



Re-commoning Water

The Public Grounds of Water in Urban Ecosystems

SHERYL SI 5482933

PUBLIC BUILDING GRADUATION STUDIO 2022/2023

THE COMMONS

Water and The Commons

Commoning is a **process of negotiating differences and conflicts** between the individual, the community and society.

A water commons means that **water is available for all people and ecosystems**, and that the resource be passed on undiminished and intact for future generations' enjoyment

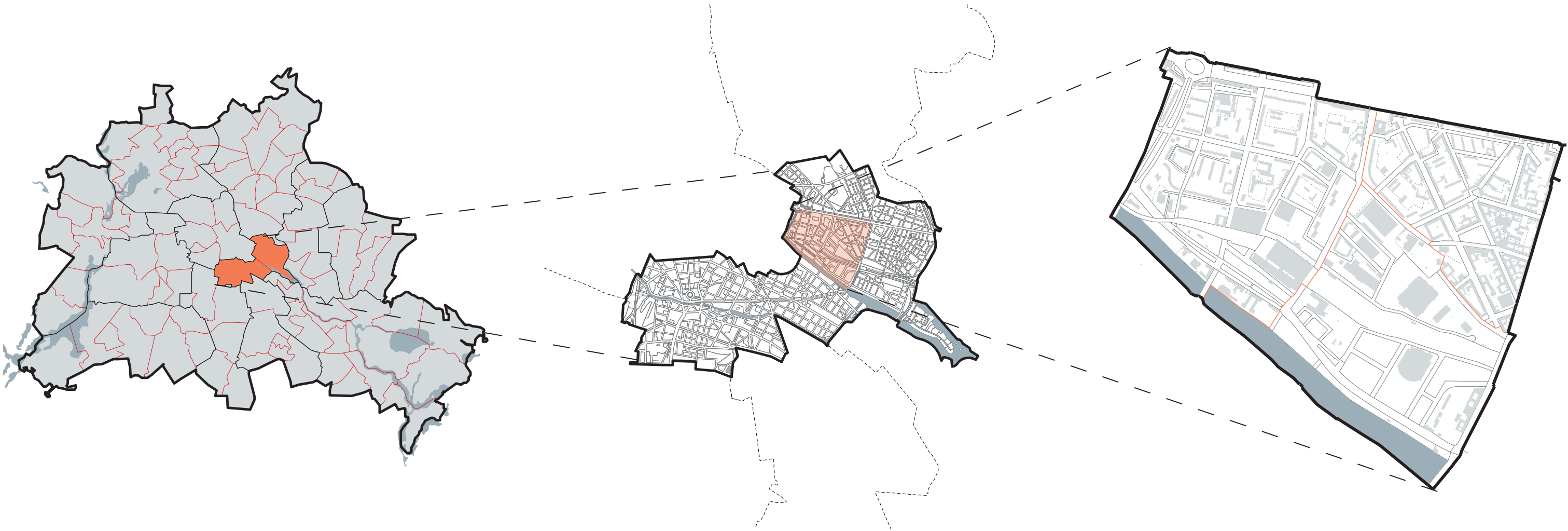


WHERE ARE WE? BERLIN, FRIEDRICHSHAIN!

CITY : BERLIN

DISTRICT: FRIEDRICHSHAIN-KREUZBERG

KIEZ: FRIEDRICHSHAIN



BERLIN FINDINGS

SITE PICTURES



“Many public swimming pools have closed...it would be nice to have a place where I can teach my toddler how to swim...”
-mother with child



*15% of
Friedrichshain-
Kreuzberg is
under 18*

43,558 inhabitants as of 2019

*the average age
is **38 years old.**
The district's
inhabitants are
mainly young
people and
young families*

a quarter of the
population is
married 68,300
[25.3 %] 2009

single child
families make
up for the
majority (58%)
in Berlin



RESEARCH QUESTION

Given the amorphous nature of water, how can it be used as a design material to form spaces that foster social interactions?

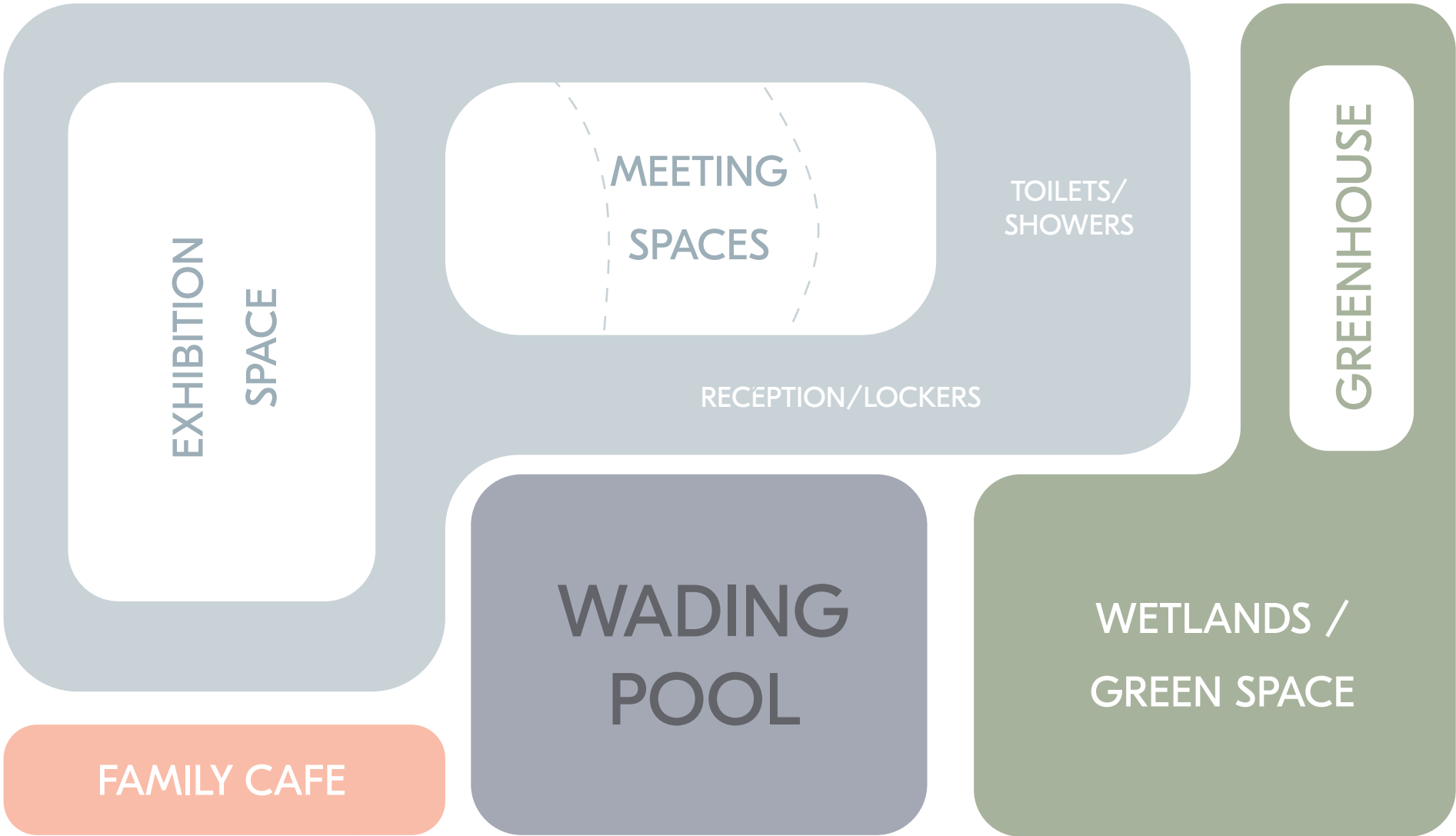
Can water be used to develop a new public building typology that not only acts as a recreation and gathering device but also an education and communing tool?



PROGRAM

CORE PROGRAM

SPACES	SIZE (SQM)
WADING POOL	1200
MEETING SPACES - LANGUAGE CLASSES - FAMILY SUPPORT MEETINGS - COOKING CLASSES - BABY YOGA - PARENT MEET-UPS	600
FAMILY CAFE	190
GREENHOUSE GARDEN	370
EXHIBITION SPACE	560
RECEPTION/LOCKERS	140
TOTAL	3060

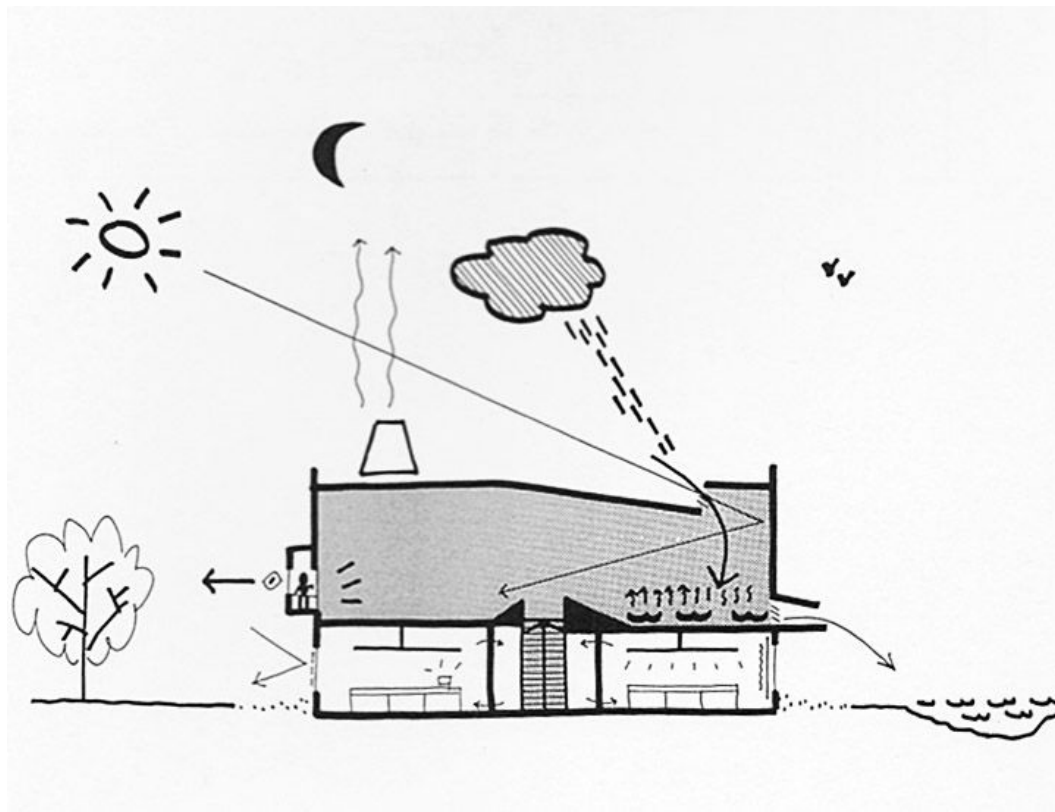


SERVICE PROGRAM

SPACES	SIZE (SQM)
RECEPTION/LOCKERS	200
TOILETS/SHOWERS	200
MECHANICAL ROOM	100
WETLAND/GREEN SPACE	3970
TOTAL	4470

CASE STUDY 1

MINNAERT BUILDING, THE NETHERLANDS



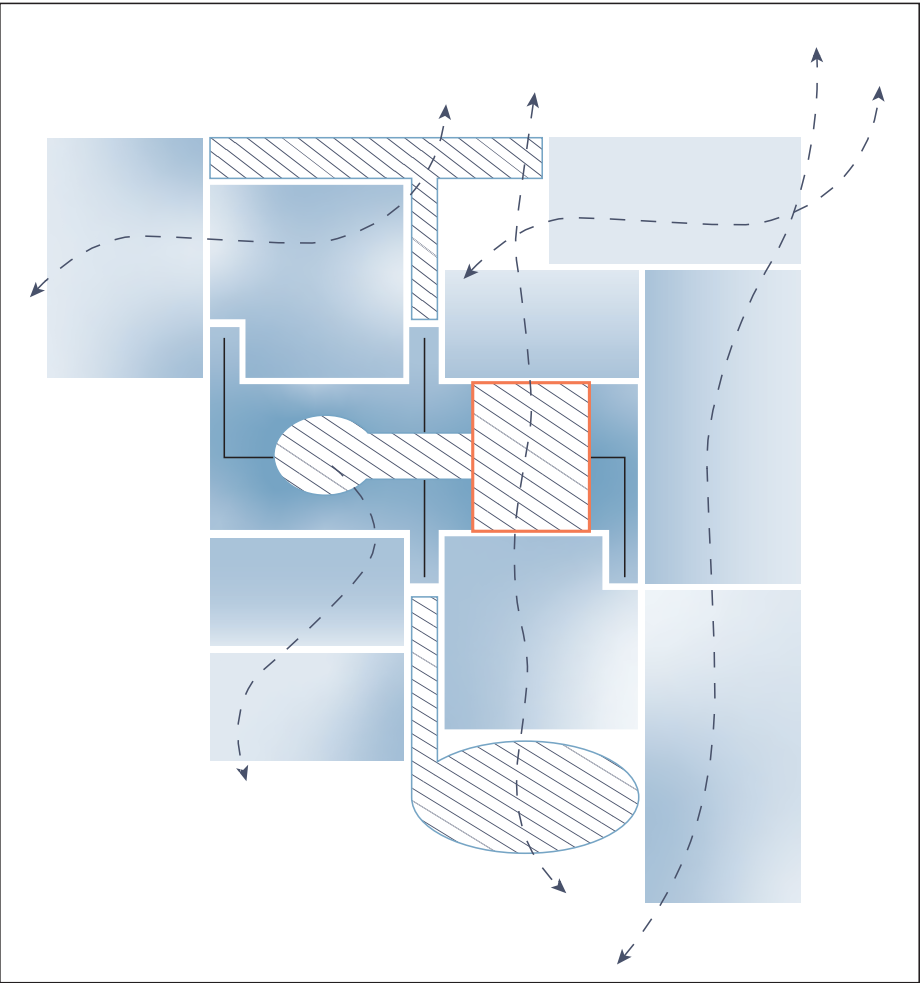
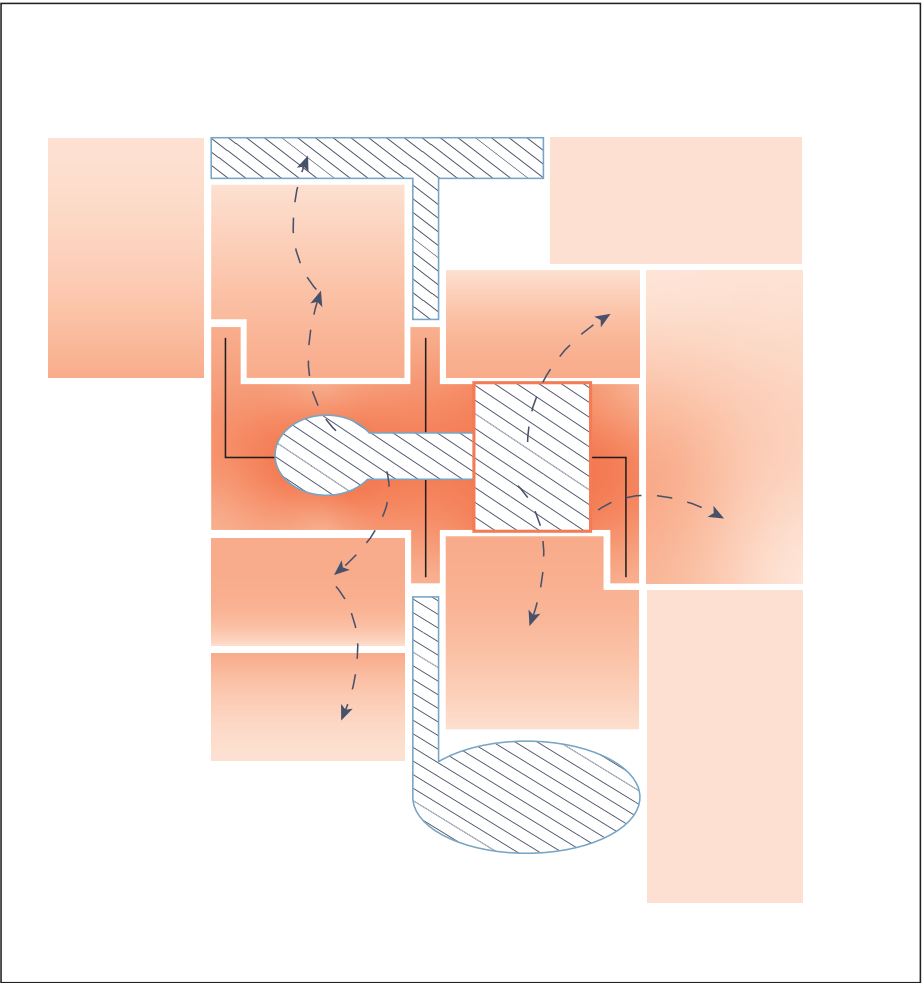
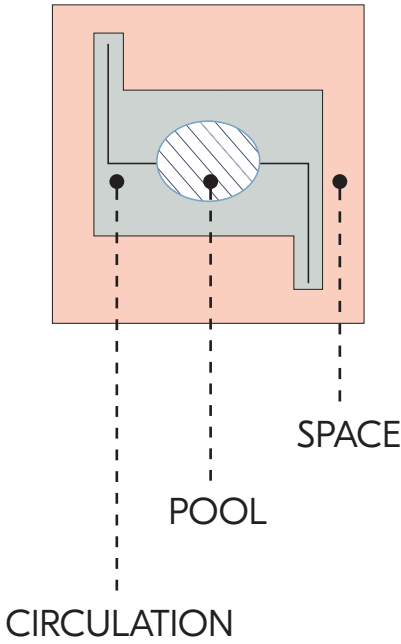
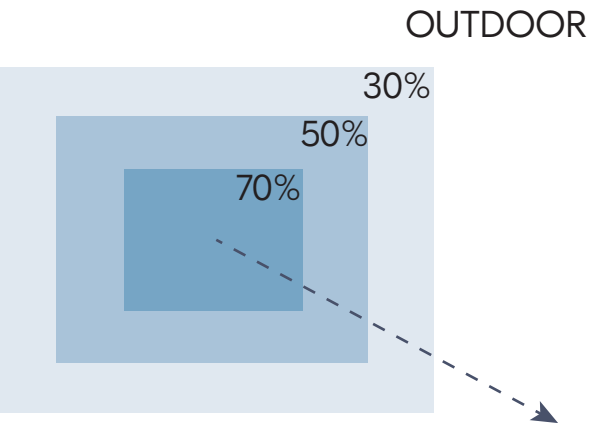
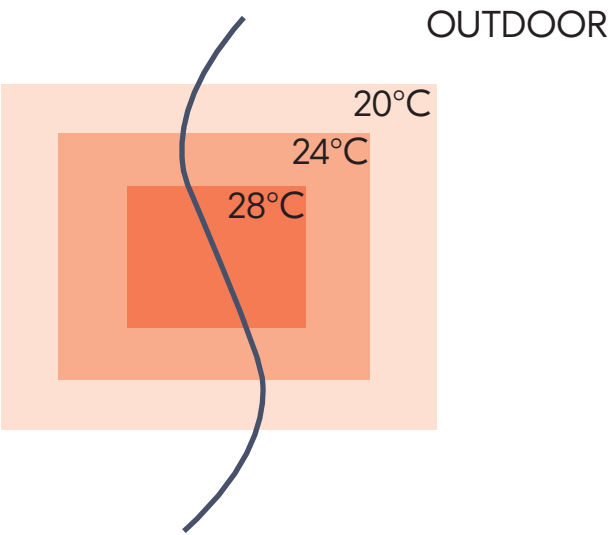
A large 10m x 50m pond collects rainwater from the building. This **water basin is used to cool down the building** during the day. The water is pumped through the building to absorb the heat.



SPATIAL PRINCIPLES & THERMODYNAMICS

DESIGNING WITH DATA

cool	20°C, 30%	dry	●
	24°C, 30%	dry	● ●
	24°C, 50%		● ● ●
warm	28°C, 50%		● ●
warm	28°C, 70%	wet	●

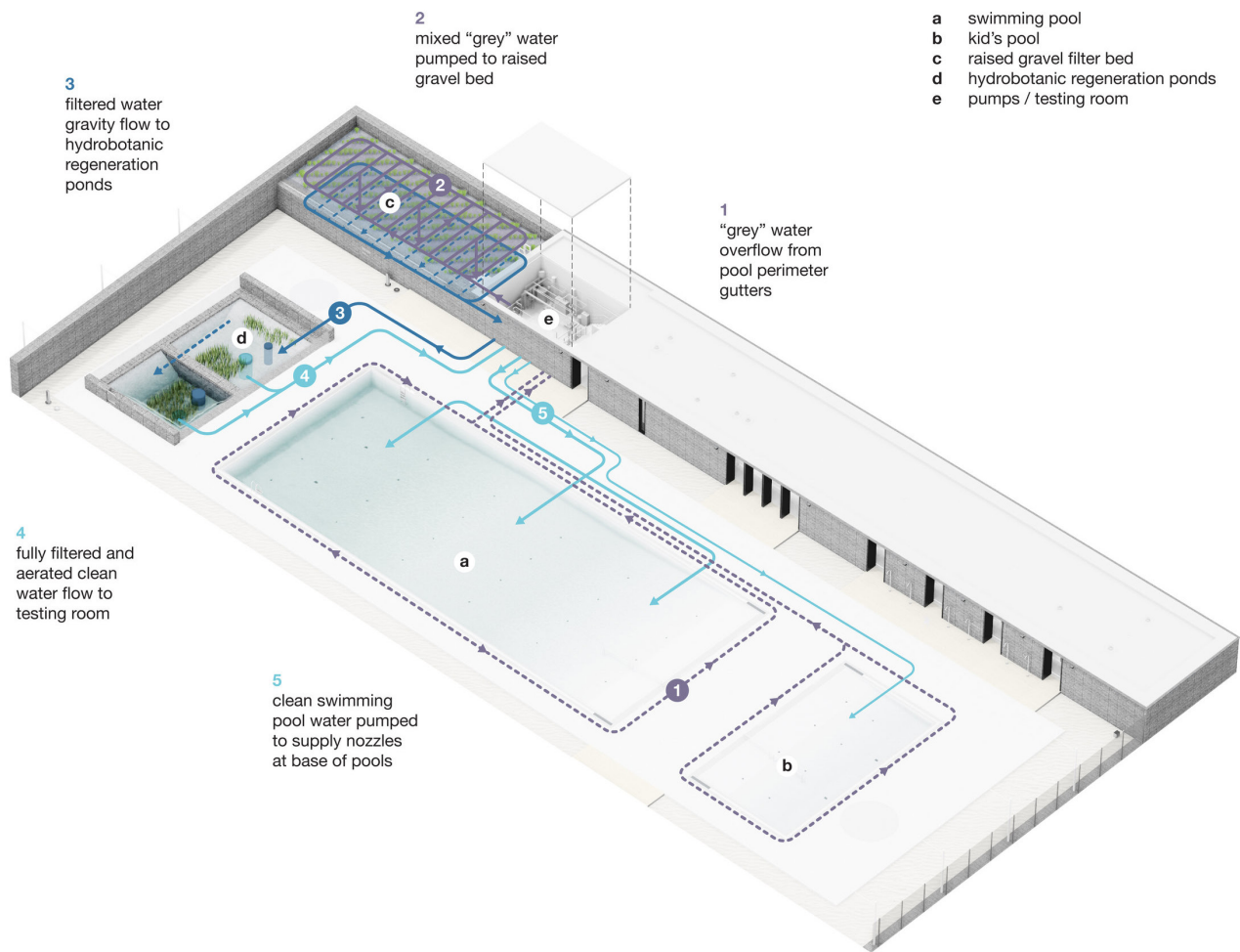


CASE STUDY 2

BORDEN NATURAL SWIMMING POOL, CANADA



The pool involves a balanced ecosystem where **plant materials, microorganisms, and nutrients** come together within a **gravel and sand filtering process** to create “living water”

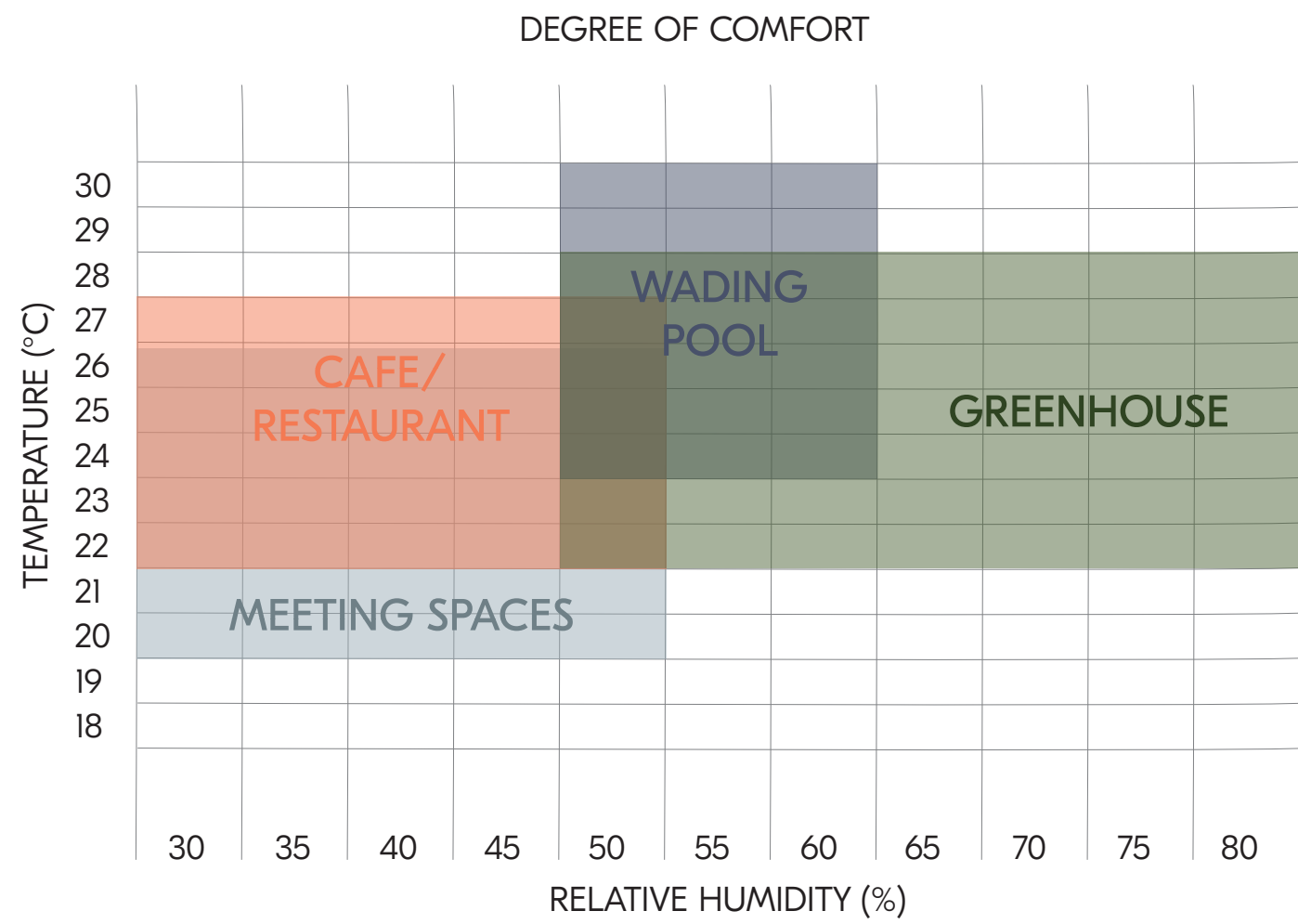


Filtration is achieved in two ways: by means of a **biological-mechanical system** or the **constructed wetland and gravel filter**, and in situ, with Zooplankton.



PROGRAM ANALYSIS & DATA

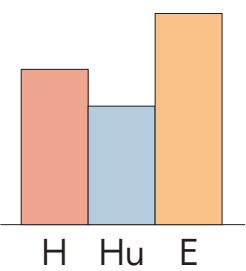
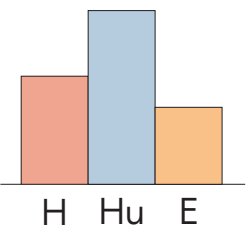
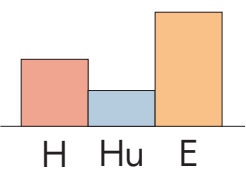
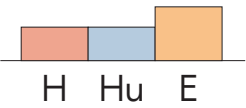
RELATIONSHIP BETWEEN TEMPERATURE & HUMIDITY



the navigations of everchanging thermal landscapes...



