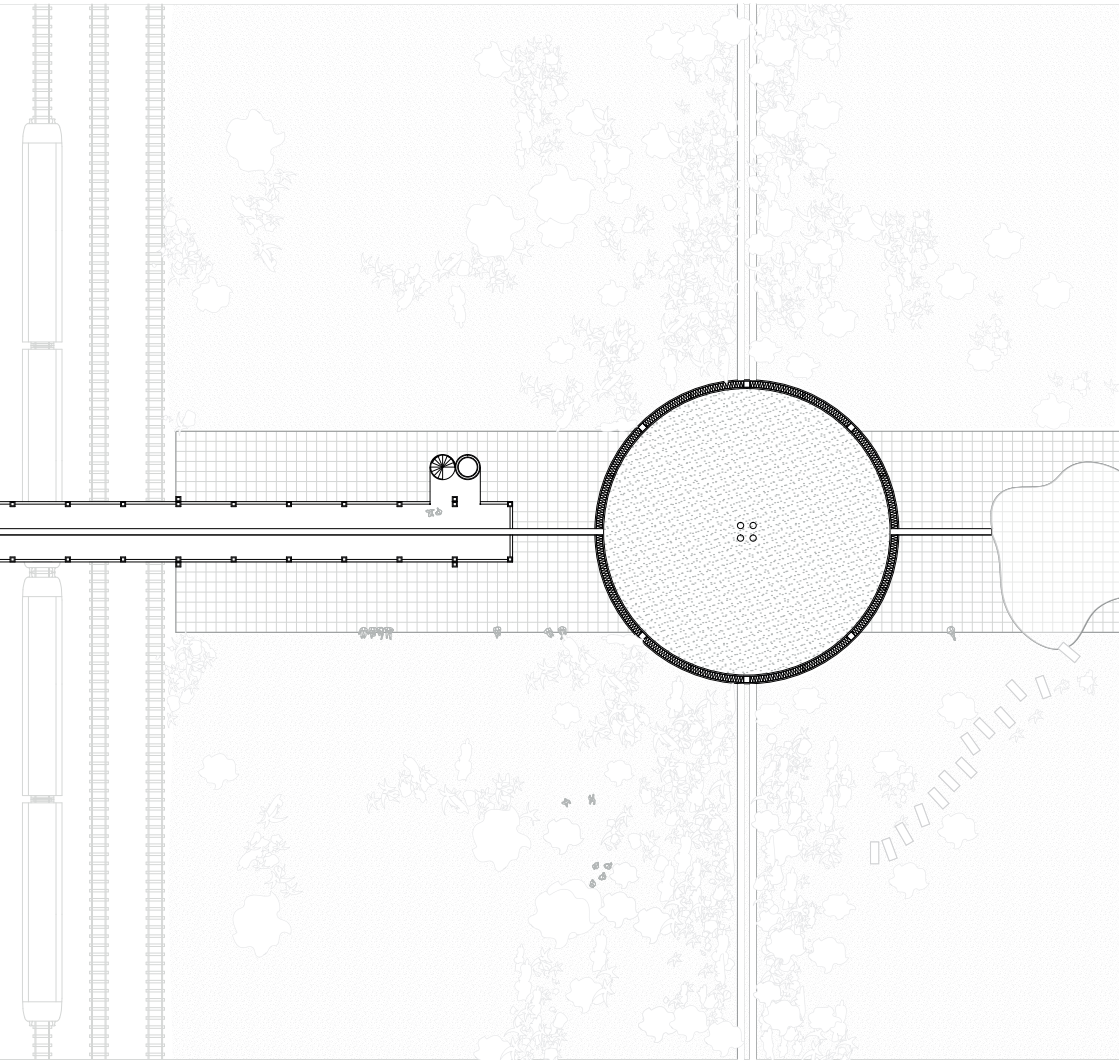


Floor Plan

fragment of first floor
Baquedano Oasis

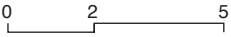
0 2 5 10

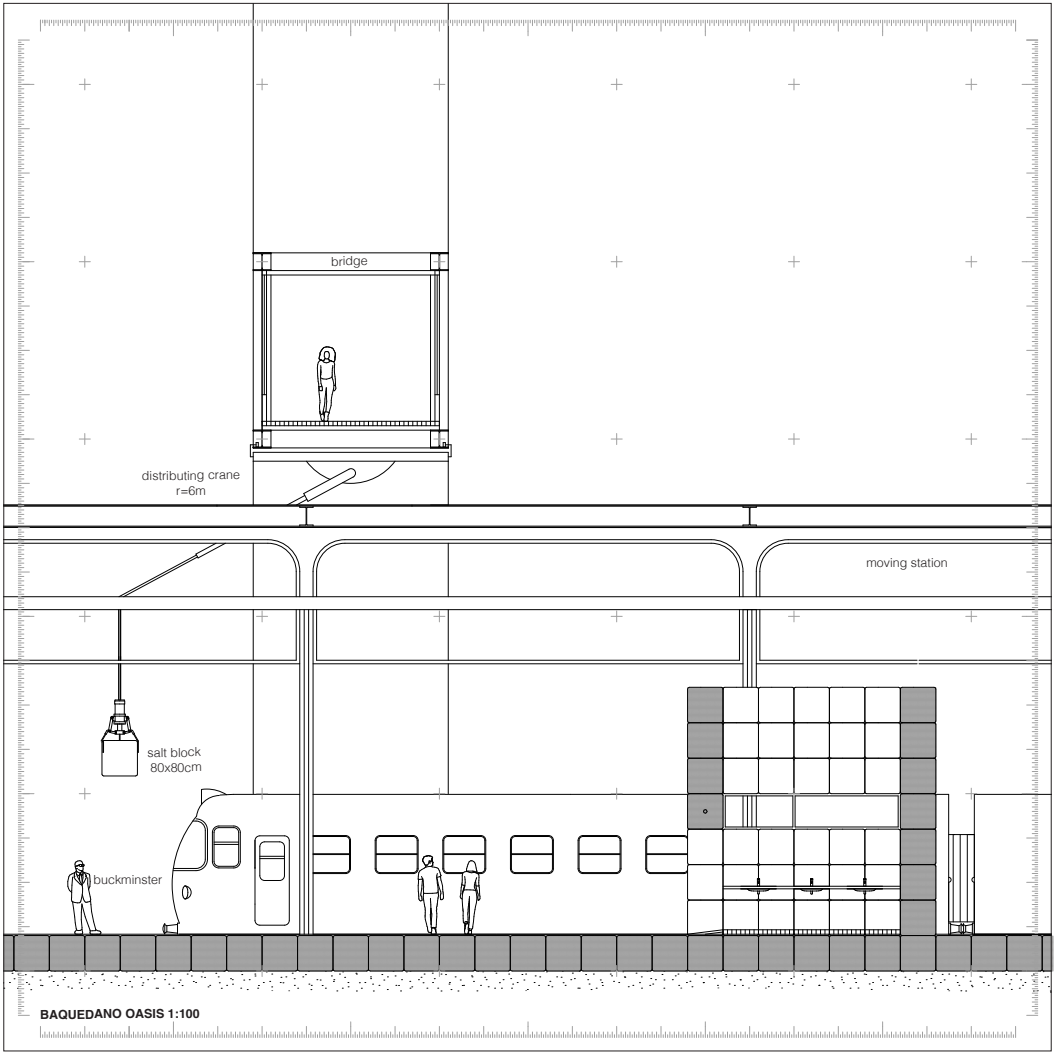




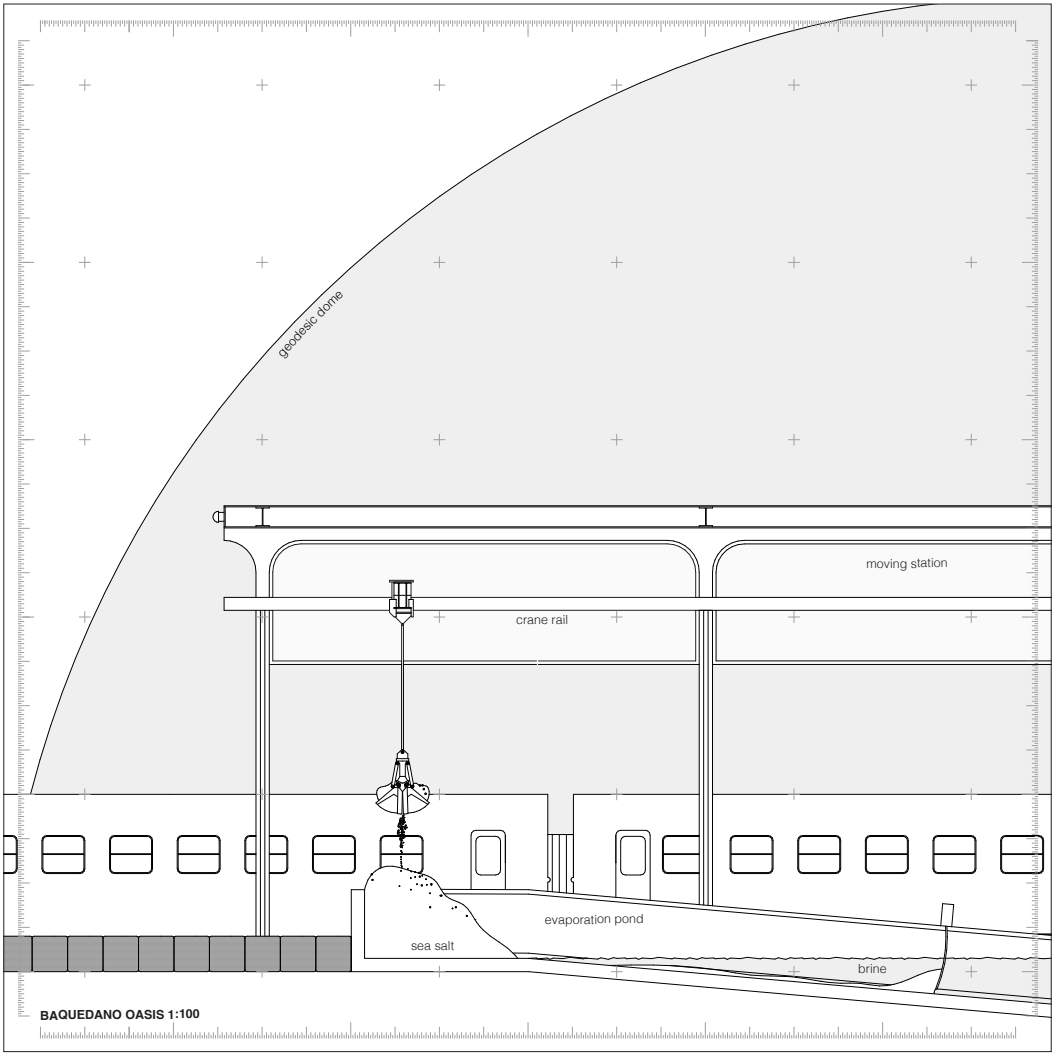
Zoom-In

plans and section
Baquedano Oasis

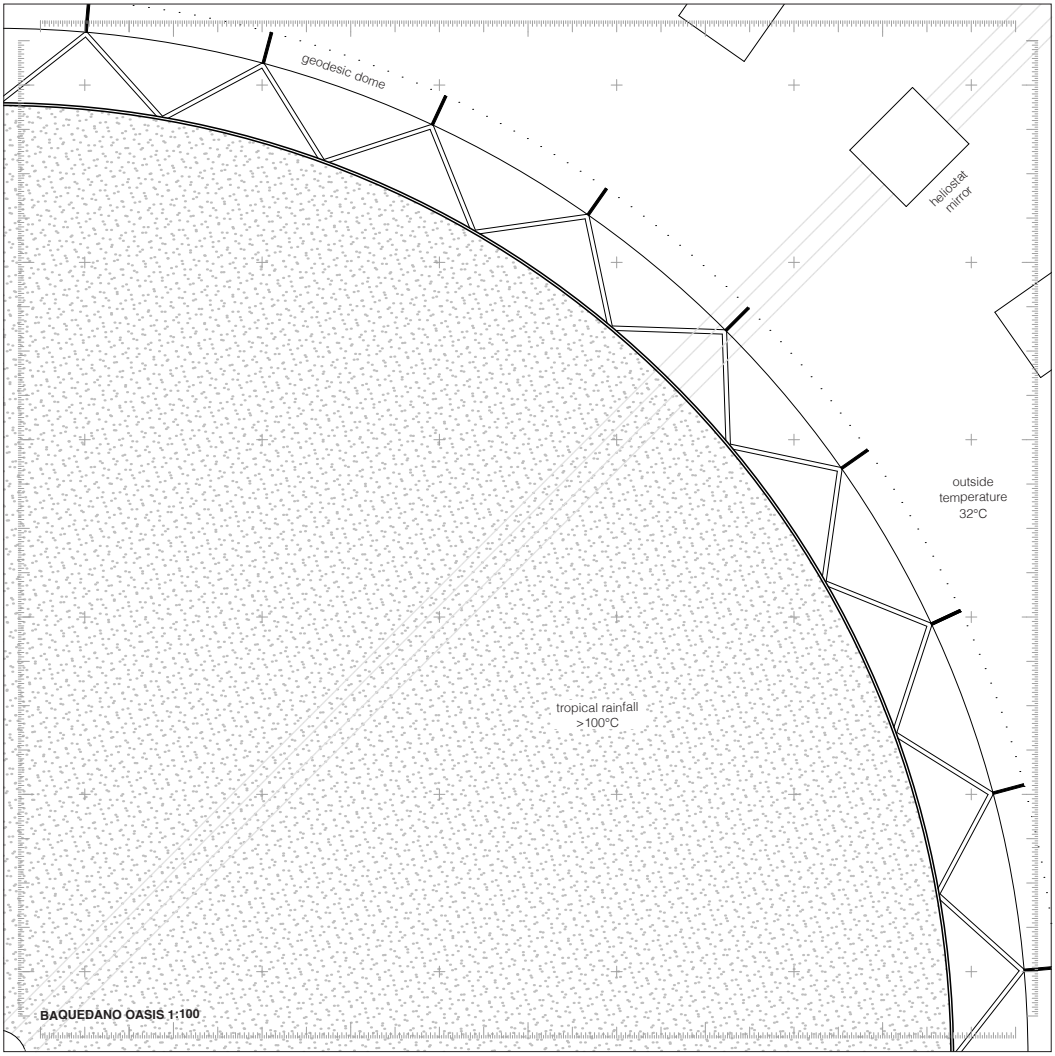




Platform of salt blocks, moving facorty, pedestrian bridge with distributing crane



