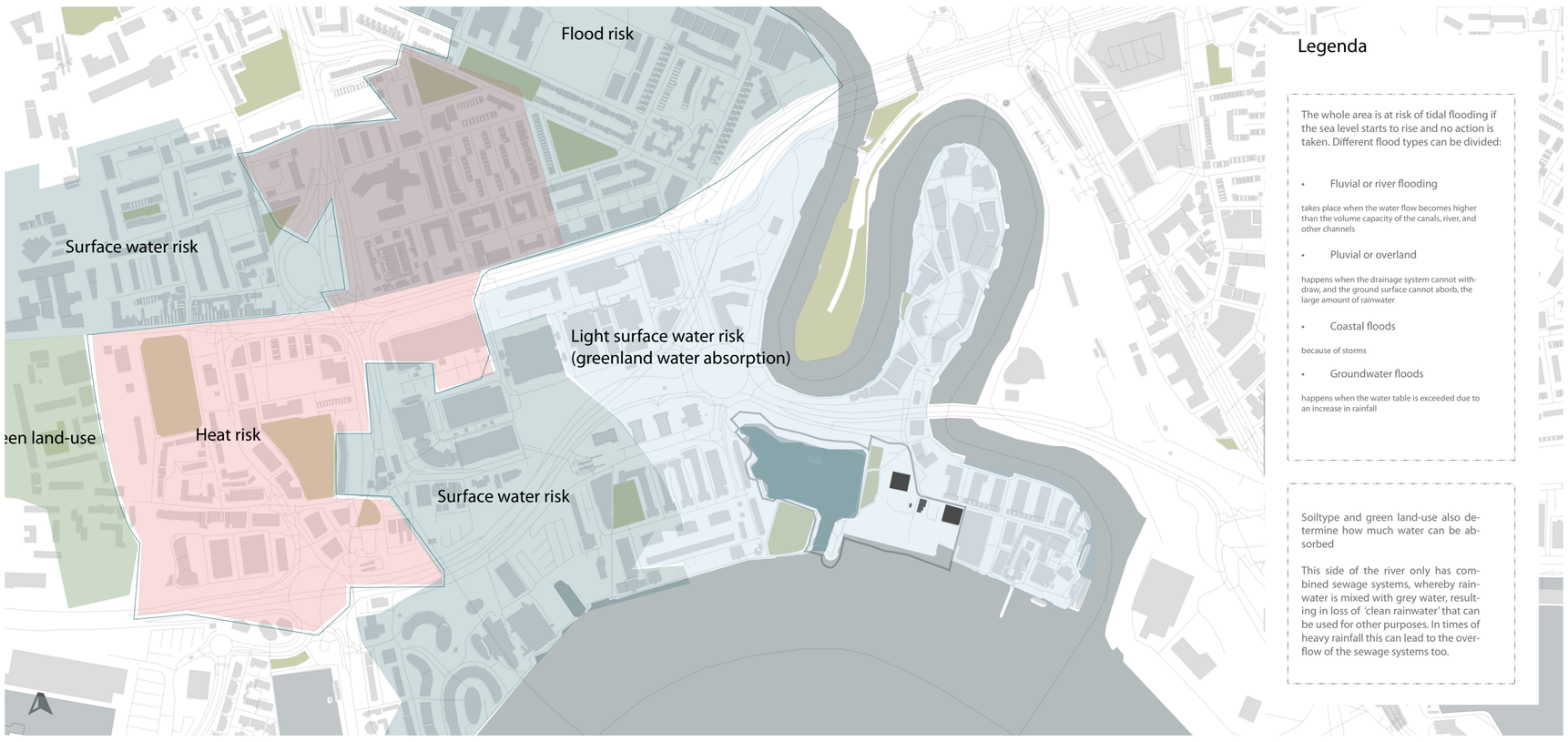
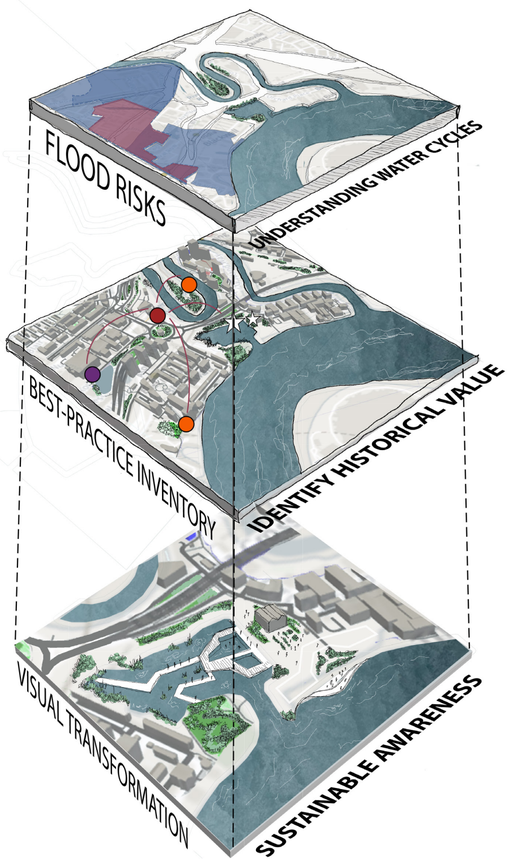
RESEARCH: ENGAGING WITH WATER

AN APPROACH ON HOW A SPONGE BUILDING AND SURROUNDING AREA CAN COMBAT WATER PROBLEMS, WHILE USING WATER AS CONNECTING BRIDGE BETWEEN NATURE, HUMANS AND BUILDINGS TO ENHANCE OUR WELL-BEING AND SIMULTANEOUSLY USE IT AS AN EXAMPLE ON HOW TO BECOME MORE SUSTAINABLE FOR COMMUNITIES AND OTHER STAKEHOLDERS

RESEARCH RESULTS - RISK INVENTORY MAP - CHOSEN SITE LONDON ORCHARD PLACE



RESEARCH RESULTS - WORKING WITH DIFFERENT SCALES TO COMBAT WATER PROBLEMS



Landscape scale

- Identifying water problem areas
- Analyse city approach on water management
- Identify types of interventions applicable

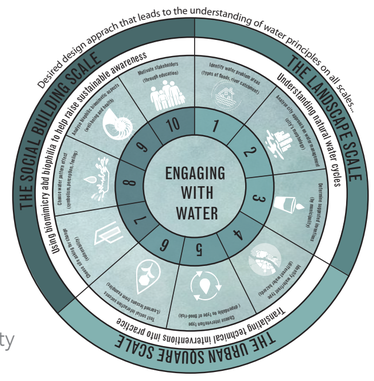
Urban square scale

- Inventory local sustainable water interventions
- Analyse appreciated undeveloped historic / cultural amenity
- Identify missing public function in neighborhood