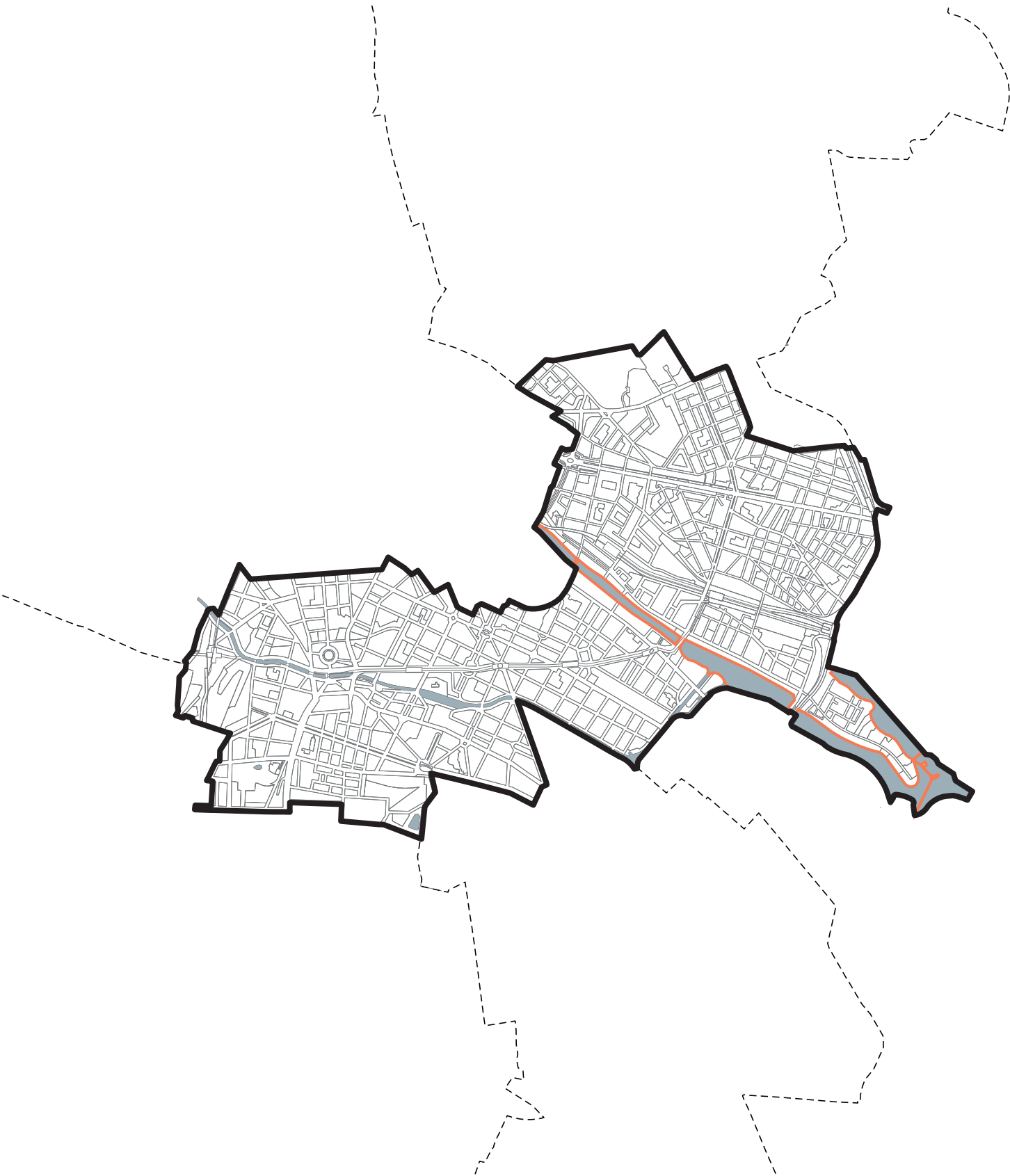
ENERGY DEMAND



H = Heat
Hu = Humidity
E = Energy

WATER CONNECTION

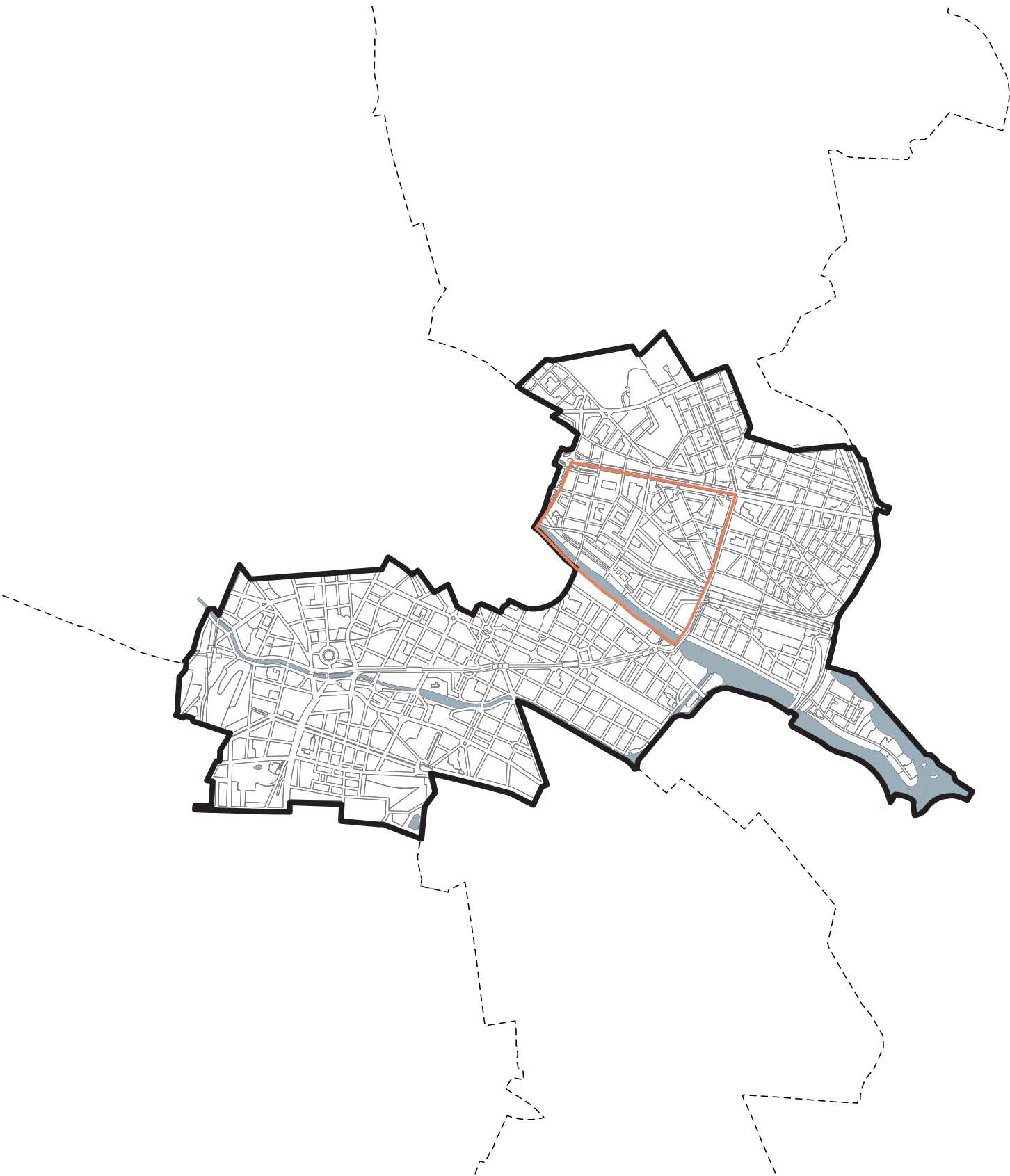
DISTRICT: FRIEDRICHSHAIN-KREUZBERG



SPREE RIVER WATERFRONT



WATER CONNECTION
DISTRICT: FRIEDRICHSHAIN-KREUZBERG

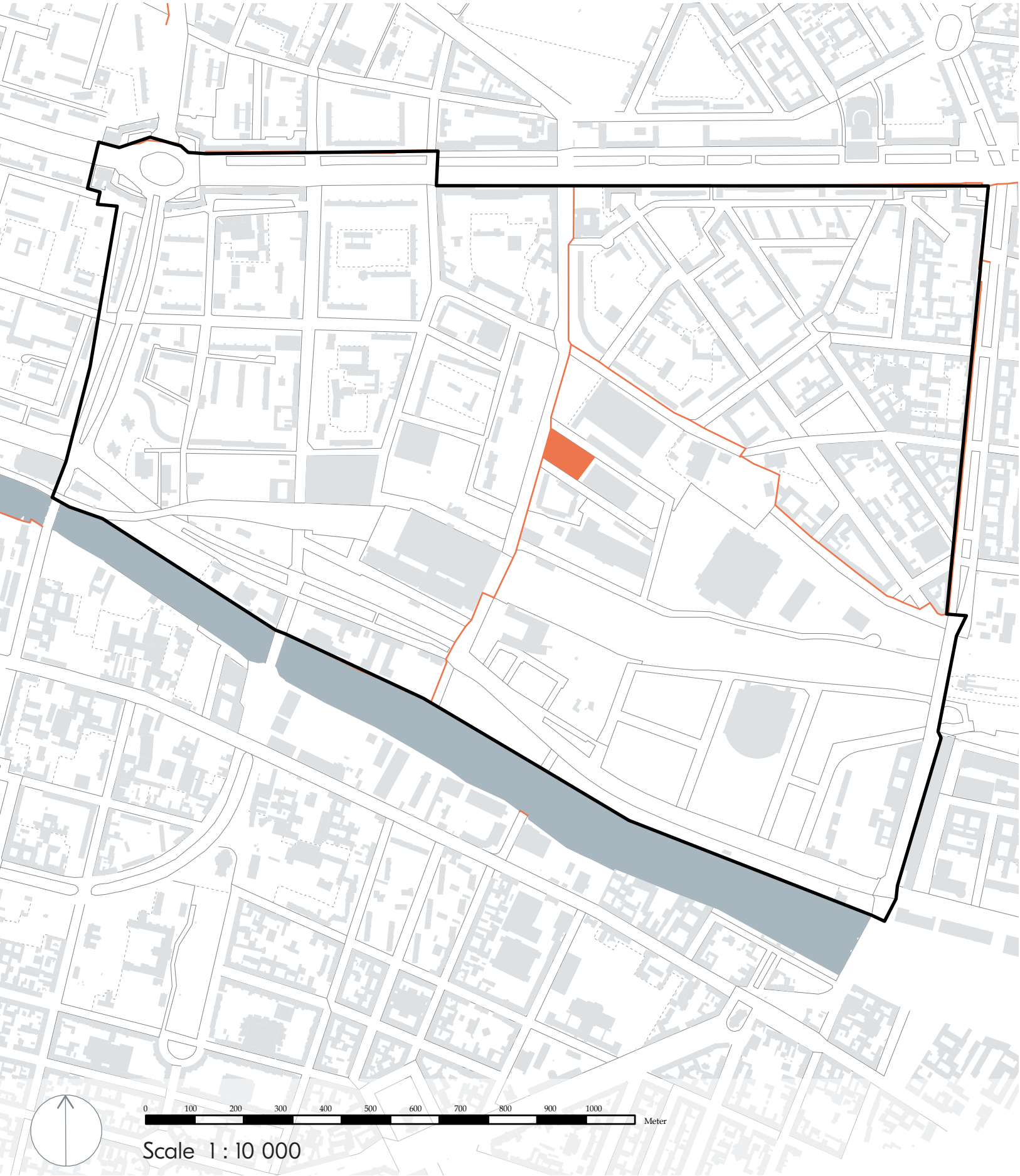


WATER PIPES SNAKING THROUGH THE CITY



SITE MAP

FRIEDRICHSHAIN DISTRICT MAP

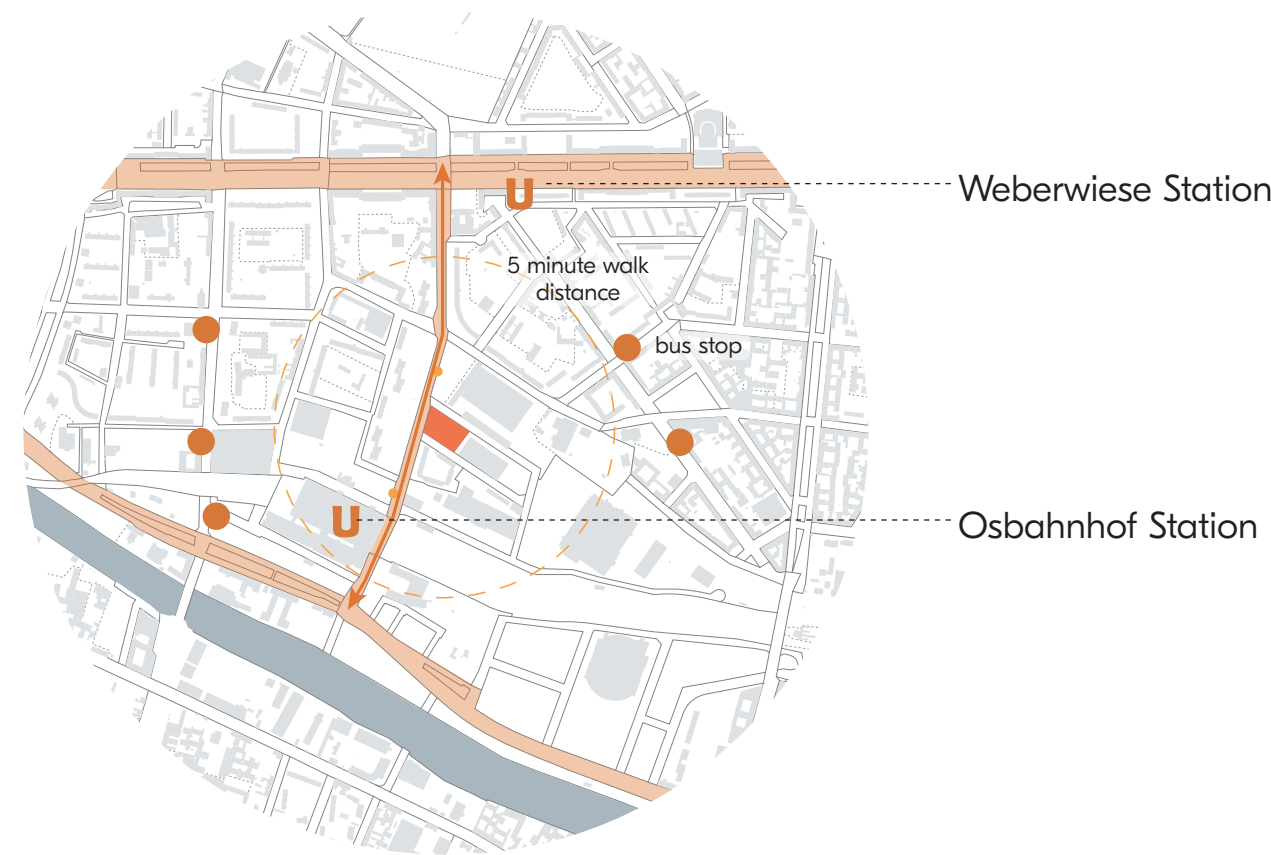


SITE PICTURES

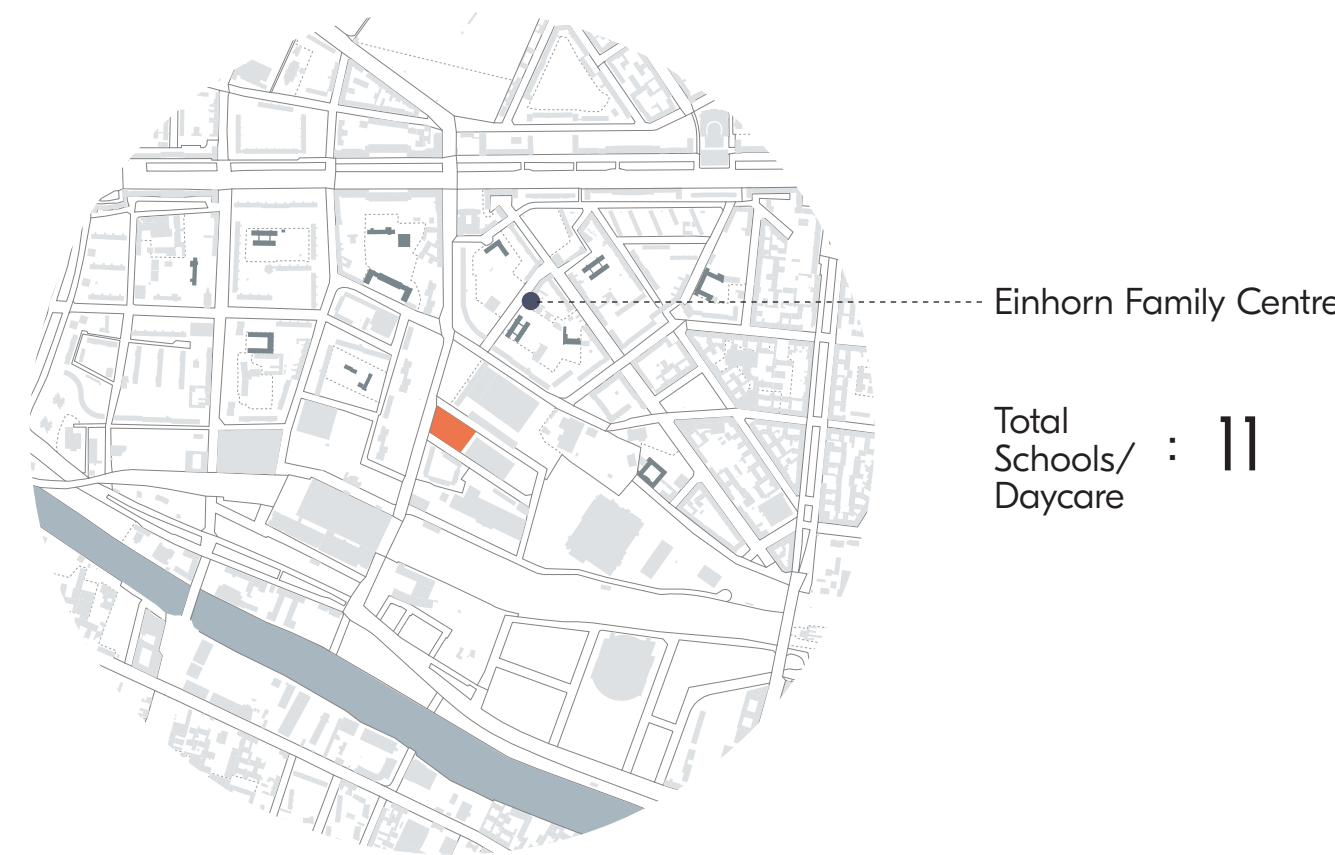


SITE ANALYSIS

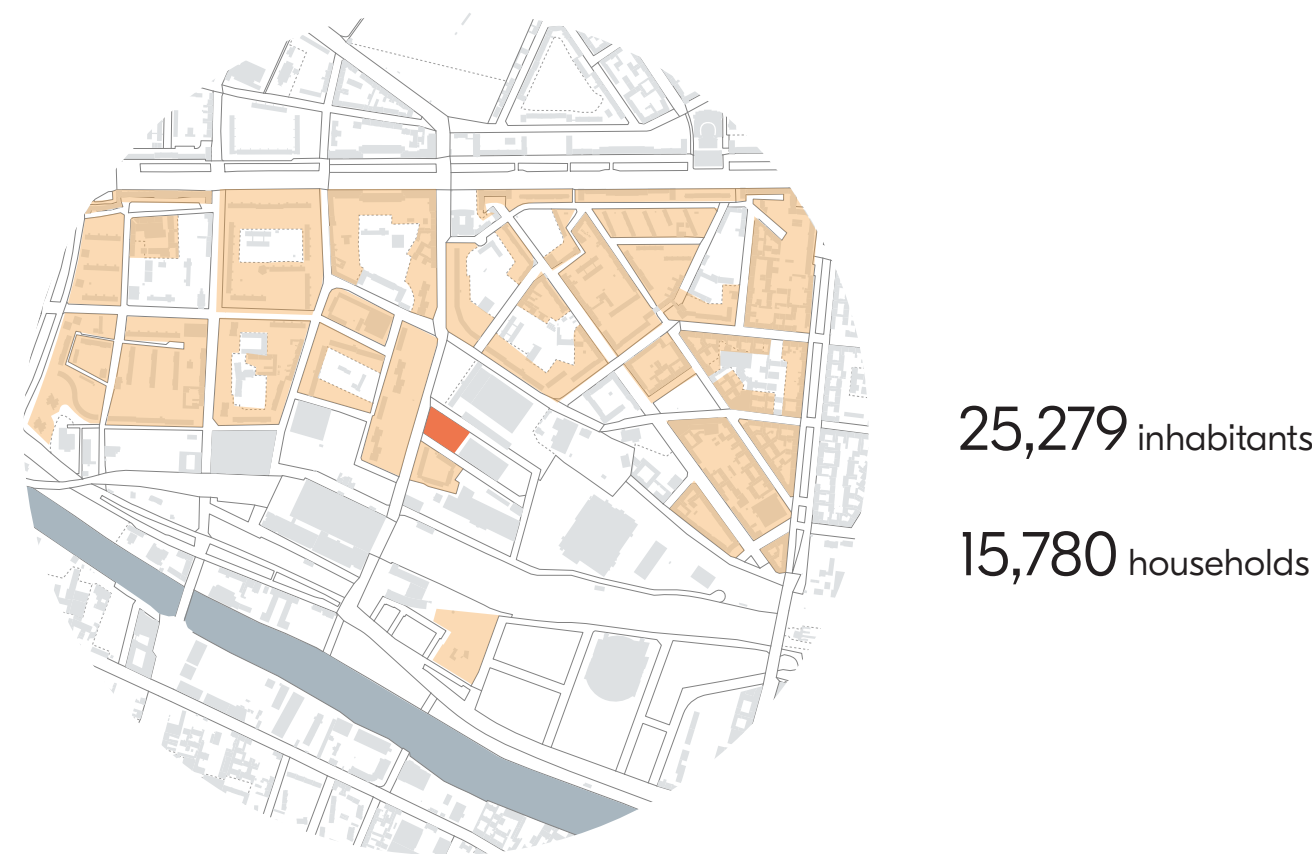
PUBLIC TRANSPORTS AND MAJOR ROADS



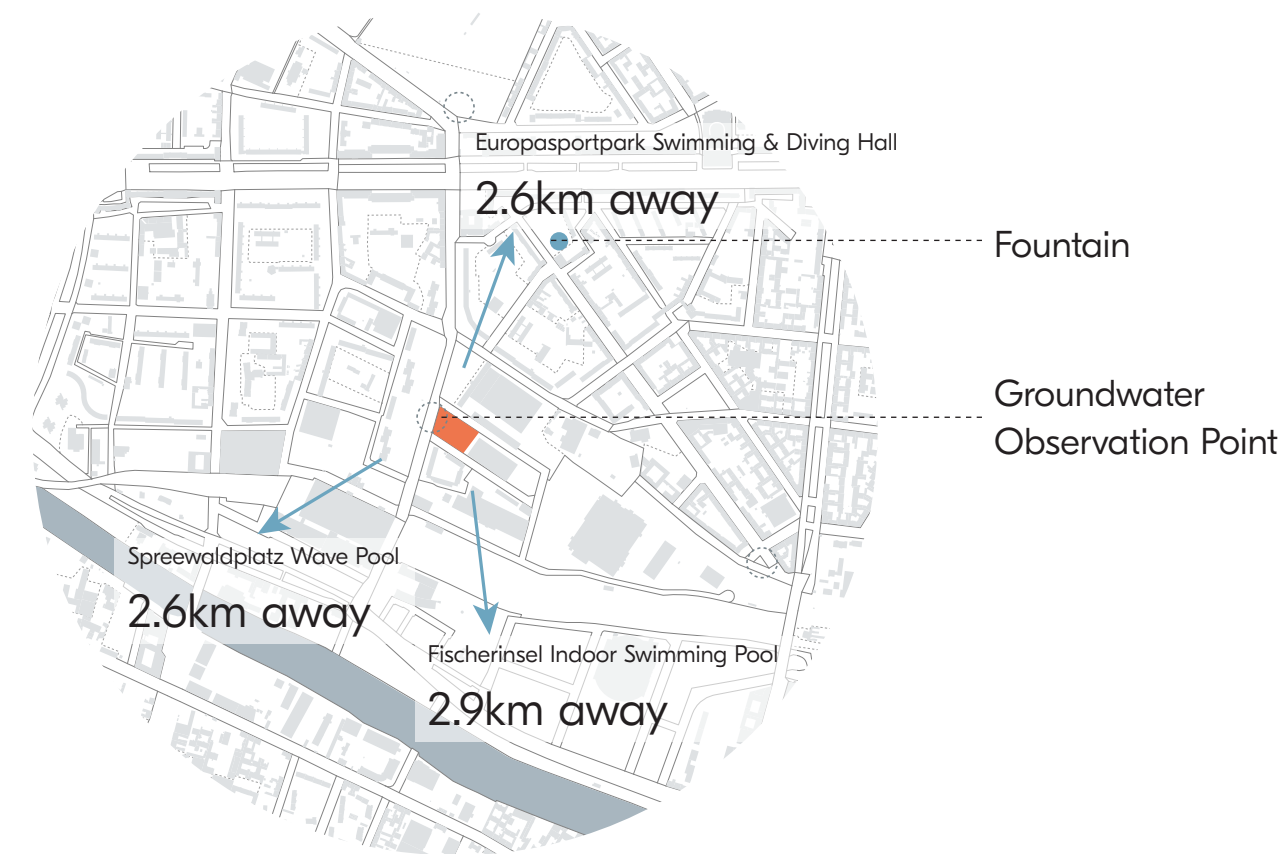
SCHOOLS & DAYCARES



HOUSING

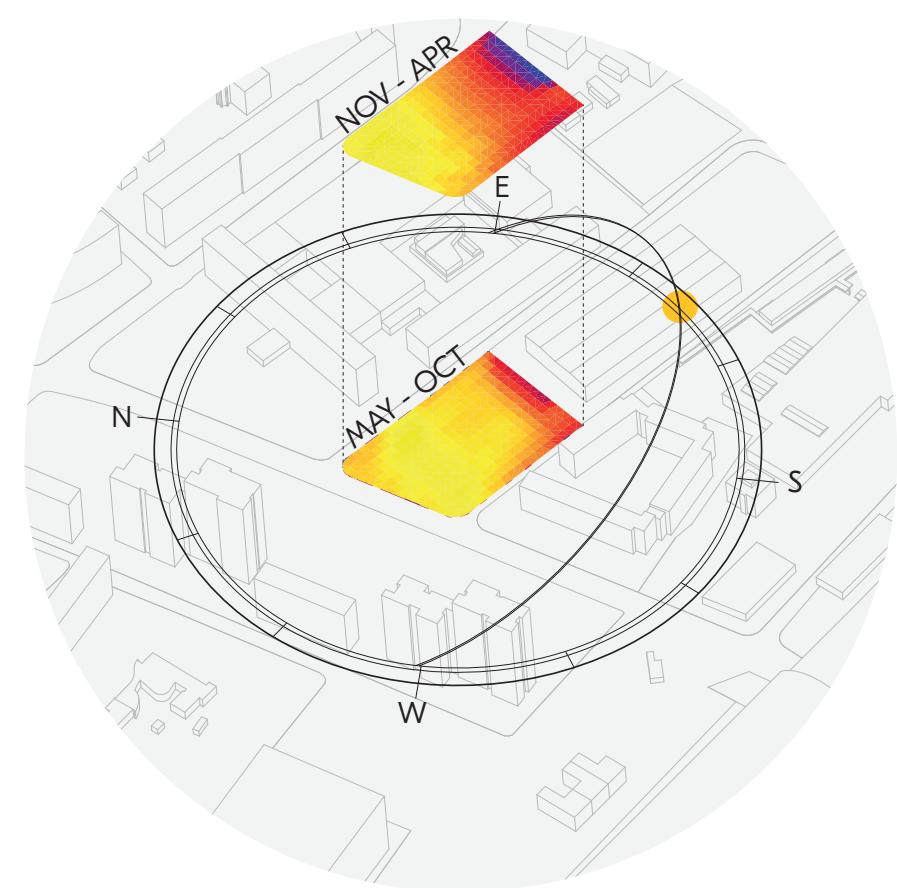


WATER RECREATION



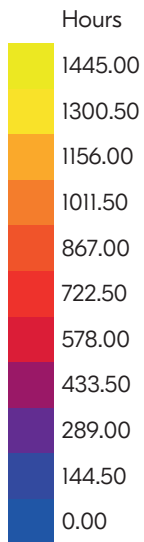
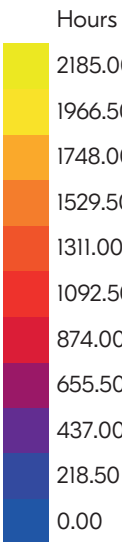
CLIMATE ANALYSIS

SUNLIGHT HOURS ANALYSIS



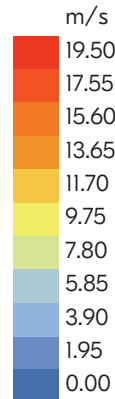
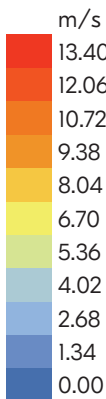
MAY - OCT

NOV - APR



MAY - OCT

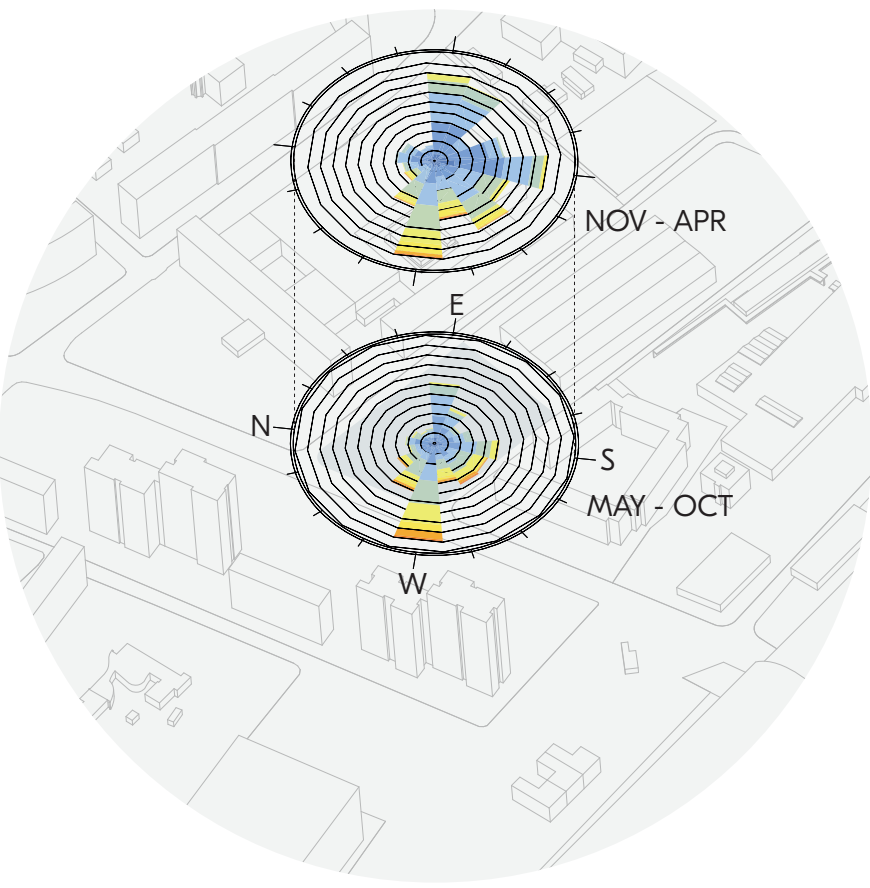
NOV - APR



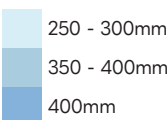
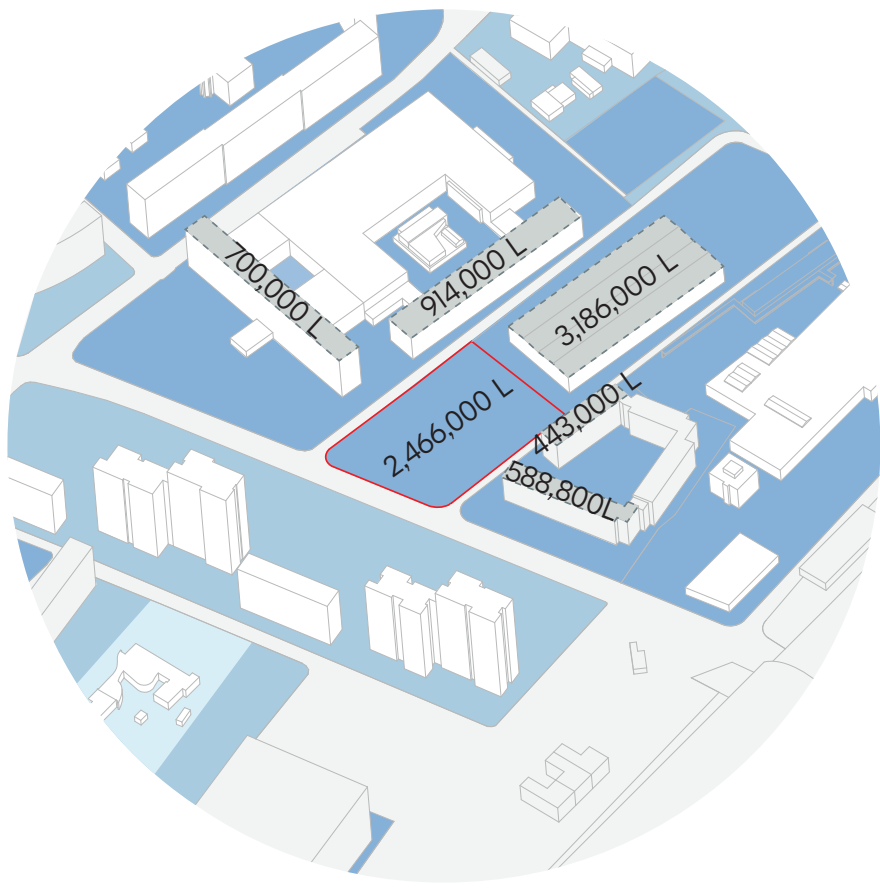
Hourly Data: Wind Speed (m/s)
Calm for 2.72% of the time
= 120 hours.

Hourly Data: Wind Speed (m/s)
Calm for 1.43% of the time
= 62 hours.