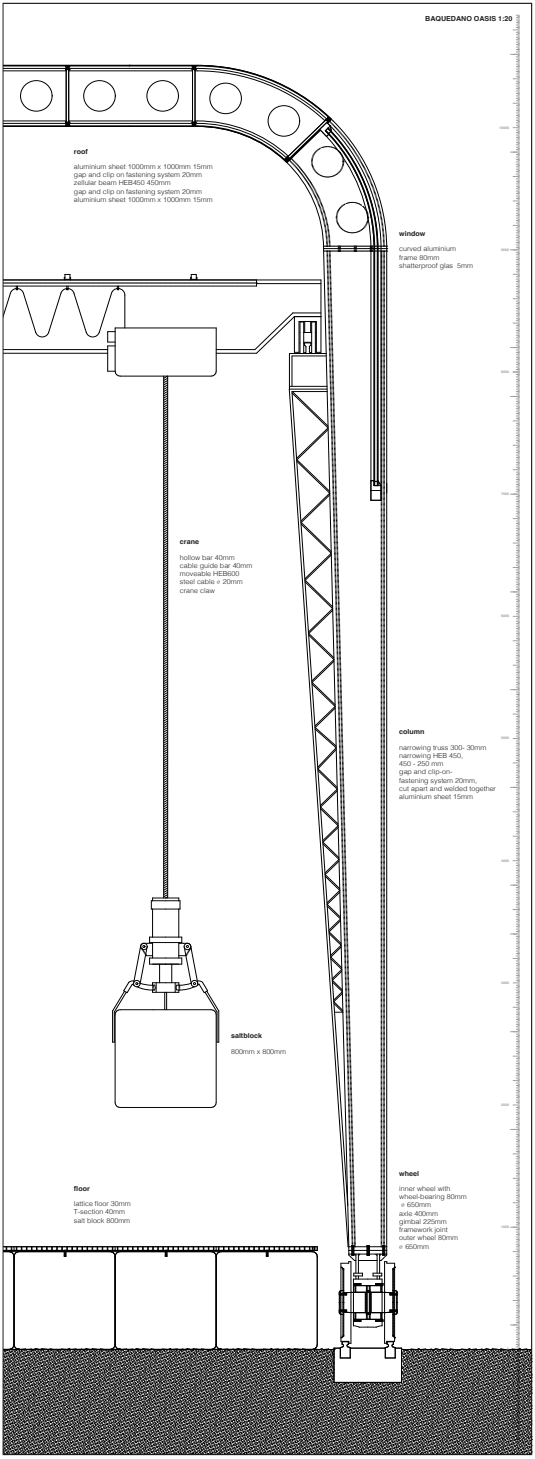
Platform of salt blocks, evaporation pond with brine processing, and geodesic dome in the back



Geodesic dome seperates brine from (sea)water

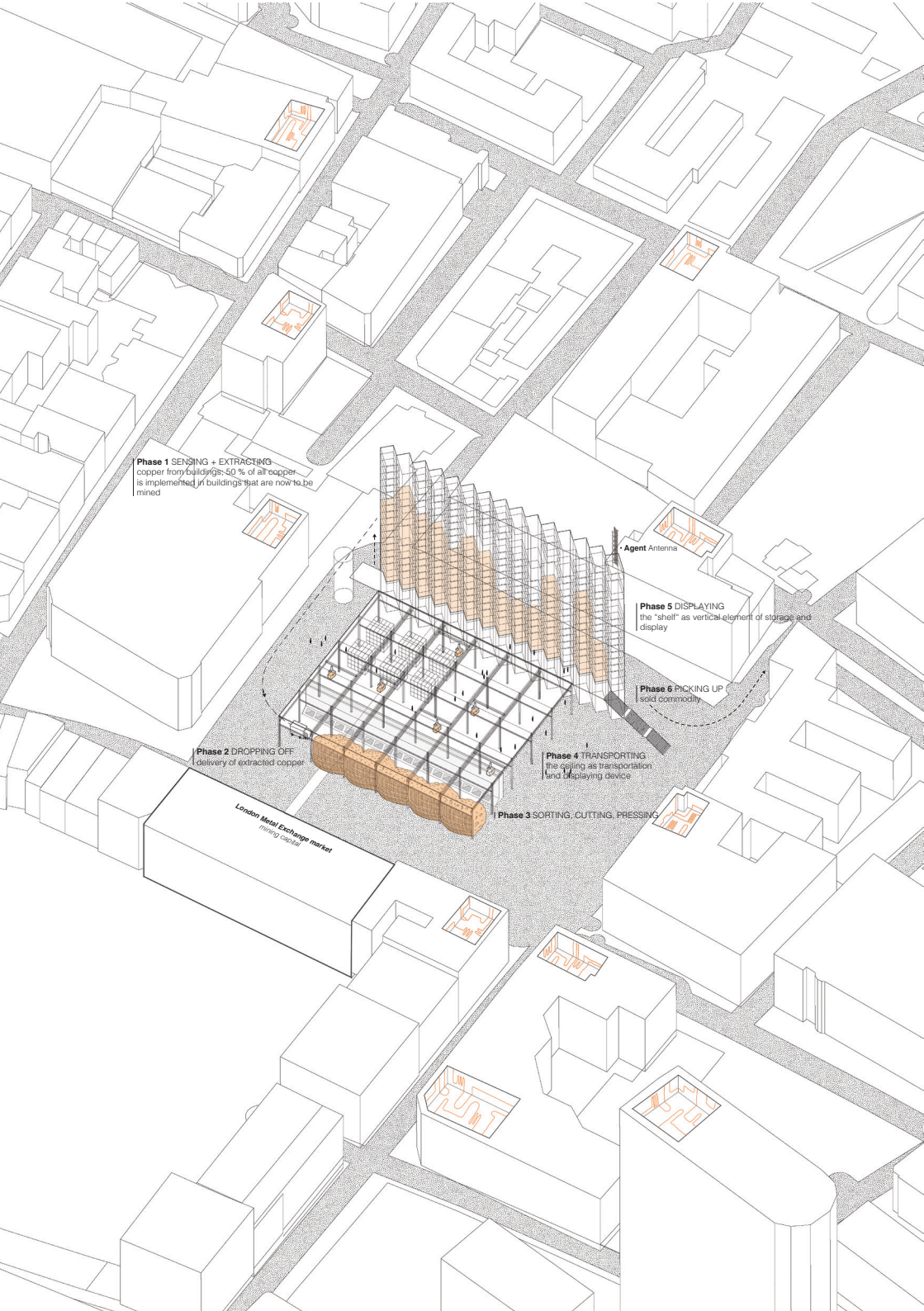
Detail

moving factory:
operating crane moving
salt blocks



THE LONDON MINE

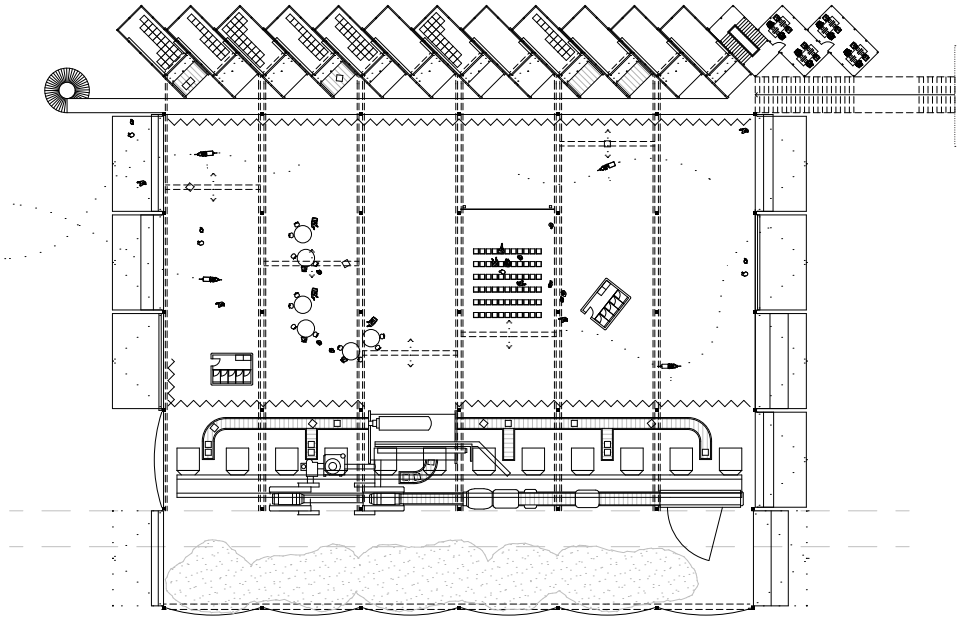
Plan Material Chapter III

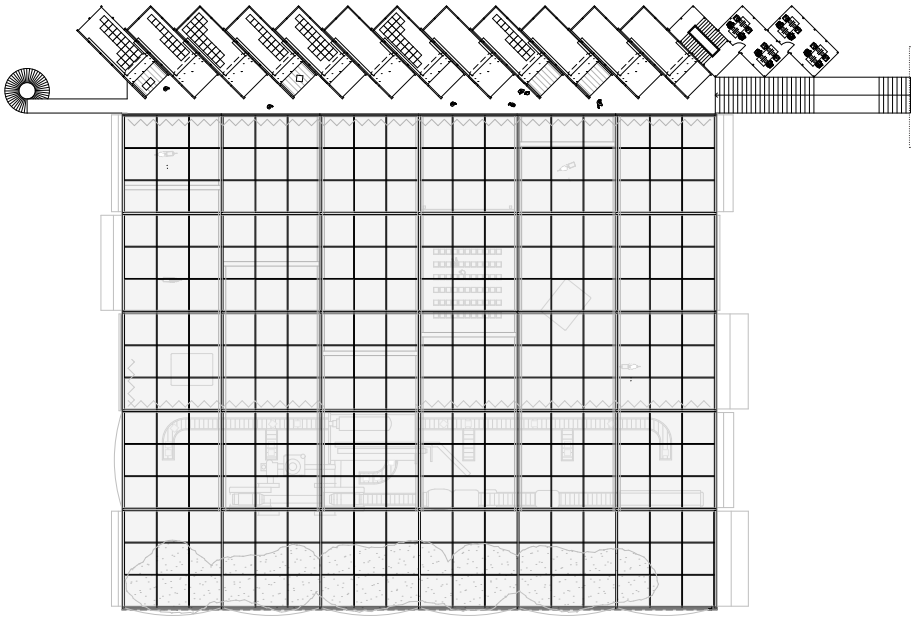

Phase 1 SENSING + EXTRACTING
copper from buildings: 50 % of all copper is implemented in buildings that are now to be mined
Agent Antenna
Phase 5 DISPLAYING
the "shelf" as vertical element of storage and display
Phase 6 PICKING UP
sold commodity
Phase 2 DROPPING OFF
delivery of extracted copper
Phase 4 TRANSPORTING
the ceiling as transportation and displaying device
Phase 3 SORTING, CUTTING, PRESSING
London Metal Exchange market
mining capital