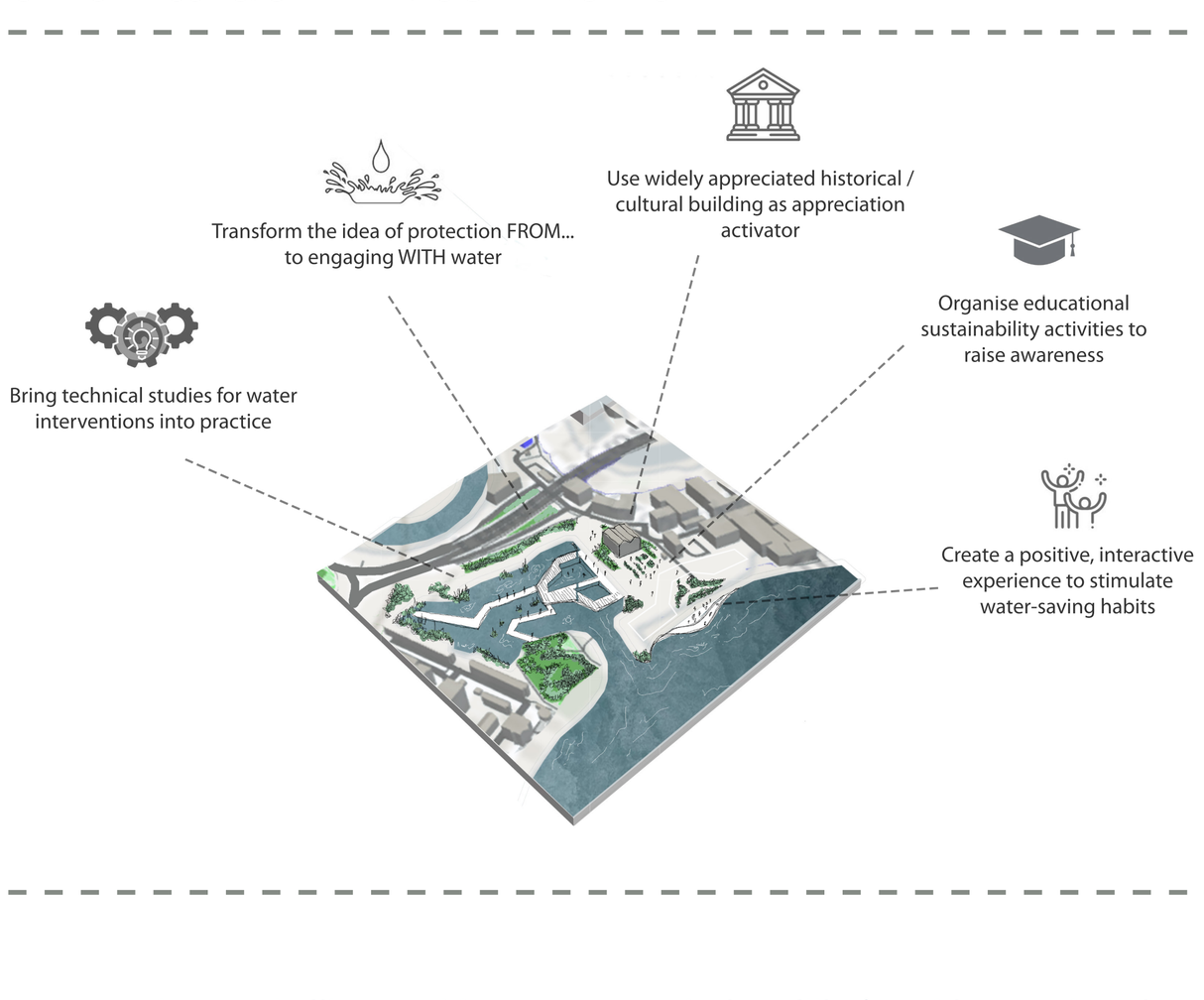
Social building scale: a public building with housing

- Enhance human well-being using biomimicry and biophilia
- Activate all stakeholders through physical and visual interventions to create appreciation for sustainable interventions
- Include educational activities for communities about sustainable interventions to raise awareness

STEP-BY-STEP GUIDELINE OF THE THREE SCALES



RESEARCH RESULTS: OVERALL DESIGN PRINCIPLES



OVERALL DESIGN PRINCIPLES

CREATING AFFORDABLE SOCIAL HOUSING IN LONDON

WORKING WITH LOCAL MATERIALS TO REDUCE TRANSPORTATION COSTS AND HOUSING PRICES

CREATING QUALITATIVE SOCIAL HOUSING IN CENTRAL LONDON TO COMBAT HOUSIGN SHORTAGE

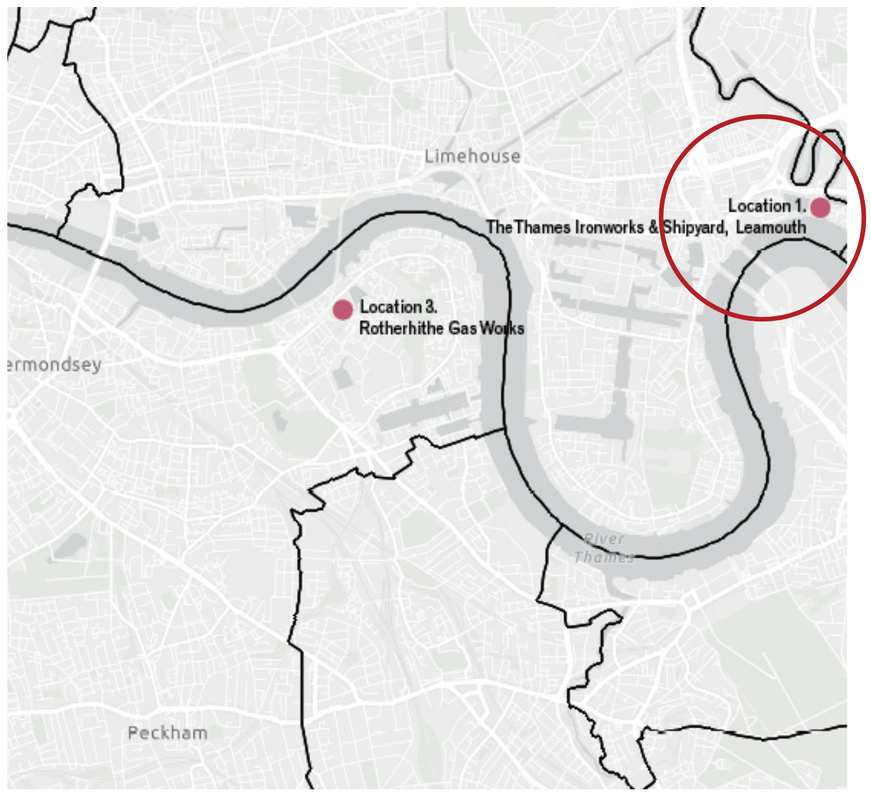
DEVELOPING FUTURE-PROOF WATER-RESILIENT SPONGE BUILDINGS: HOUSING ADAPT TO CHANGING WEATHER TYPES

TRANSFORMING HISTORICAL VACANT SITE TO VIBRANT PUBLIC SPACE USING BIOMIMICRY AND BIOPHILIA AS DESIGN ELEMENTS



Straddling the mouth of Bow Creek where it joins the River Thames in east London, the Thames Ironworks and Shipbuilding Company was one of the first of its kind to build iron ships. Founded in 1837, the company created the world's first all-iron warship, the HMS Warrior which launched in 1860.