WIND SPEED ANALYSIS



TOTAL YEARLY RUNOFF FROM PRECIPITATION



Total Yearly Runoff from Precipitation

TOTAL RAINWATER COLLECTED FROM SURROUNDING ROOFS = 5,831,8000 L

MINIMUM RAINWATER TANK SIZE = 1,944,667 L

ASSUME THE RAINWATER TANKS CAN FILL 3 TIMES PER YEAR

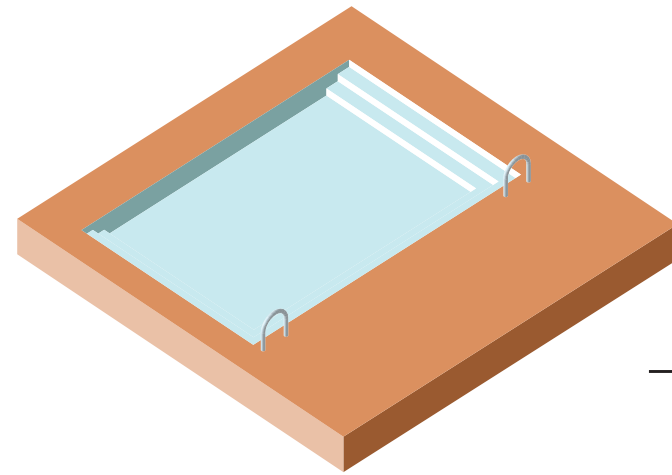
PART 1 : WATER SYSTEMS

PART 2 : RESILIENCE IN PROGRAMMING

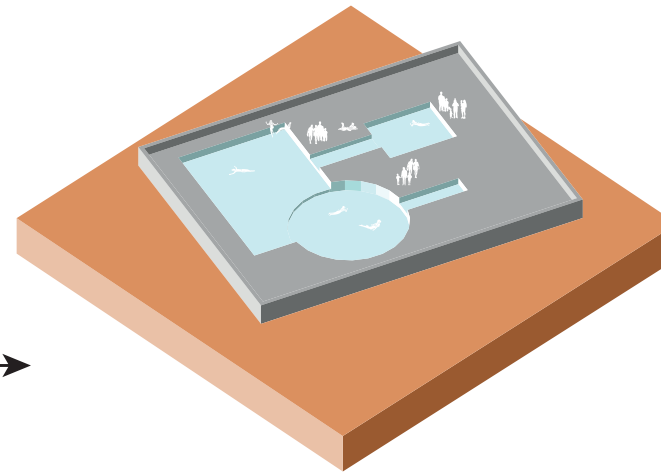
PART 3 : COMBINATION



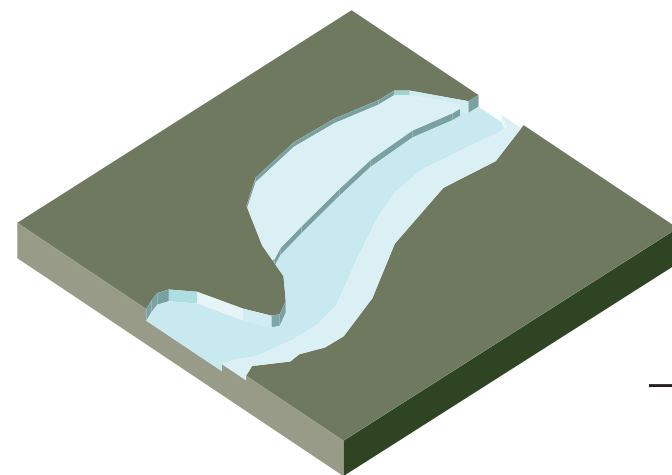
WATERSCAPES IN THE BUILDING



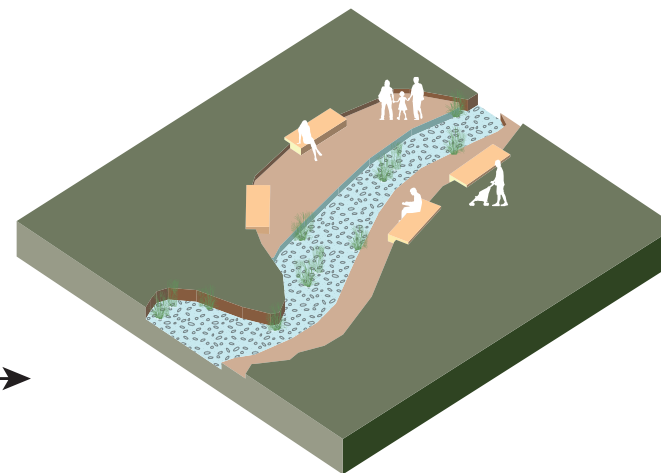
SWIMMING POOL



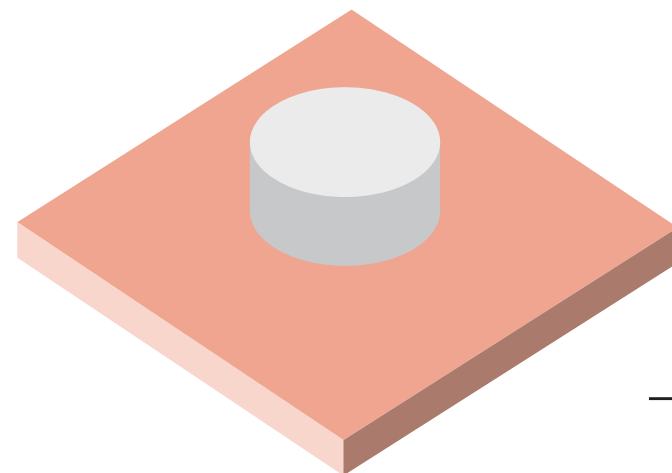
PUBLIC CONDENSER



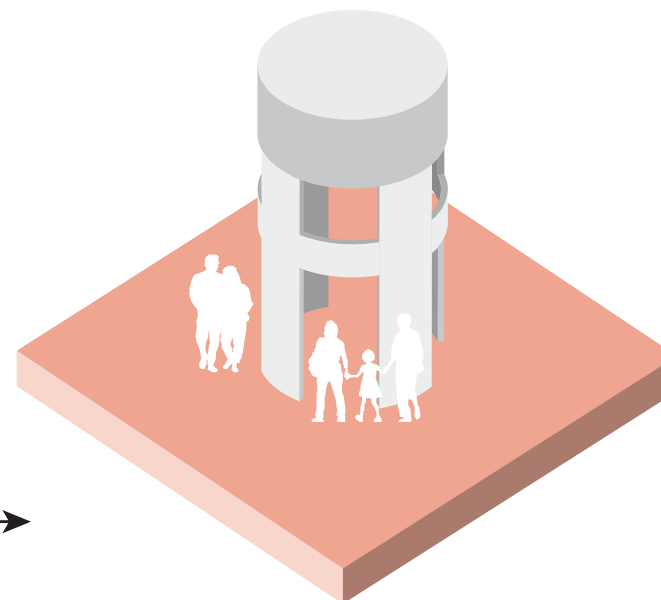
POND



CONSTRUCTED WETLAND



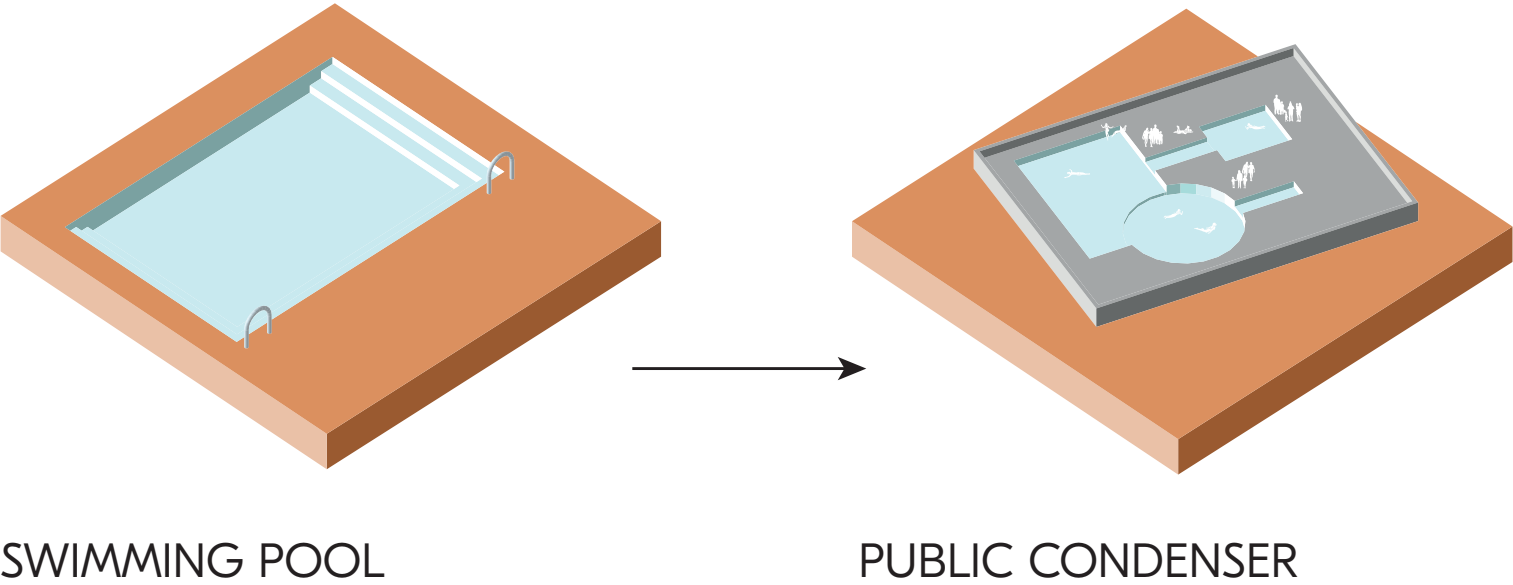
WATER TANK



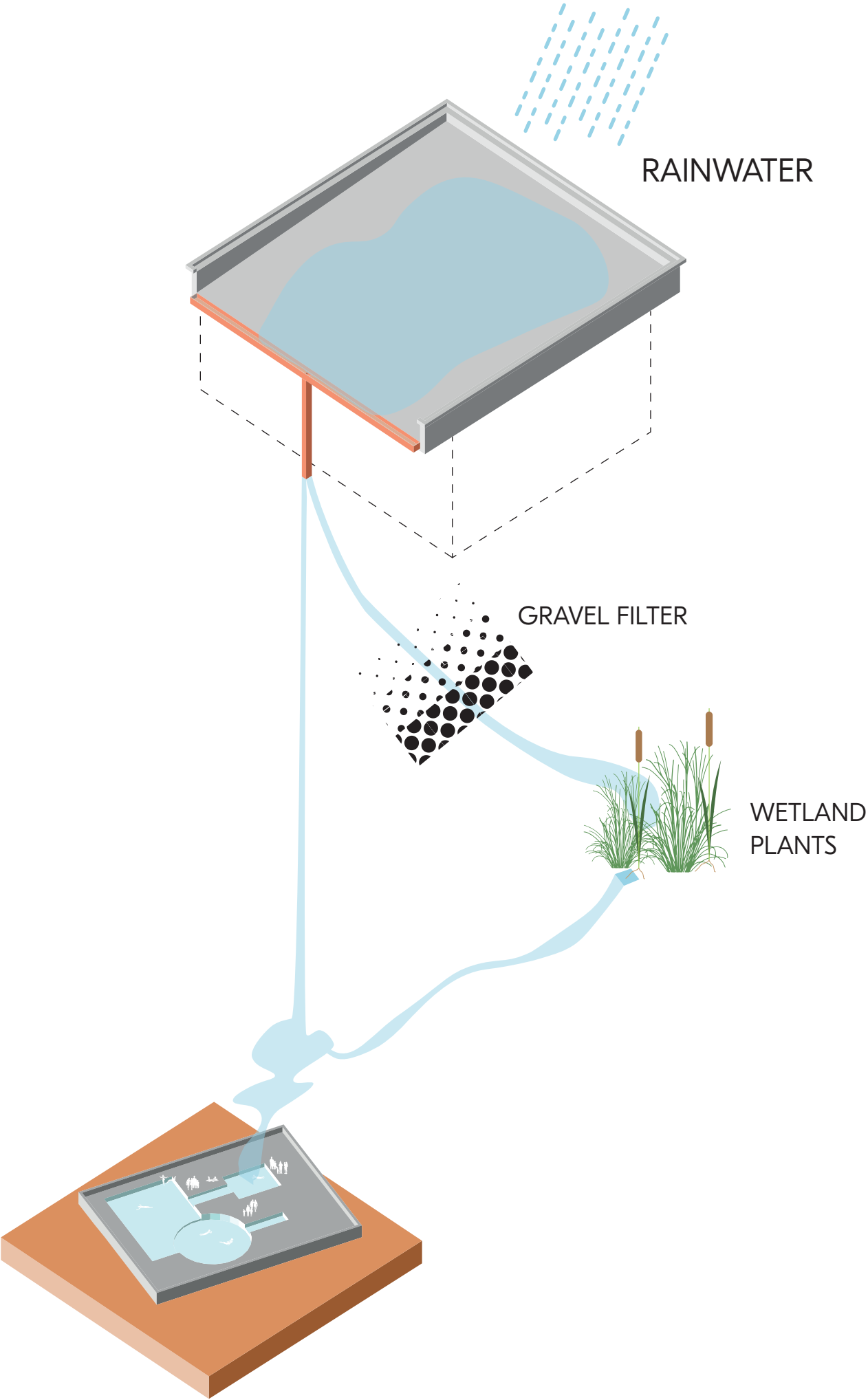
STRUCTURAL FEATURE

The multifunctionality of the waterscapes within the building contribute to the scheme's overall **multiplicity, sustainability, hybridity, and resilience.**