Floor Plan

groundfloor and
first floor London Mine

0 5 10 25

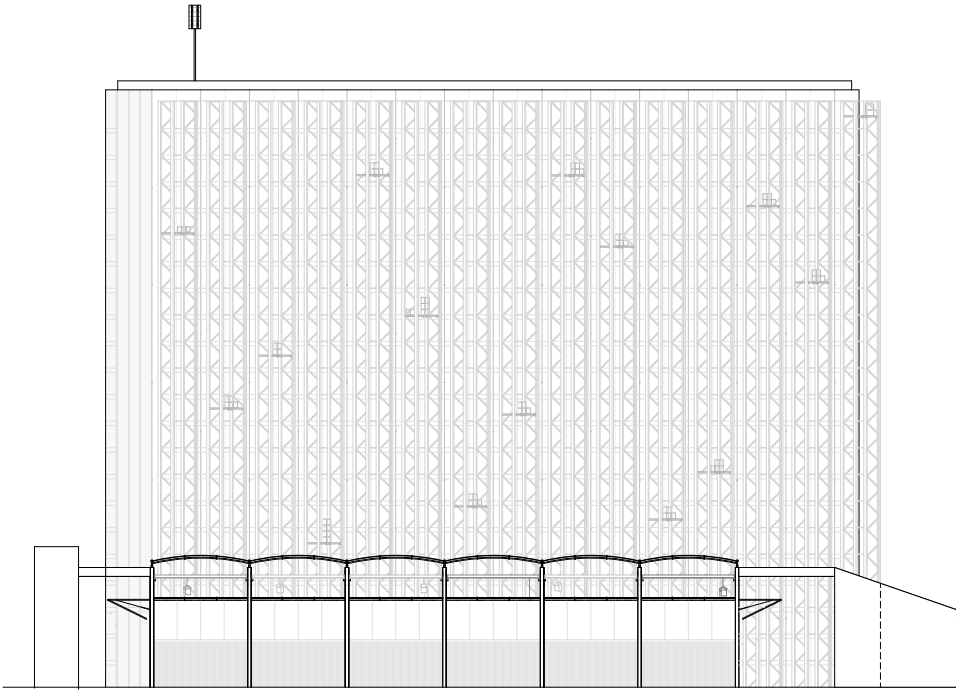


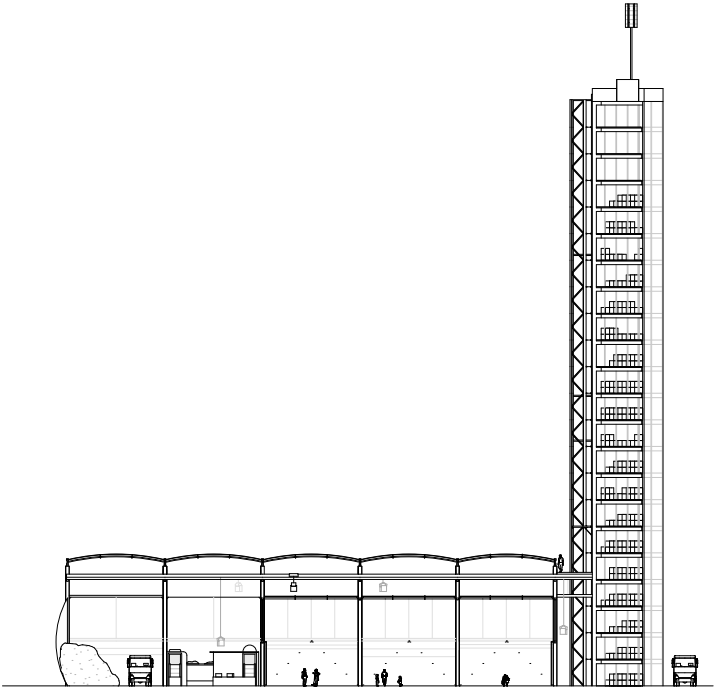


Section

longitudinal and cross section
London Mine

0 5 10 25

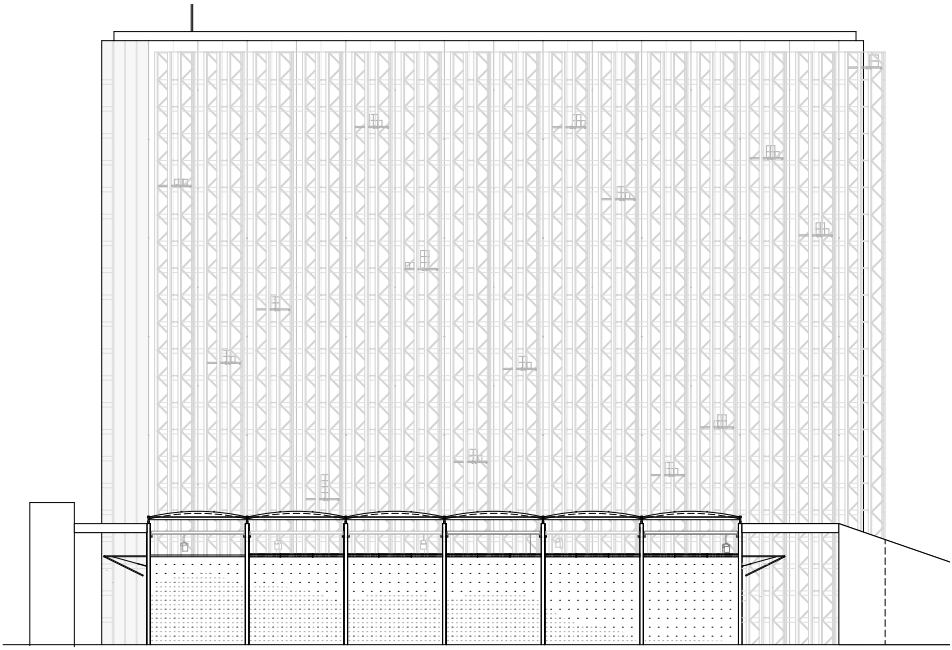


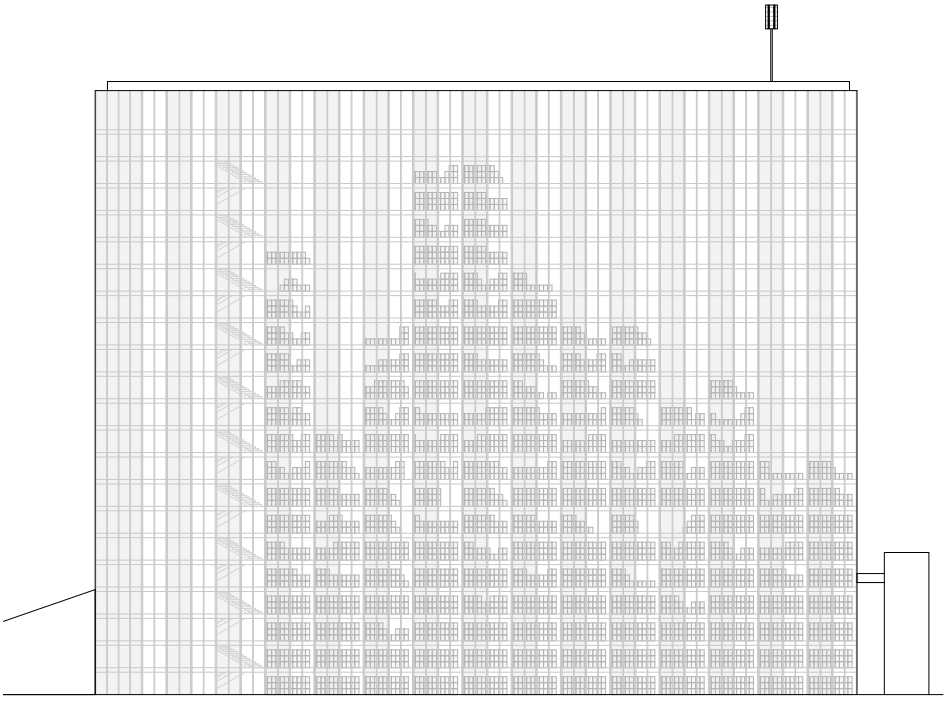


Elevation

west and east elevation
London Mine

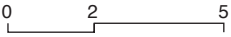
0 5 10 25

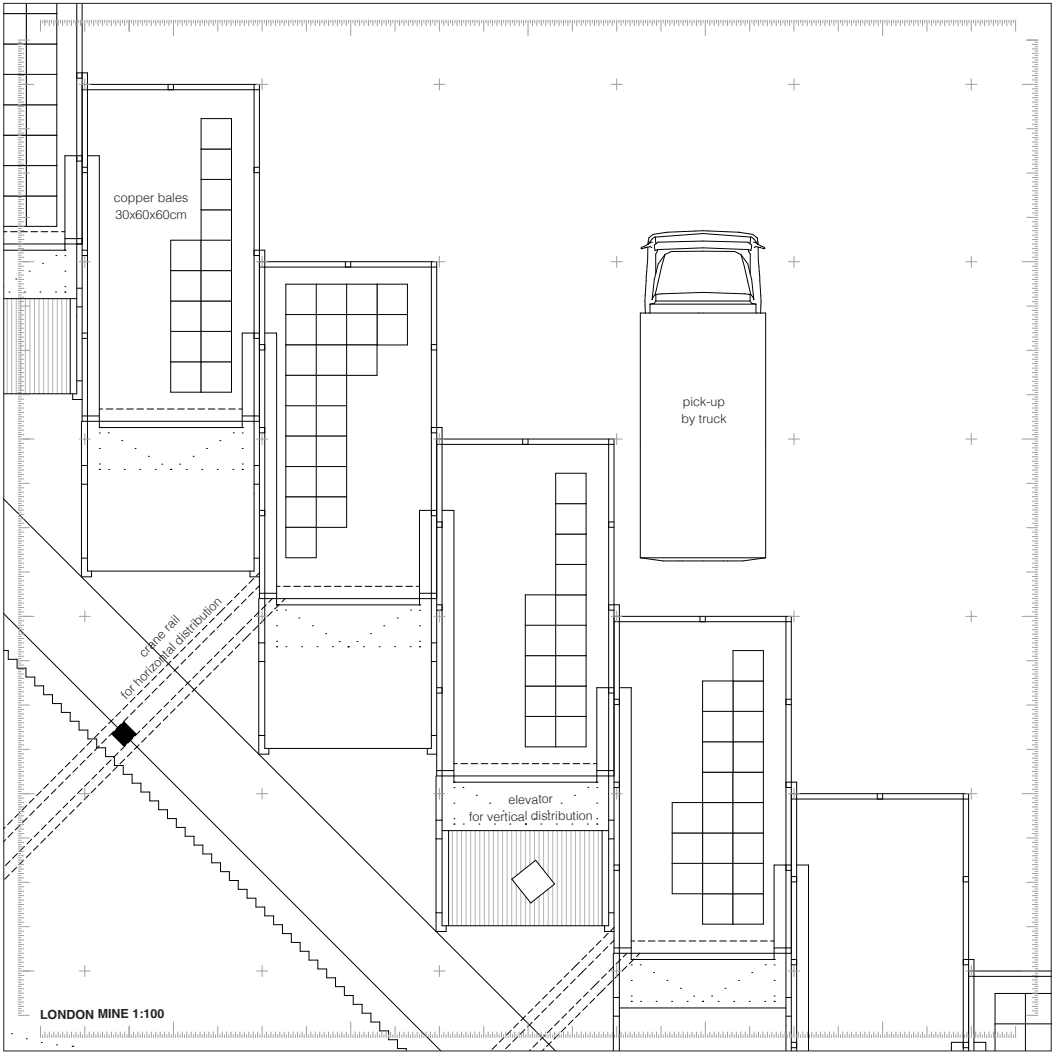




Zoom-In

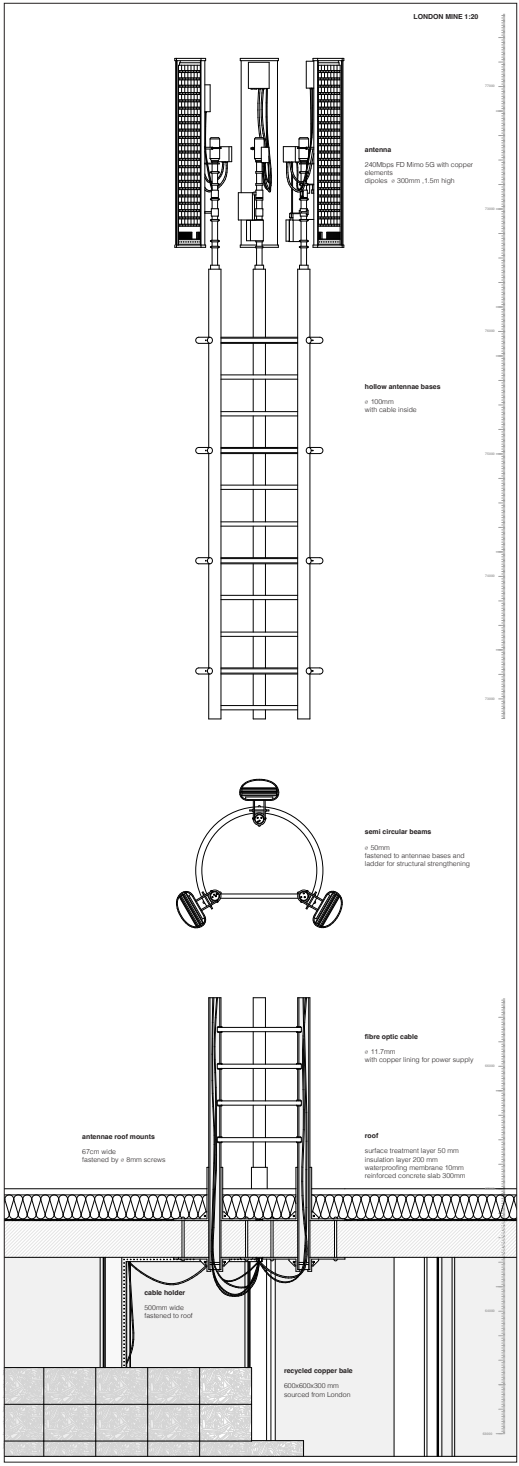
plan copper balepick up
London Mine




copper bales
30x60x60cm
pick-up
by truck
crane rail
for horizontal distribution
elevator
for vertical distribution
LONDON MINE 1:100

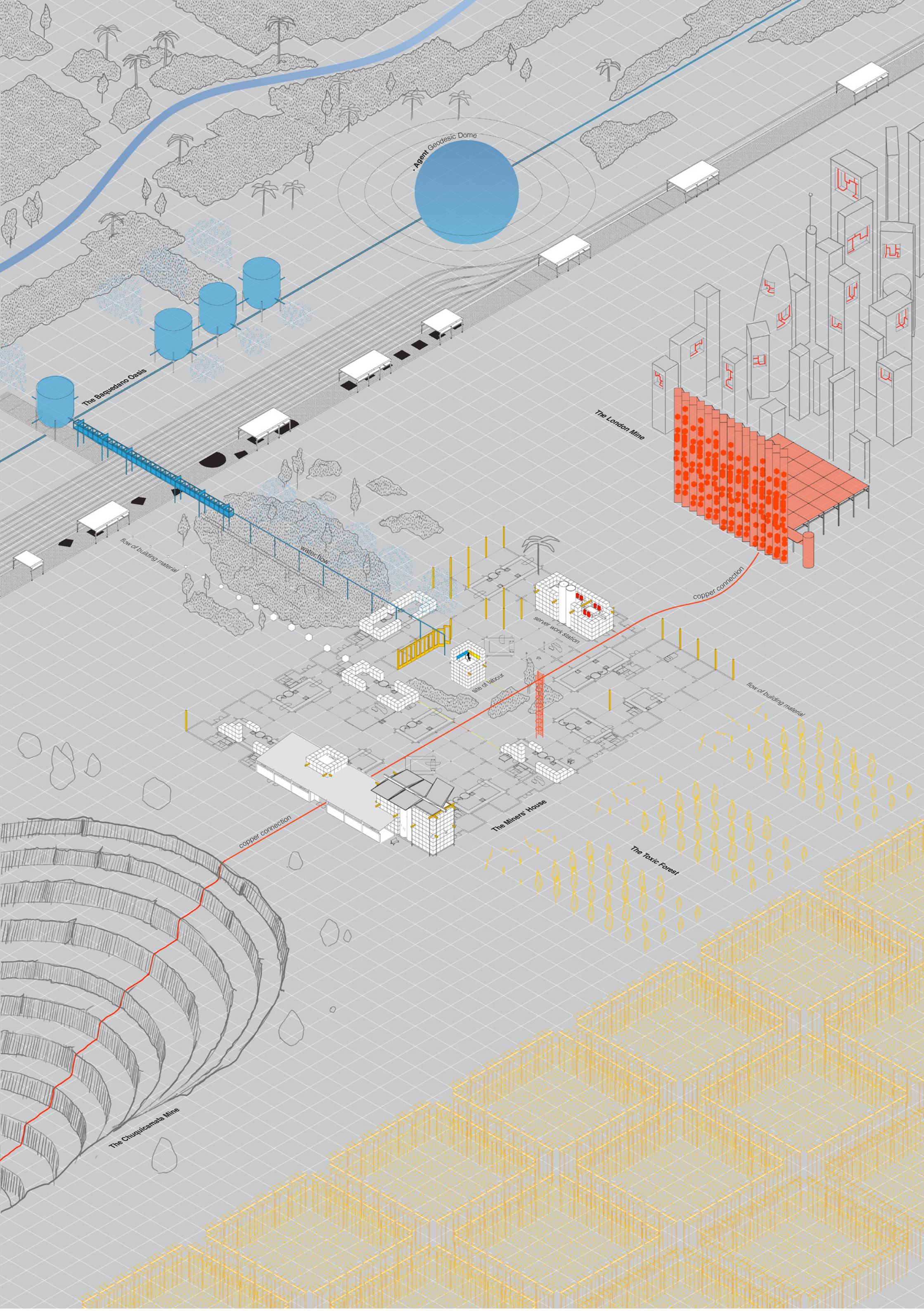
Detail

antenna on London Mine,
from copper scrap to
communication technology



THE MINER‘S HOUSE

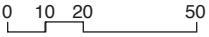
Plan Material Prologue and Epilogue



Agent Geodesic Dome
The Baquedano Oasis
The London Mine
flow of building material
water flow
copper connection
server work station
site of labour
flow of building material
The Miners' House
The Toxic Forest
copper connection
The Chuquicamata Mine

Site Plan

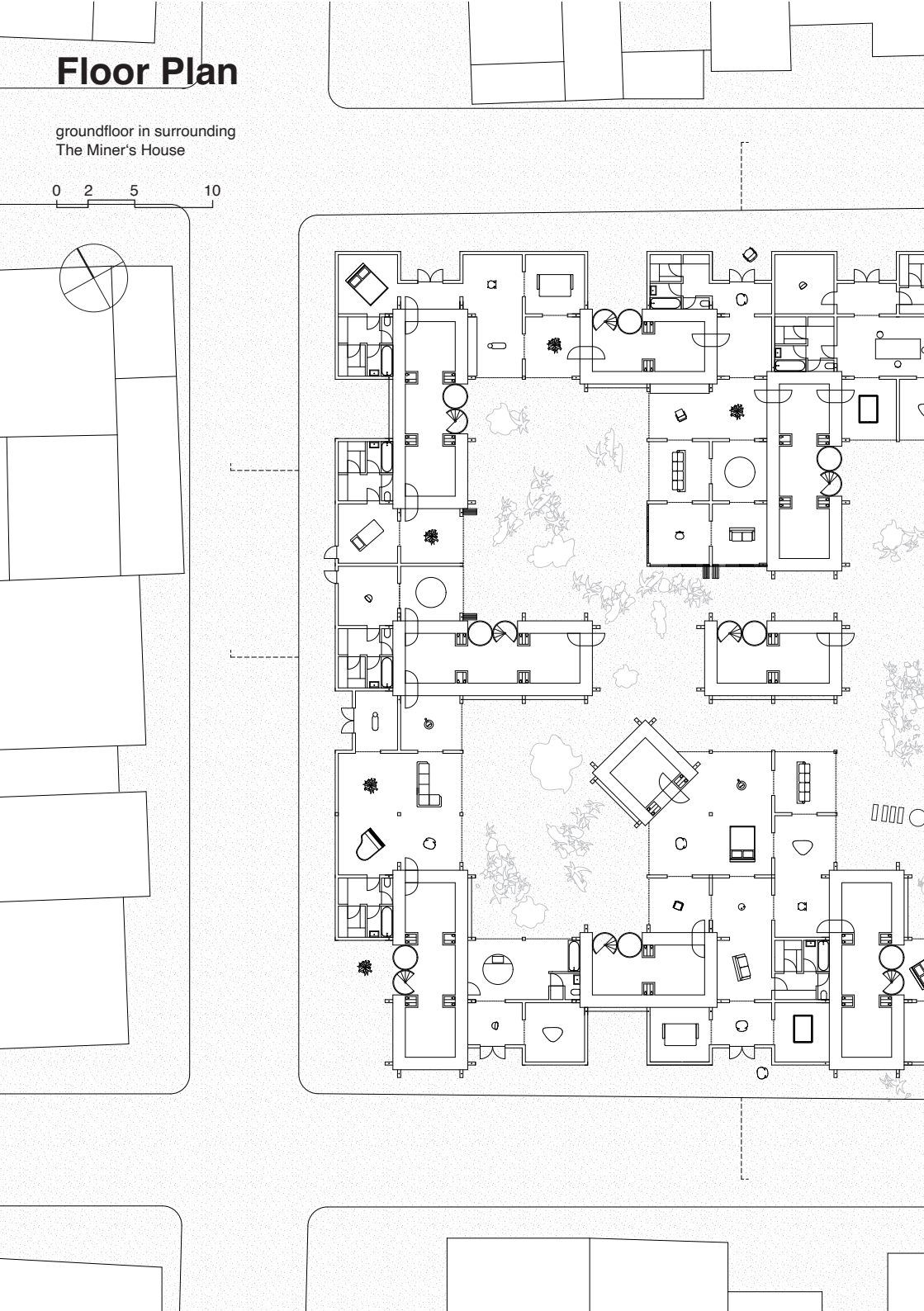
groundfloor in surrounding
The Miner's House