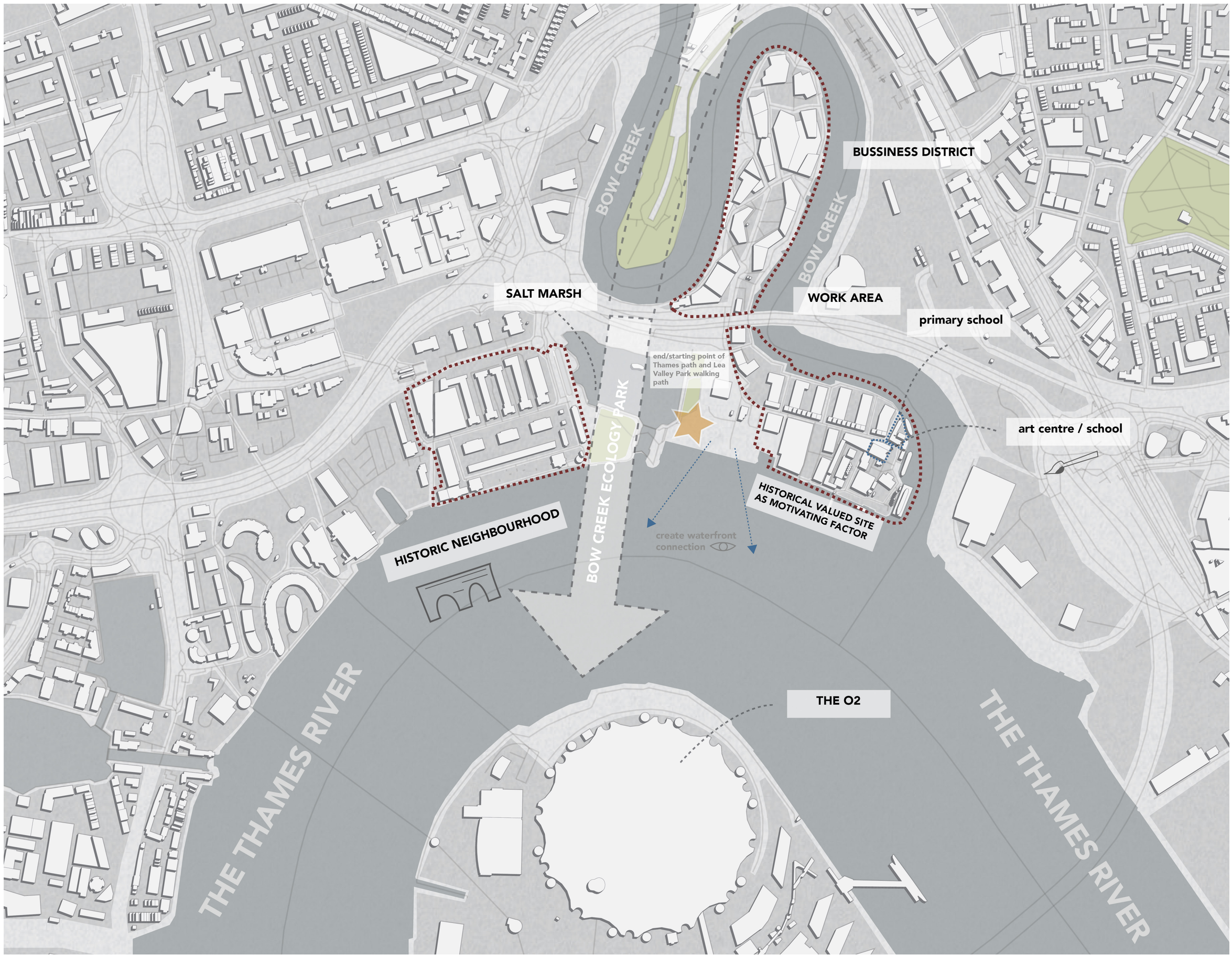
SITE SELECTION



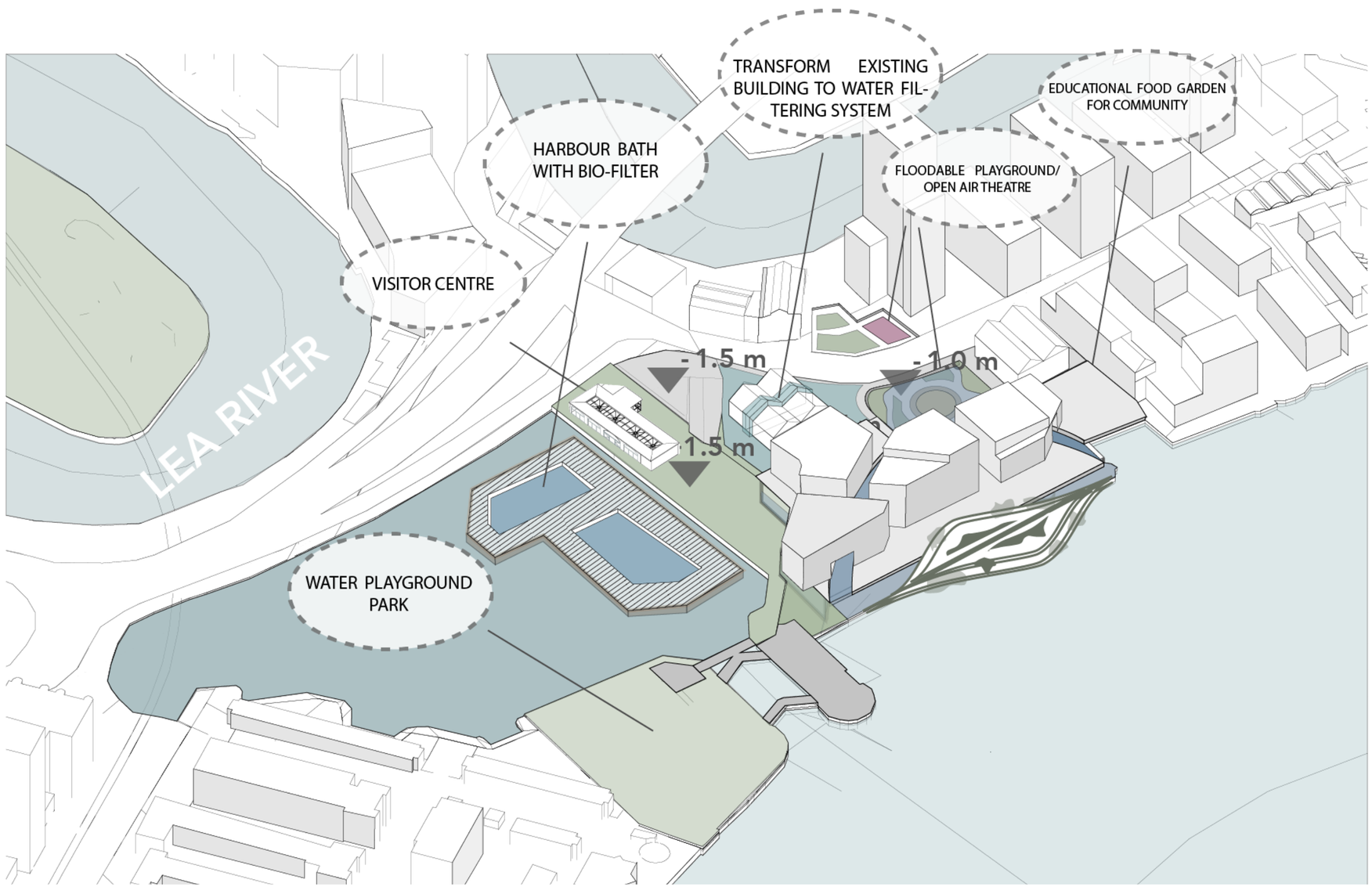
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THE URBAN SQUARE SCALE

MASTERPLAN - ORIGINAL SCALE 1:20.000



OVERVIEW SUSTAINABLE URBAN DRAINAGE SYSTEMS



CONNECTING NEIGHBOURHOODS THROUGH INTERACTIVE WATER INTERVENTIONS



Why not use vacant industrial building sites?



By integrating Sustainable urban Drainage Systems and Green Infrastructure the buildings become more embedded within their environment and add more value to the surrounding neighbourhoods. The integration makes it possible to build new social housing along the Thames

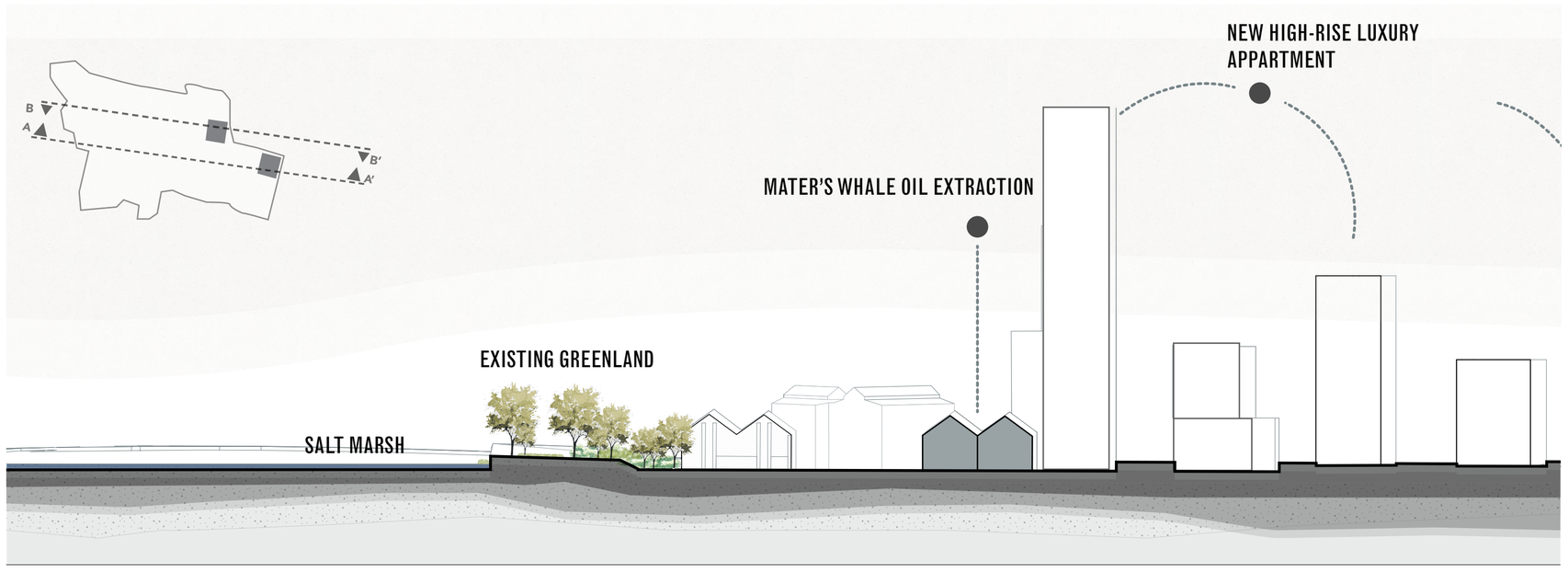
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THE LANDSCAPE SCALE

REDEVELOPING HISTORICAL VACANT SITE BASED ON URBAN / LANDSCAPE ANALYSIS



URBAN PLAN
SCALE 1:1000



SECTION AA'