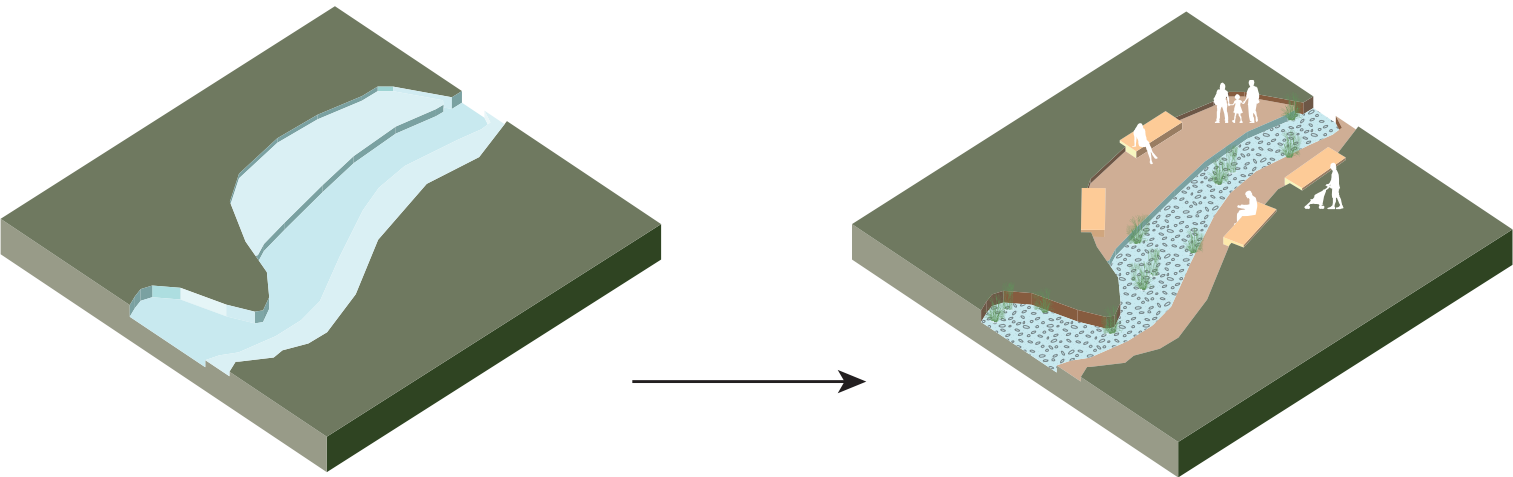
NATURAL SWIMMING POOL



Humboldt Park wading pool, USA



POND

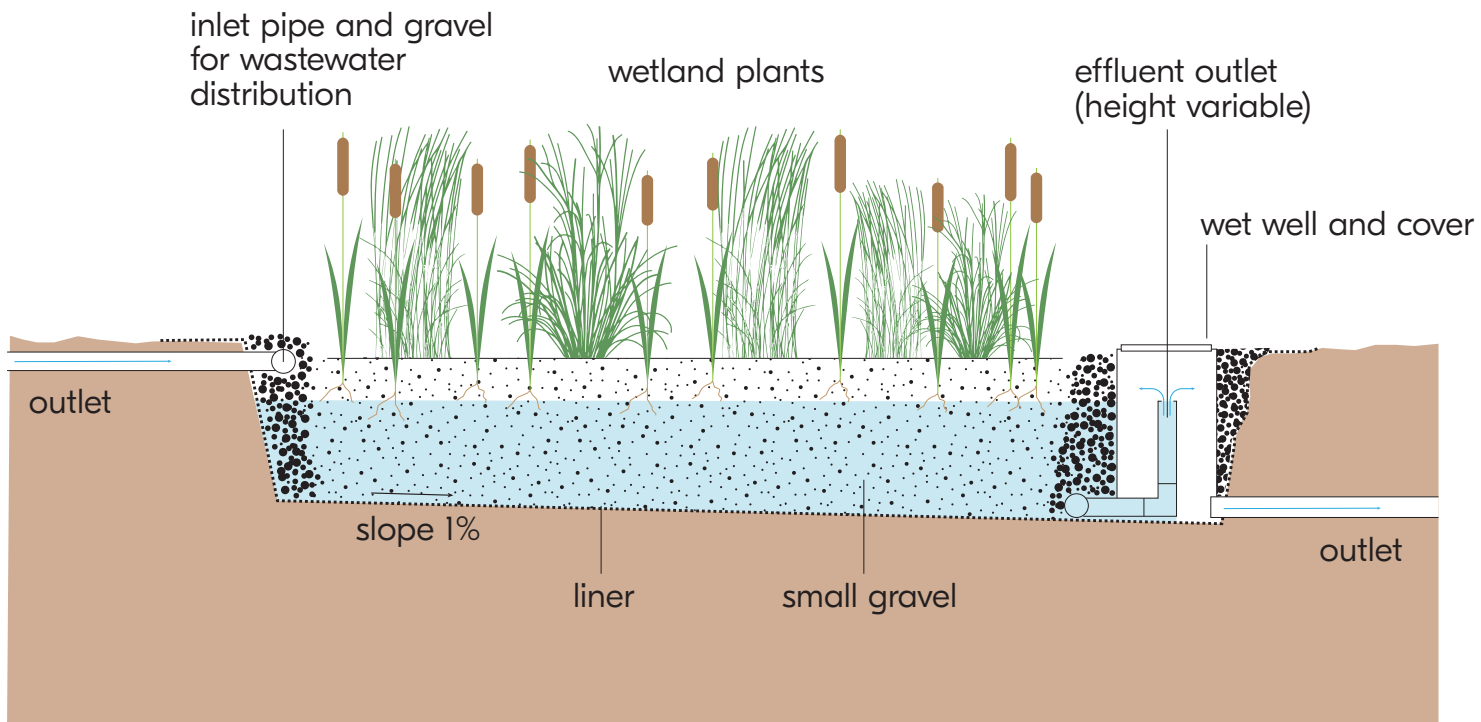


POND

CONSTRUCTED WETLAND



Shanghai Houtan Park, China

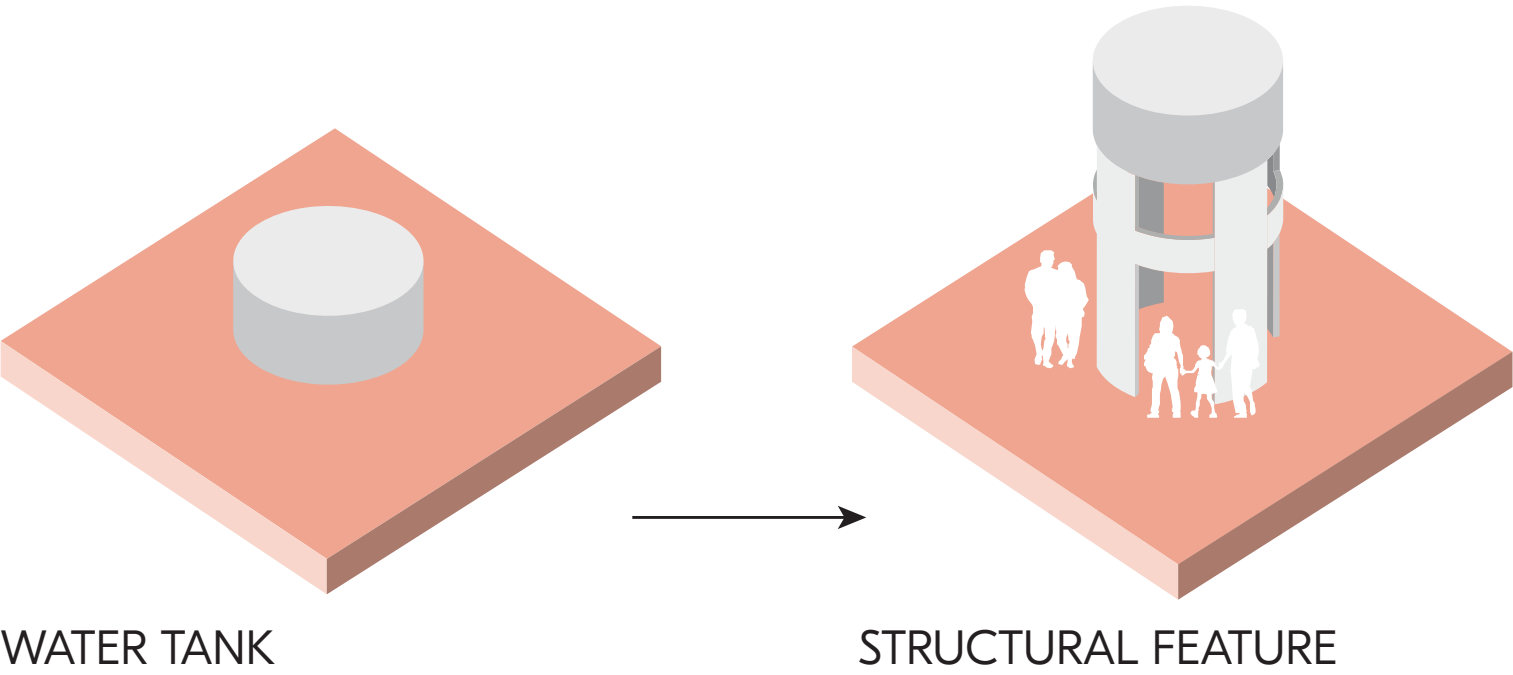


constructed wetland

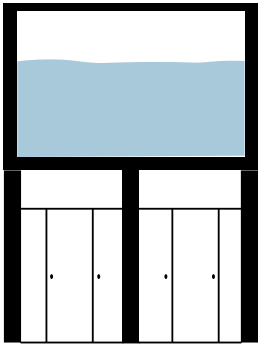


Emmen Zoo, The Netherlands

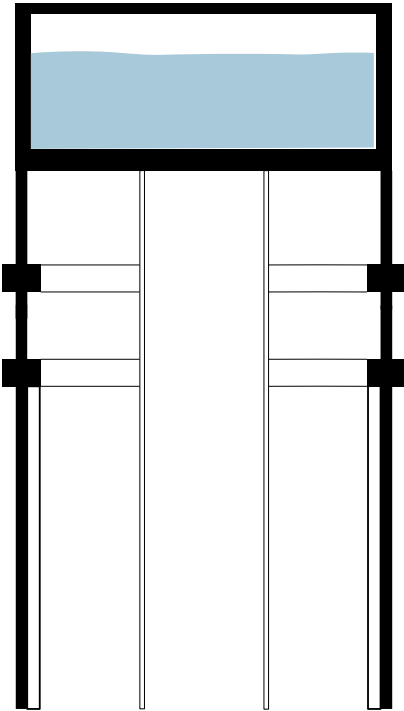
WATER TANKS



WATER TANK TYPOLOGIES IN THE BUILDING



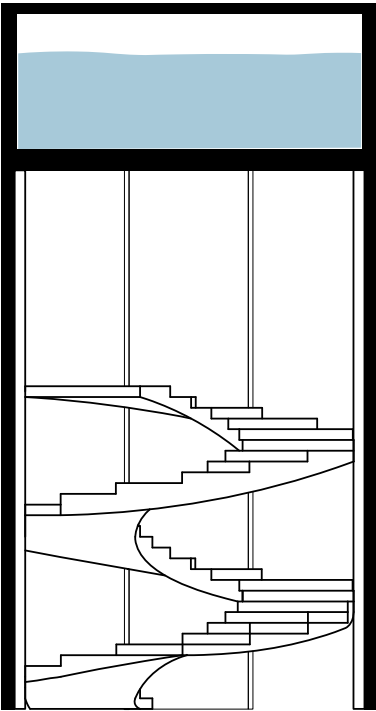
TOILETS



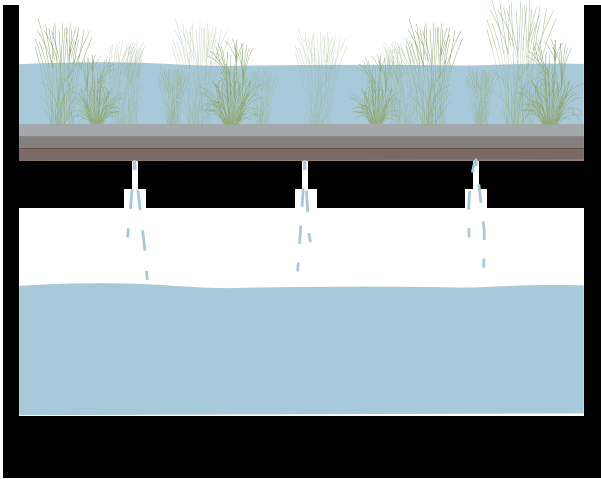
STRUCTURAL



Waterzuivering Berenplaat, The Netherlands

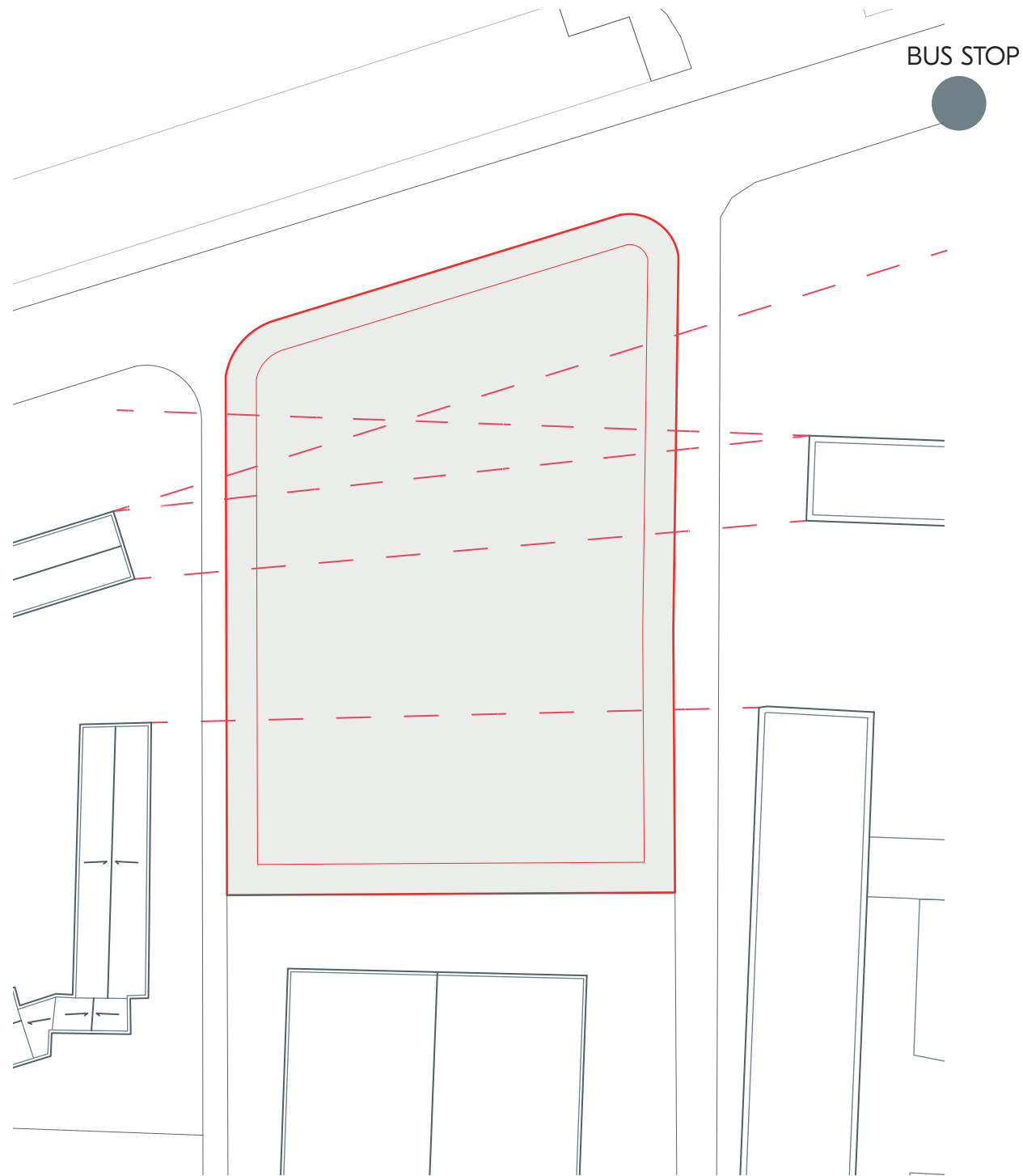


STAIRS

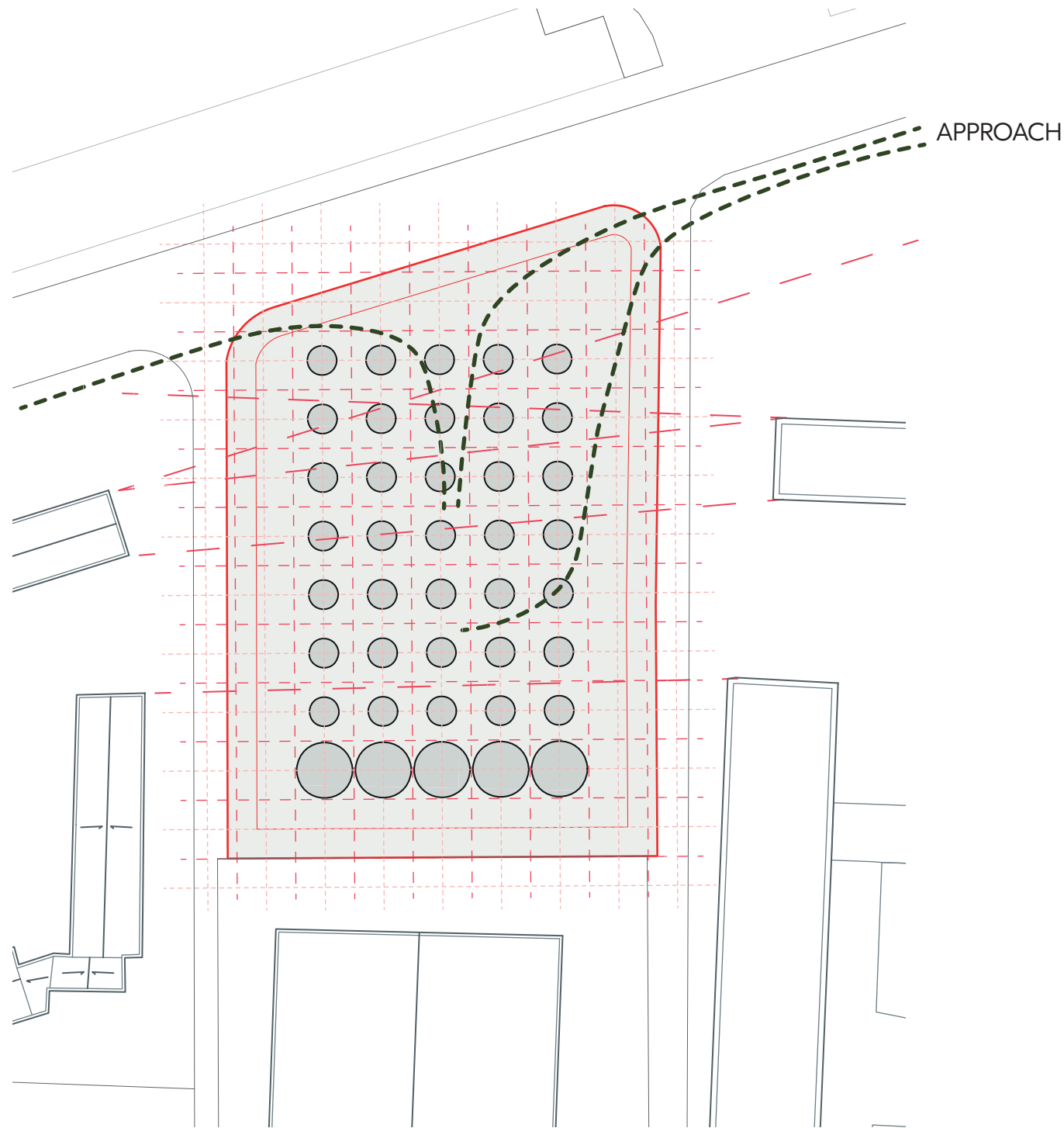


WETLAND

ORGANISATIONAL DIAGRAM



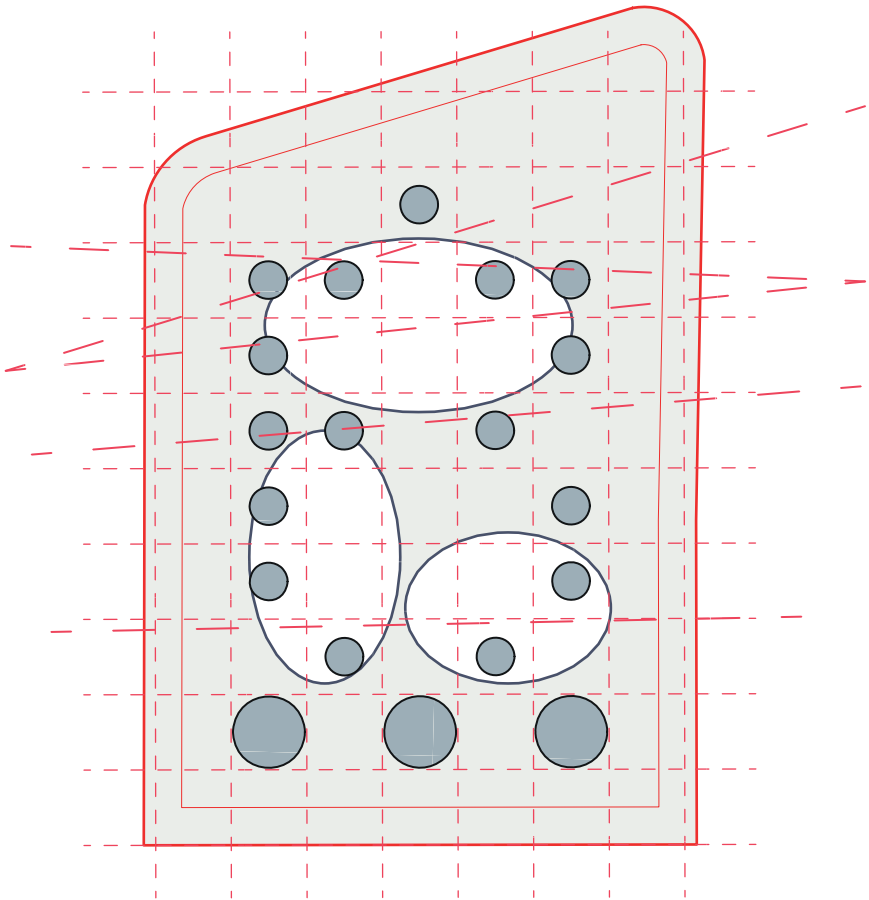
SITE LINES



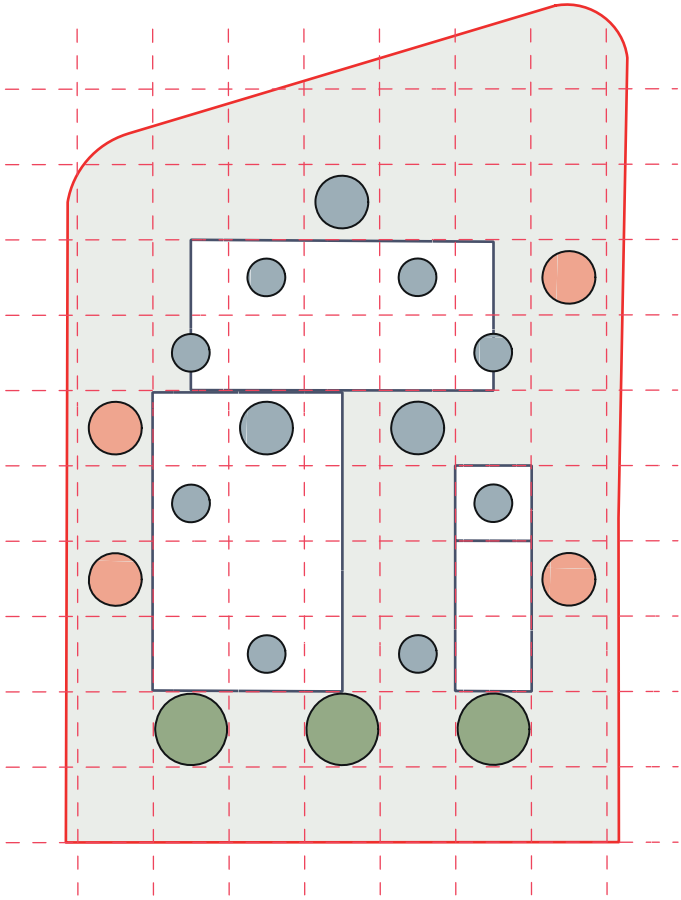
ESTABLISHING A GRID



ORGANISATIONAL DIAGRAM

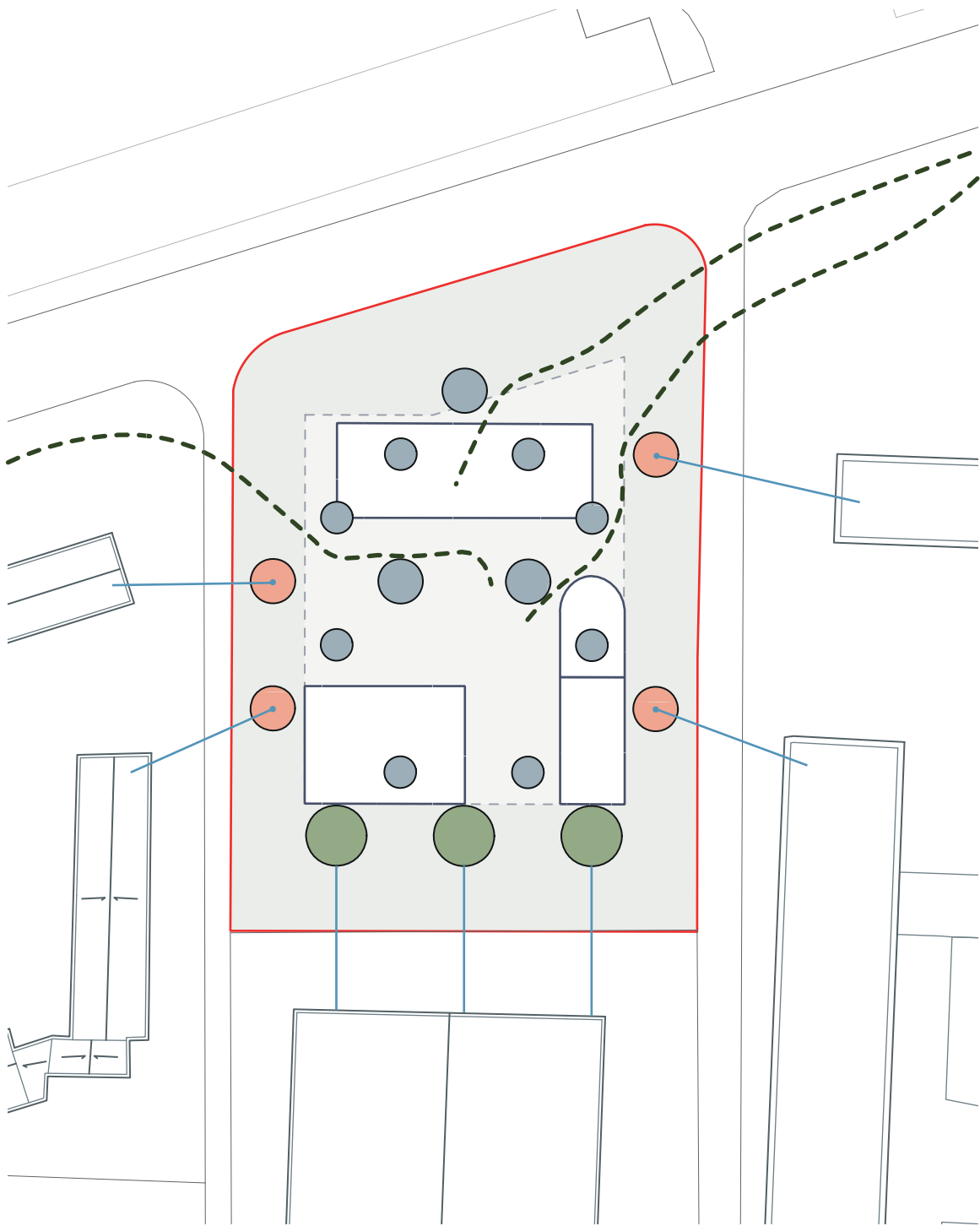


ESTABLISHING THE INNER SPACES WITHIN THE TANKS



- CORE SPACES
- WETLAND
- INLET TANKS

TANK DIFFERENTIATION

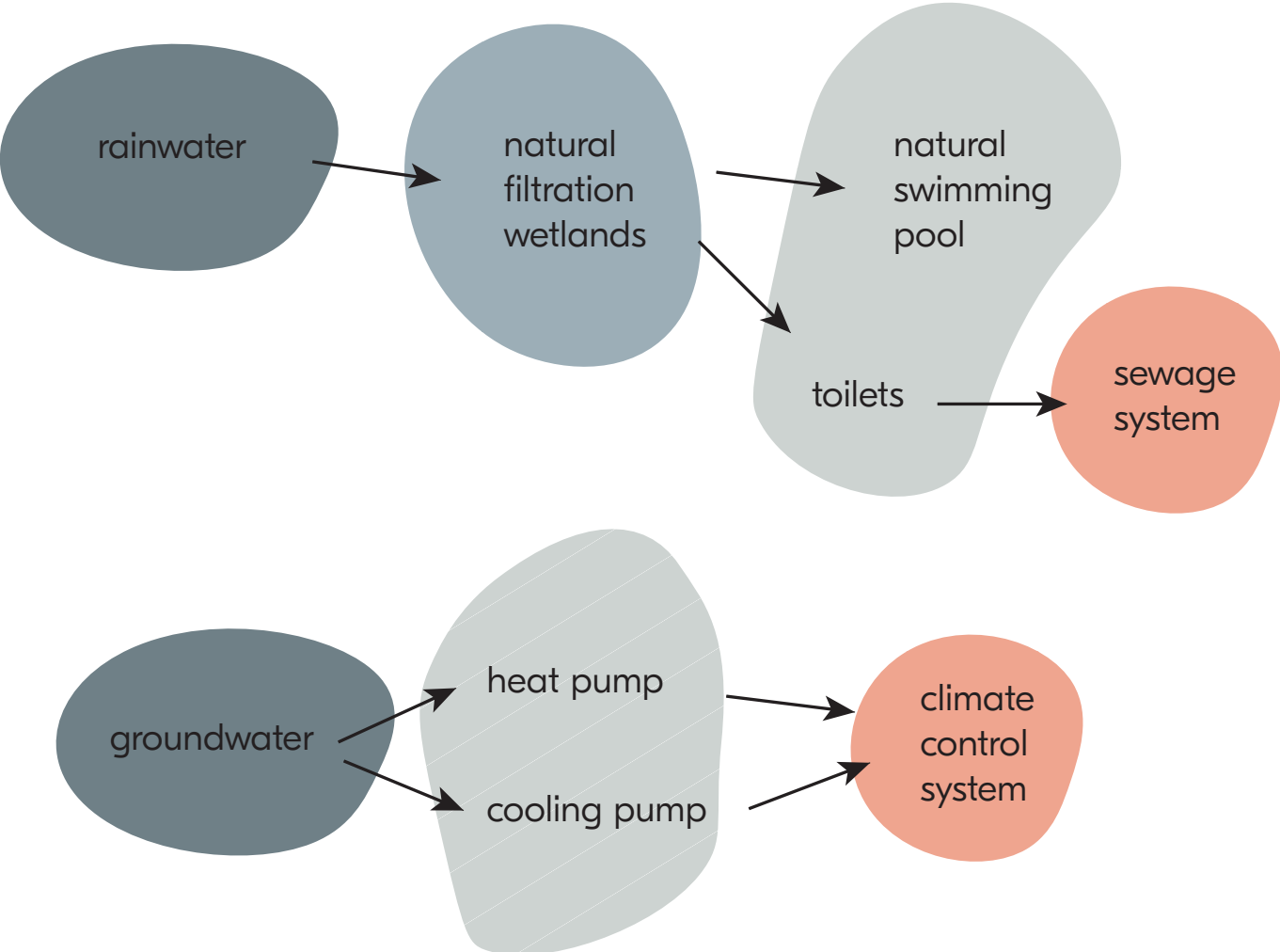


PAVILIONS WITHIN THE TANKS

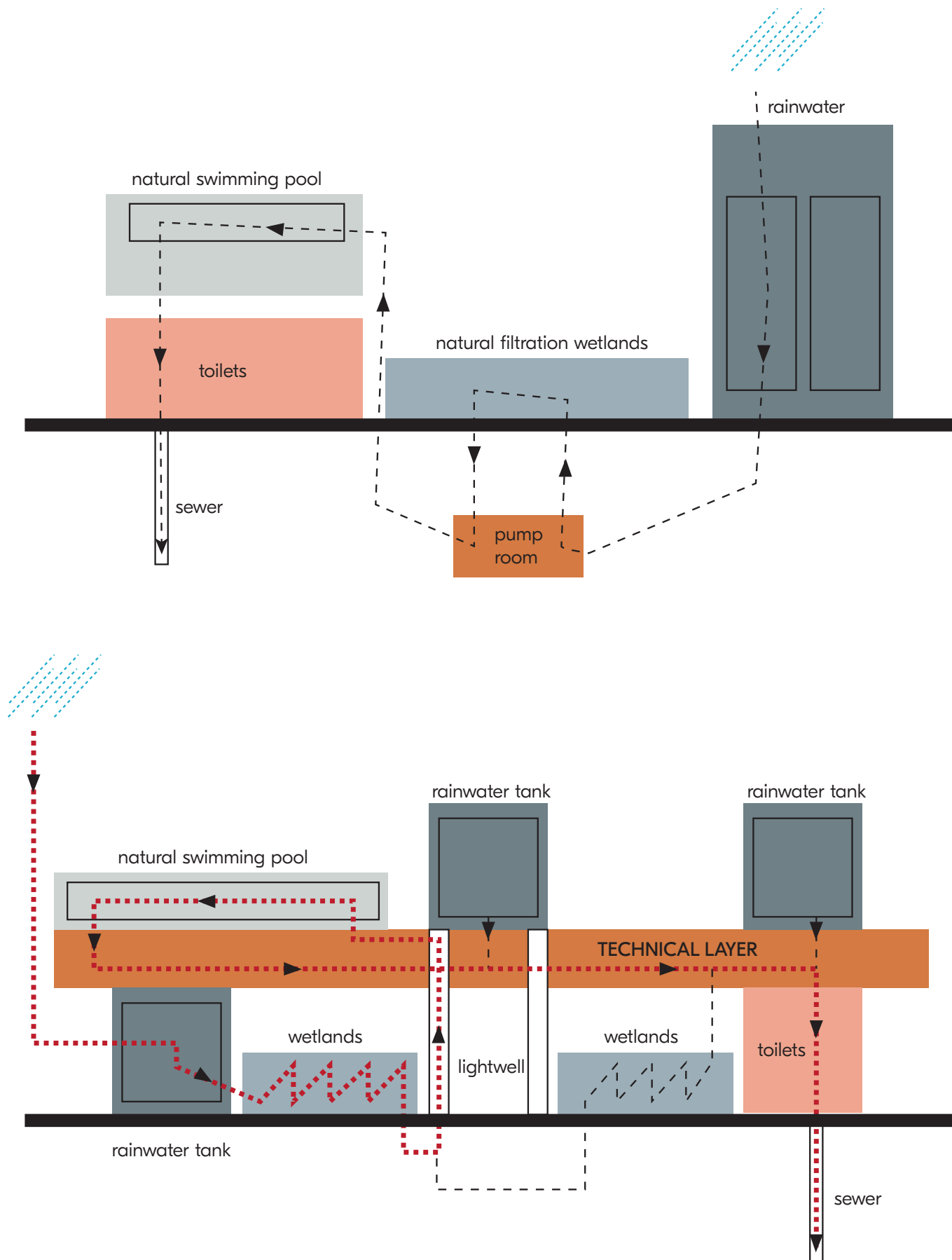


WATER CYCLE ANALYSIS

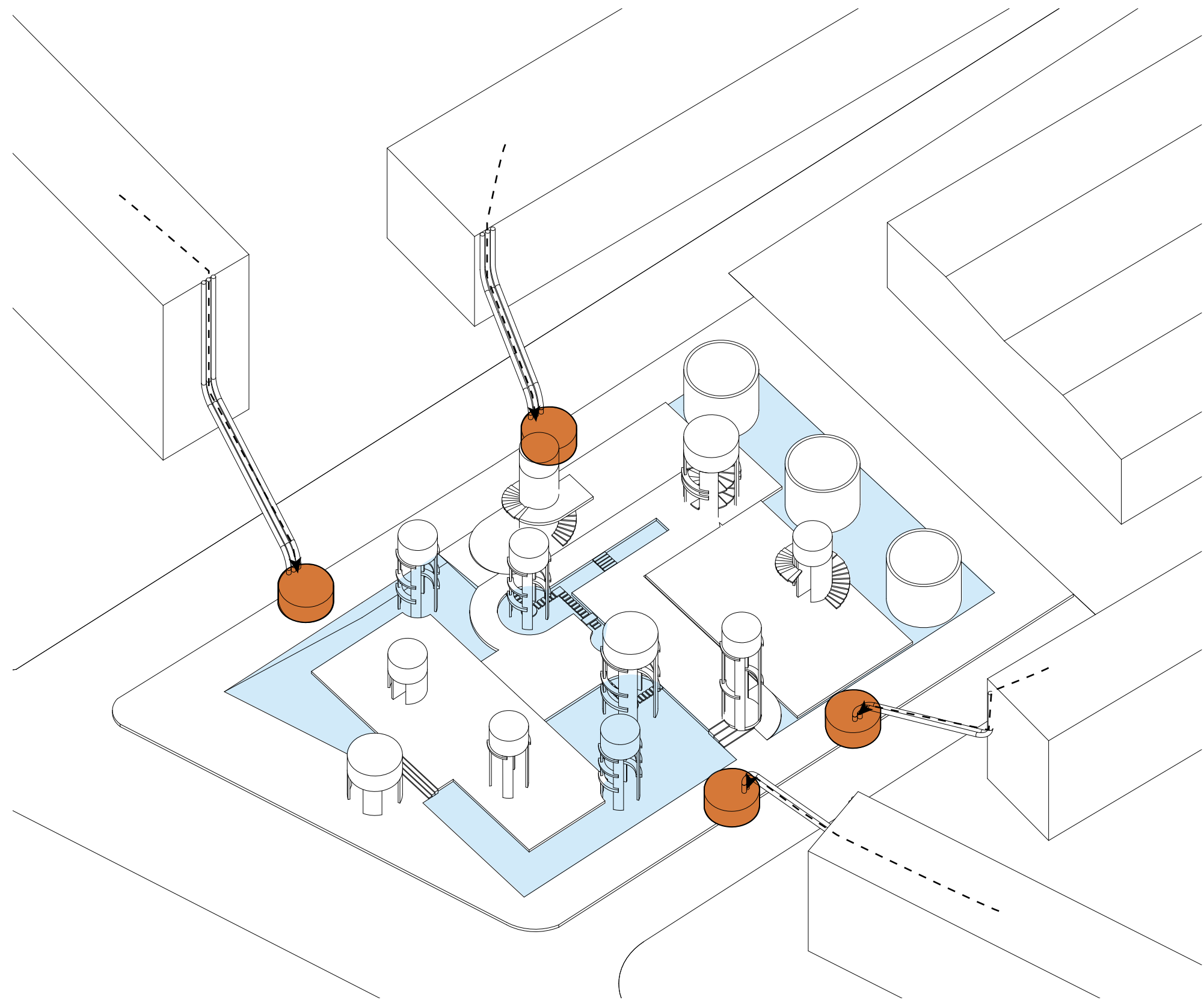
WATER CYCLE IN THE BUILDING



WATER PATH THROUGH THE BUILDING

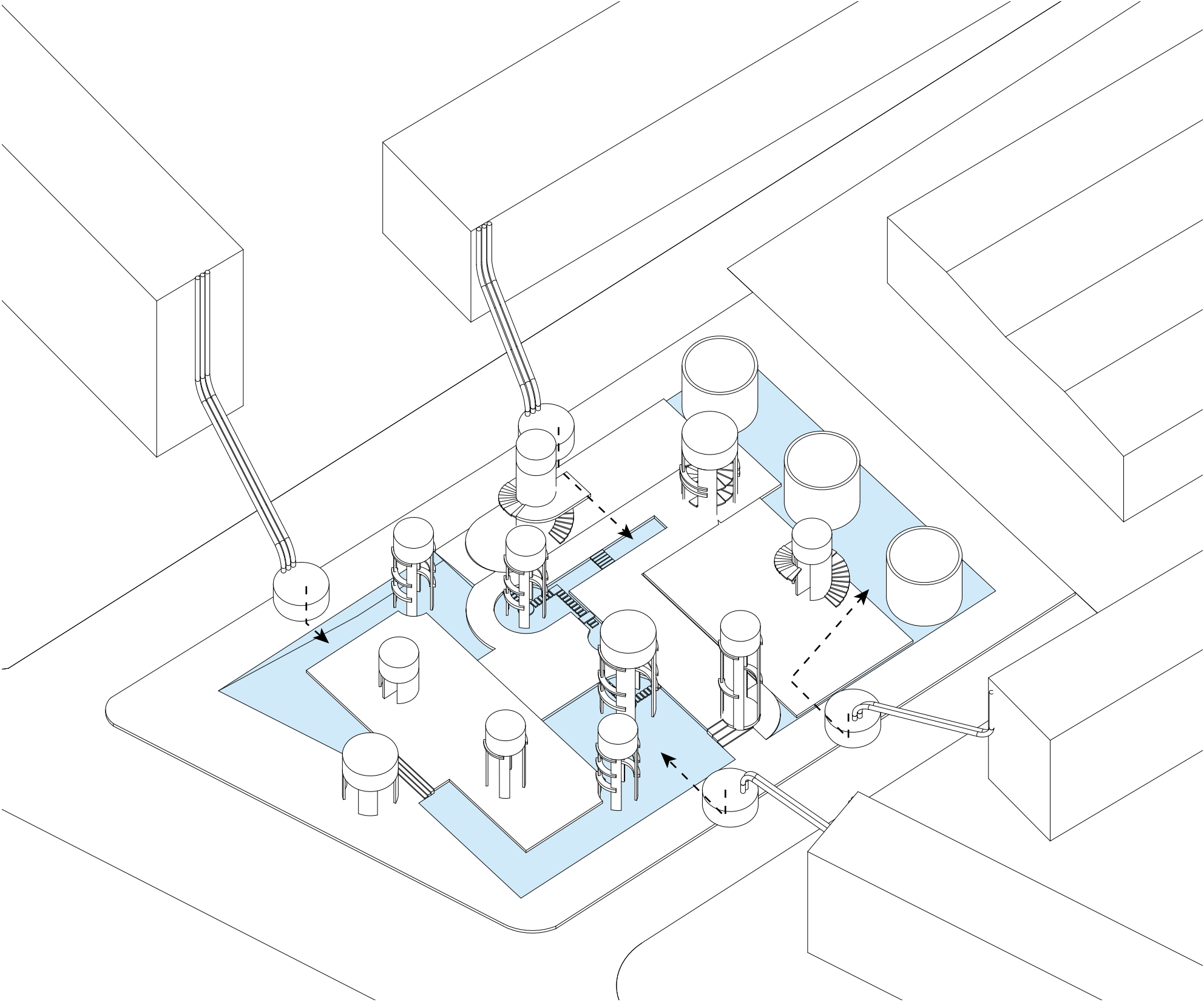


WATER PATH THROUGH THE BUILDING



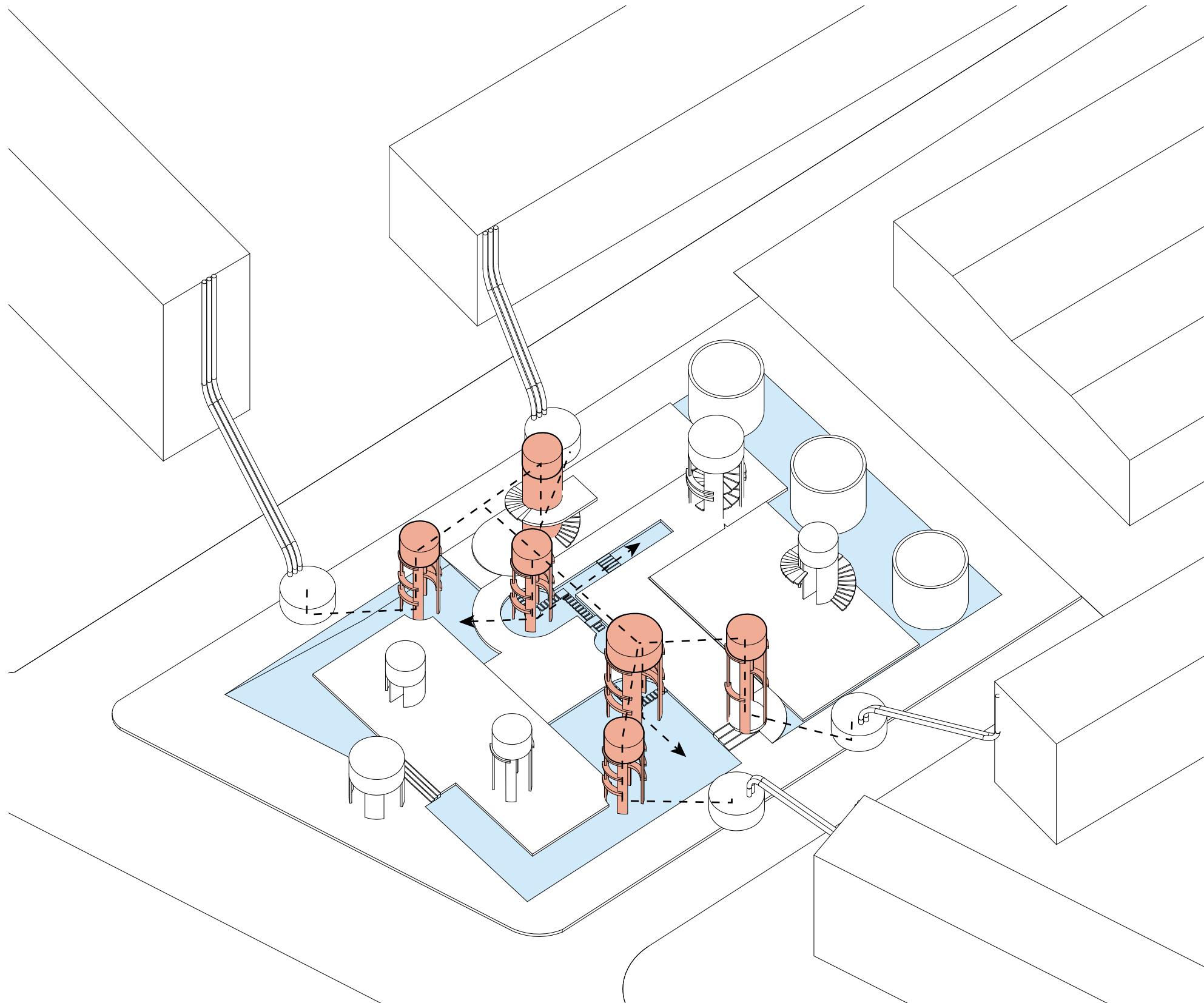
RAINWATER COLLECTED IS FILTERED THROUGH THE **INLET TANKS**

WATER PATH THROUGH THE BUILDING



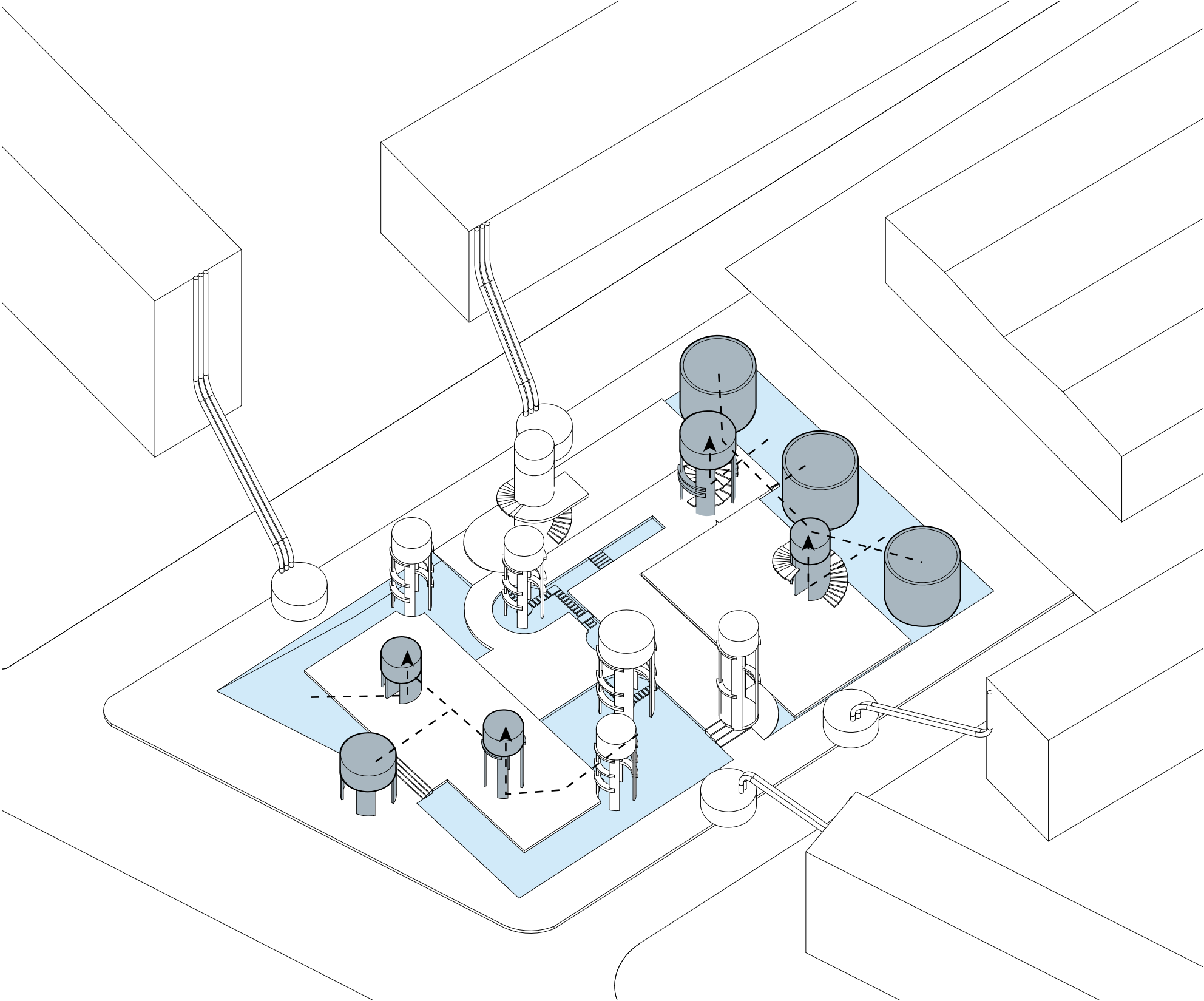
RAINWATER IS DISCHARGED INTO THE WETLANDS