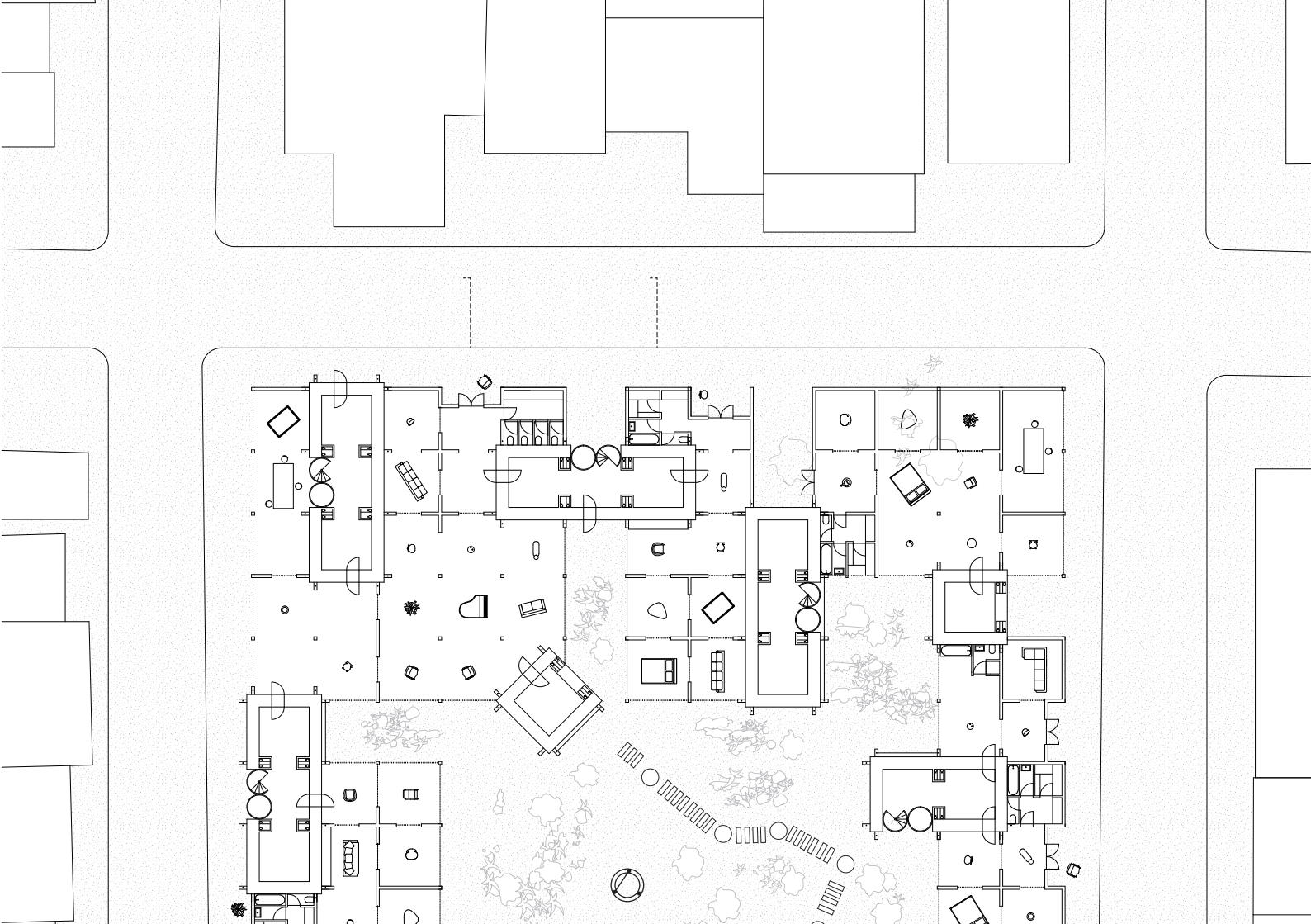


Floor Plan

groundfloor in surrounding
The Miner's House

0 2 5 10

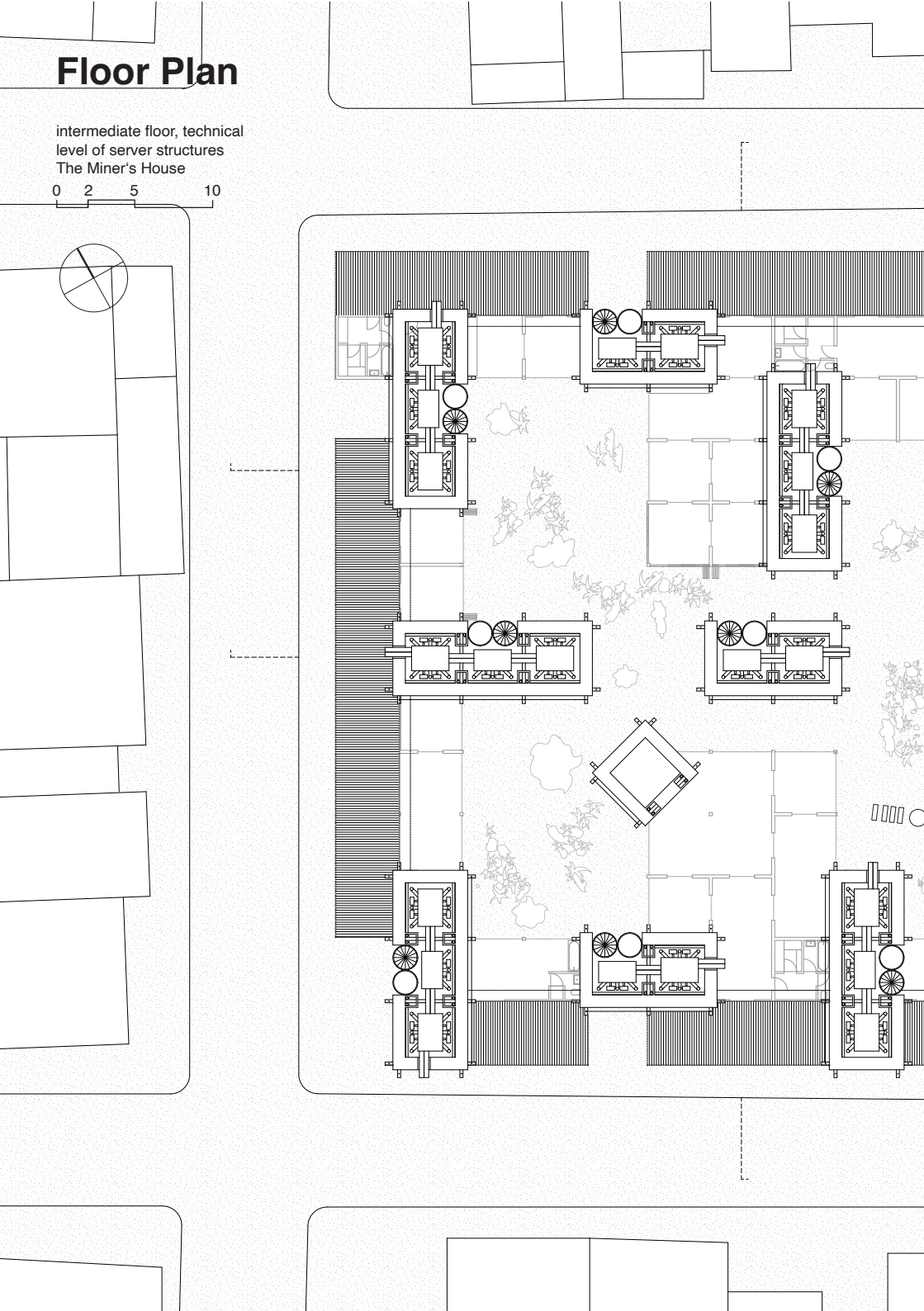


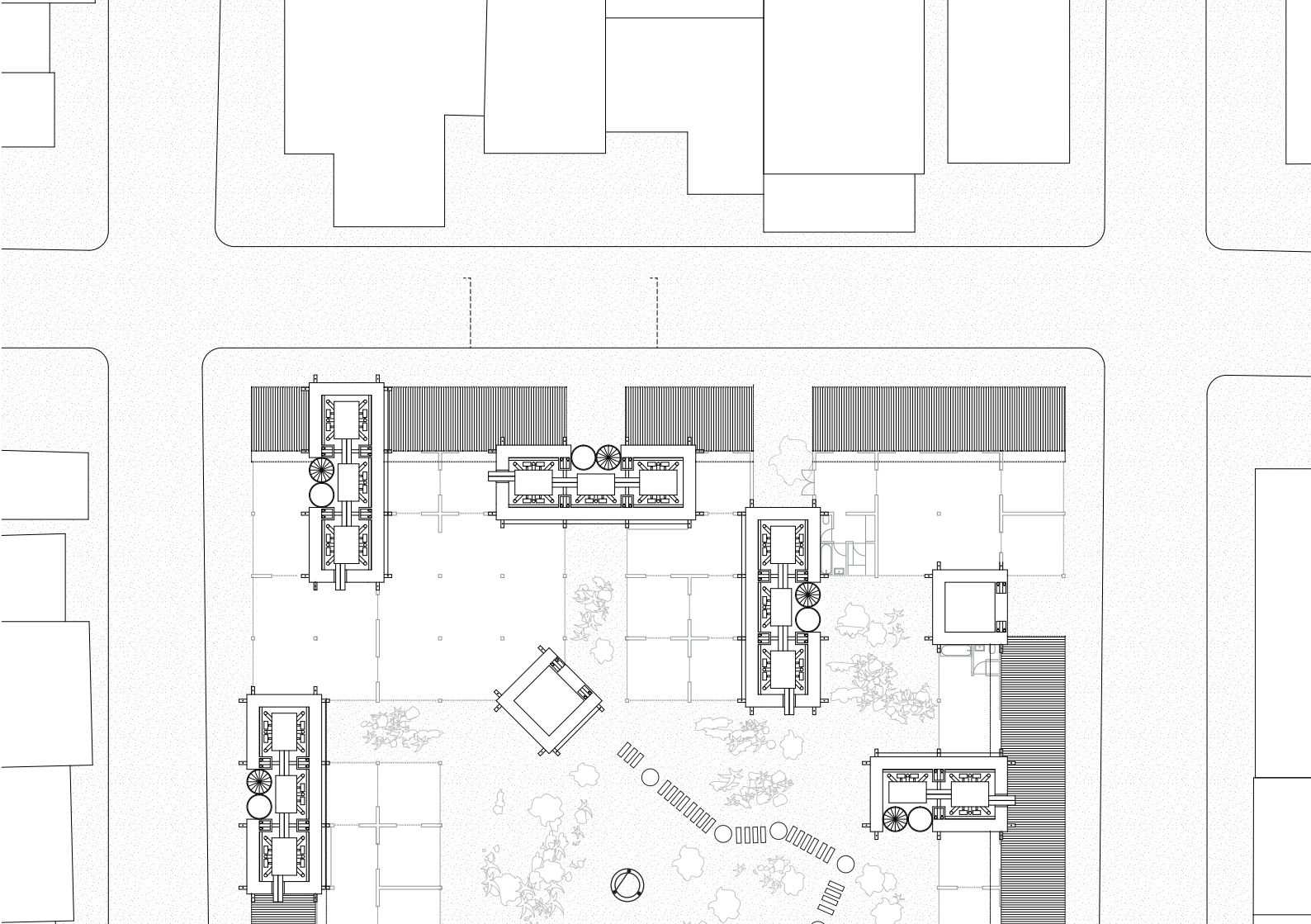


Floor Plan

intermediate floor, technical
level of server structures
The Miner's House

0 2 5 10

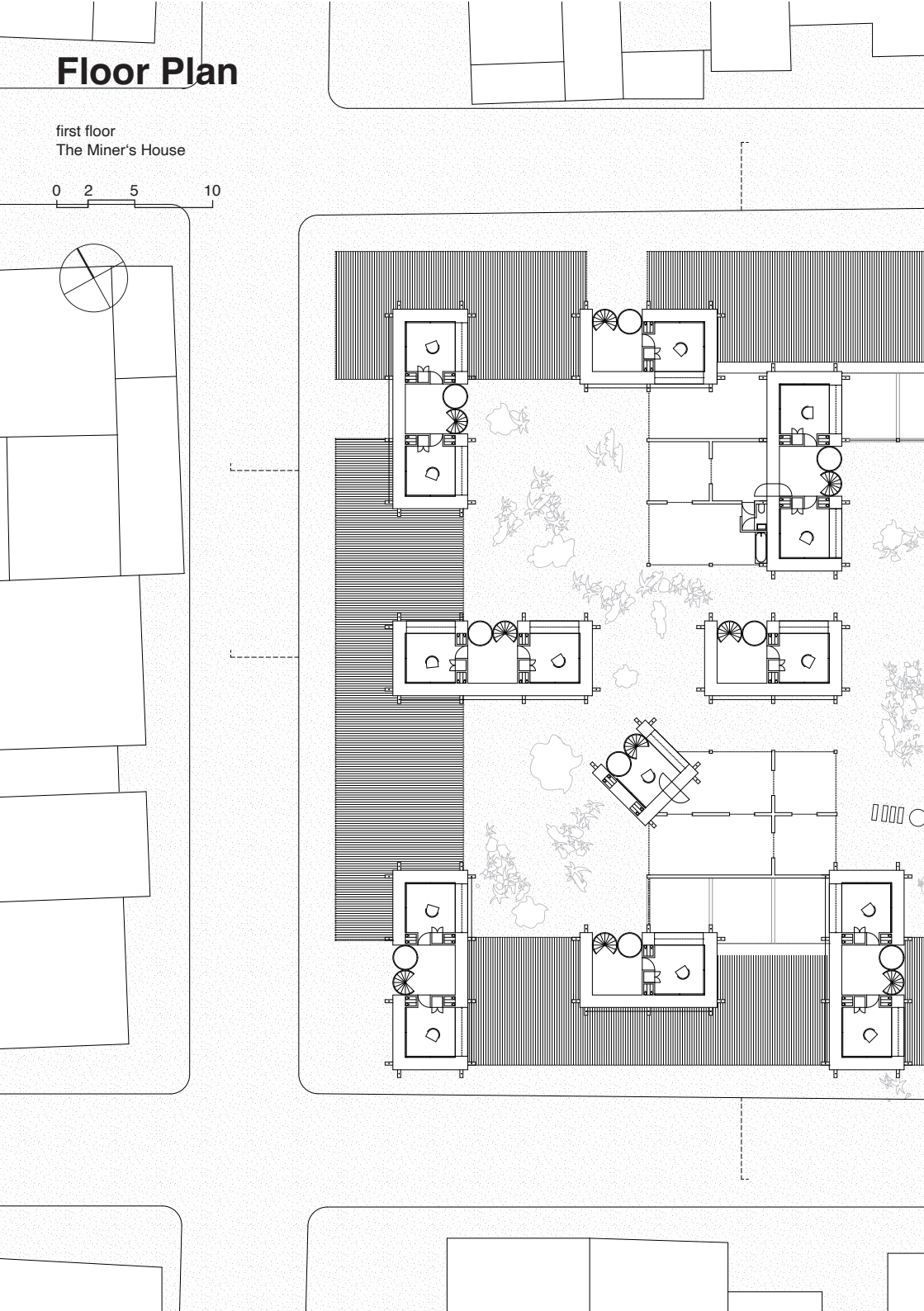


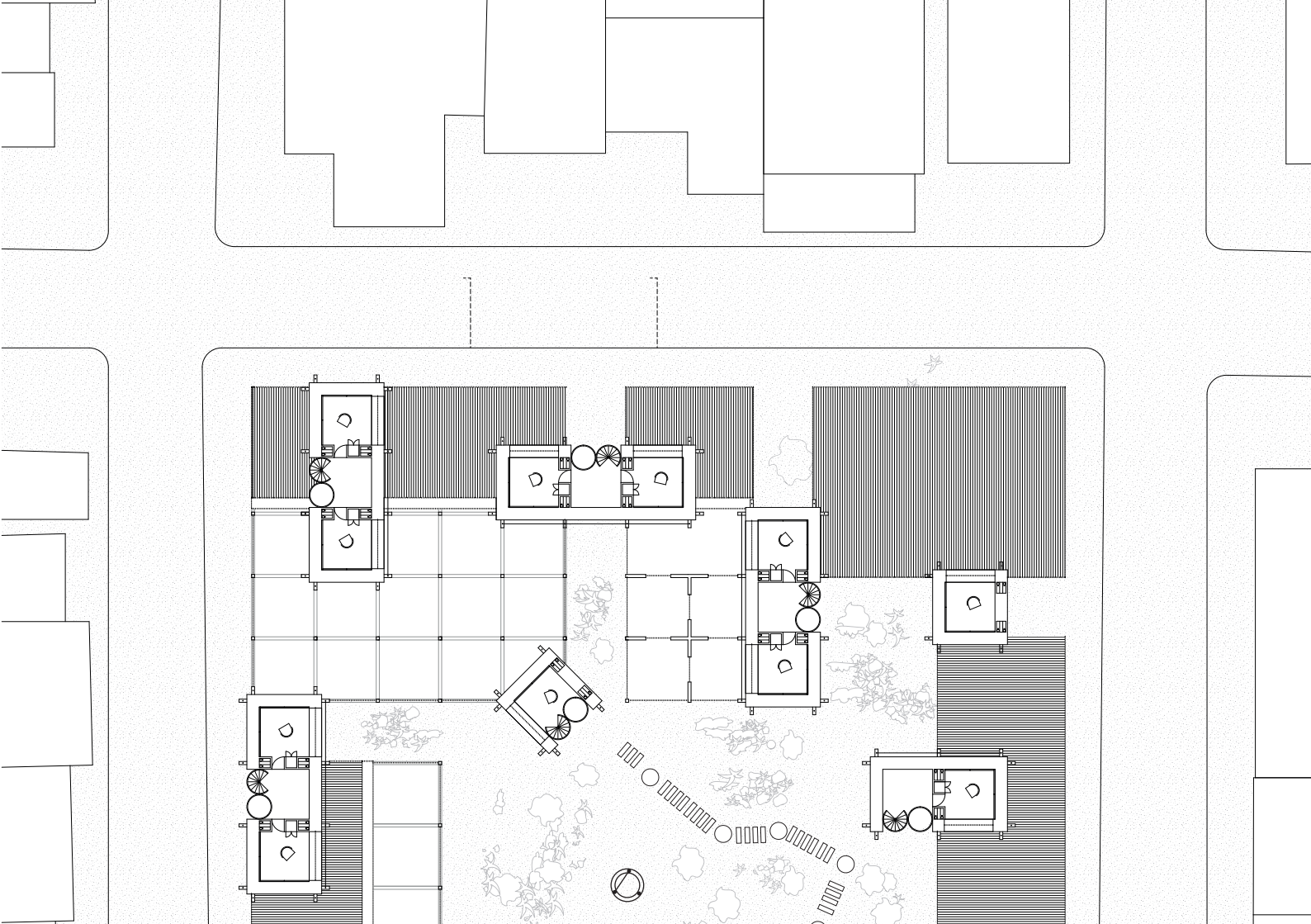


Floor Plan

first floor
The Miner's House

0 2 5 10