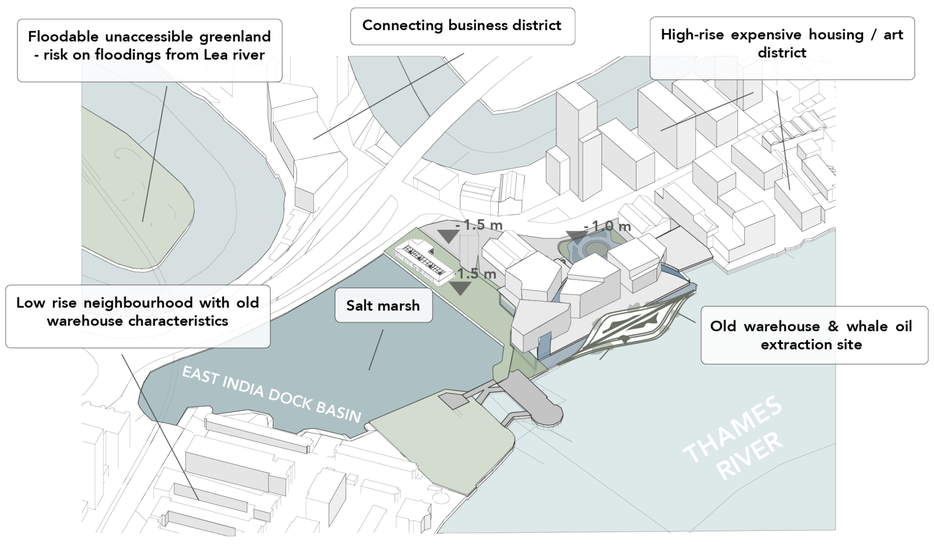


SECTION BB'

SECTION OF EXISTING SITE
SCALE 1:1000

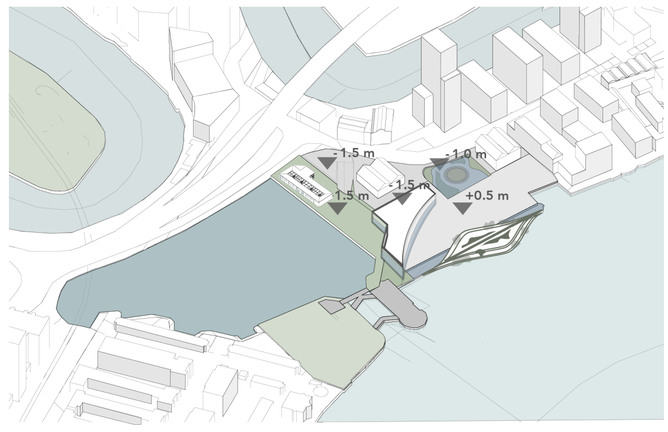
The landscape scale forms the base layer of the to be developed site to be able to guide the water to designated areas that are allowed to become flooded, like the lowered water garden

With this approach people will not get harmed and most of the buildings structure stay protected