WATER PATH THROUGH THE BUILDING

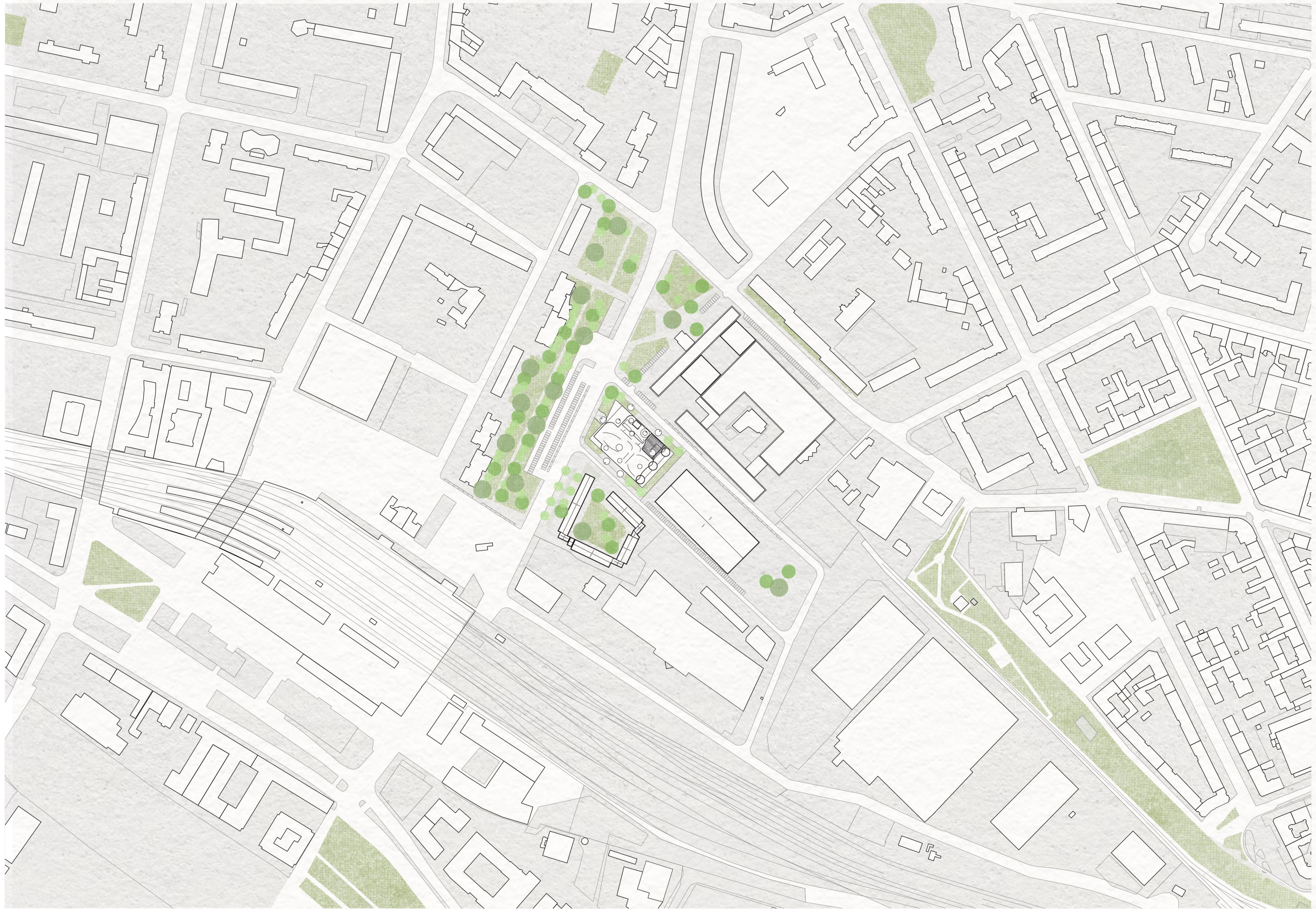


DURING HEAVY STORMS, THE EXCESS WATER IS STORED IN THE MIDDLE TANKS TEMPORARILY

WATER PATH THROUGH THE BUILDING



THE EXCESS CLEAN WATER IS STORED IN THE FRONT & BACK TANKS FOR THE SWIMMING POOL



PART 1 : WATER SYSTEMS

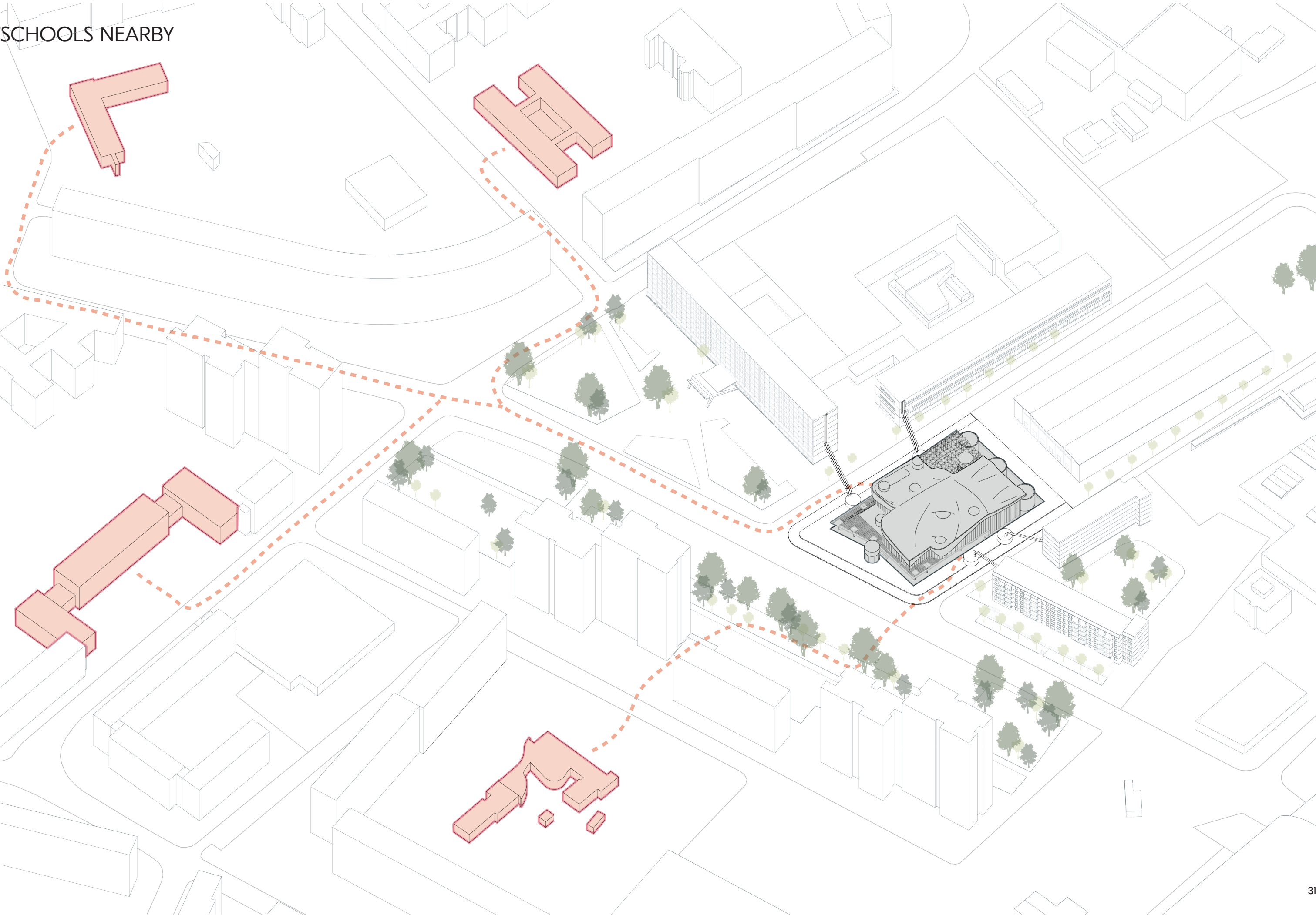
PART 2 : RESILIENCE IN PROGRAMMING

PART 3 : COMBINATION



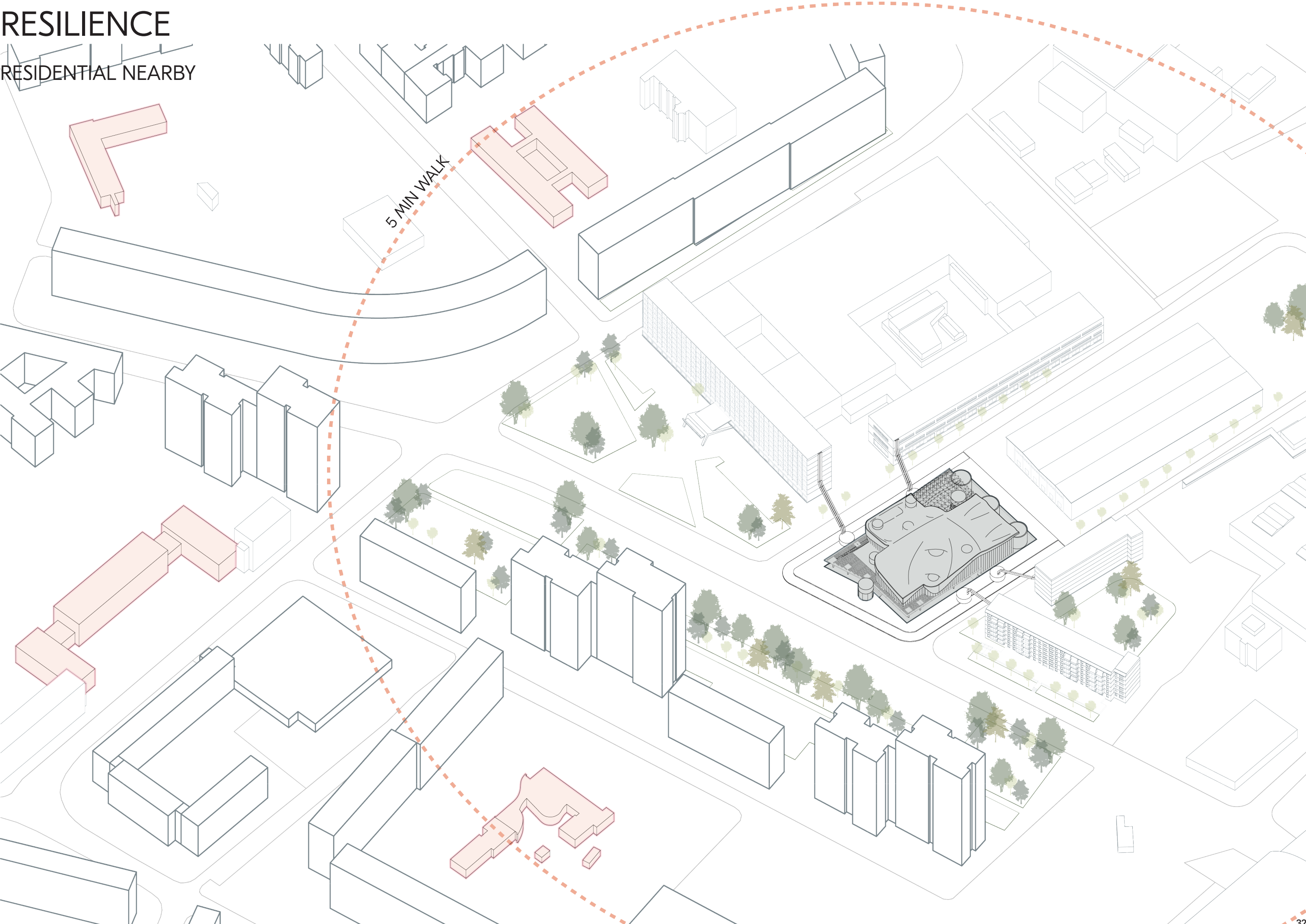
RESILIENCE

SCHOOLS NEARBY



RESILIENCE

RESIDENTIAL NEARBY



PART 1 : WATER SYSTEMS

PART 2 : RESILIENCE IN PROGRAMMING

PART 3 : COMBINATION



BUILDING FRAGMENT

THE LAYERS OF THE BUILDING

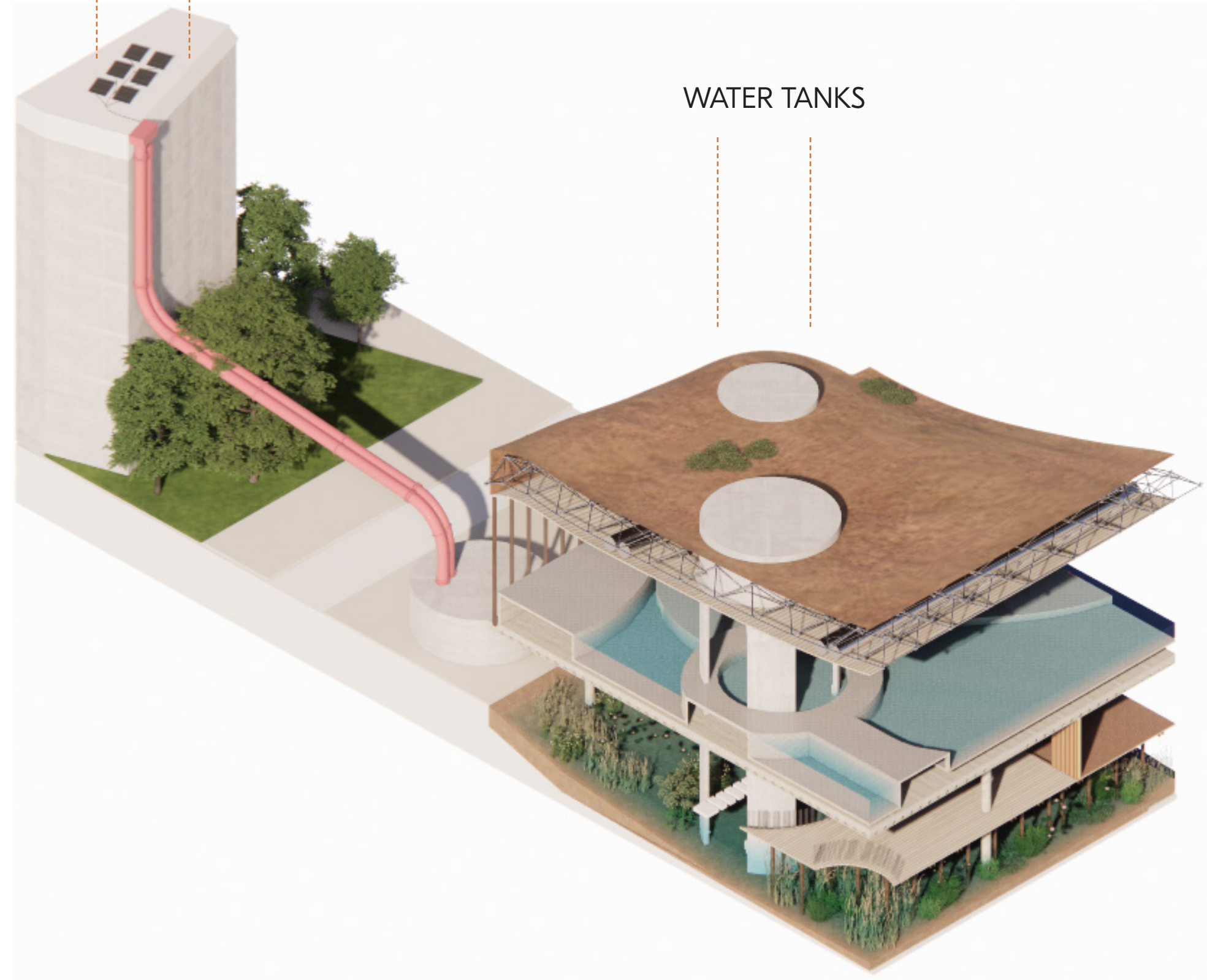
WATER COLLECTION &
SOLAR COLLECTORS

WATER TANKS

ROOF

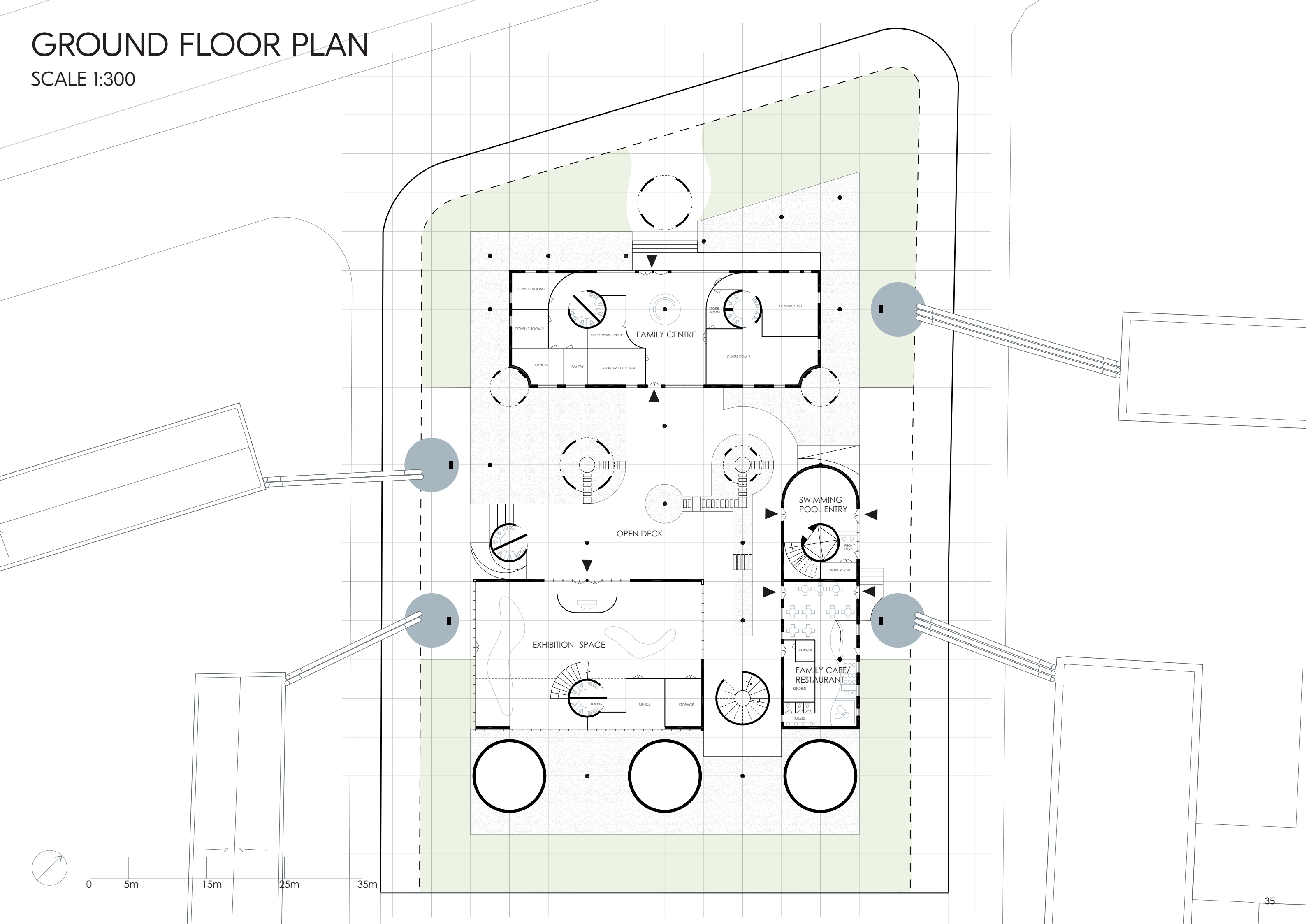
TECHNICAL LAYER

WETLANDS



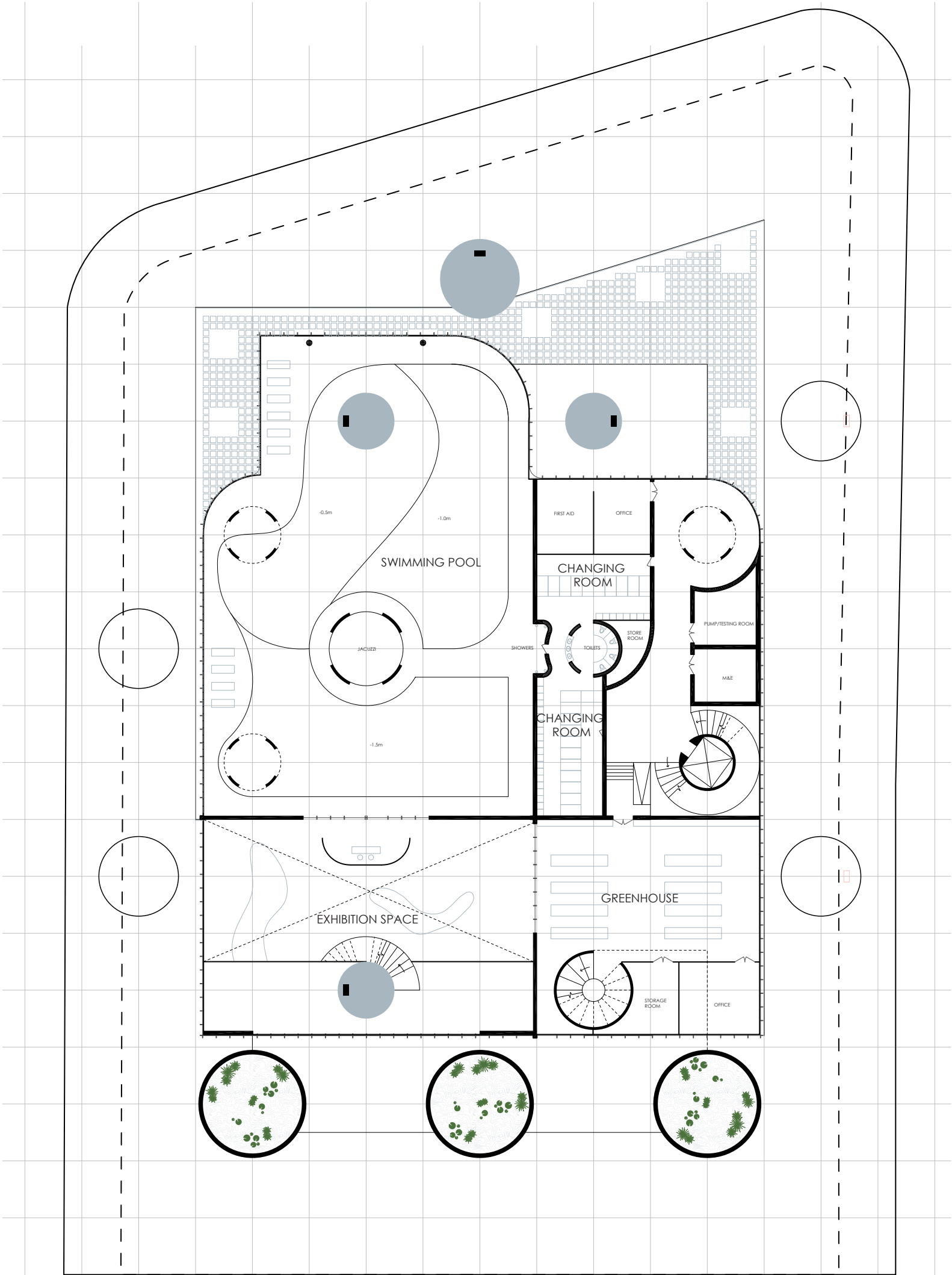
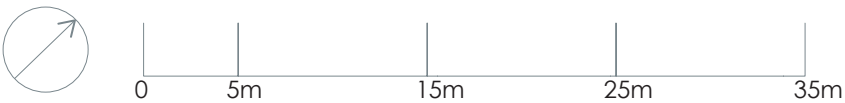
GROUND FLOOR PLAN