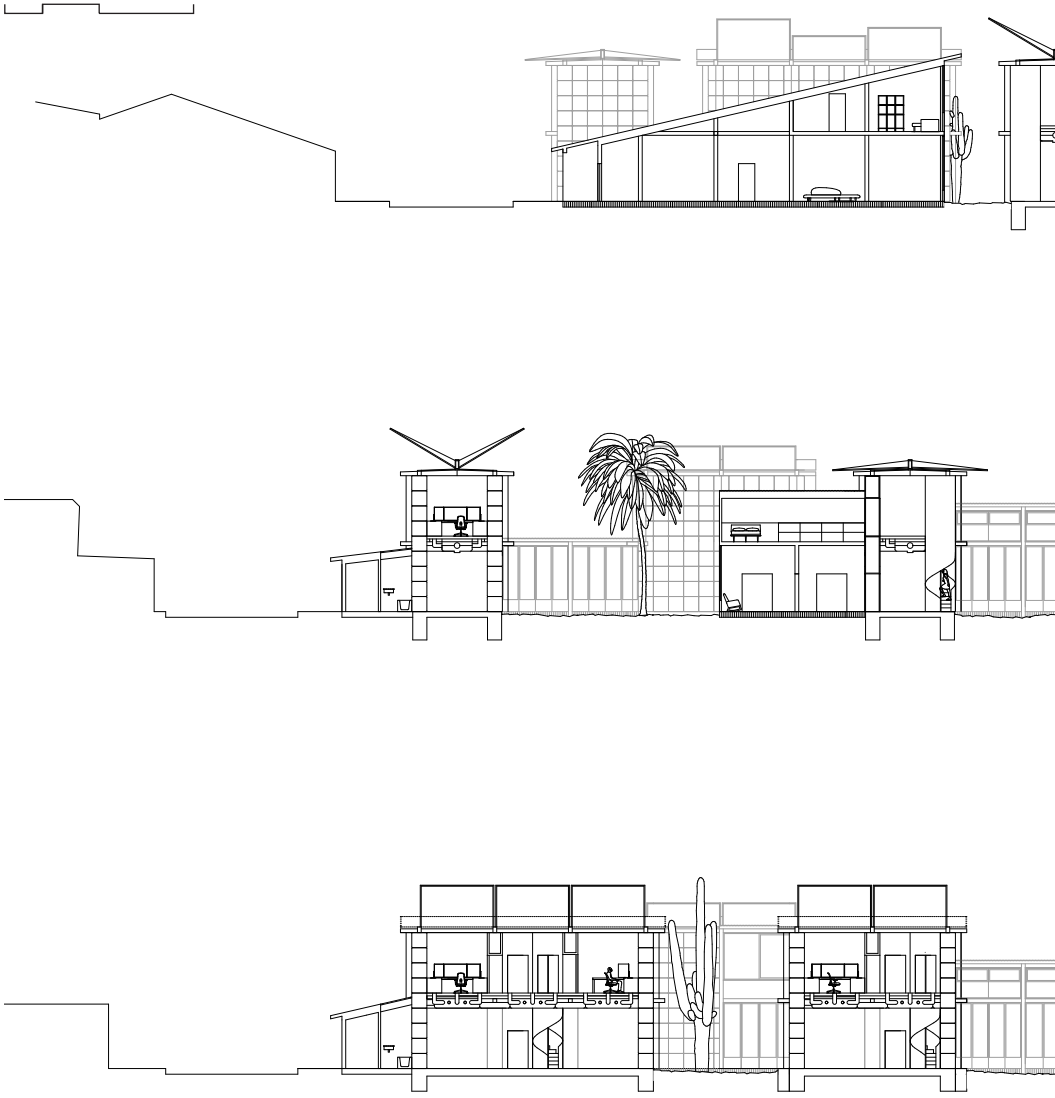


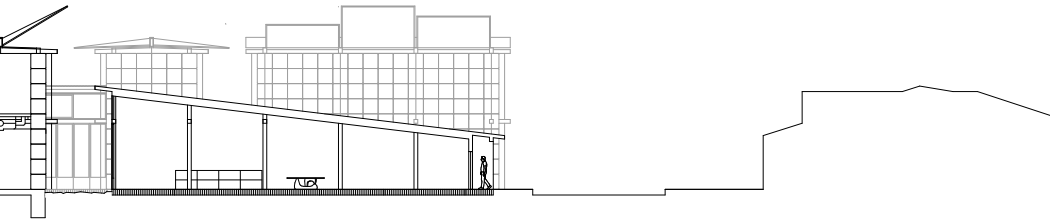


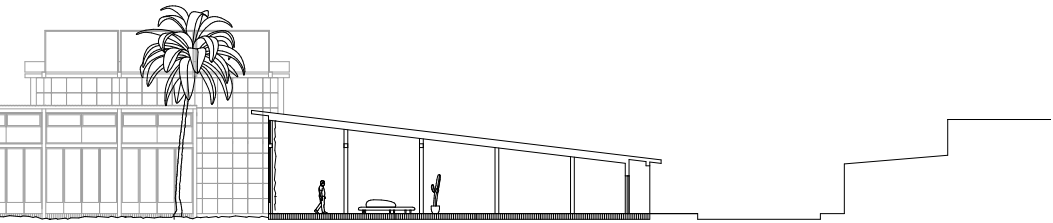
Section

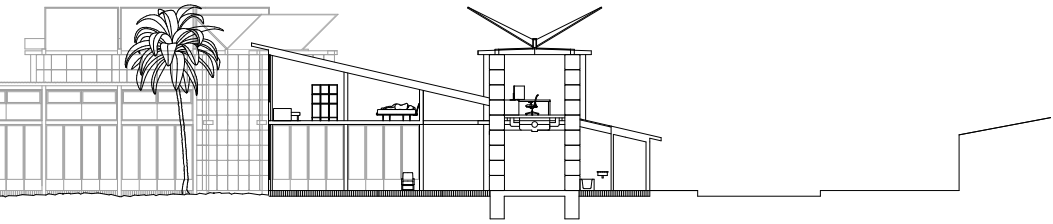
longitudinal and cross section
The Miner's House

0 2 5 10





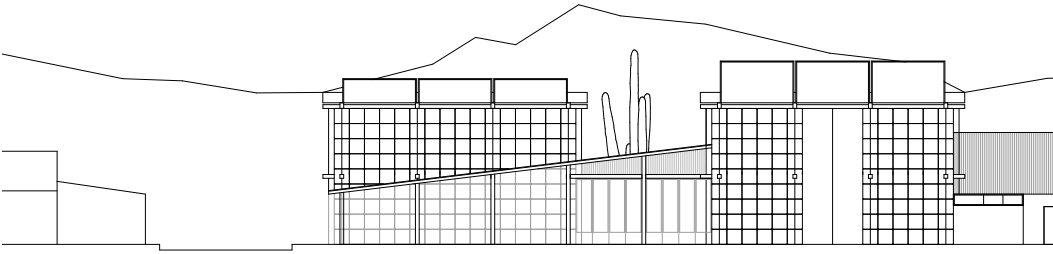


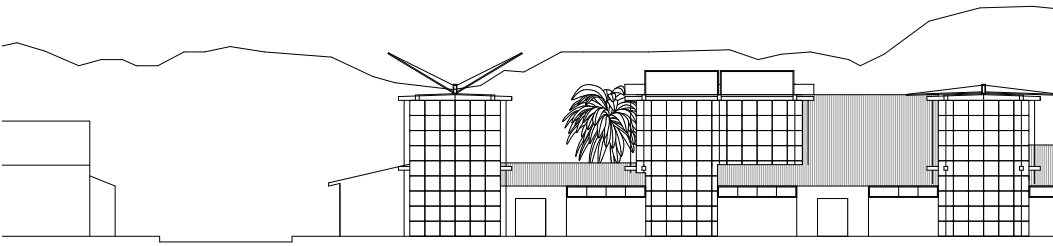


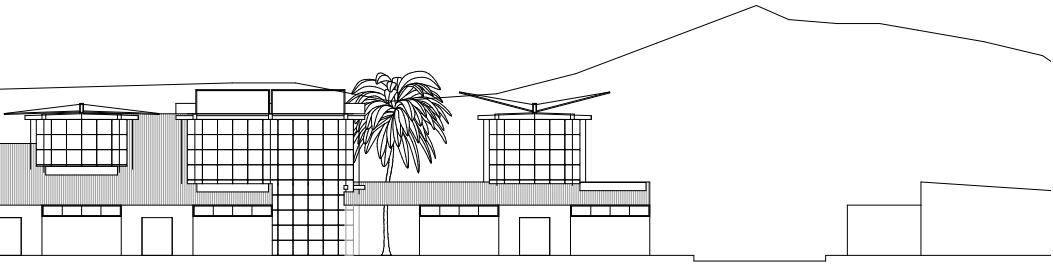
Section

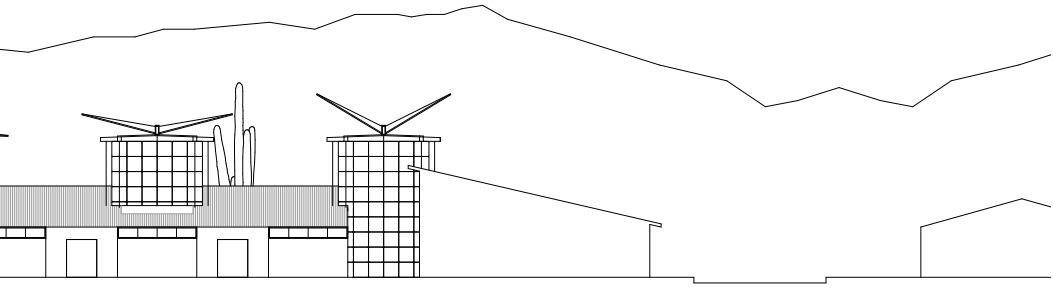
longitudinal and cross section
The Miner's House