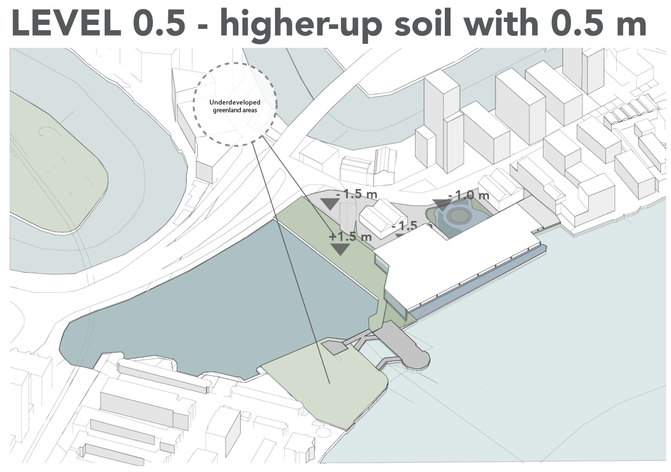


Surrounding area characteristics

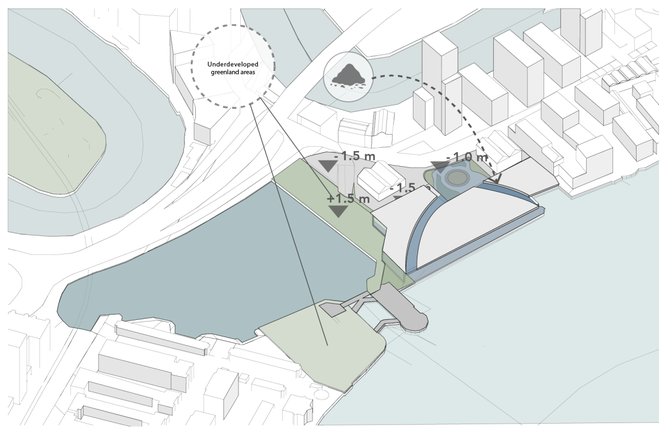
DESIGN PRINCIPLES: DESIGNING WITH DIFFERENT FLOOD LEVELS



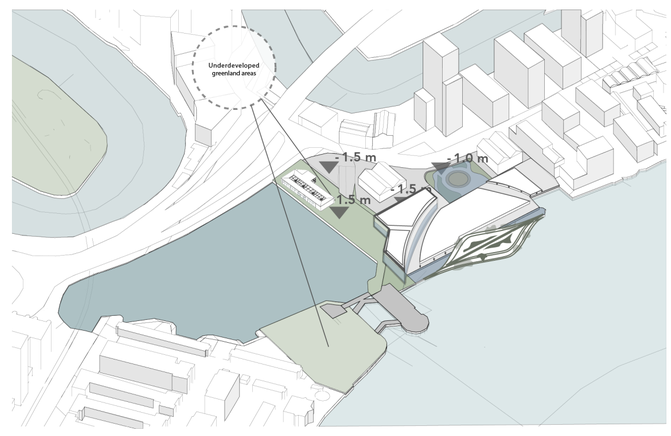
LEVEL 0.5 - higher-up soil with 0.5 m



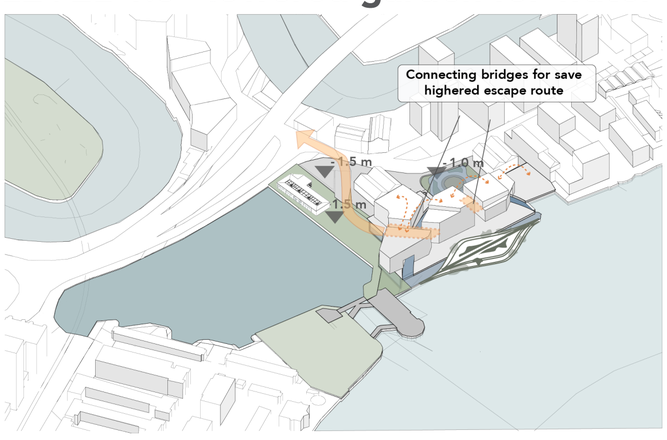
LEVEL 1.0 - air labyrinth 0.5 m



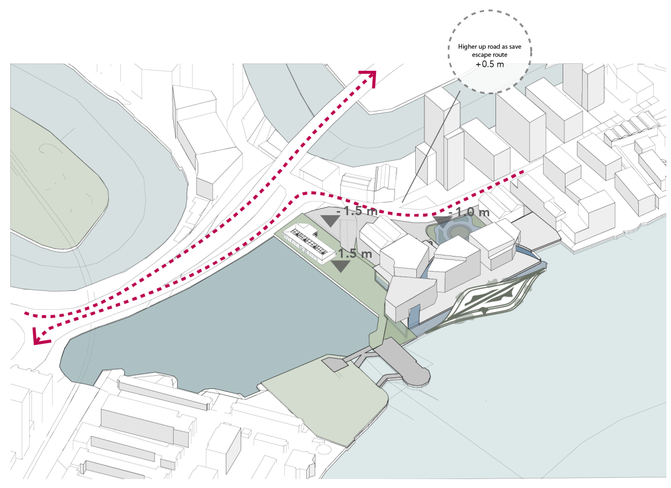
LEVEL 1.0 - create guiding waterways



LEVEL 1.5 - lowered garden for water



LEVEL 1.5 - highered escape routes

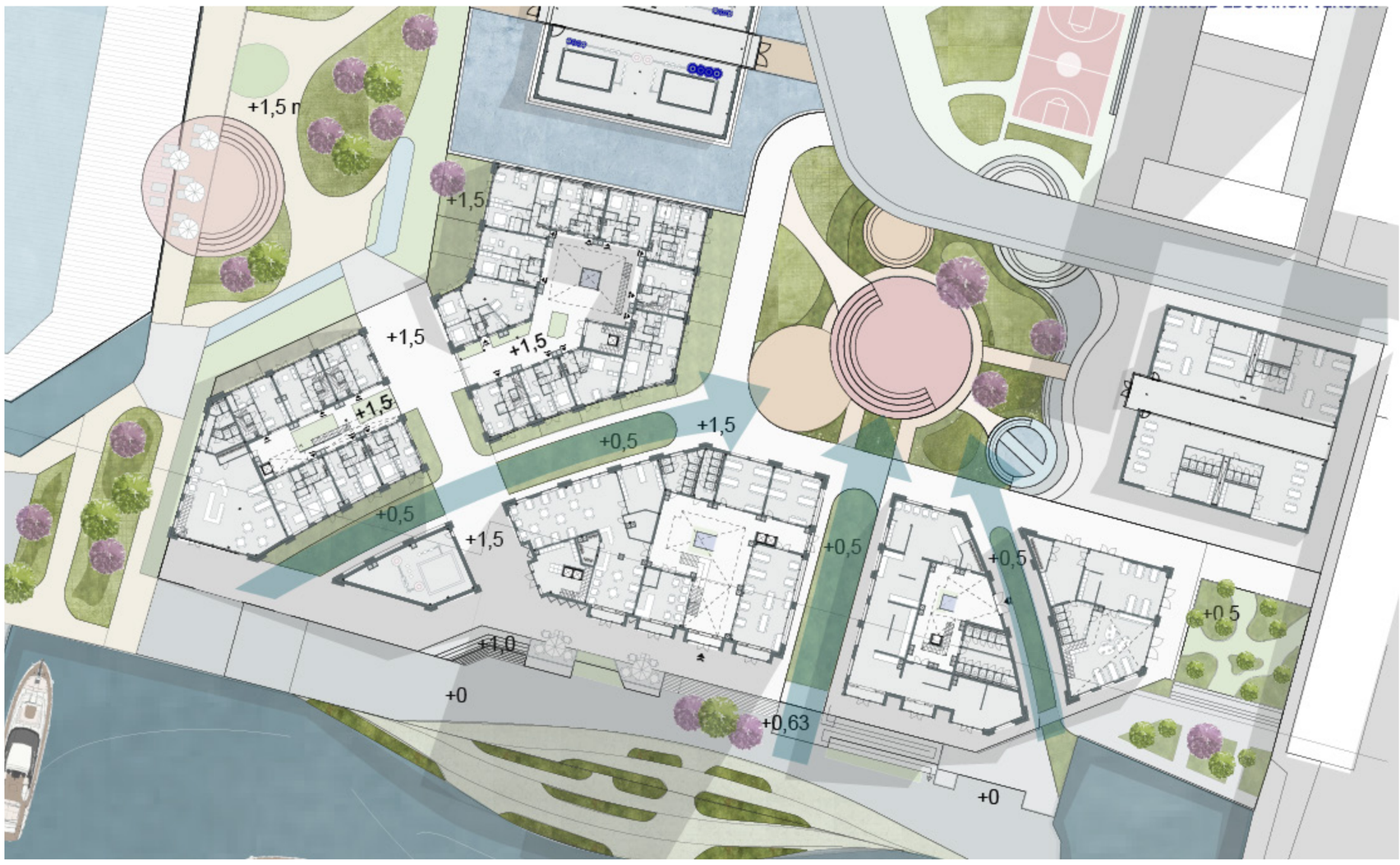


LEVEL 1.5 - main escape route

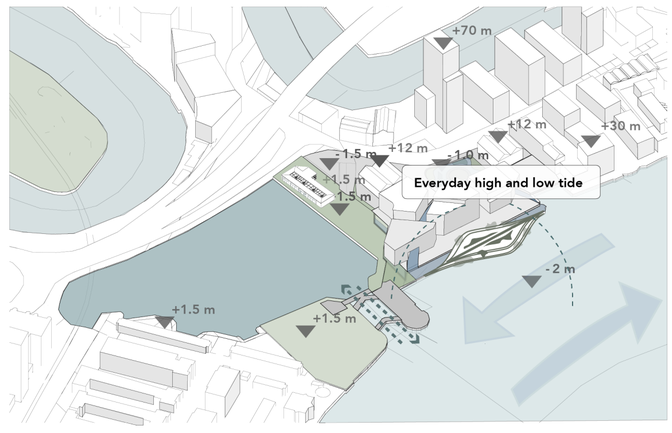
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THE URBAN SQUARE SCALE

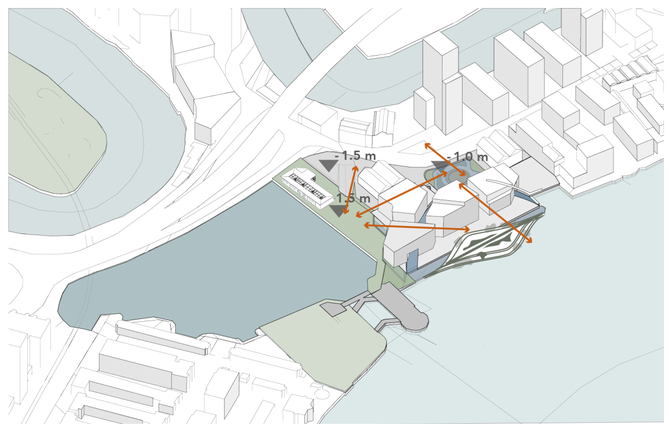
INDOOR OUTDOOR CONNECTION - COURTYARD - RIVERFRONT - GARDEN AND PARKSIDE



GROUND FLOOR PLAN - ACCENTUATED WATERWAYS
SCALE 1:500



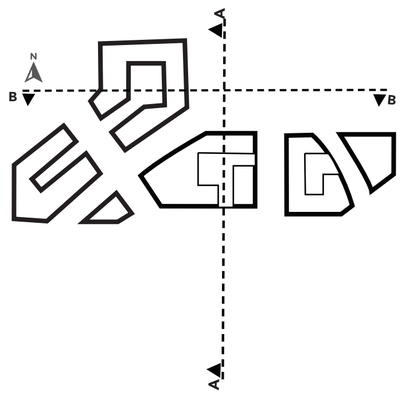
Volumes respond to surrounding building heights and Thames waterways



Connecting sightlines to waterfront

The urban square scale focusses on how to then solve the water problems through the use of Sustainable urban Drainage systems & Green Infrastructure outdoors

visible here: water garden with helophytesfilter; terraced waterfront to slow down waterstream from Thames



INTERNAL COURTYARD - open waterfall effect (air filter)

SECTION AA' - WATERFRONT - FLOOD LEVEL 0.5 m

OUTDOOR COURTYARD - open waterfall effect (water filter)

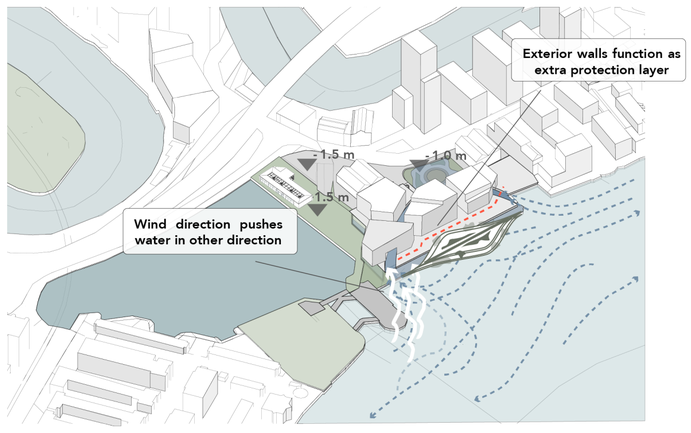


SECTION BB' - GARDEN / PARKSIDE - FLOOD LEVEL 1.5 m

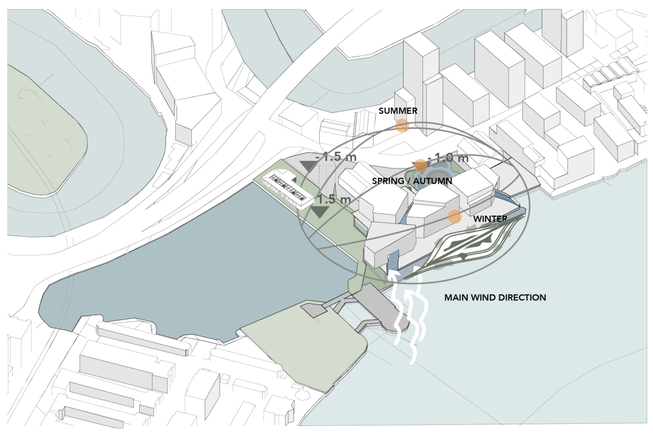
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THE URBAN SQUARE SCALE