SCALE 1:300



FIRST FLOOR PLAN

SCALE 1:300



ROOF PLAN

SCALE 1:300



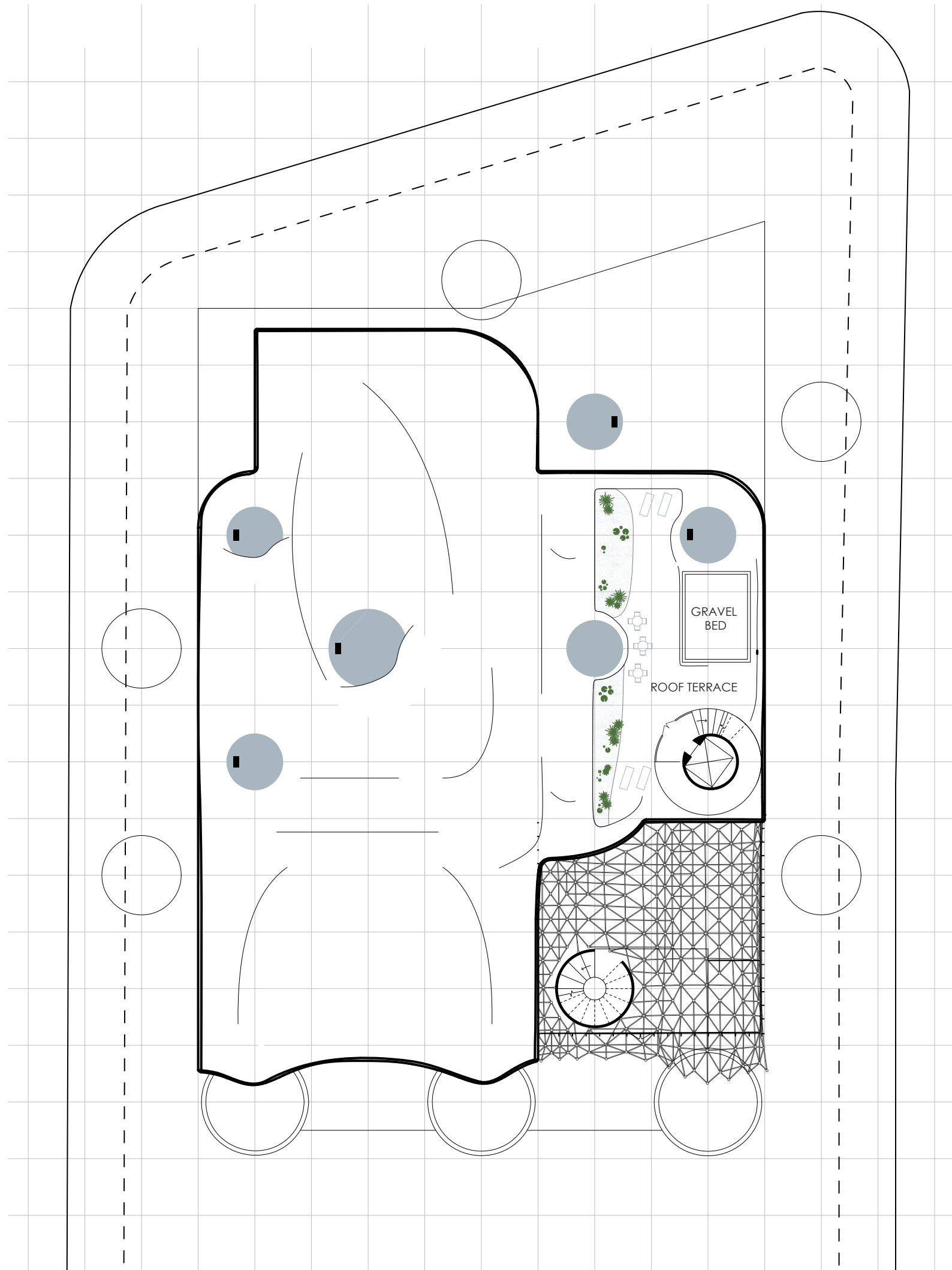
0

5m

15m

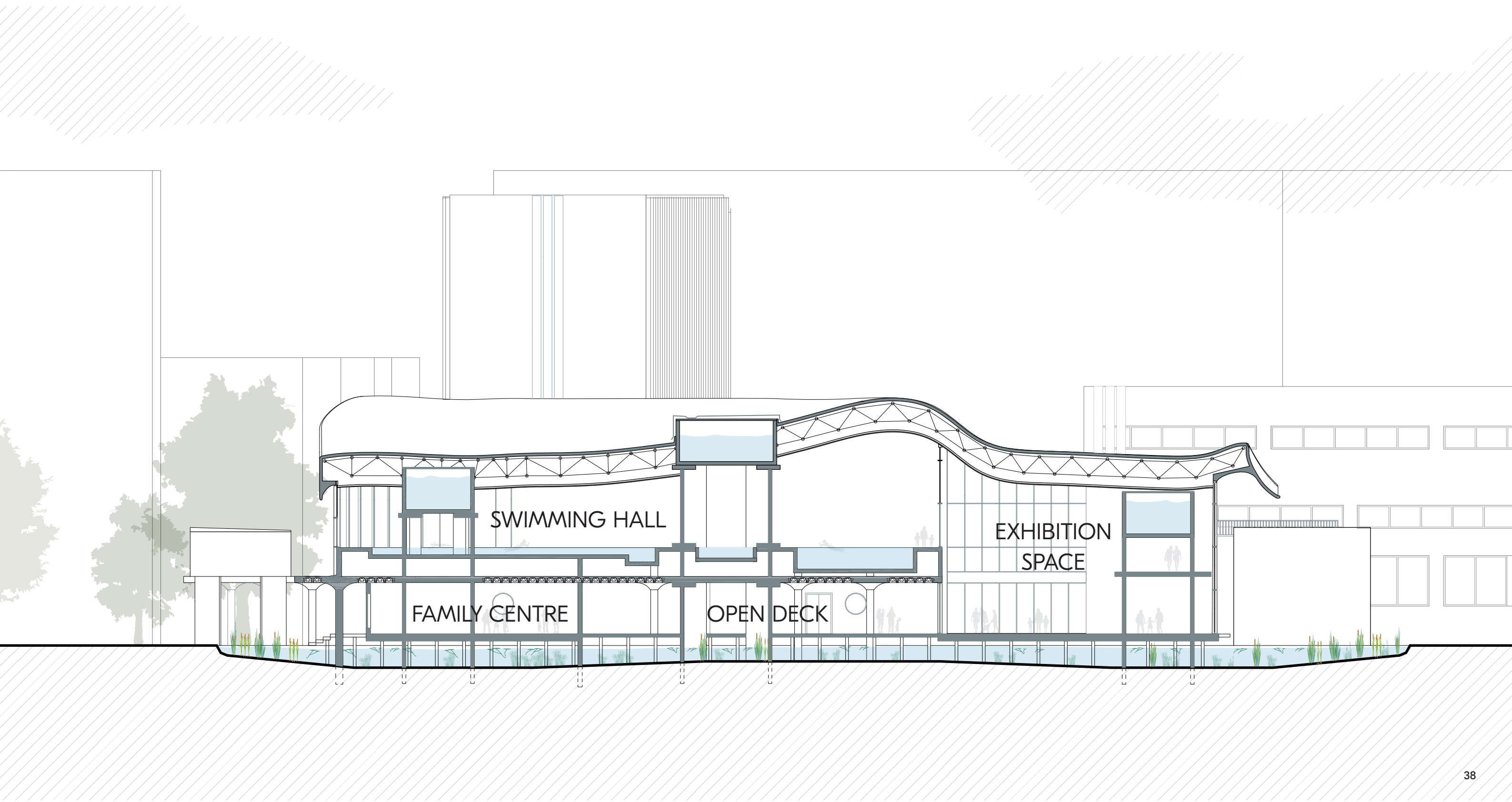
25m

35m

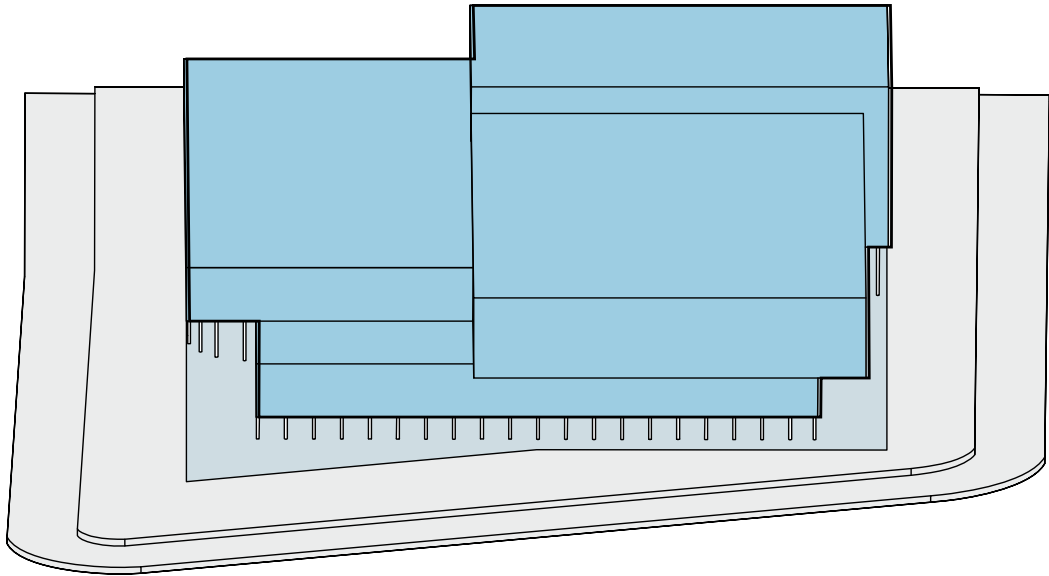


SECTION

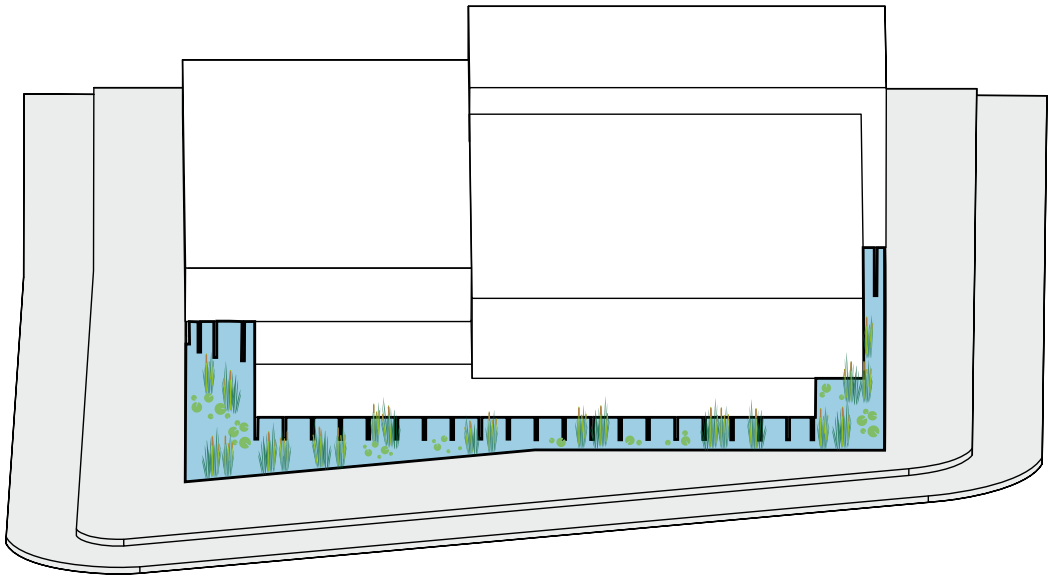
SCALE 1:250



DESIGN SEQUENCE

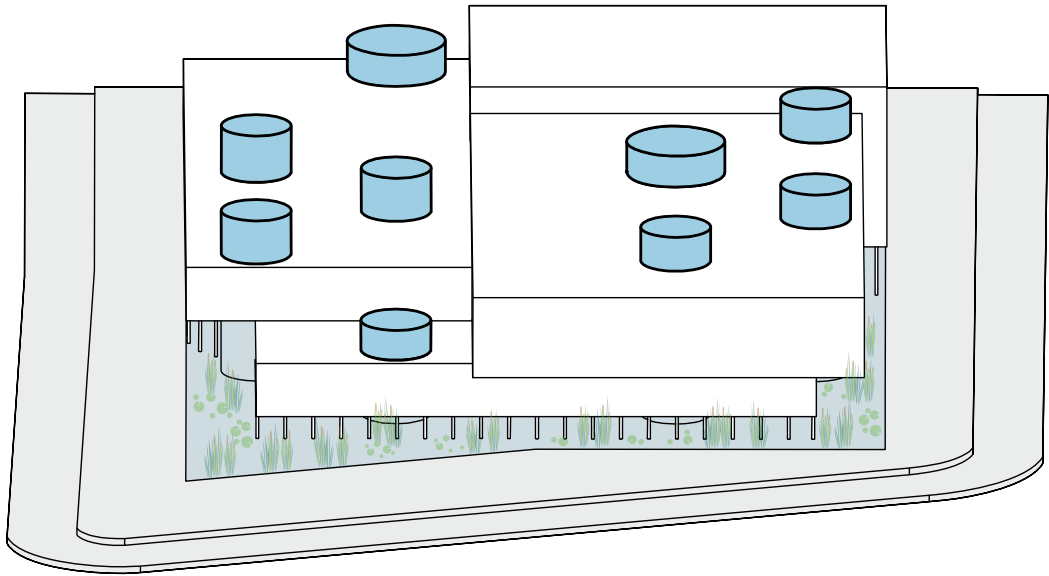


PROGRAMME BOXES ARE STACKED UPON EACH OTHER OVER WATER

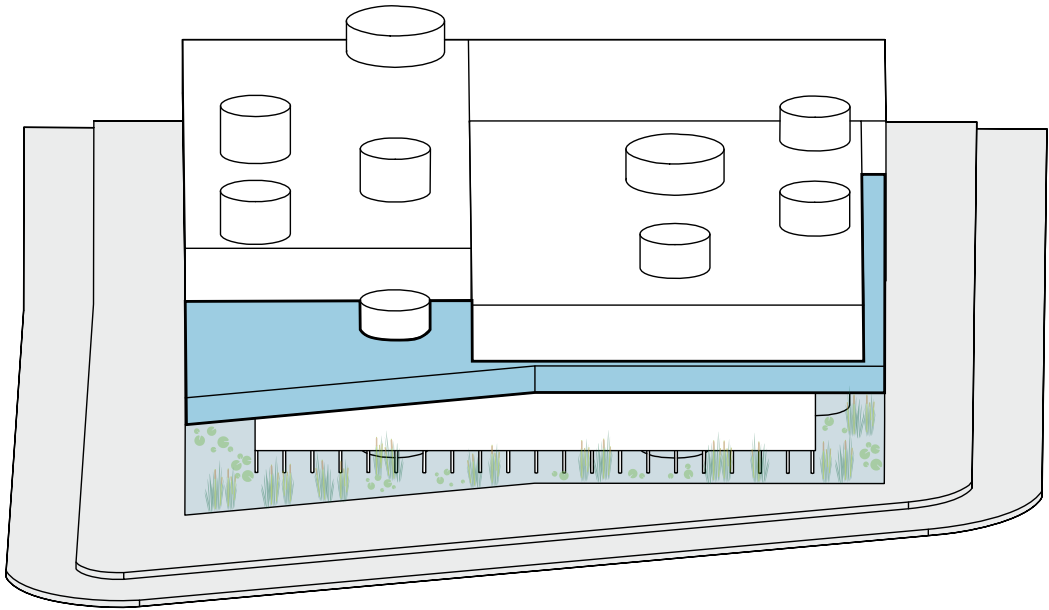


THE WETLANDS ARE ESTABLISHED

DESIGN SEQUENCE

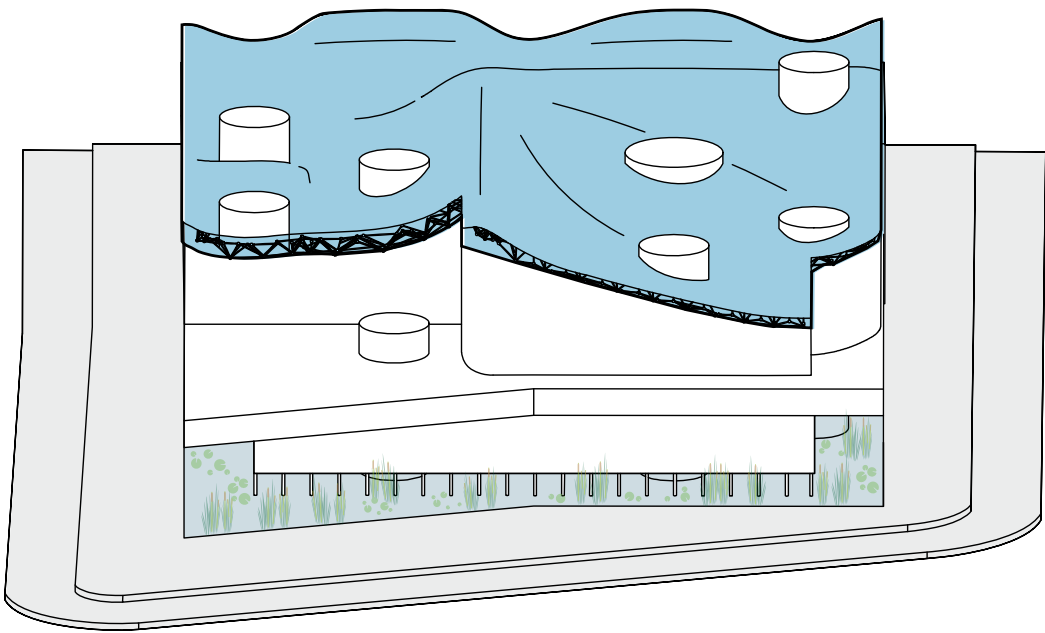


WATER TANKS PUNCH THROUGH THE MASS

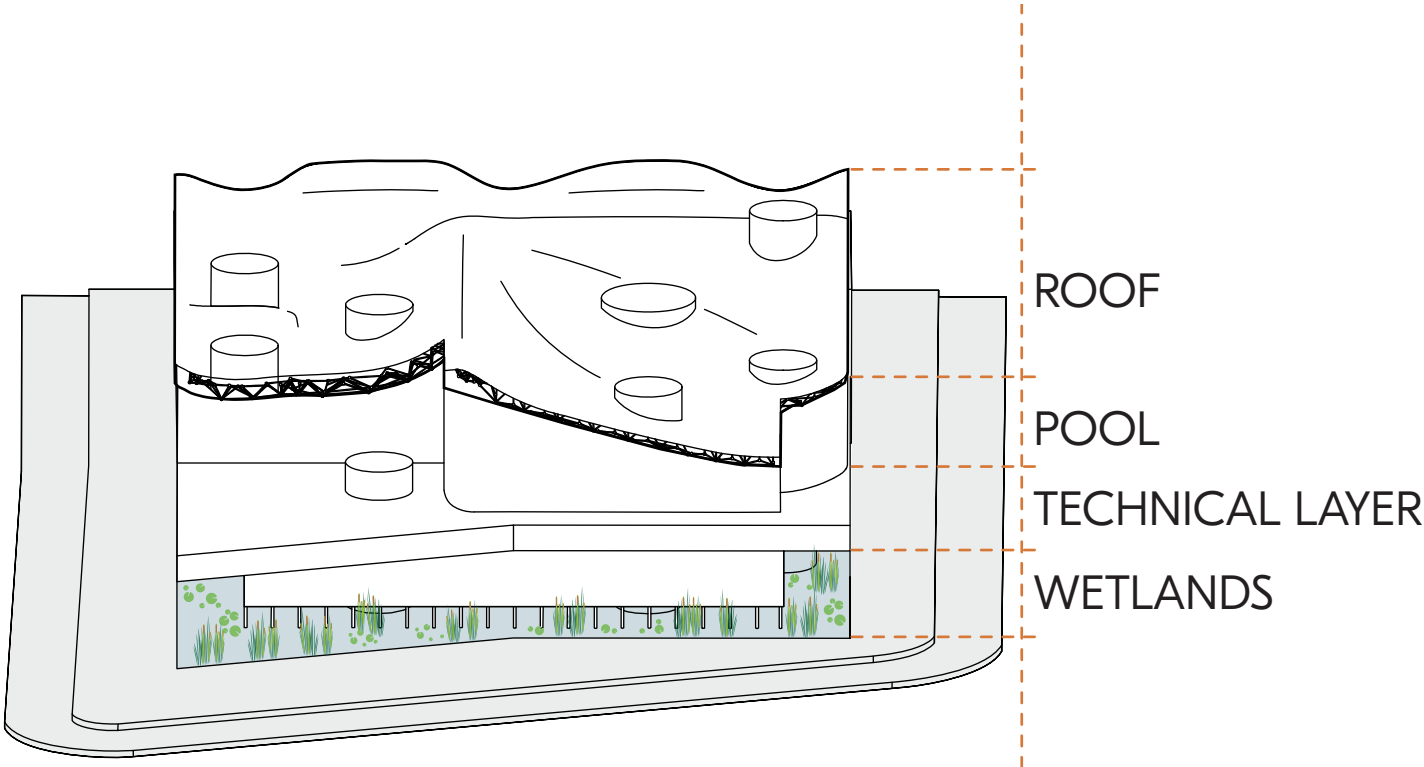


A TECHNICAL LAYER IS INTRODUCED BETWEEN FLOORS

DESIGN SEQUENCE

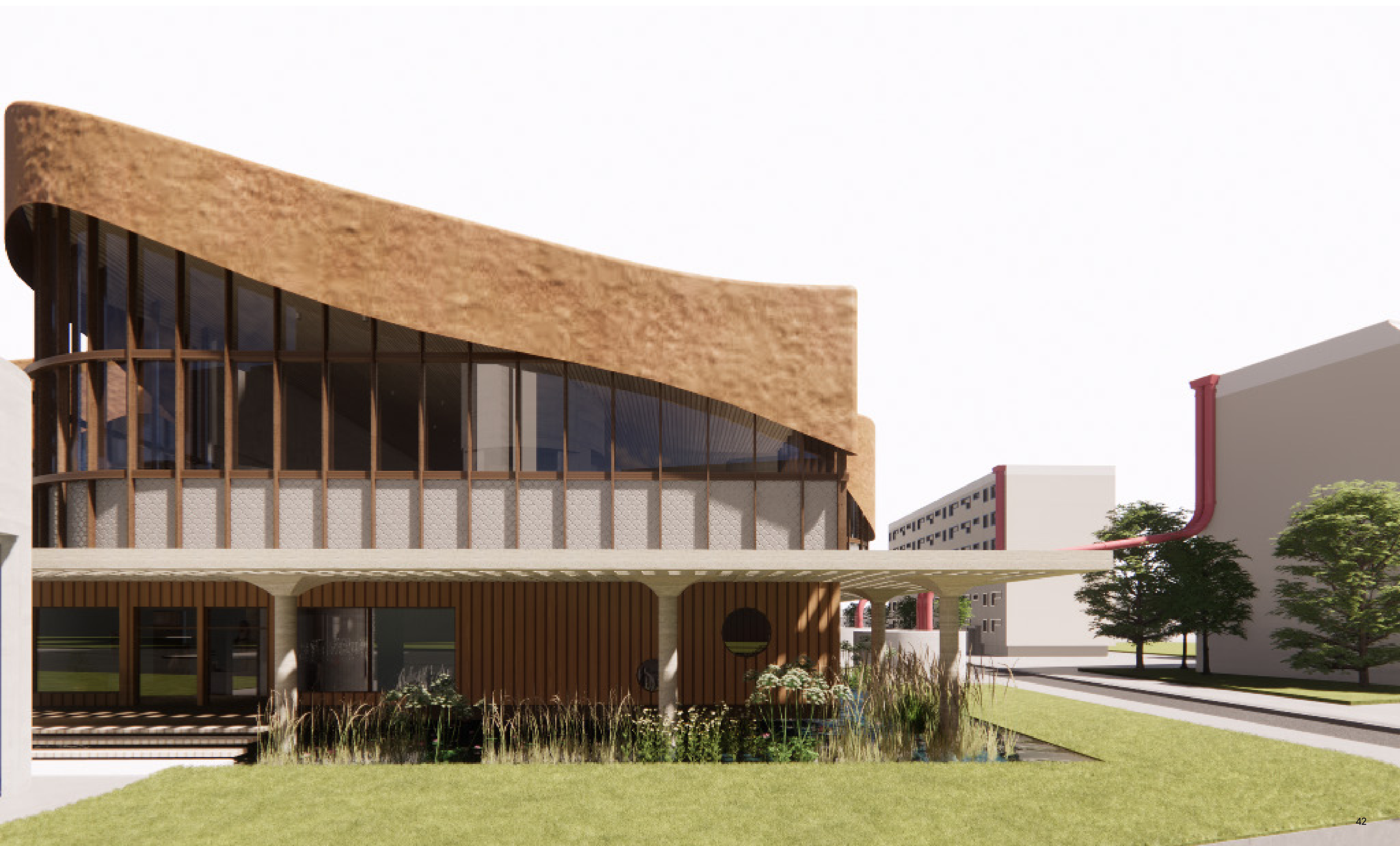


THE ROOF IS SHAPED BY AND FOR WATER



VIEW

THE LAYERS OF THE BUILDING



WETLAND LAYER

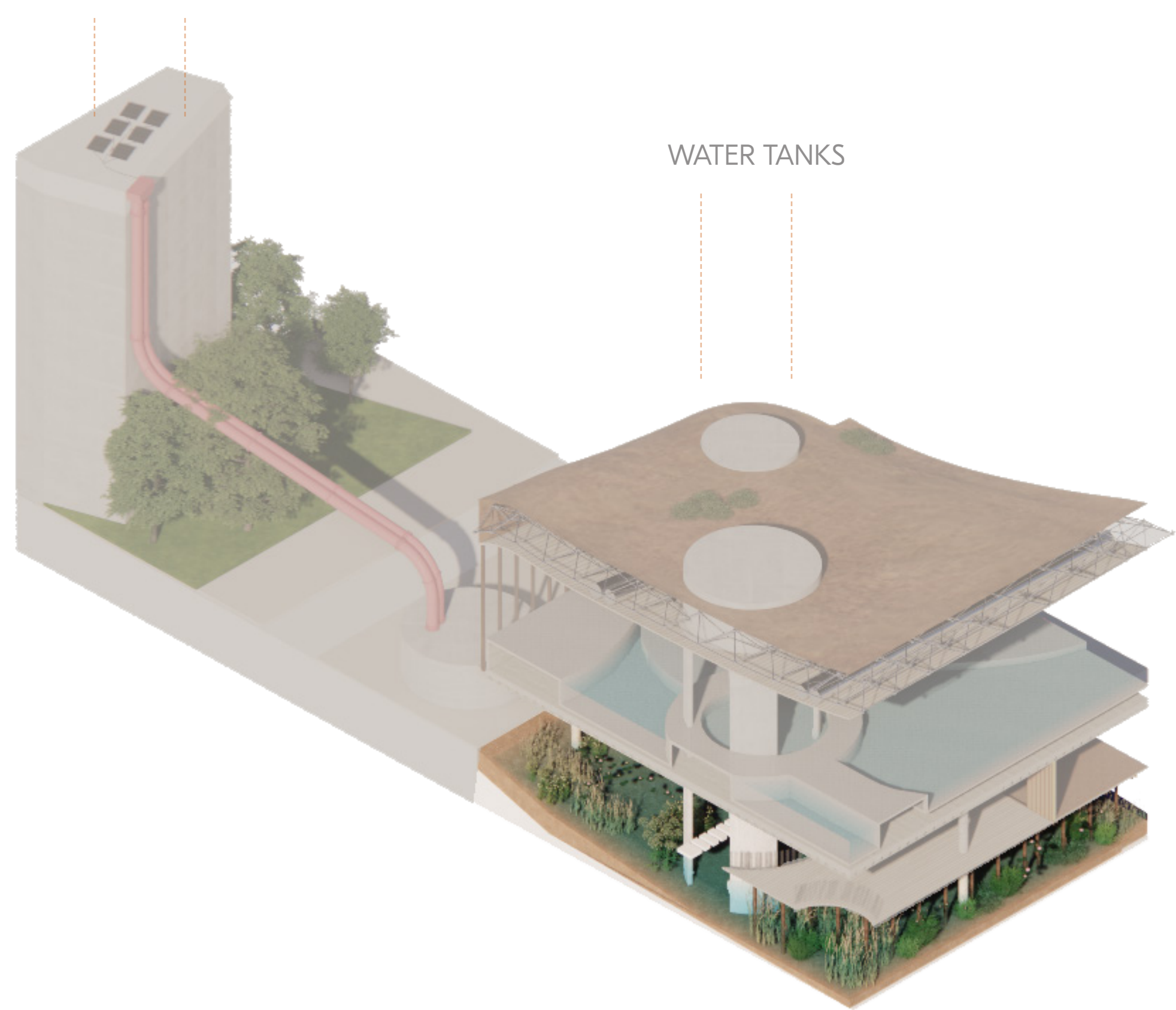
WATER COLLECTION &
SOLAR COLLECTORS

WATER TANKS

ROOF

TECHNICAL LAYER

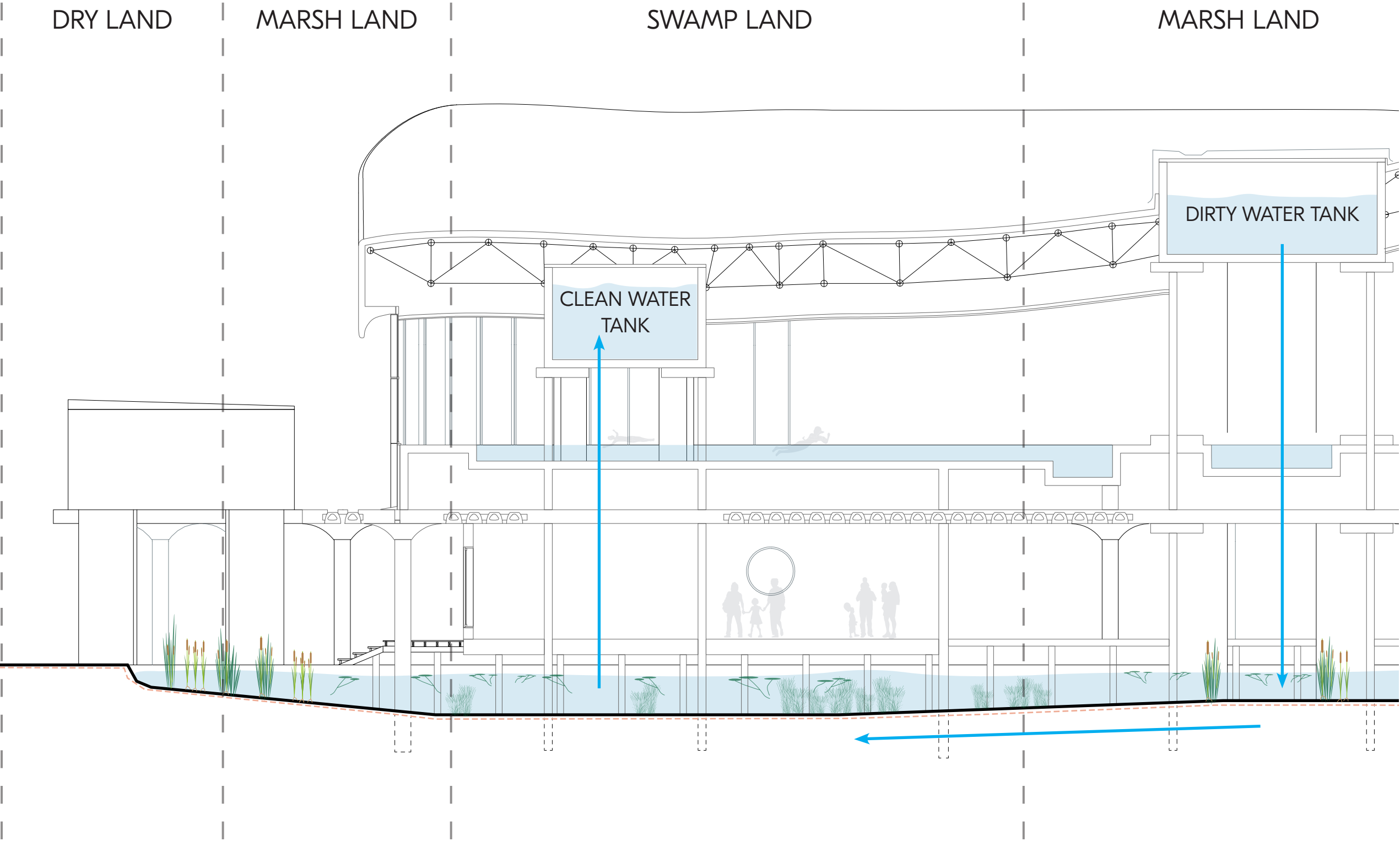
WETLANDS



ECOLOGY

WETLAND ZONES

DRY ← → WET



Soil PH should be 6.5 - 8.5PH

Medium textured/loamy soils are a good choice.

For stormwater wetlands, the goal should be a diverse assemblage of plants not only for it to be aesthetically pleasing but also it will be more likely to resist invasive species and pests.

The water should only reach up to 3m, otherwise light cannot penetrate to the bottom of the pond

ECOLOGY

WETLAND PLANT TYPES

Emergent aquatic macrophytes

These are the dominating life form in wetlands and marshes, growing within a water table range from 50 cm below the soil surface to a water depth of 150 cm or more.



Common Reed



Mannagrasses



Oenanthe Conioides

Floating-leaved aquatic macrophytes

The freelyfloating species are highly diverse in form and habit, ranging from large plants with rosettes of aerial and/or floating leaves and well-developed submerged roots to minute surface-floating plants with few or no roots



Water Lilies



Water Lettuce



Water Hyacinth

Submerged aquatic macrophytes:

These have their photosynthetic tissue entirely submerged but usually the flowers exposed to the atmosphere



Elodea



Myriophyllum



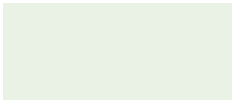
Deschampsia wibeliana

endemic to Europe

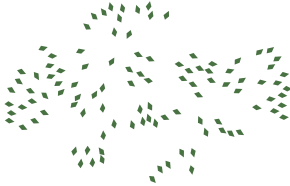
ECOLOGY

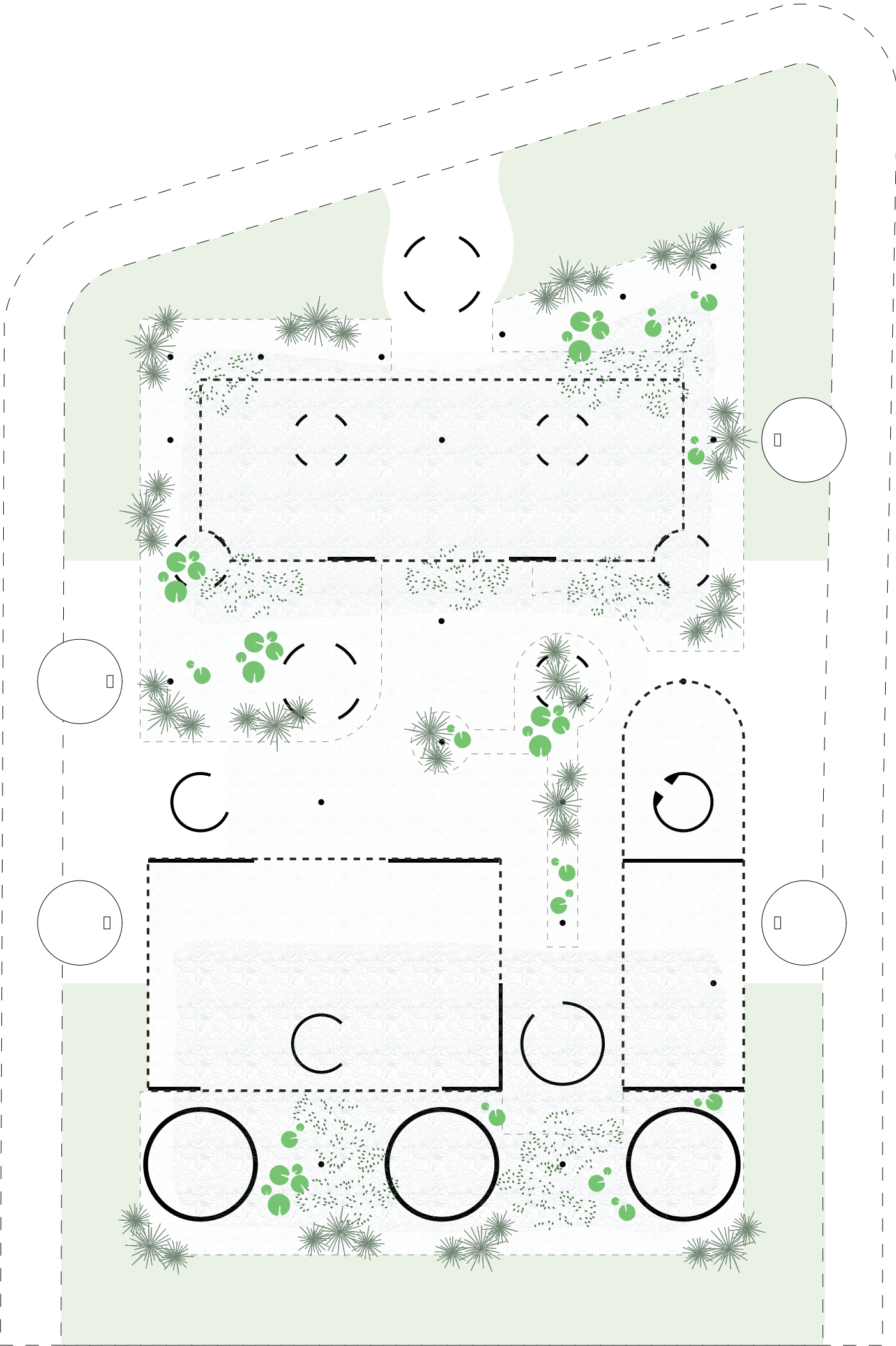
PLANTING PLAN

WETLAND ZONES

-  Dry land
-  Marsh land
-  Swamp land

WETLAND PLANT TYPES

-  Emergent aquatic macrophytes
-  Floating-leaved aquatic macrophytes
-  Submerged aquatic macrophytes:



ECOLOGY

OPEN DECK VIEW



ECOLOGY

EXHIBITION HALL VIEW



ECOLOGY

EXTERIOR VIEW



TECHNICAL LAYER

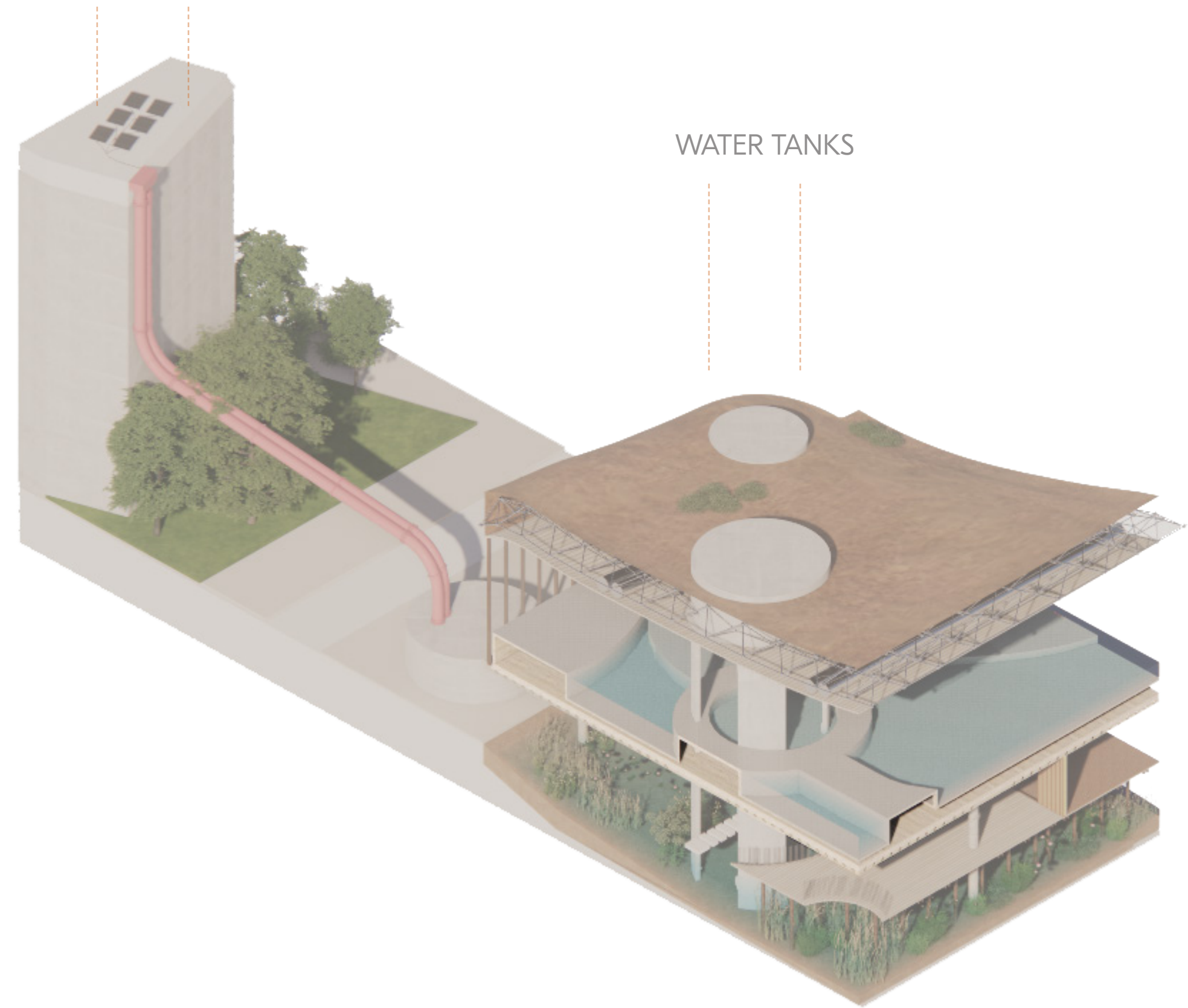
WATER COLLECTION &
SOLAR COLLECTORS

WATER TANKS

ROOF

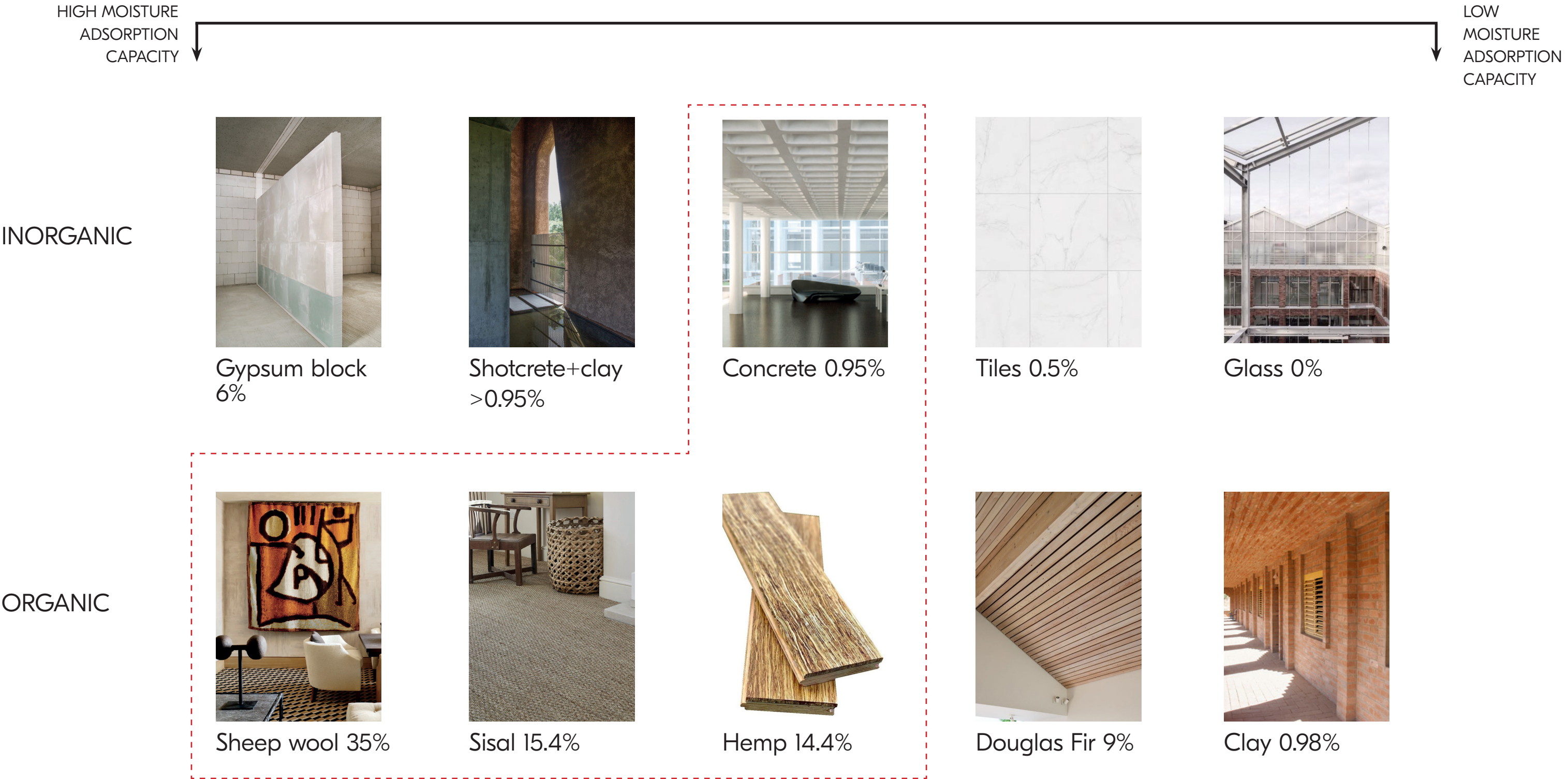
TECHNICAL LAYER

WETLANDS



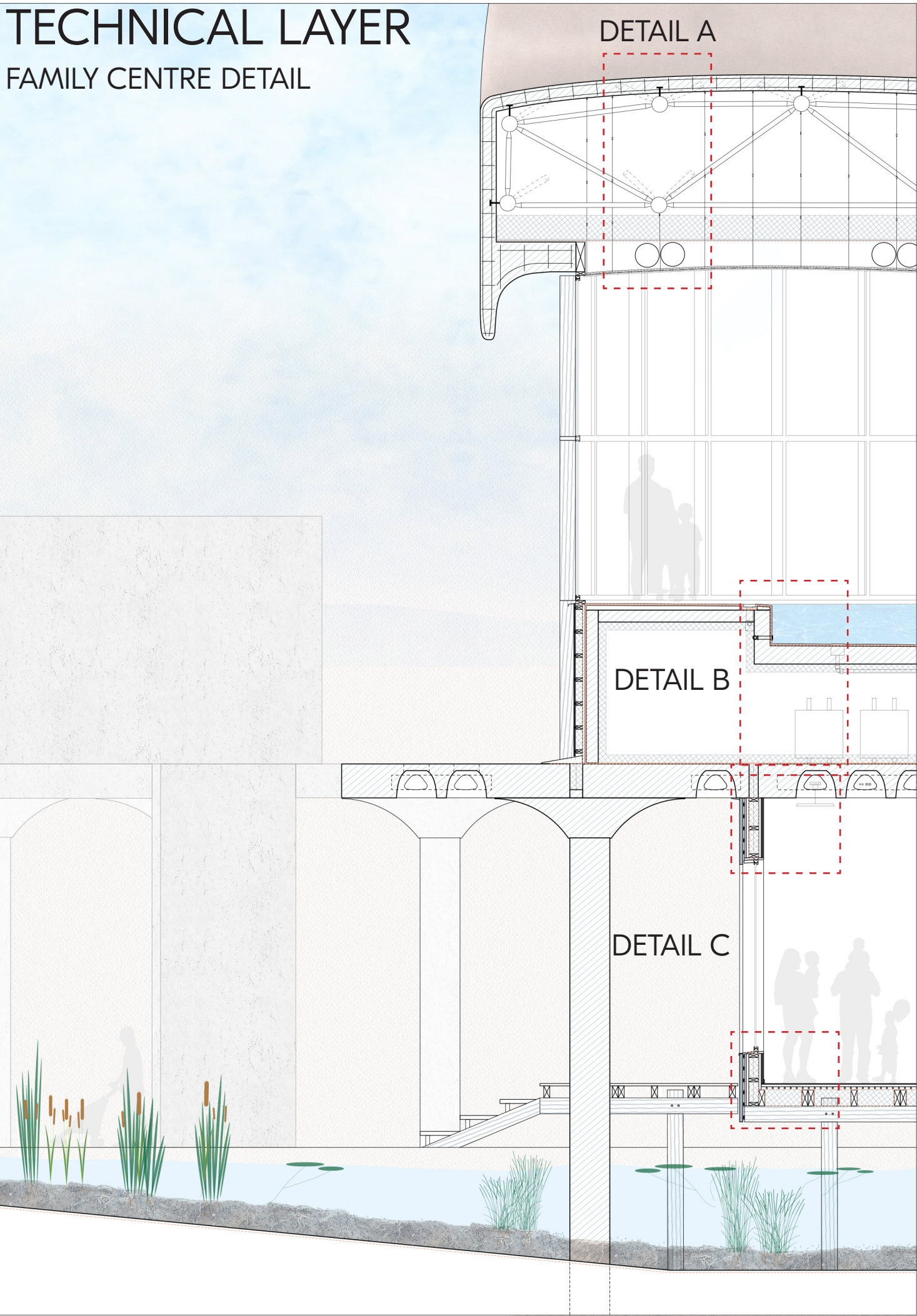
CLIMATE

MATERIAL CATALOG: FAMILY CENTRE



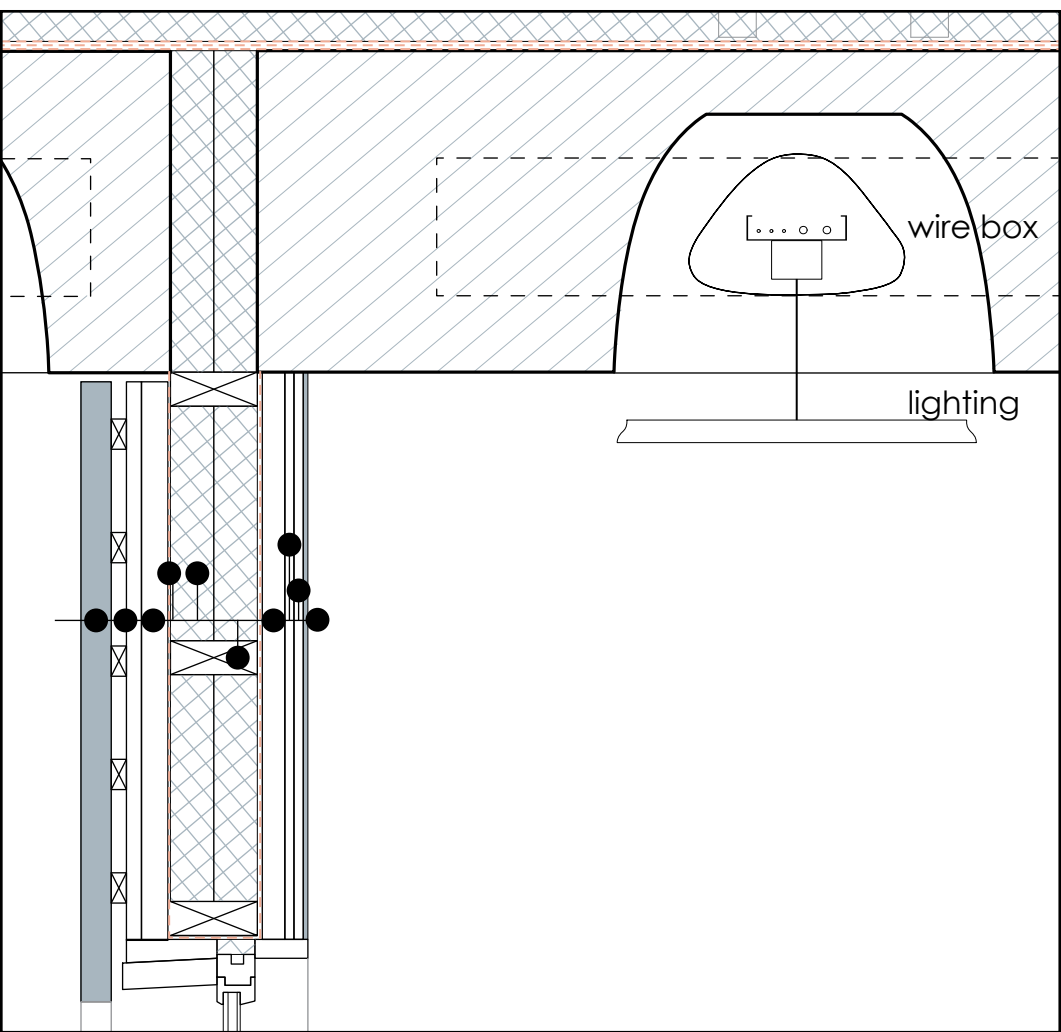
TECHNICAL LAYER

FAMILY CENTRE DETAIL

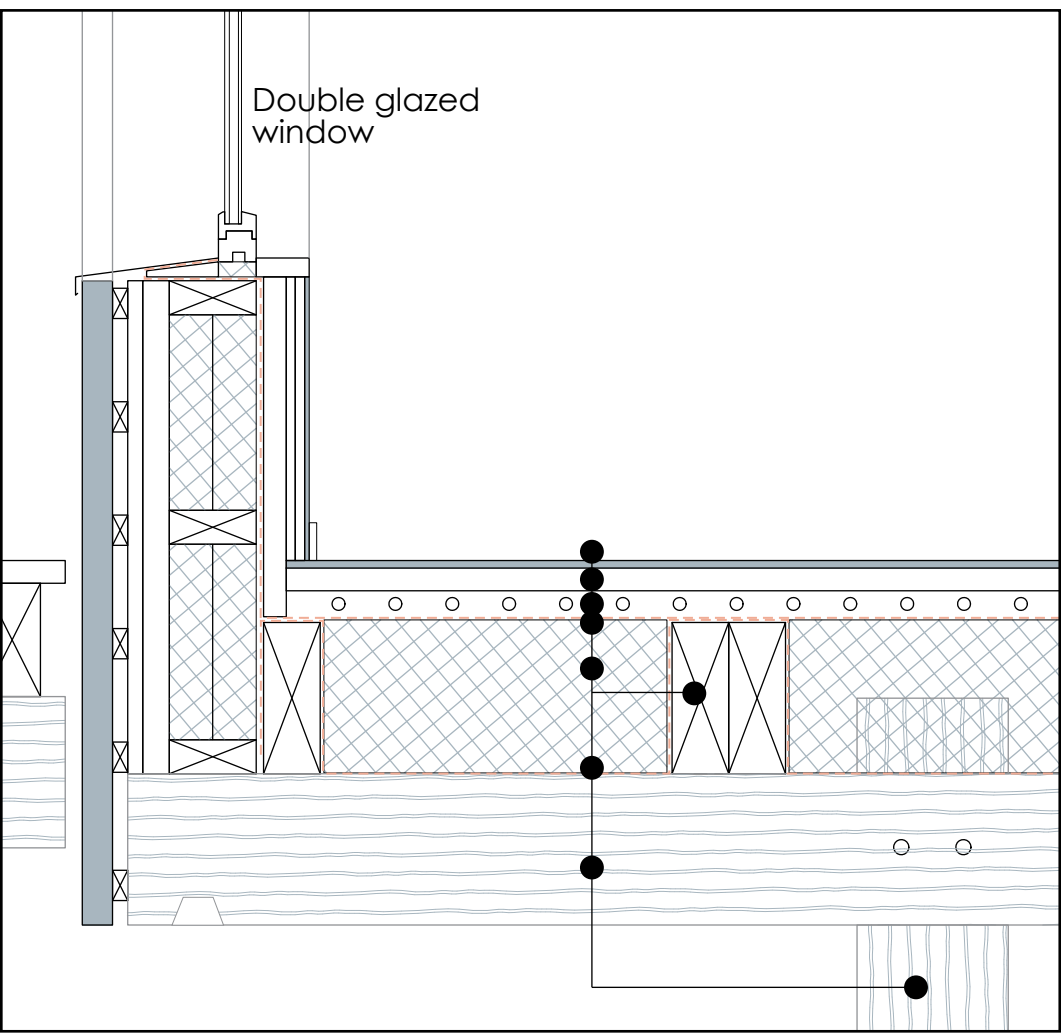


DETAIL C

- Wall
- Timber mullion
- Batons & counter batons
- Breathable bitumen fireboard 35mm
- Windtight breathable membrane
- Hemp insulation
- Laminated wood section
- Plywood 12mm
- Plasterboard 12.5mm
- Clay plaster topcoat 6mm



- Floor
- Sisal flooring
- Timber floor joists
- Underfloor heating
- Airtightness membrane
- Insulation
- Joists
- Windtight breathable membrane
- Headstock
- Pile



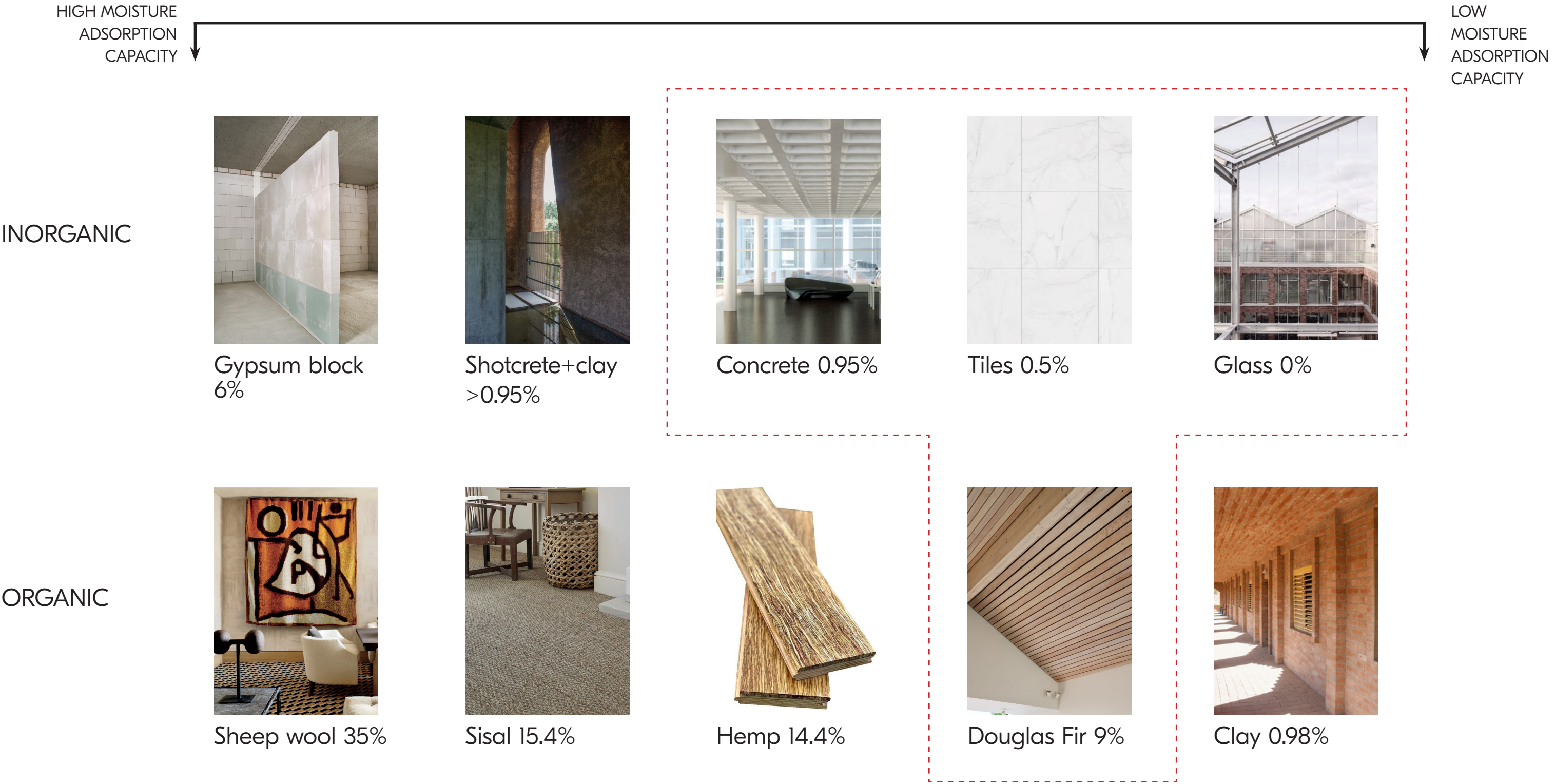
TECHNICAL LAYER

FAMILY CENTRE VIEW



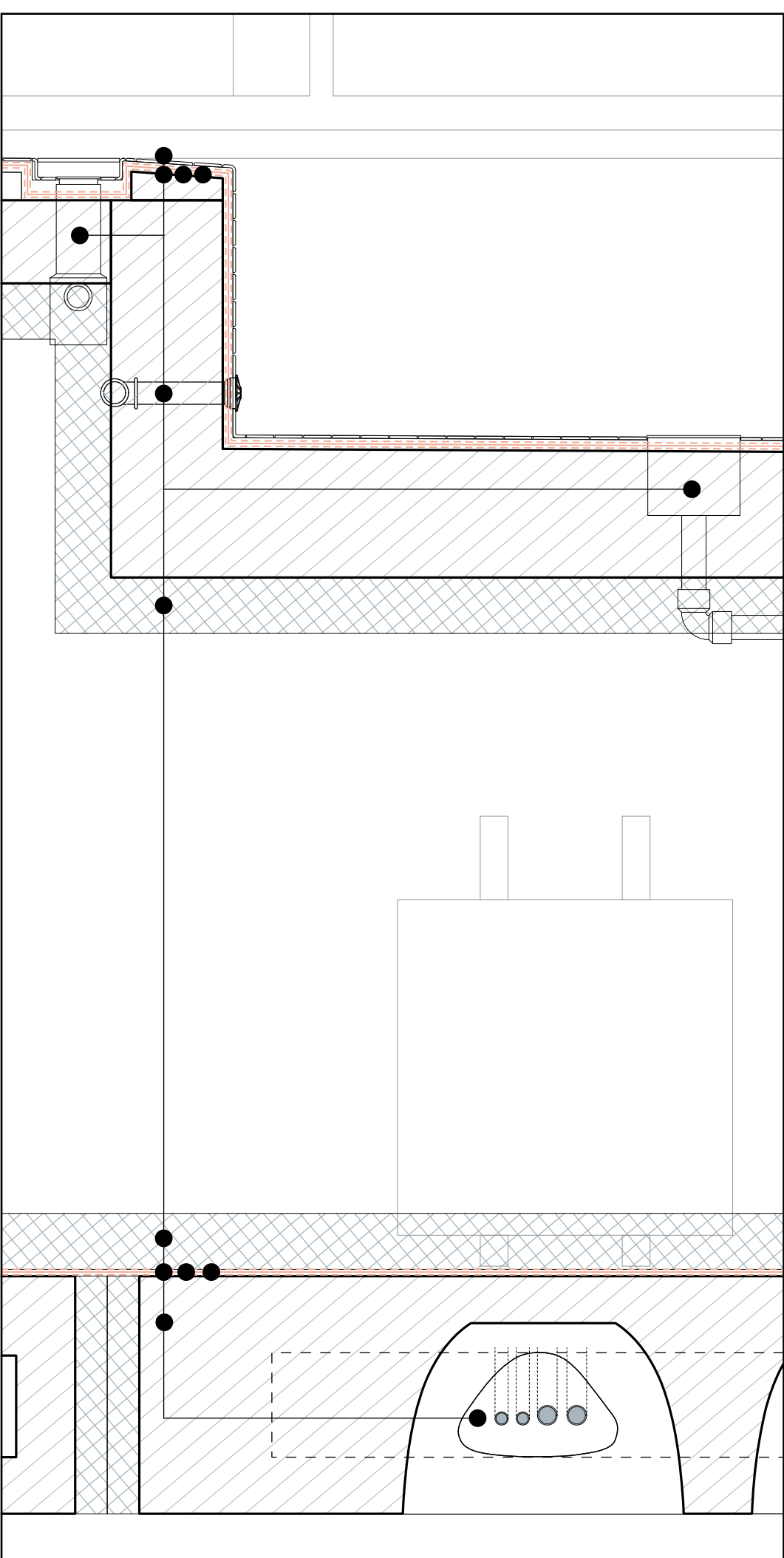
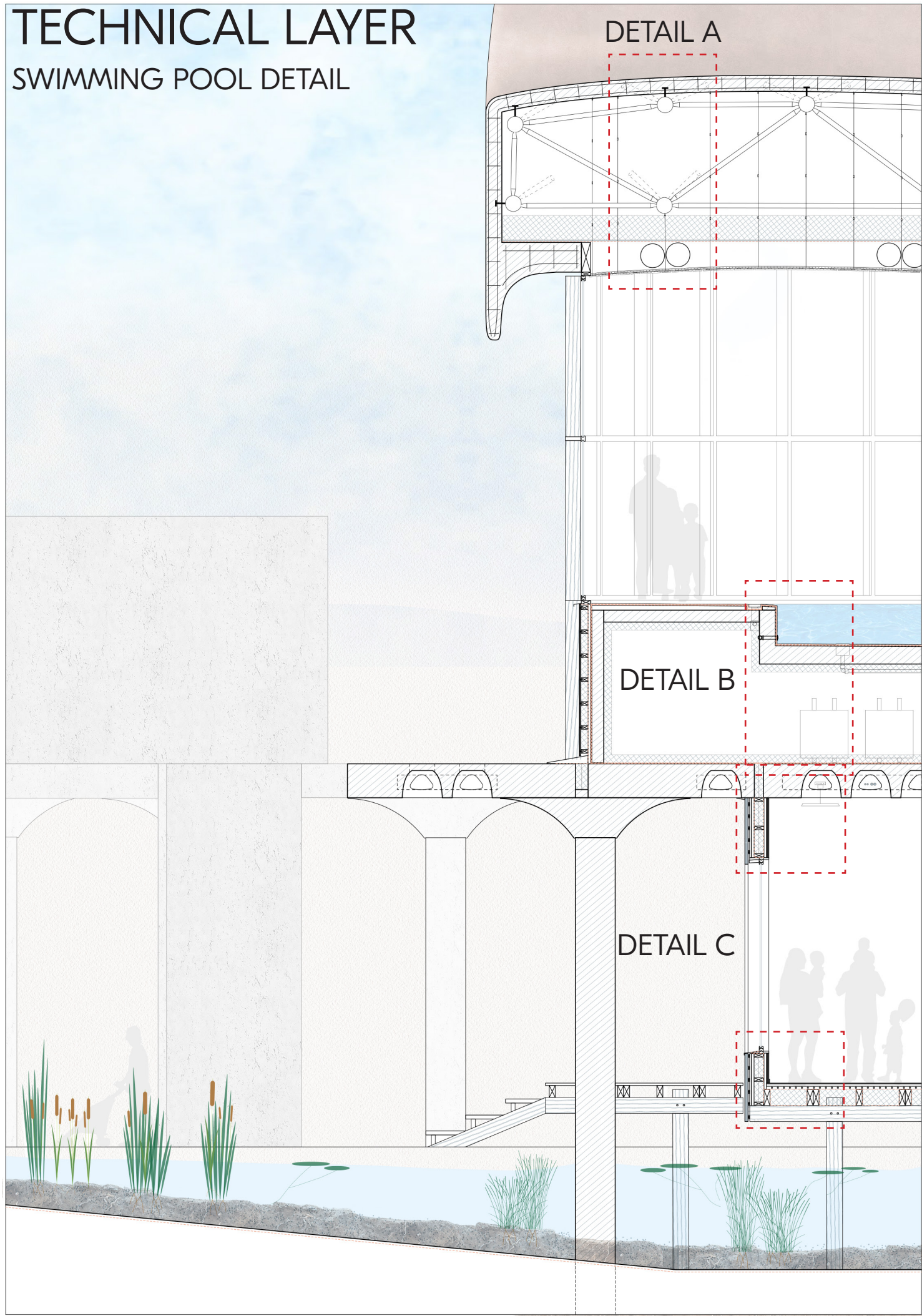
CLIMATE

MATERIAL CATALOG: SWIMMING POOL HALL



TECHNICAL LAYER

SWIMMING POOL DETAIL



DETAIL B

- Pool
- Tile + adhesive
- Waterproofing membrane
- Fibreglass mesh
- Waterproofing membrane
- Overflow channel
- Reinforced concrete
- Pool return jets
- Main drain
- Insulation

- Insulation
- Waterproofing membrane
- Fibreglass mesh
- Waterproofing membrane
- Concrete waffle slab
- Water pipes