0 2 5 10



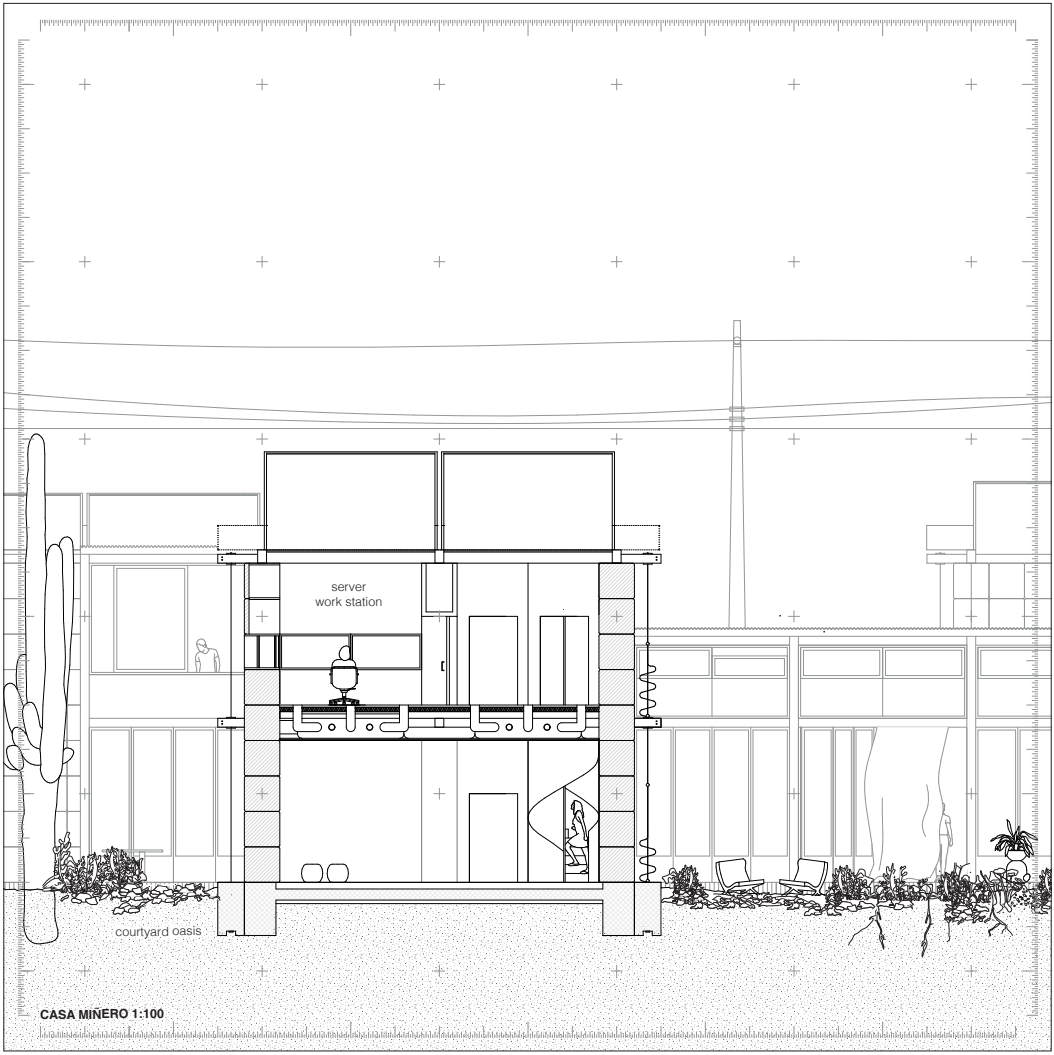




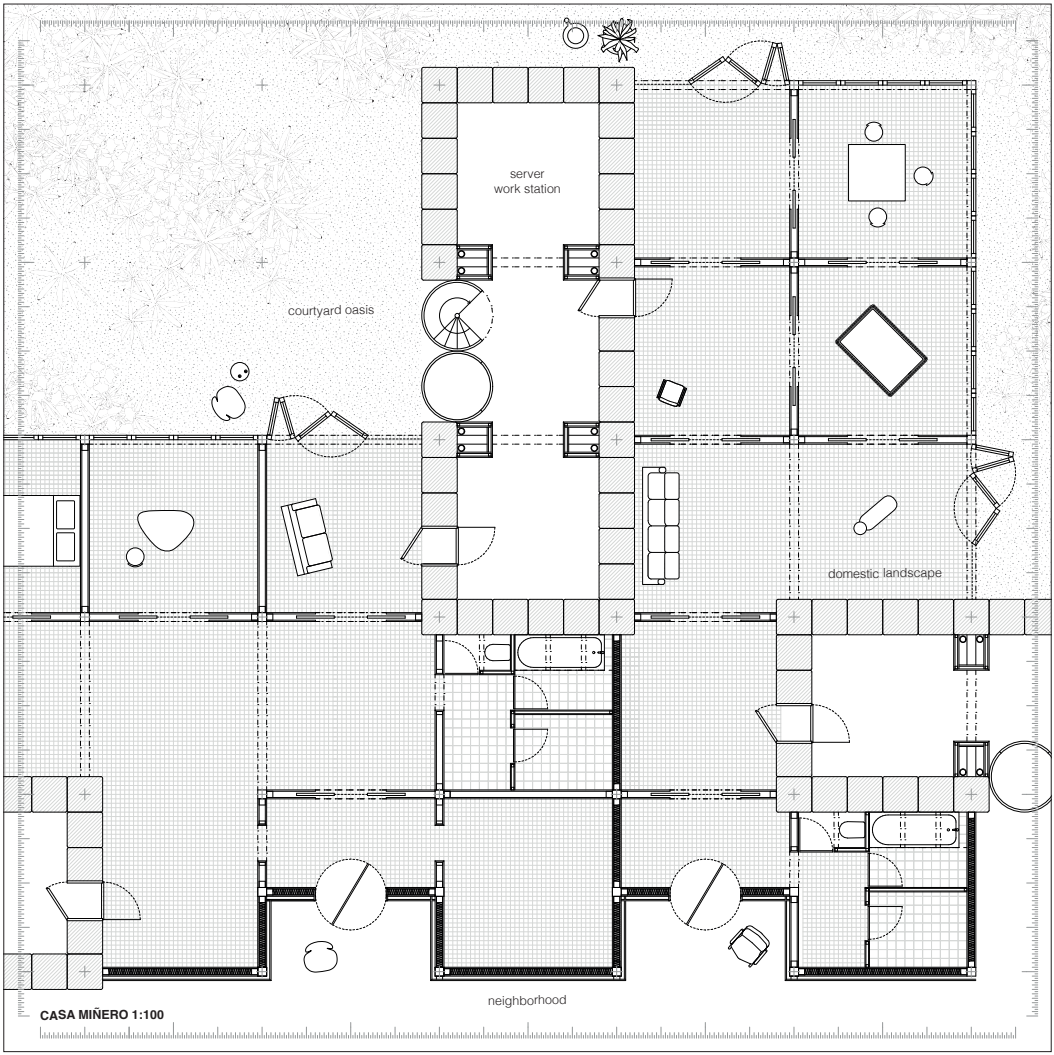


Zoom-In

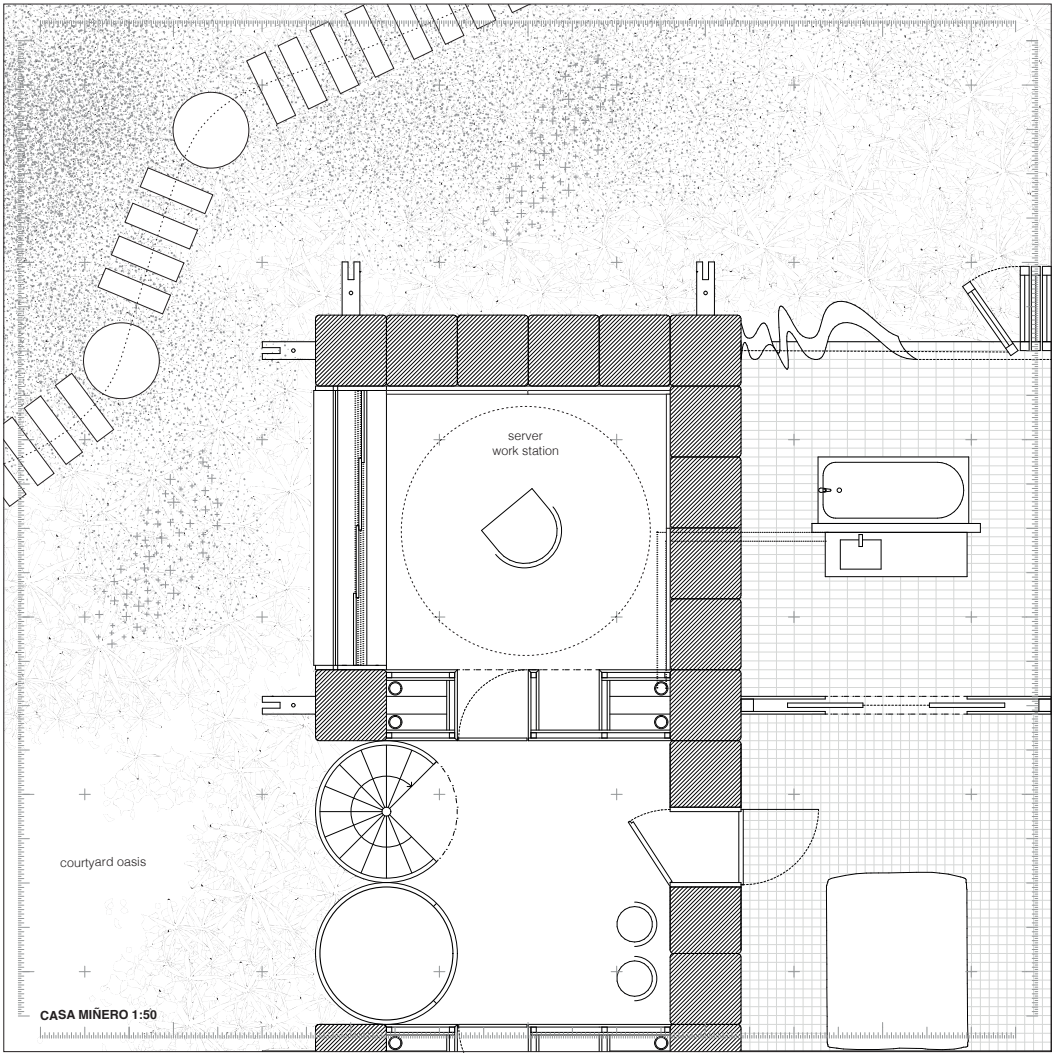
section and plans
The Miner's House



Server structure with miner's workstation, server as serving element for the surrounding floorplan



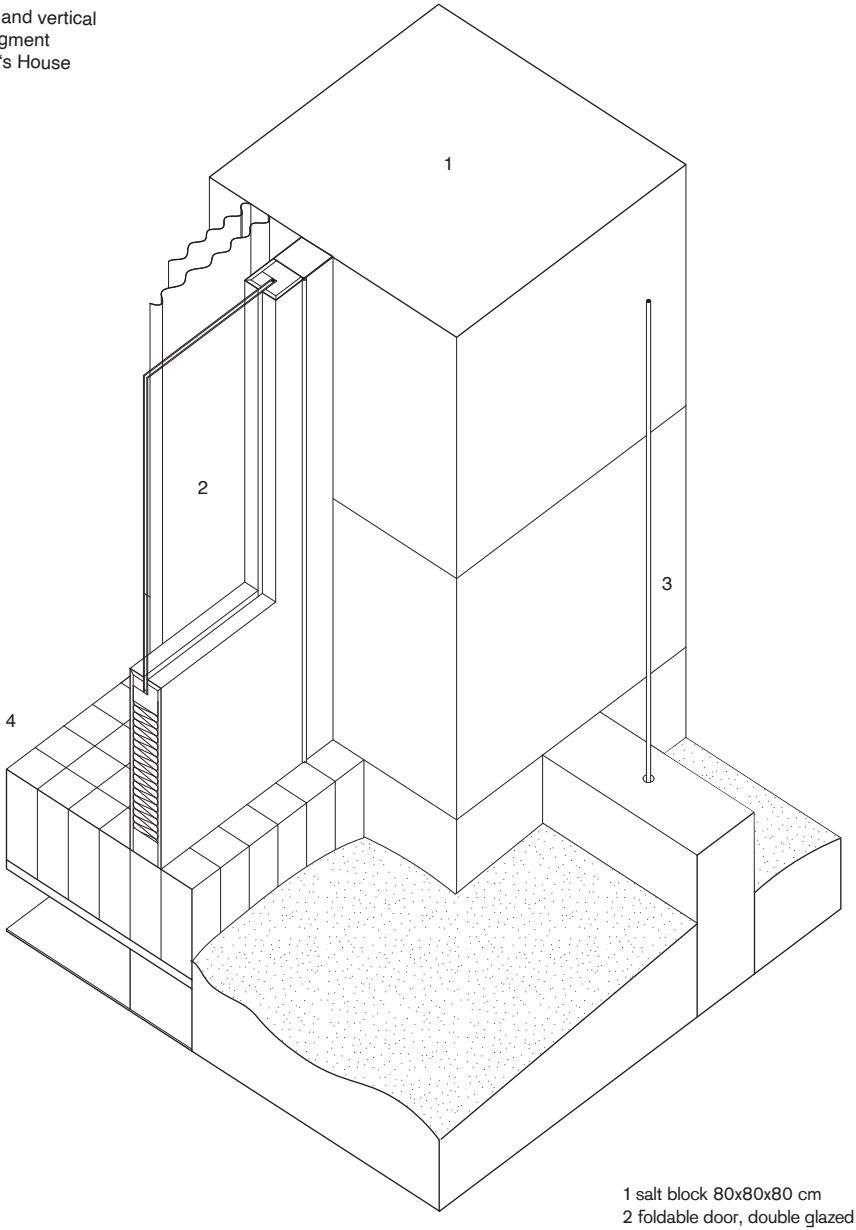
Domestic Landscape,
various possibilities of
inhabitation



Server structure, server
as serving element for the
surrounding floorplan

Facade Fragment

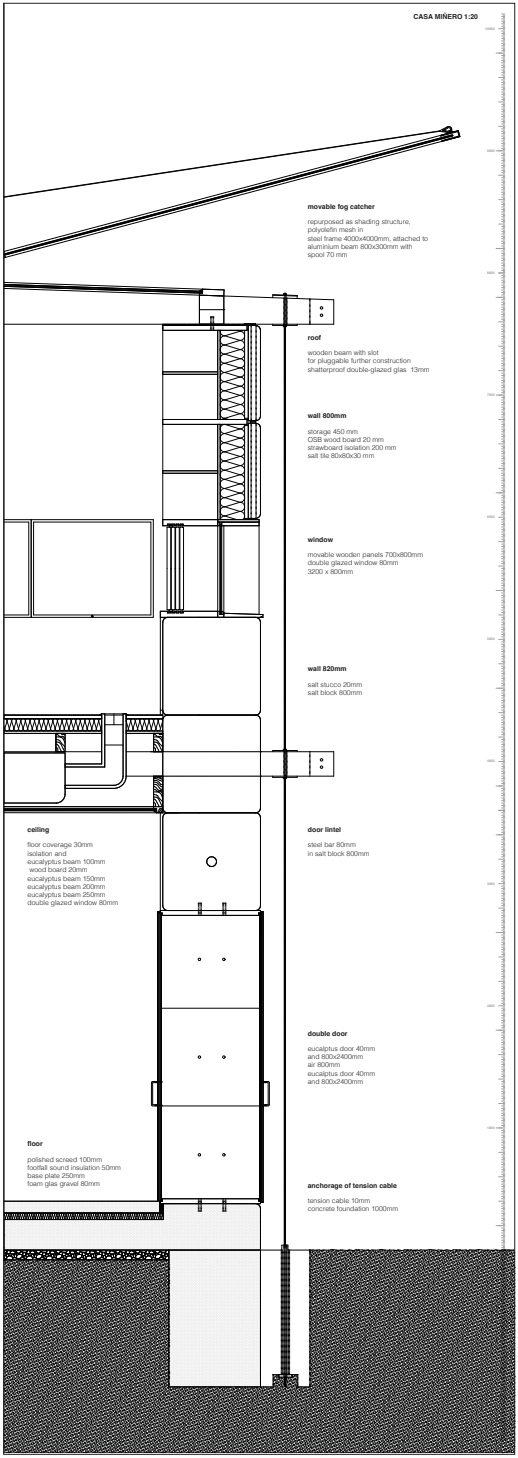
horizontal and vertical
facade fragment
The Miner's House



1 salt block 80x80x80 cm
2 foldable door, double glazed window 10cm, thermo curtain
3 tension cable 3cm
4 eucalyptus floor10x10x30cm, OSB 3cm, beam and enclosed air circulation, anti insect mat