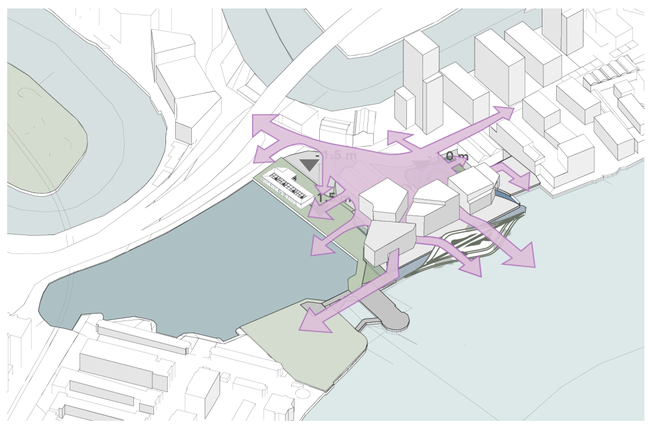
CONNECTING NEIGHBOURHOODS - CREATING CONNECTION BETWEEN PRIVATE AND PUBLIC SPACES



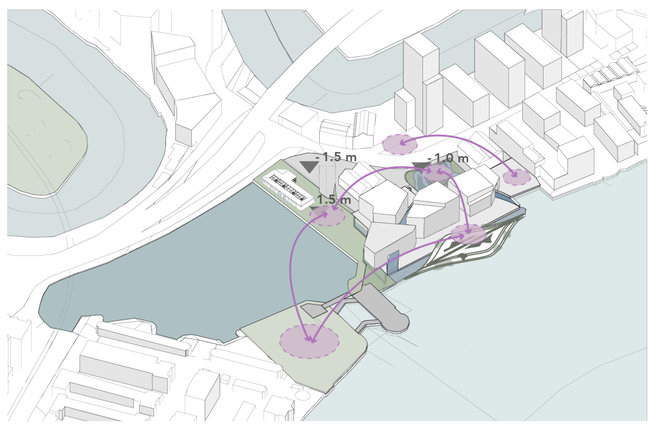
WATERFLOW - INFLUENCE NATURAL ASPECTS OF HIGH AND LOW TIDES AND MAIN WIND DIRECTION



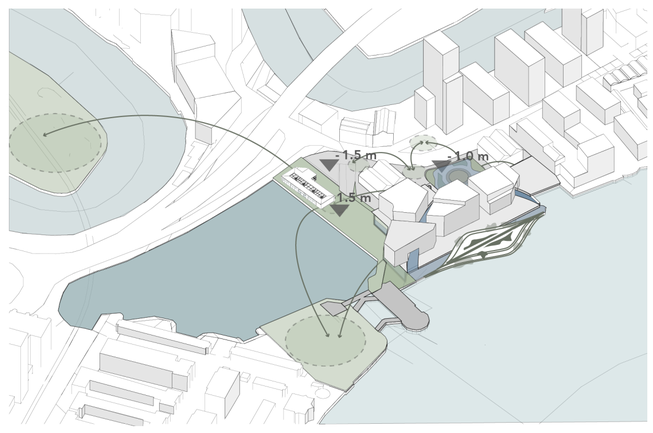
SHAPE FORMATION - NATURAL FORCES ANALYSIS



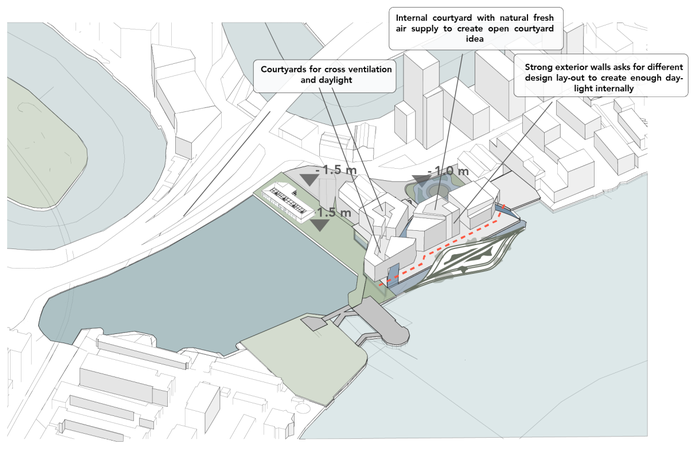
ROUTING - CONNECTING NEIGHBORHOODS



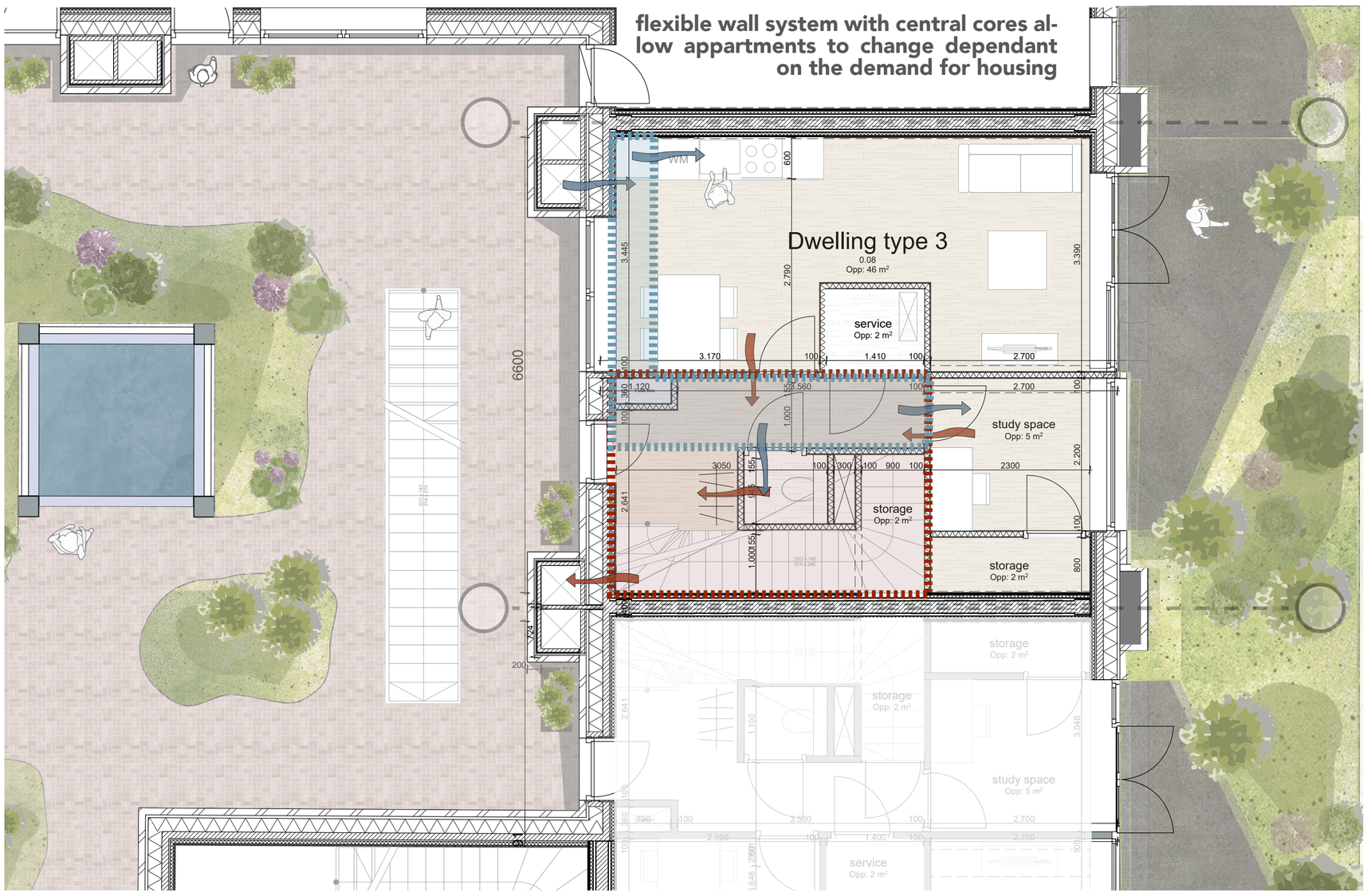
CONNECTING PUBLIC AREAS FOR SOCIAL INTERACTION