TECHNICAL LAYER

SWIMMING POOL HALL VIEW



ROOF LAYER

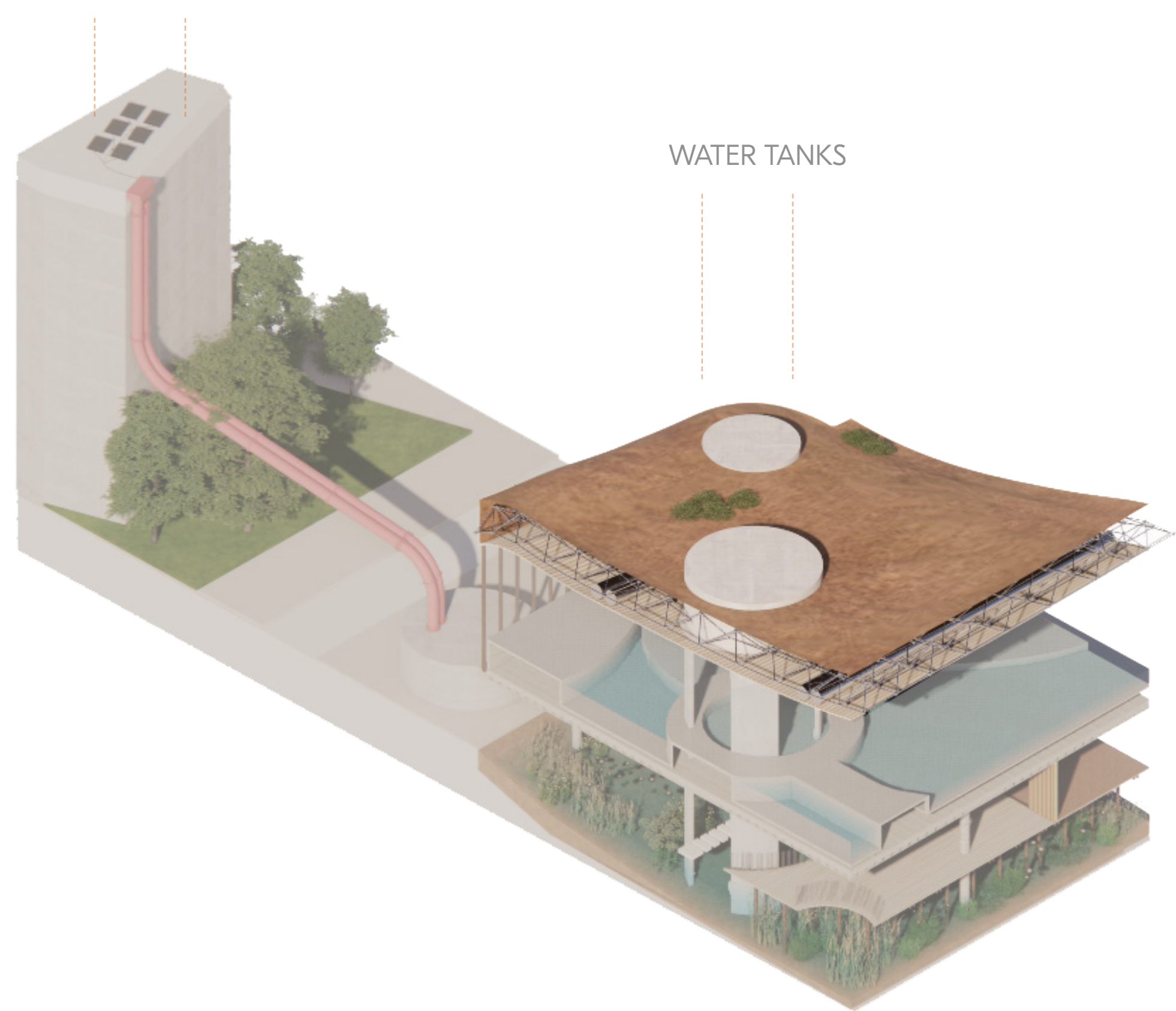
WATER COLLECTION &
SOLAR COLLECTORS

WATER TANKS

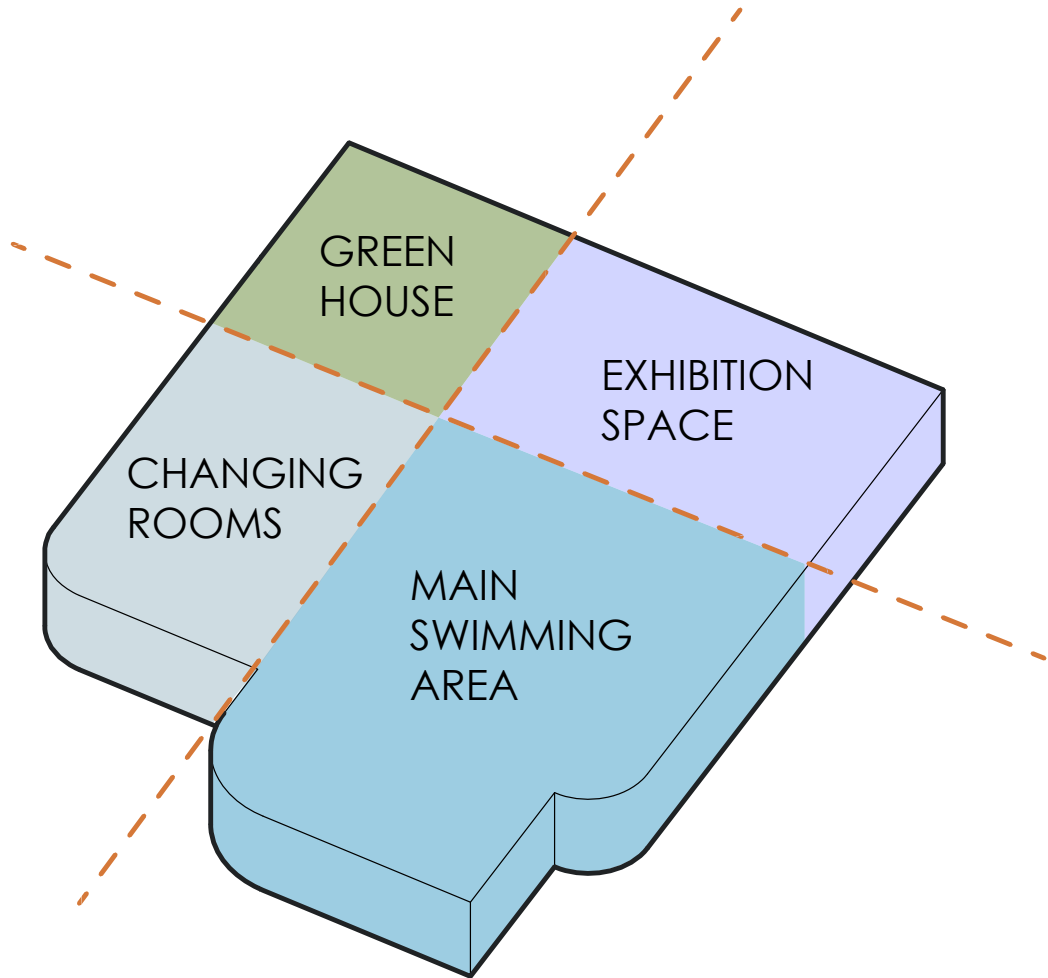
ROOF

TECHNICAL LAYER

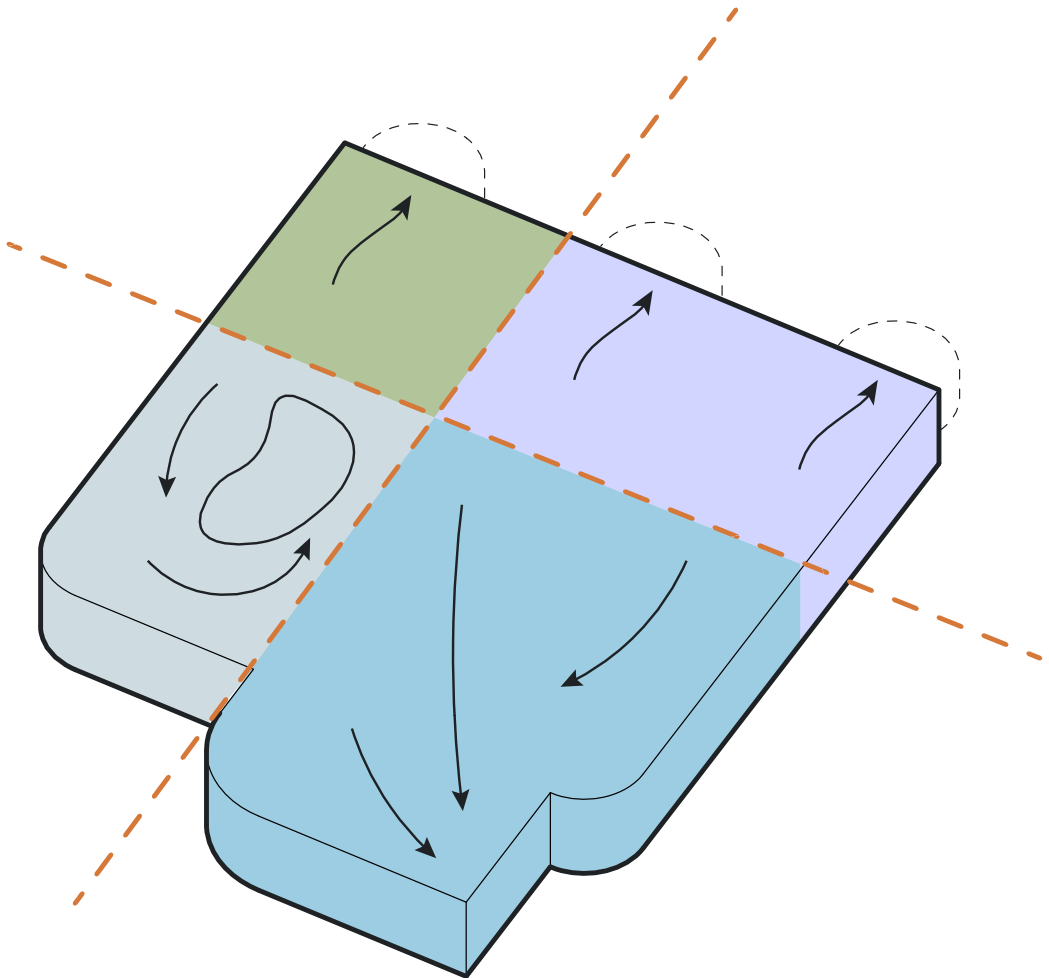
WETLANDS



ROOF FORM DIAGRAM

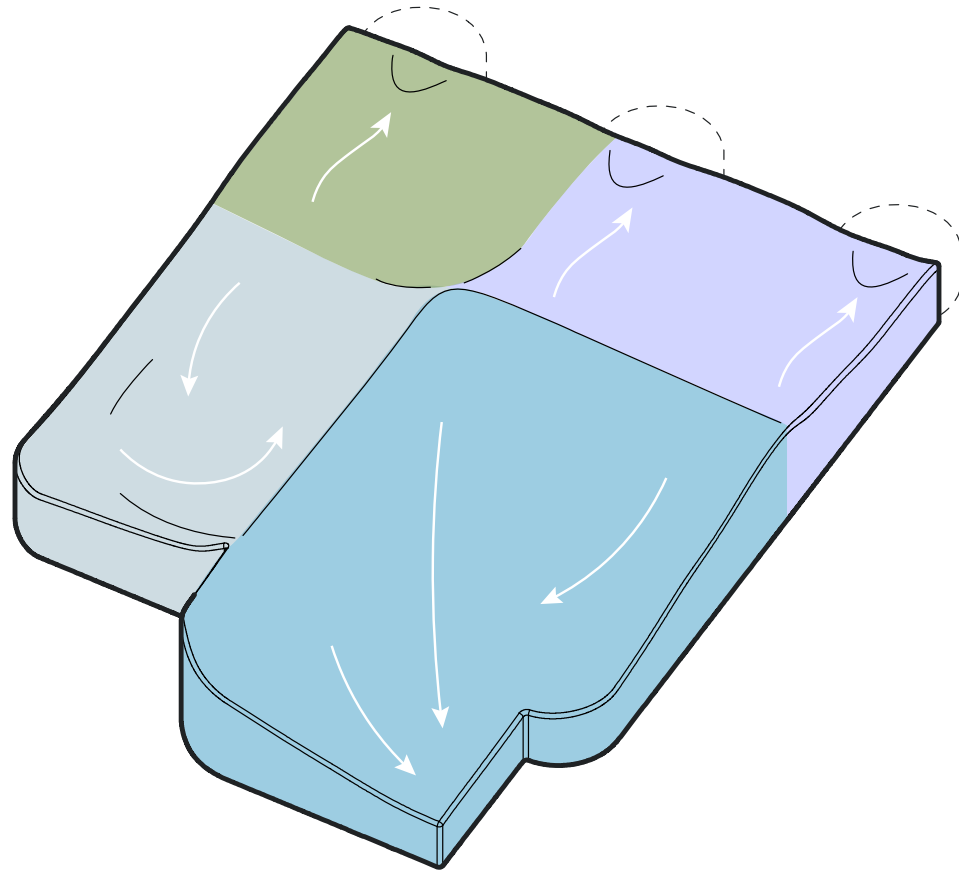


PROGRAM ESTABLISHING THE AXIS

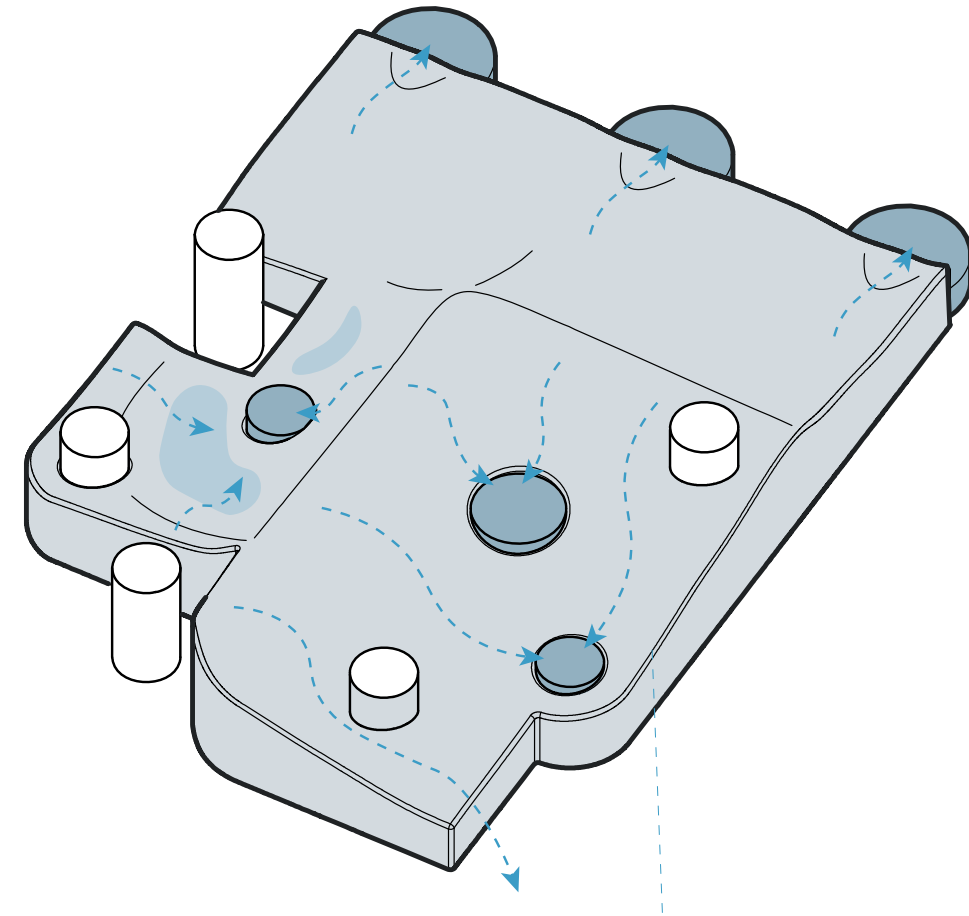


DIRECTION OF WATER FLOW

ROOF FORM DIAGRAM



ROOF FORM

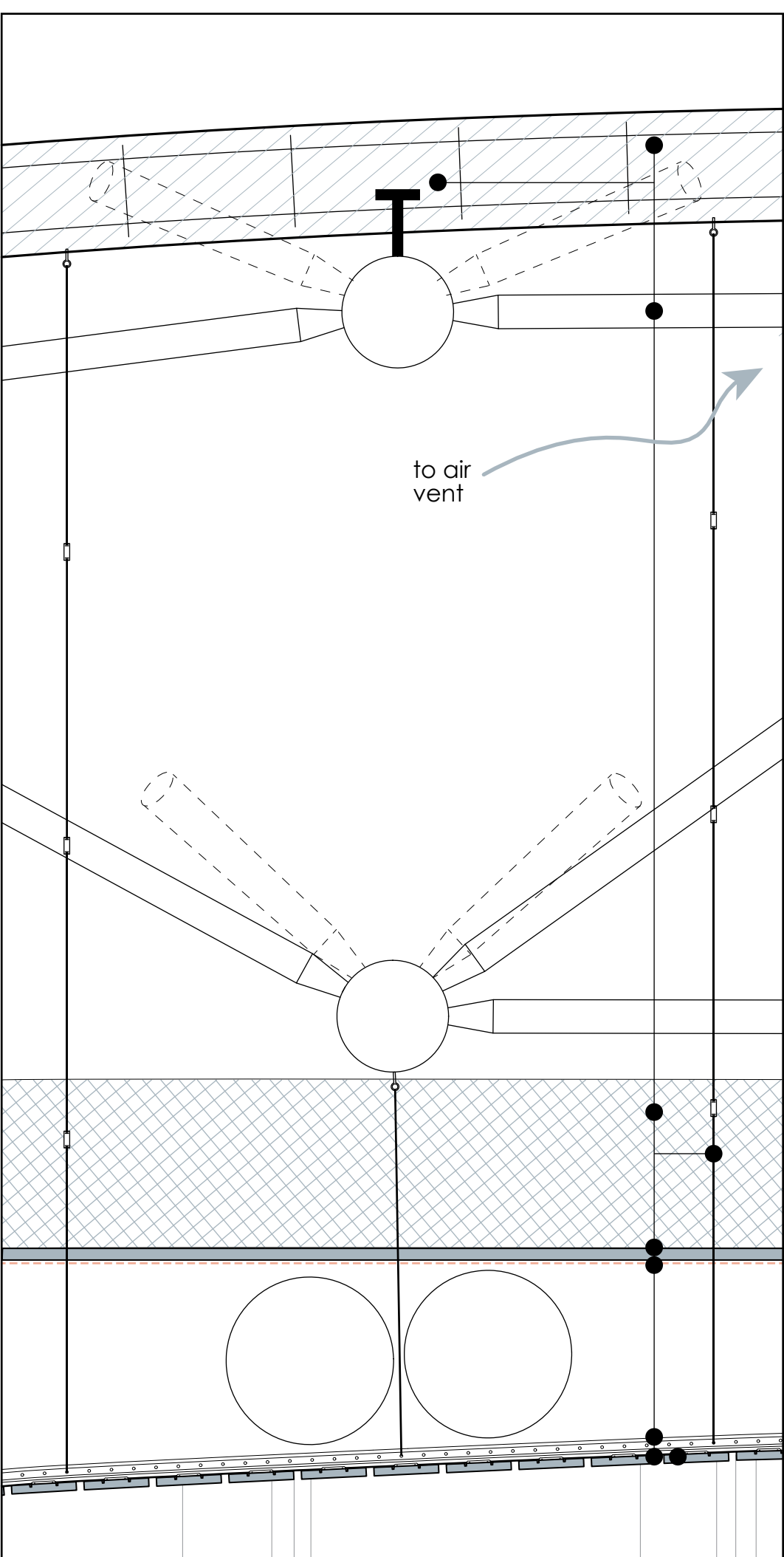
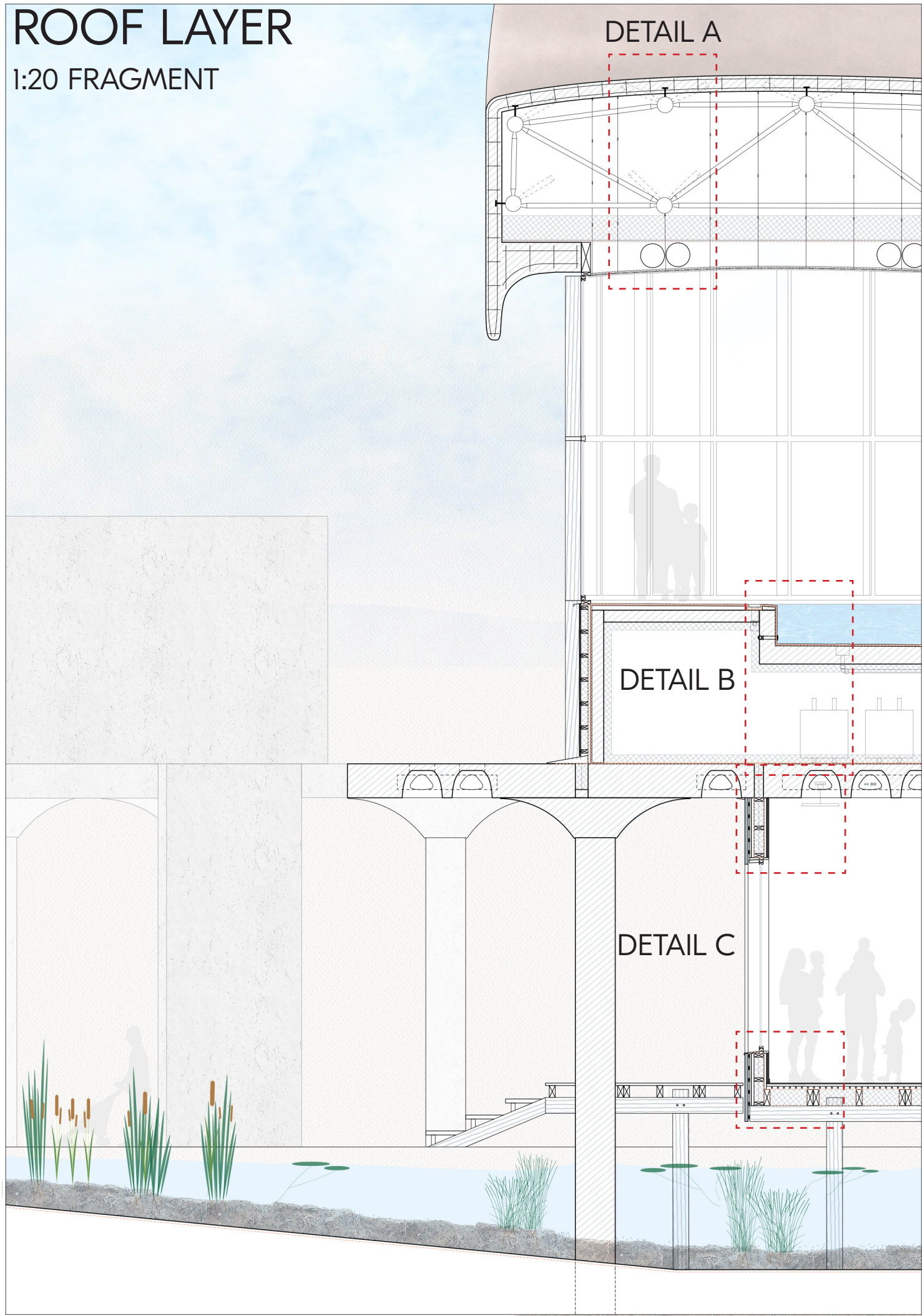


CREATING 3 TYPES OF WATER SCAPES

1. WATER FLOWING INTO SELECTED TANKS
2. WATER POOLING ON THE ACCESSIBLE ROOF
3. WATER FLOWING DOWN THE BUILDING INTO THE WETLANDS BELOW

ROOF LAYER

1:20 FRAGMENT



DETAIL A

Roof

Shotcrete with steel structure

Shear connector

Steel Roof Truss

False Ceiling

Polypropylene geotextile drainage layer

Quick action hanger

Gypsum board

Waterproofing membrane

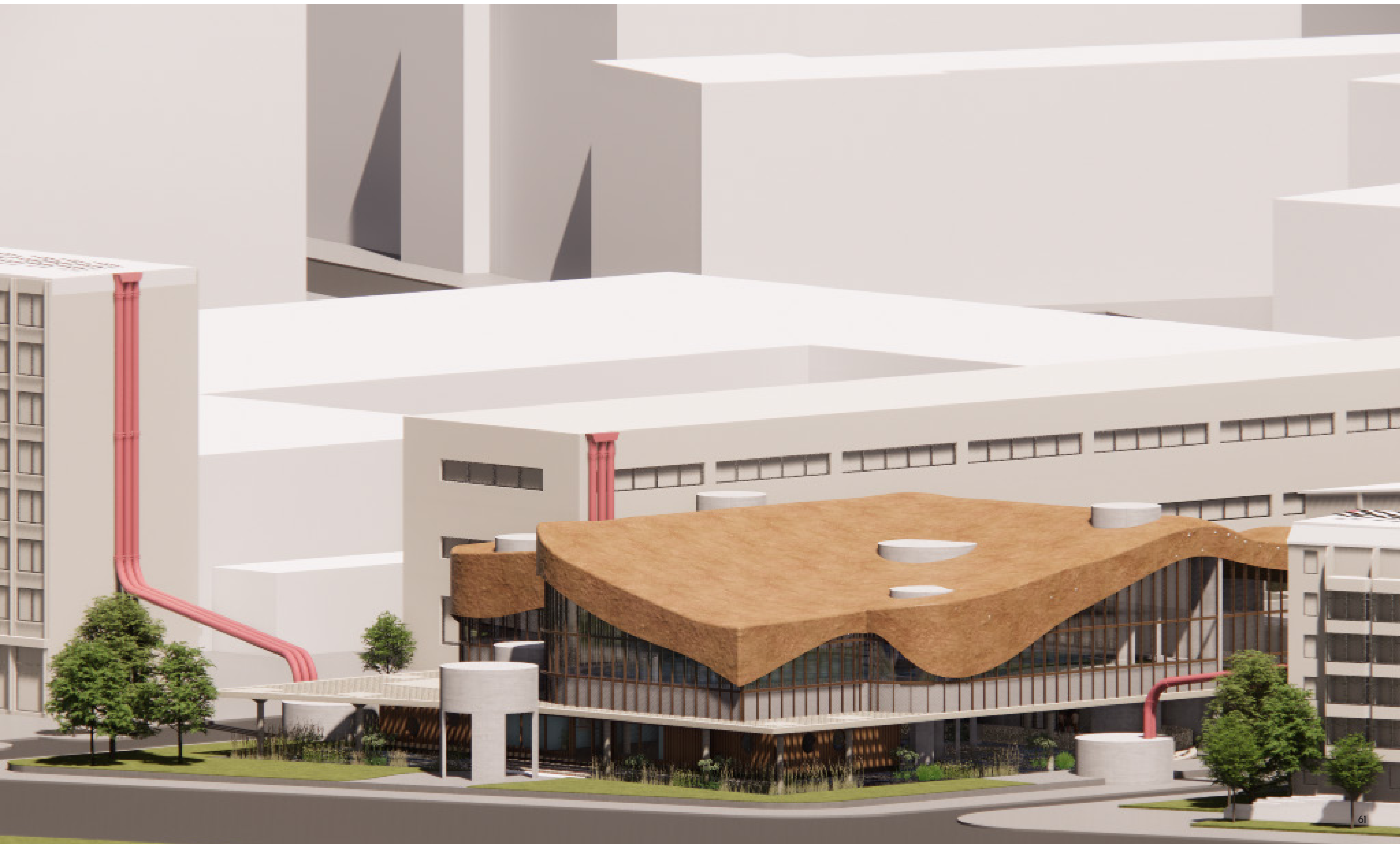
Galvanised steel profile with clips

Black acoustic non-woven tissue

Solid wood linear panel

ROOF DIAGRAM

VIEW



WATER TANKS

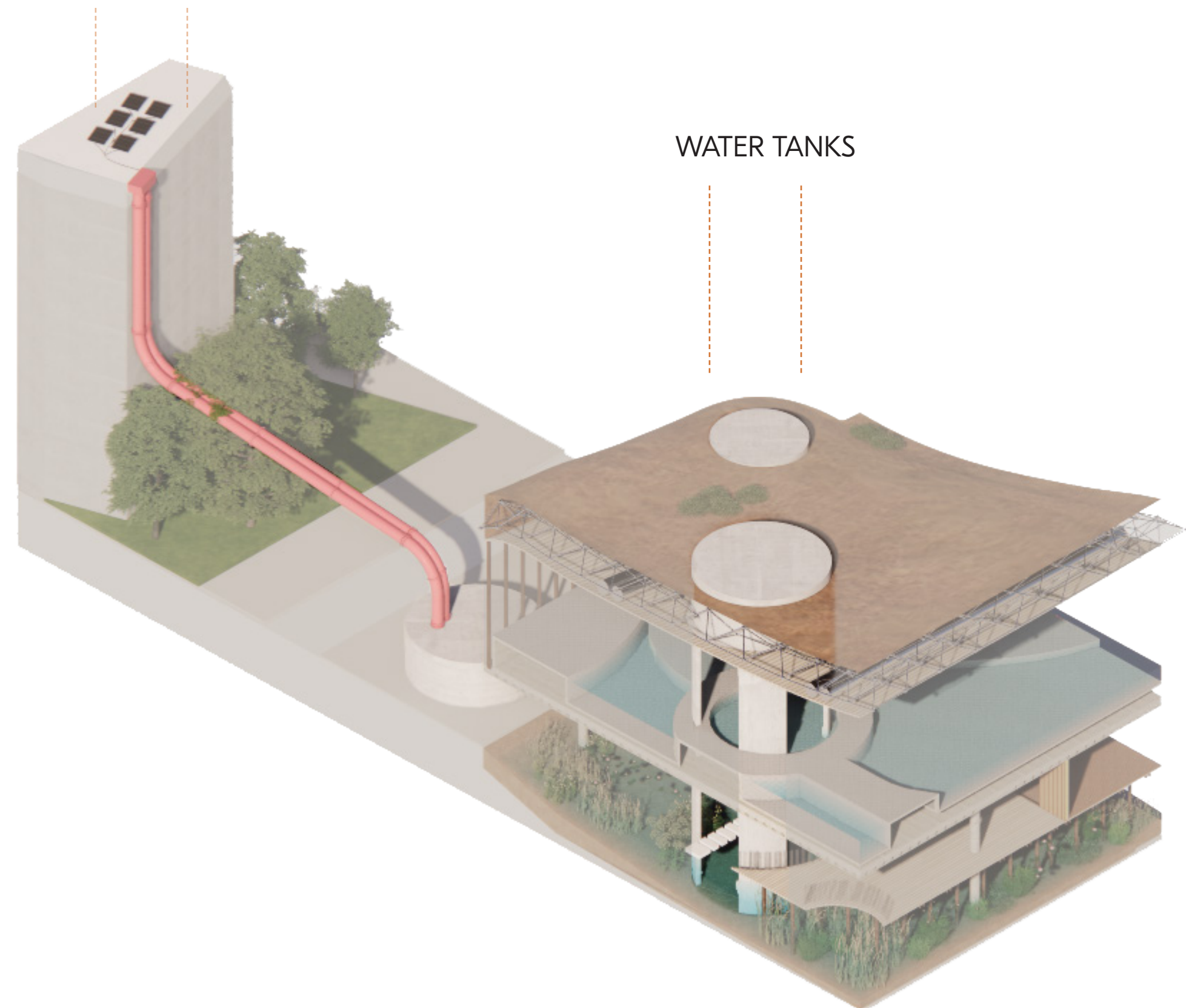
WATER COLLECTION &
SOLAR COLLECTORS

WATER TANKS

ROOF

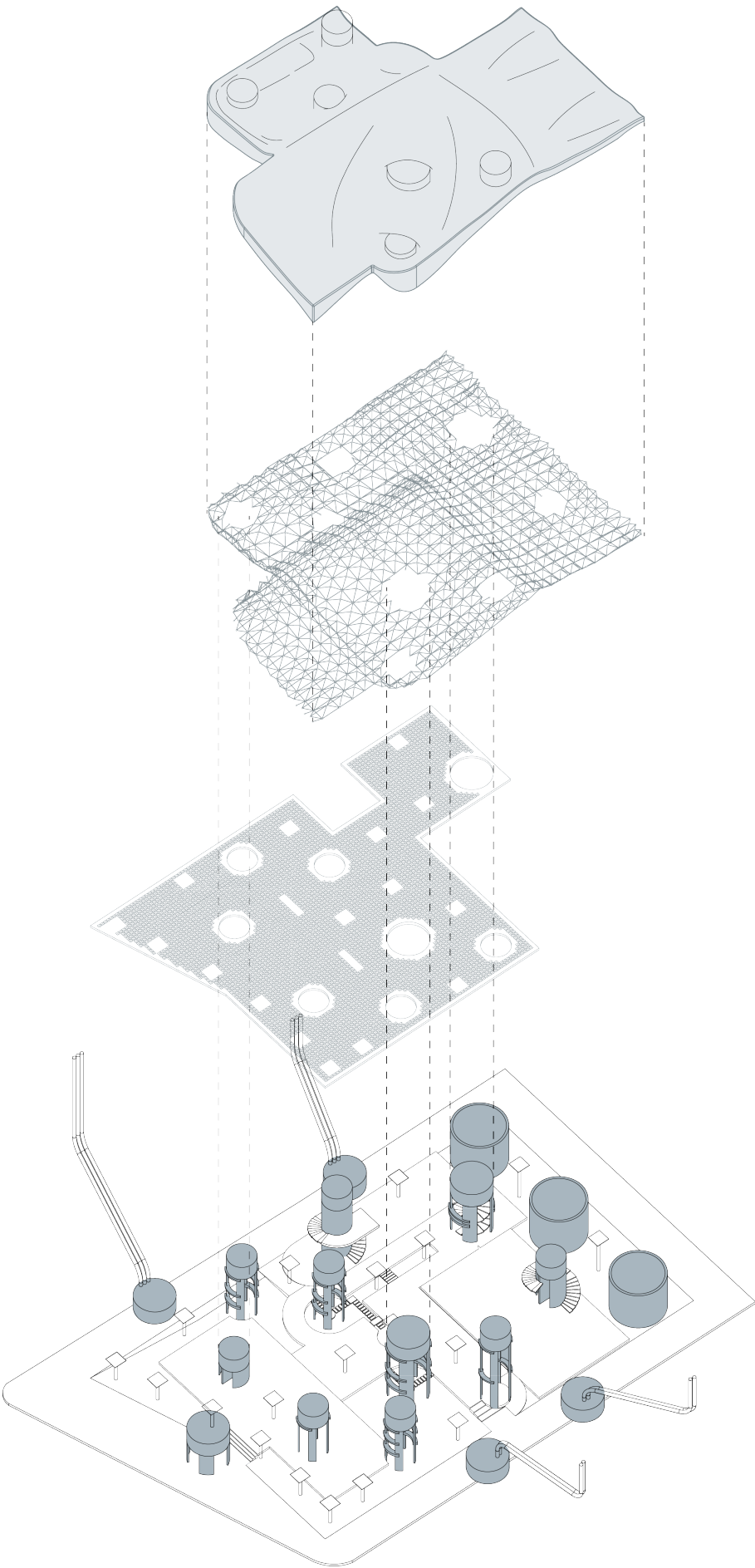
TECHNICAL LAYER

WETLANDS



STRUCTURE

STRUCTURAL LAYERS



SHOTCRETE MIXED
WITH CLAY ROOF
FORM

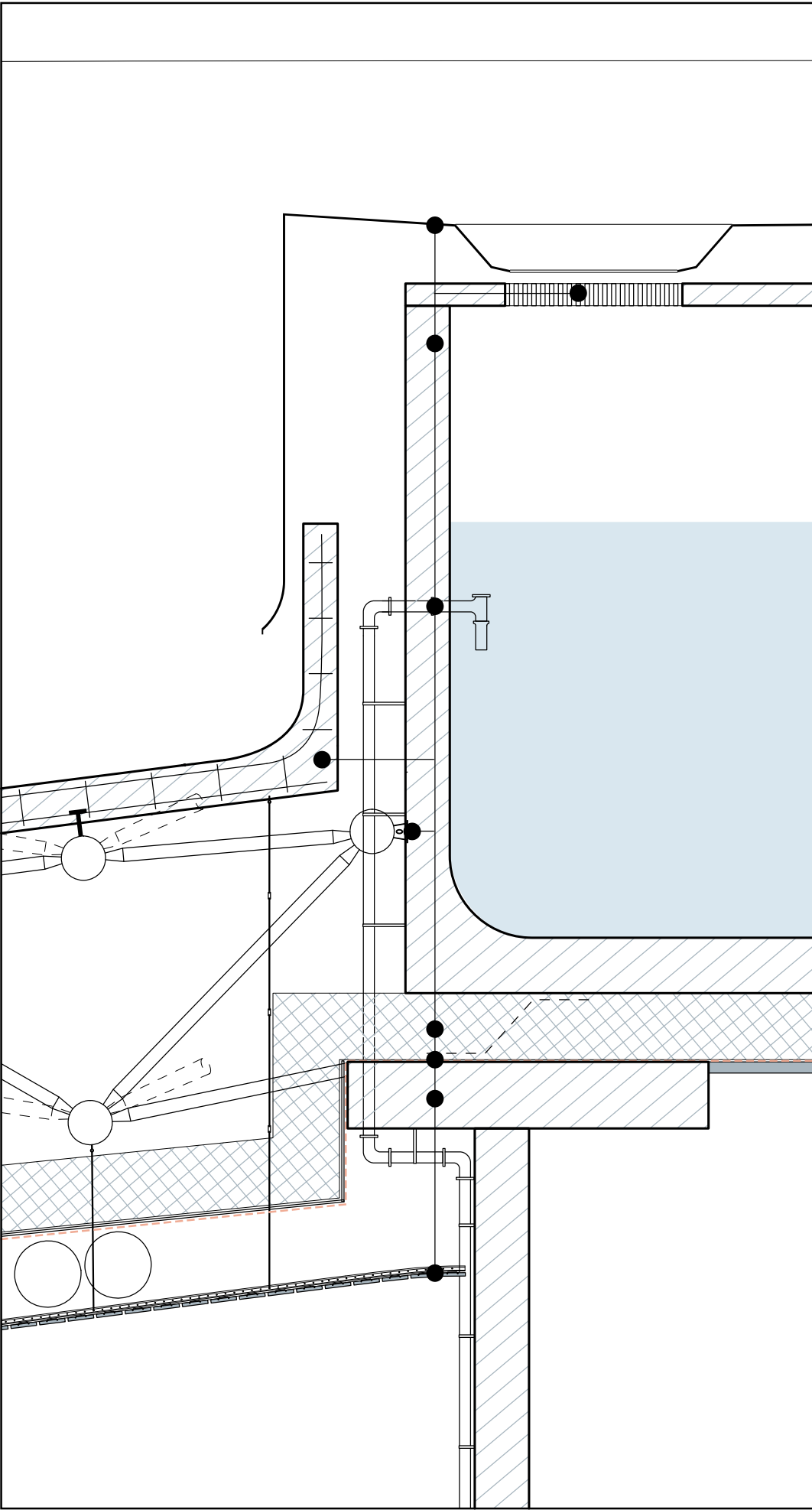
STEEL TRUSS SYSTEM

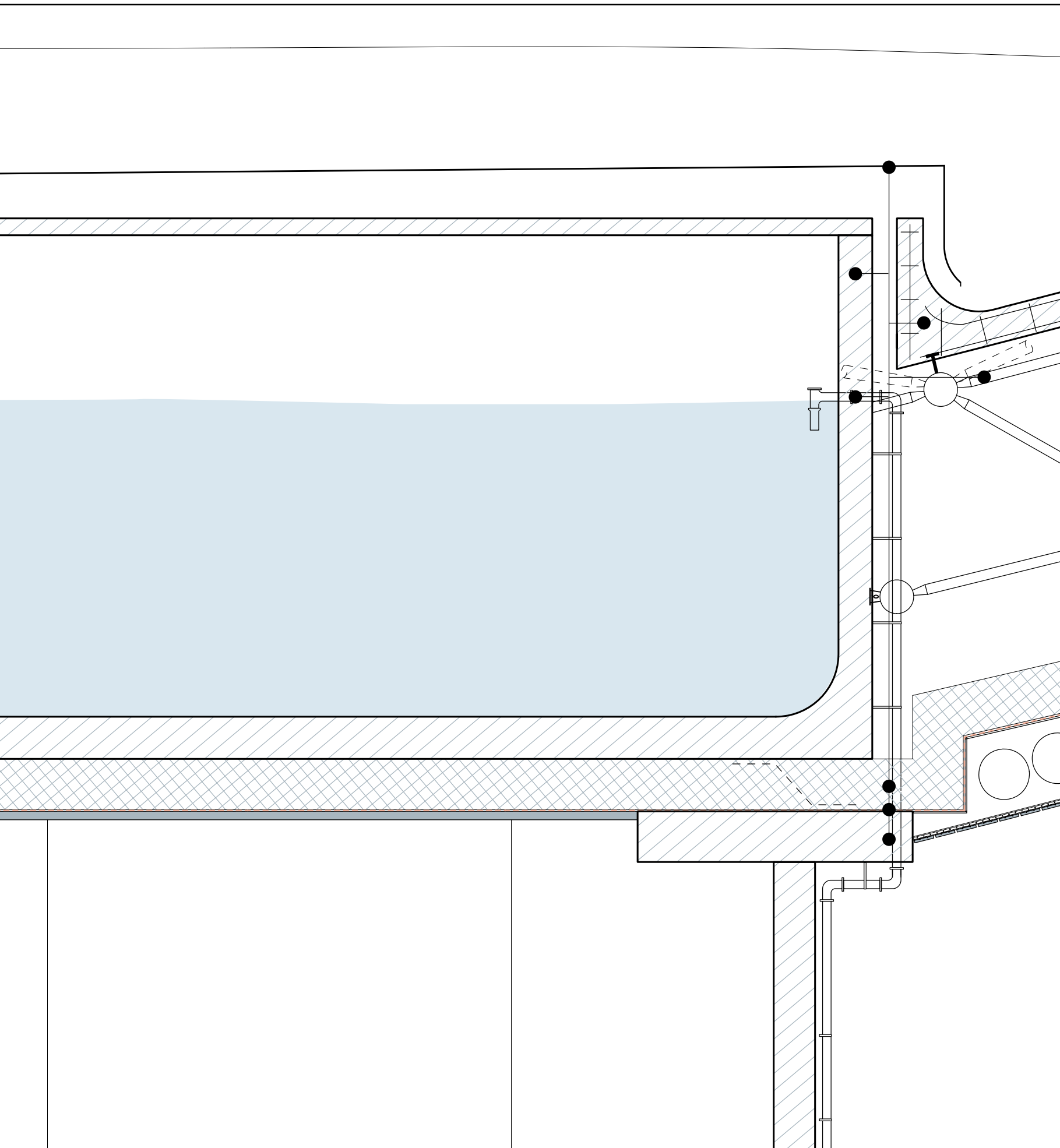
WAFFLE SLAB
STRUCTURE

WATER TANKS &
COLUMNS

Water Tank Detail

- Metal cover
- Grate cover
- Concrete water tank
- Outlet pipe
- Shotcrete with steel structure
- Steel truss connector
- Hard insulation
- Waterproofing membrane
- Concrete column
- False ceiling





Water Tank Detail

Metal cover

Concrete water tank

Shotcrete with steel structure

Steel truss

Outlet pipe

Hard insulation

Waterproofing membrane

Concrete column

BUILDING FRAGMENT

THE LAYERS OF THE BUILDING

WATER COLLECTION &
SOLAR COLLECTORS

WATER TANKS

ROOF

TECHNICAL LAYER

WETLANDS