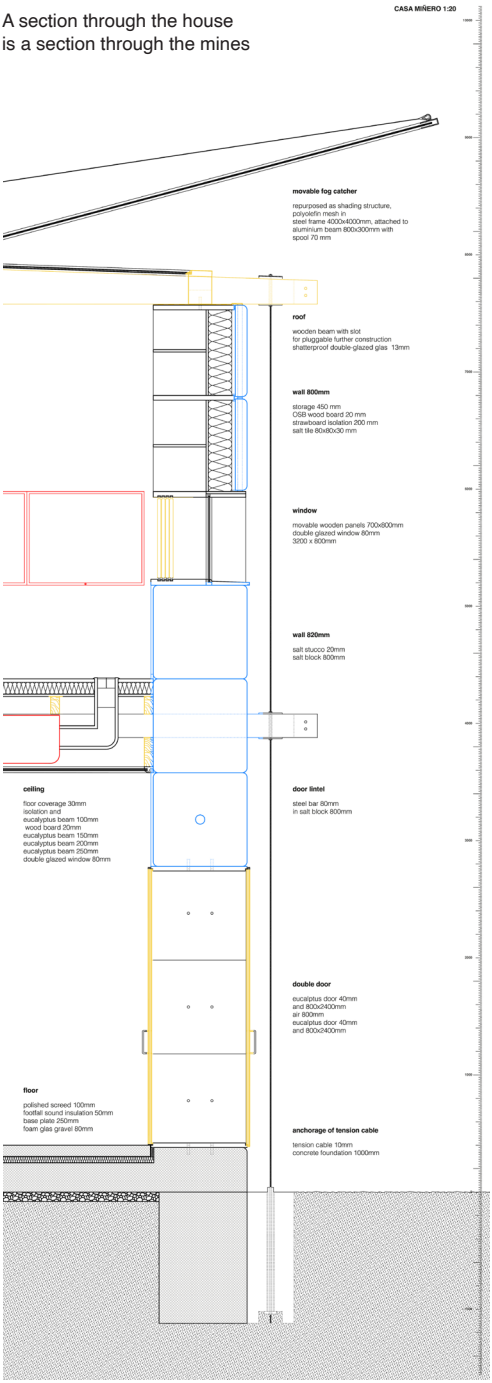
Detail

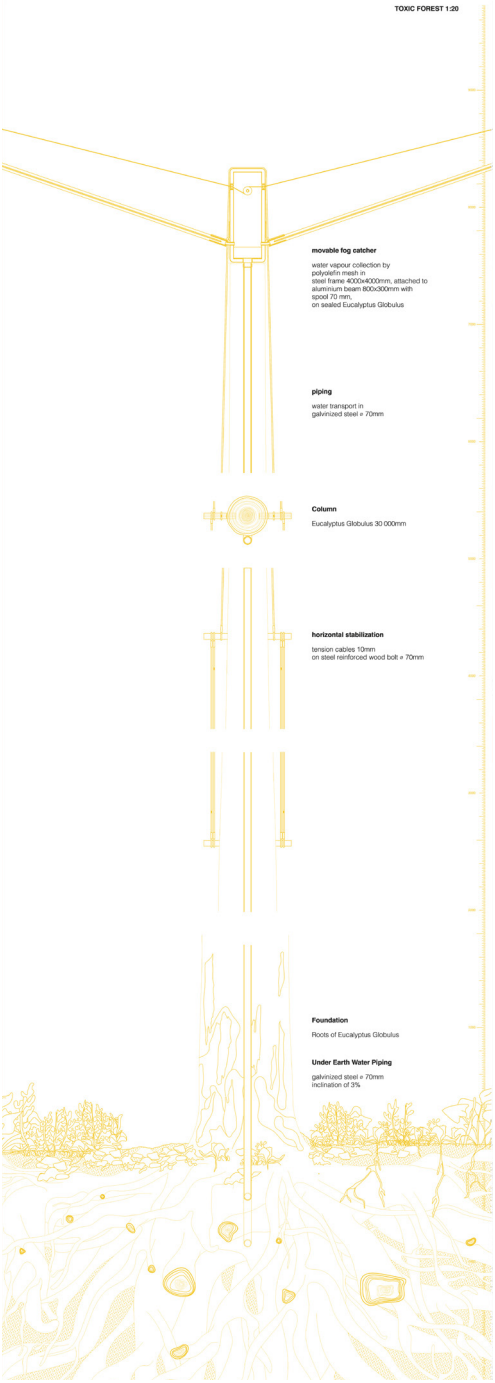
server with fog catcher (Toxic Forest), saltblocks (Baquedano Oasis) and copper network (London Mine)



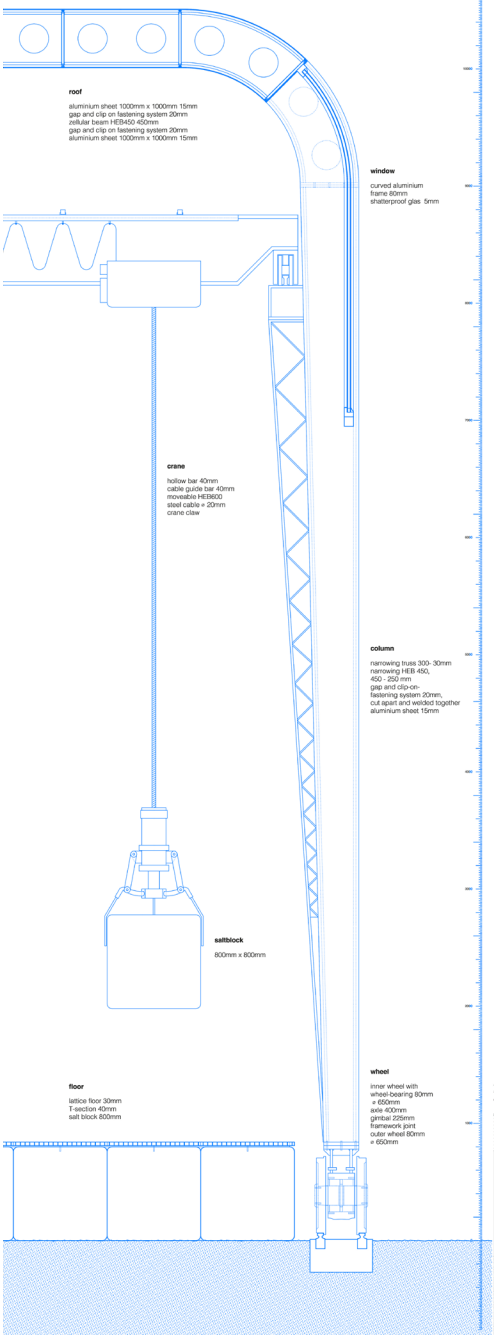
Detail

A section through the house
is a section through the mines





BAQUEDANO OASIS 1:20



roof

aluminium sheet 1000mm x 1000mm 15mm
gap and clip on fastening system 20mm
zellular beam HEB450 450mm
gap and clip on fastening system 20mm
aluminium sheet 1000mm x 1000mm 15mm

window

curved aluminium
frame 80mm
shatterproof glas 5mm

crane

hollow bar 40mm
cable guide bar 40mm
moveable HEB600
steel cable ≈ 20mm
crane claw

column

narrowing truss 300- 30mm
narrowing HEB 450,
450 - 250 mm
gap and clip-on-
fastening system 20mm,
cut apart and welded together
aluminium sheet 15mm

saltblock

800mm x 800mm

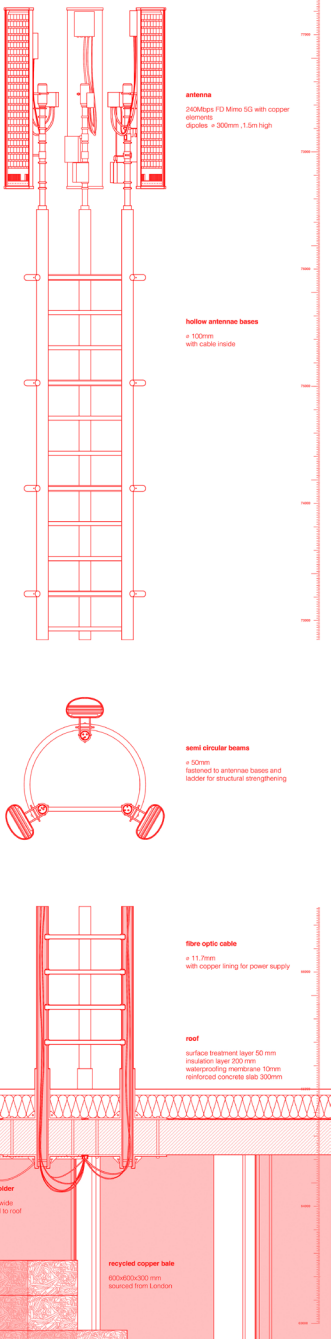
floor

lattice floor 30mm
T-section 40mm
salt block 800mm

wheel

inner wheel with
wheel-bearing 80mm
≈ 650mm
axle 400mm
gimbal 225mm
framework joint
outer wheel 80mm
≈ 650mm

LONDON MINE 1:20



antenna

240Mbps FD Mimo 5G with copper
elements
dipoles ≈ 300mm , 1.5m high

hollow antennae bases

≈ 100mm
with cable inside

semi circular beams

≈ 50mm
fastened to antennae bases and
ladder for structural strengthening

fibre optic cable

≈ 11.7mm
with copper lining for power supply

antennae roof mounts

67cm wide
fastened by ≈ 8mm screws

roof

surface treatment layer 50 mm
insulation layer 200 mm
waterproofing membrane 10mm
reinforced concrete slab 300mm

cable holder

500mm wide
fastened to roof

recycled copper bale

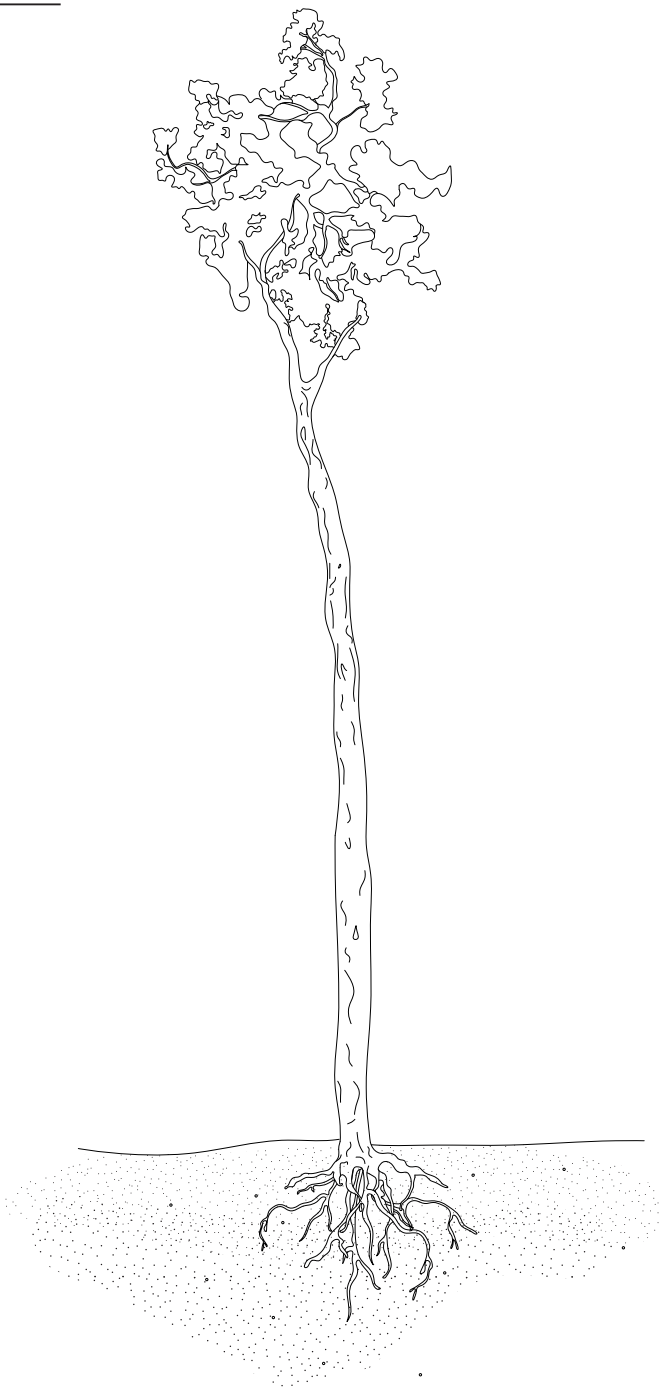
600x600x300 mm
sourced from London

GIZMOS

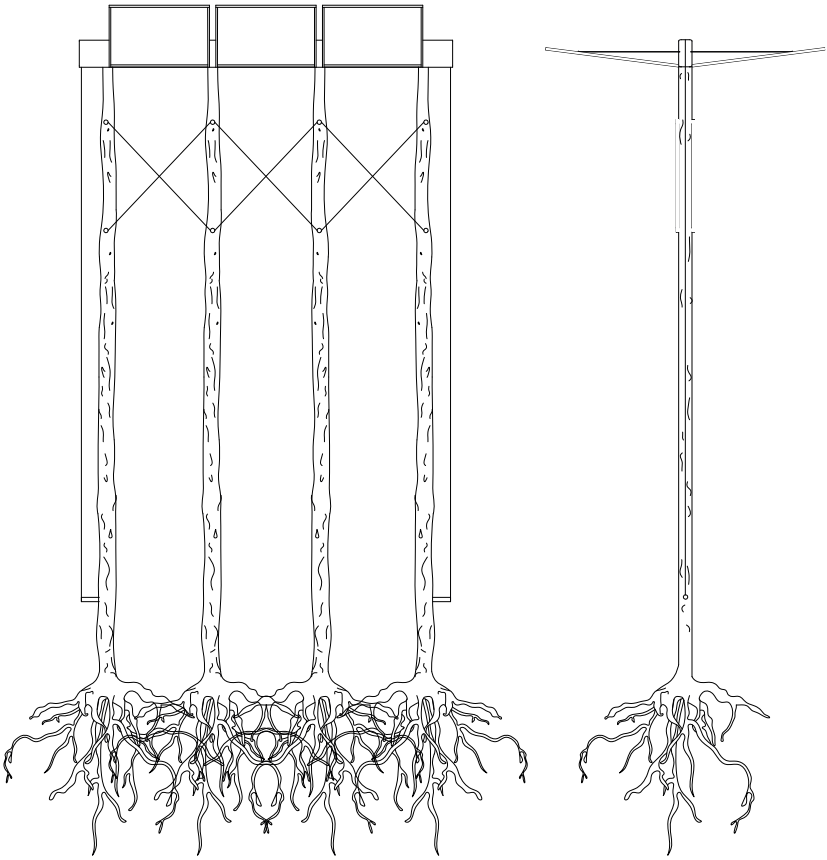
Architectural Agents af All Chapters

Agent Eucalyptus Tree

water - 200l/day
height up to 40m
Ø ~40-100 cm

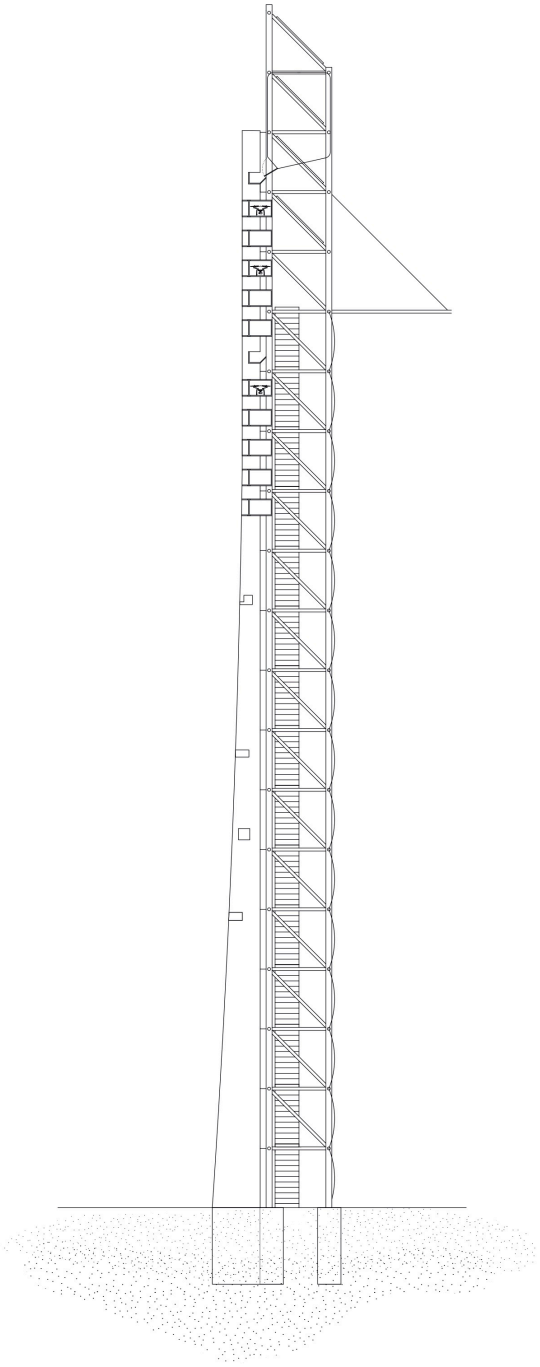


transpiration per tree: up to 30 % of
consumed water
height: 20m



Agent Drone Tower

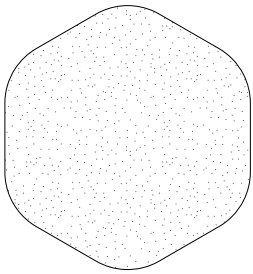
8,5x4x40m
fertilizer, seed,
battery rechgarge