CREATING SAVE ESCAPE ROUTES WHEN FLOODS OCCUR



VOLUME FORMATION - INTERNAL AND OPEN COURTYARD



GROUND FLOOR PLAN - CENTRAL AIR SUPPLY - LOWERED CEILING (central core)
SCALE 1:50 - SINGLE FAMILY HOUSING EXAMPLE

2 PERSON APARTMENT



CLOSE TO WORK ENVIRONMENT / BUSINESS DISTRICT

CLOSE TO CENTRAL LONDON

2 PERSON APARTMENT



ROOM FOR FAMILY GROWTH

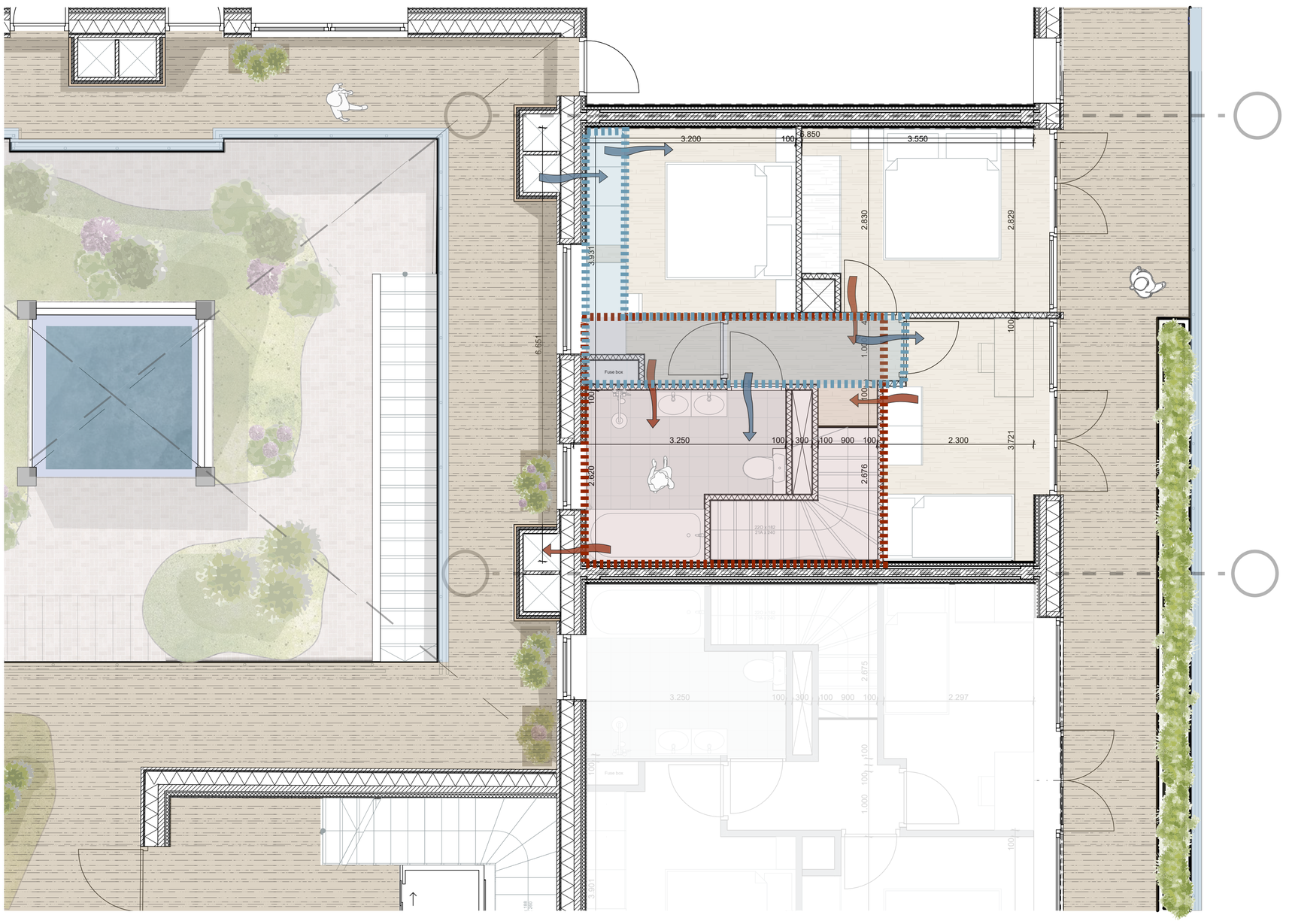
SINGLE FAMILY APARTMENT



CLOSE TO EDUCATIONAL INSTITUTES

SINGLE FLOOR OR 2-LEVEL APARTMENT

APARTMENT TYPOLOGIES: WHO LIVES IN CENTRAL LONDON IN THE NEAR FUTURE?