Agent Salt Block

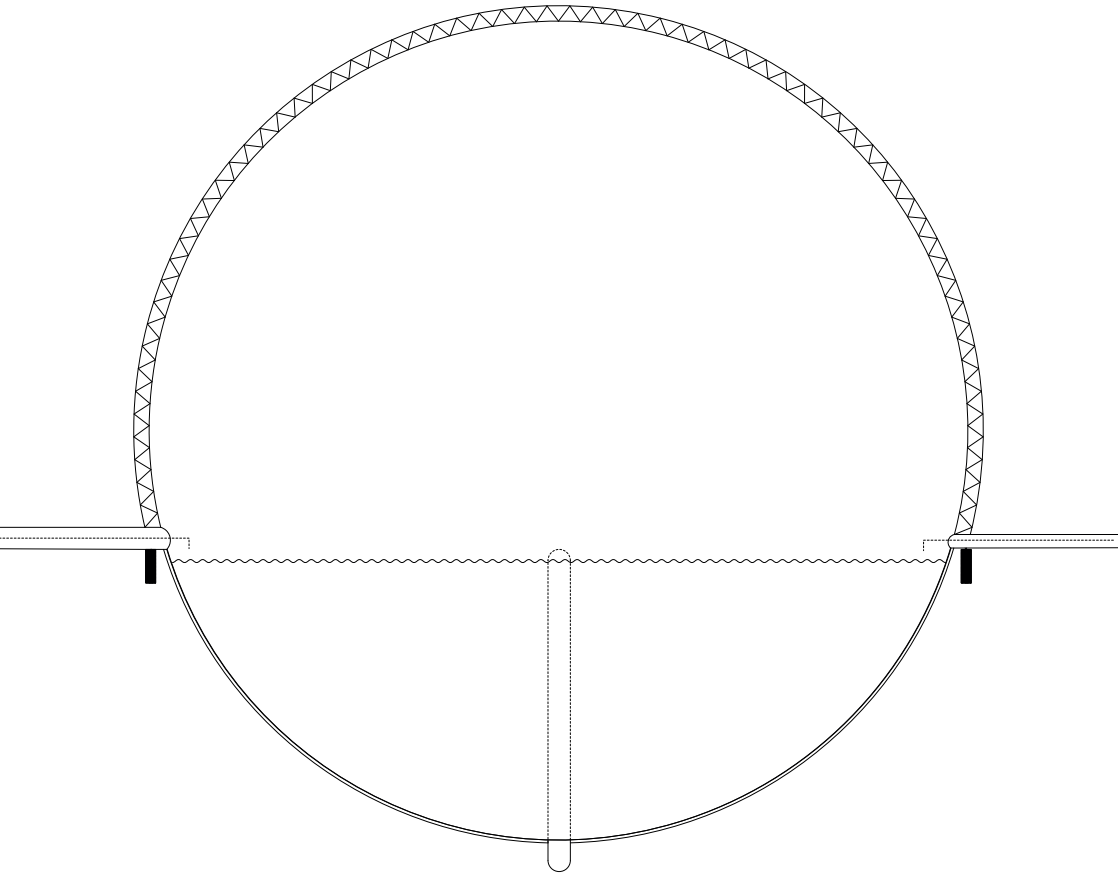
1*1*1m

	kg/m3
Chloride	38.324
Sodium	21.358
Magnesium	2.554
Sulfate	5.360
Calcium	0,8192
Potassium	0,7906
Carbon	0,0552
Bromide	0,1326
Boron	0,0088
Strontium	0,0158
Fluoride	0,0026
Lithium	0,24



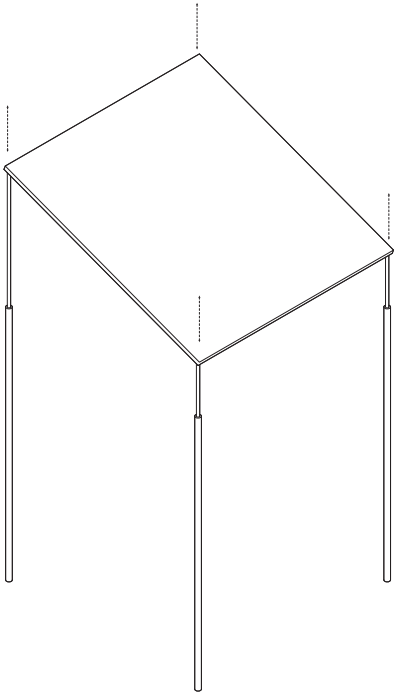
Agent Evaporation Dome

water - 80.000 l/day
brine - 95.000 l/day
Ø 74m



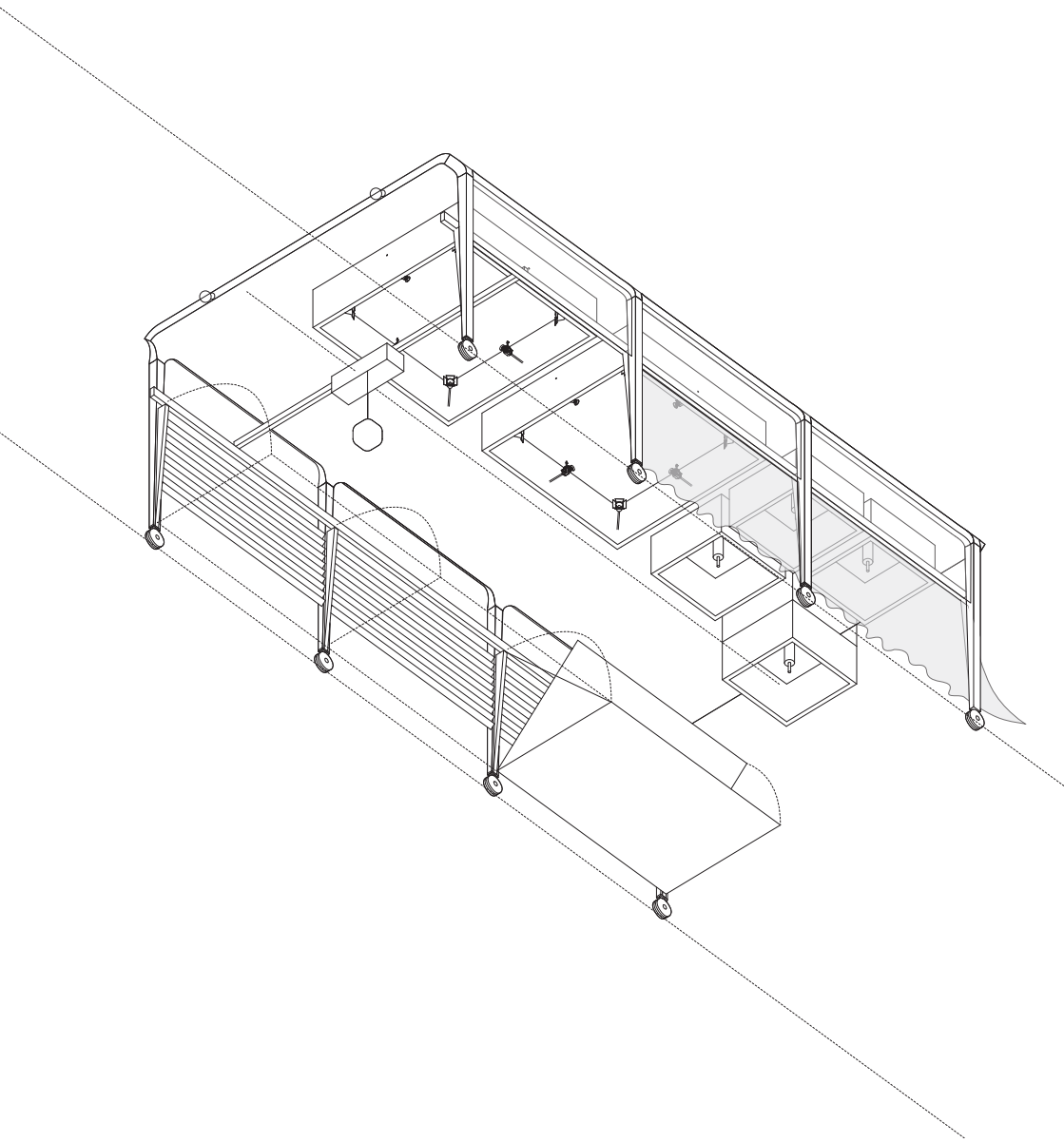
Agent Heliostat

kw/h*m2 - 2500 > 3389
2*3*0.1m
120 Heliostats / Evaporation Dome



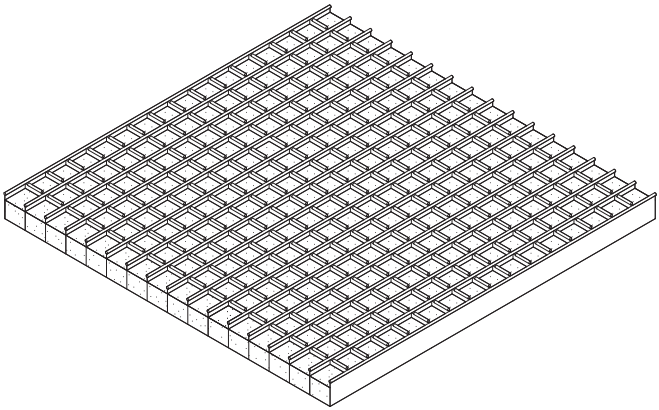
Agent Moving Platform

processing salt blocks
30*17*10m



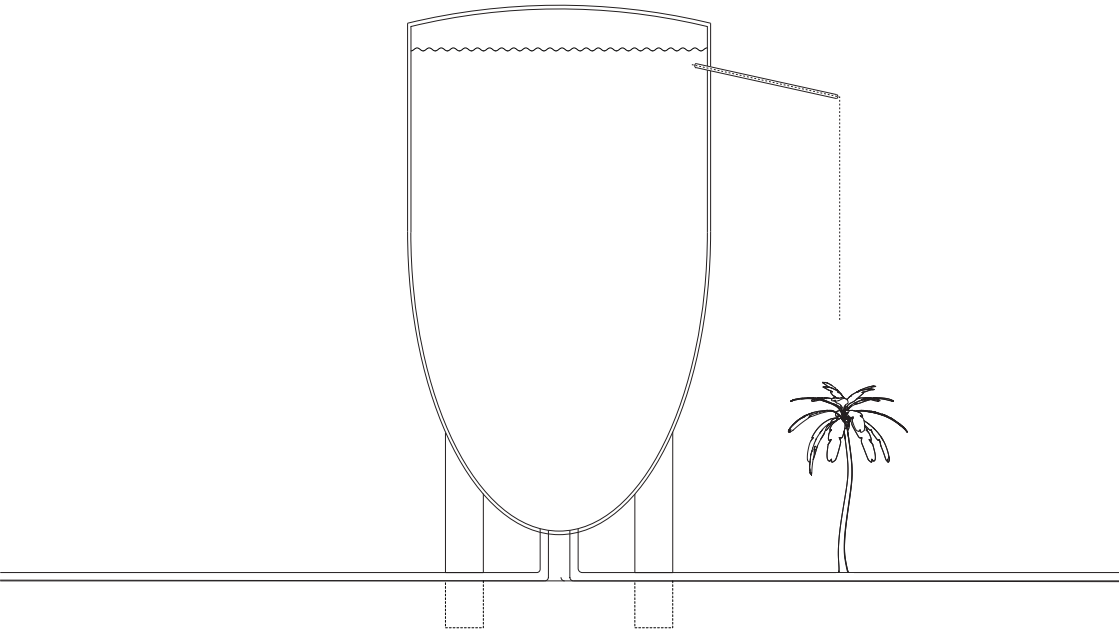
Agent Evaporation Pond

16*16*1m



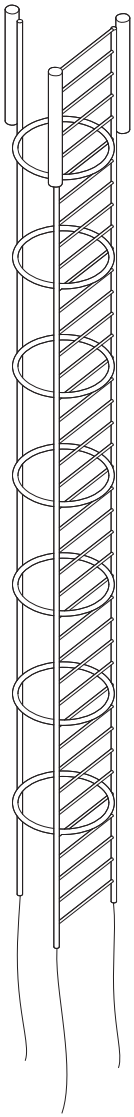
Agent Water Tank

potable water - 20 000L
Ø 12m



Agent Tower Antenna

Ø 2m
2,44 GHz Parabole Antenna



NOTES

On Narration as Design Method

ON NARRATION

as Design Method

Stories as Transitions

Over the course of the last year, we have developed our designs in storyboards. Image by image, the mines expanded, the stories spun on, new architectural characters were introduced, some excluded again. Every scene that was fed helped us to think further, to ask new questions or to answer open ones. Thinking in stories was what enabled us to weave the enormous research that went into this project and that our sites demanded - not into *one* solution to *one* specific problem, but into a transition design that develops directions ("from-to") for a possible future across different scales, times, and disciplines within chapters. A future built on the present and the complexities of a vast copper territory.

Visualisation as Spatialization

The visualisation of the chapters is their spatialization. The architect as narrator links and mediates the different scales, materials, times and disciplines into an experiential product that visually addresses space. In this

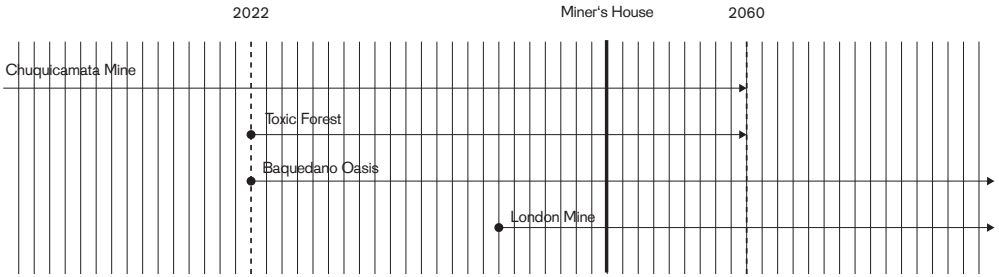
way, the (economic, ecological and material) questions encountered in the research become spatially conceivable and the answers that unfold all the more holistic. Nevertheless, the visualization also holds the possibility of confronting different views and expressing critique towards the world we create: The protester in the chapter of the Toxic Forest sees a weakness in the linking of economic and ecological action. (see p. 25) The Baquedano Oasis' advertising slogan makes a dazzling promise that the scene clearly fails to deliver. (see p. 40)

Architecture as Condition

The architectural agents occurring within the chapters give conditions for the development of a „story". Their appearance is reduced to the expression of their agency:
The formal exaggeration of the water tank's overflow pipe points towards a future of water abundance (p. 164)
The fog catcher, whose panels on pruned trees collect their transpiration and lead it back into the water system, gives new conditions to the tree to act as a pump. (p. 157)
The high volume of the mine in London points toward the future state of copper scrap as a transportable commodity: Its zig-zag shape optimally accommodates the trucks on the ground floor for pick up. (p. 129)

A Section through the House as a Section through the Chapters

The chapters do not occur consecutively, but temporally overlap each other and form an important point of intersection: The miner‘s house. A section through the house is a section through the mines, that is, a section through the context they have created and the materials they yield. (see p. 152) The new mines and their stories find a momentary articulation in the house, made their own by its inhabitants: From Mine to „mine“.



Timeline of Chapters