FIRST FLOOR PLAN - CENTRAL AIR SUPPLY - LOWERED CEILING
SCALE 1:50 - SINGLE FAMILY HOUSING EXAMPLE

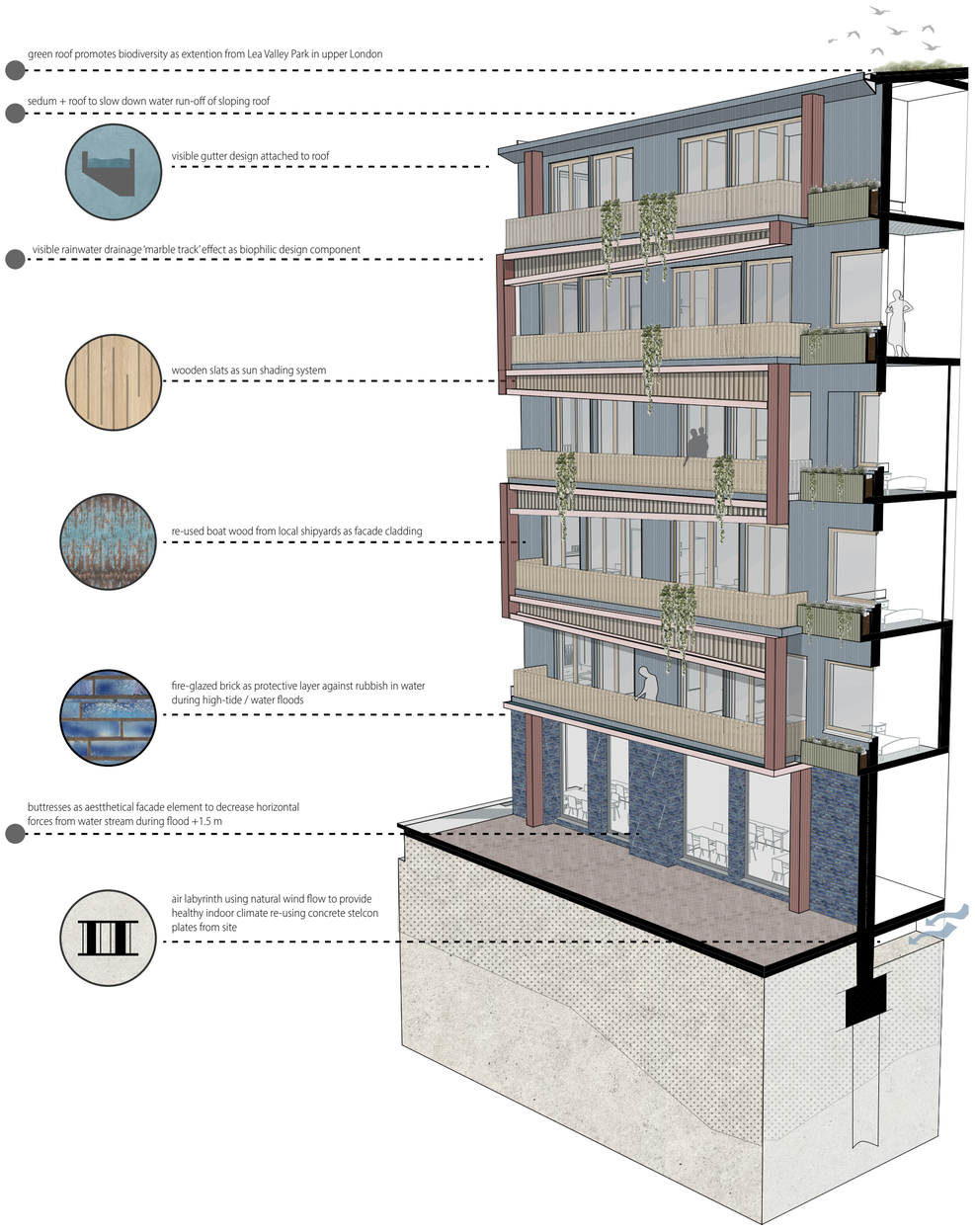
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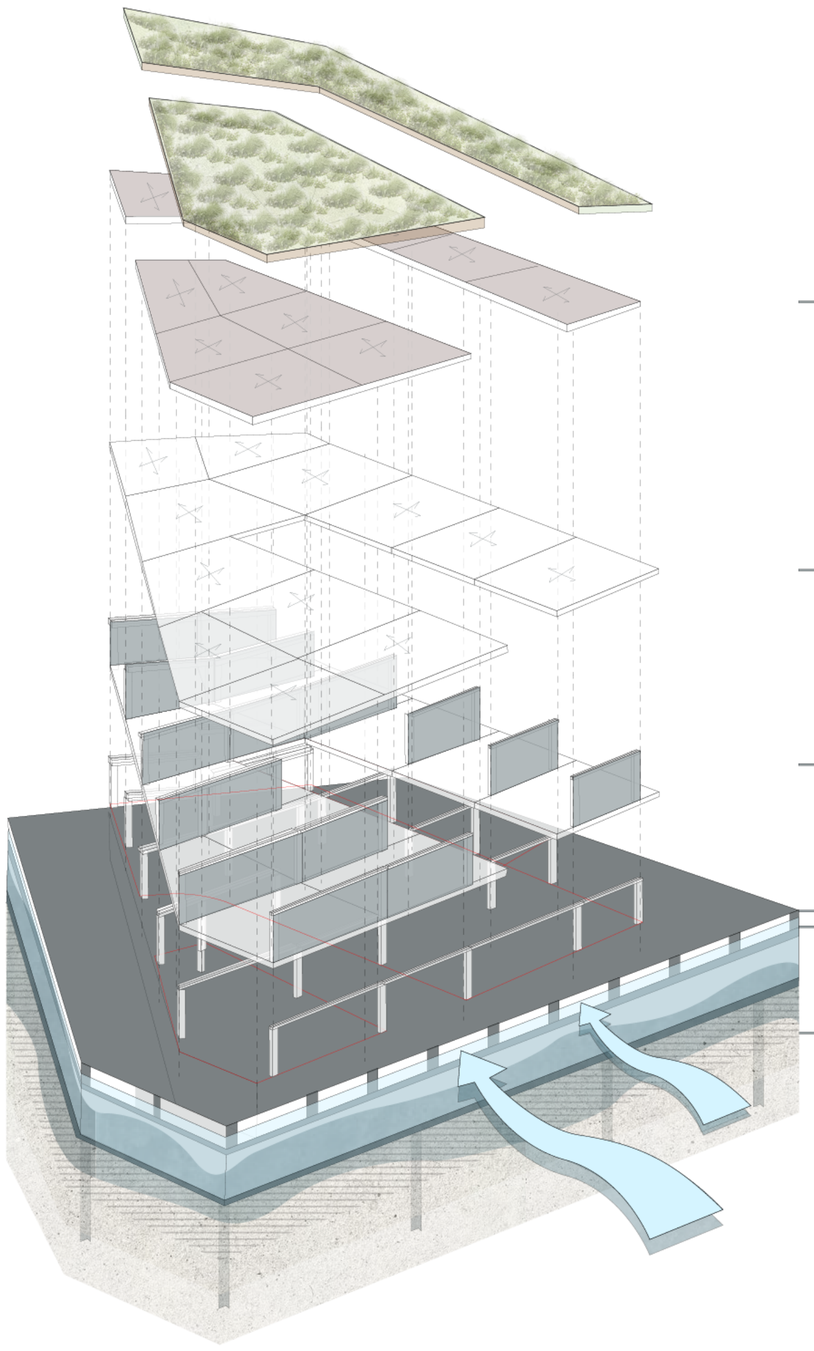
TRANSLATING TECHNICAL INTERVENTIONS

CREATING UNDERSTANDING OF CLIMATE SYSTEMS IN BUILDINGS - USING NATURE'S FORCES - BIOPHILIA & BIOMIMICRY

By creating visiblity of the gutters and water drainage systems, people can enjoy the aesthetics of them within the facade, while also understanding how water run-off is being slowed down and captured.

The positive water interaction will lead to more relaxation of people on exterior scale, while on the indoor and outdoor courtyard people can also enjoy the appearance of a 'waterfall' water filter, in combination with the visible GLUBAM beams and Cross Laminated Bamboo floors that are noticable on the ceiling. The natural potentials are implemented, which is the biophilic aspect.





CLB ROOF
Sedum + sloping roof for biodiversity with supporting beams and columns

CLB FLOORS
Ground floor: 5 -layered CLB (better water resistancy because of more glued layers)
Upper floors: 3-layered CLB (cross laminated bamboo)

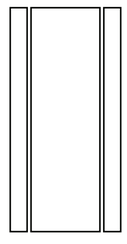
CLB WALLS
with visible gluebam columns and beams - easy to access when reparation is needed

air labyrinth transporting natural air supply - extra protection flood layer for upper floor re-using stelcon plates from site

-1.5 m parking underground - becomes flooded when floodings occur

Steel pole foundation for enough depth in ground for support when soil is washed away by floodings



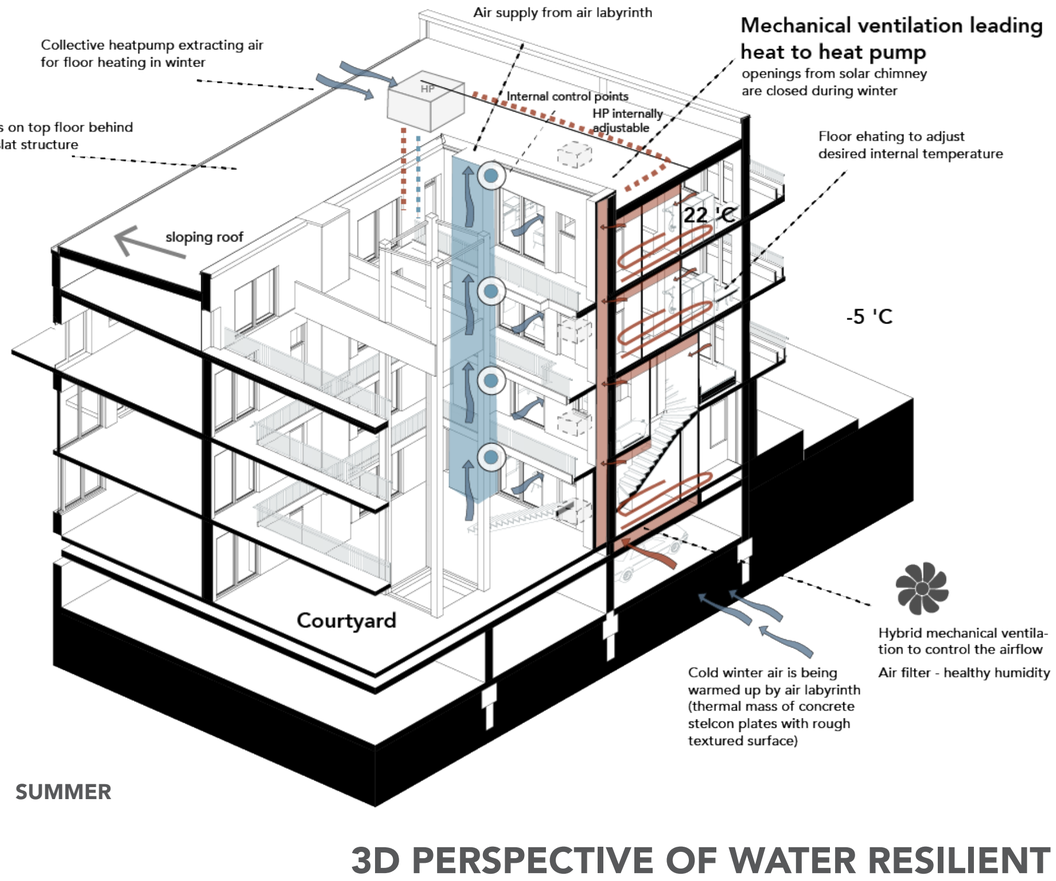


Stelcon slabs

Stelcon slabs are re-used from the site, where the site is currently covered with. They will be cut in half and clamped to funciton as walls for the air labyrinth.

AXONOMETRIC PERSPECTIVE CONSTRUCTION

APPLIED WATER INTERVENTION TYPES IN FACADE

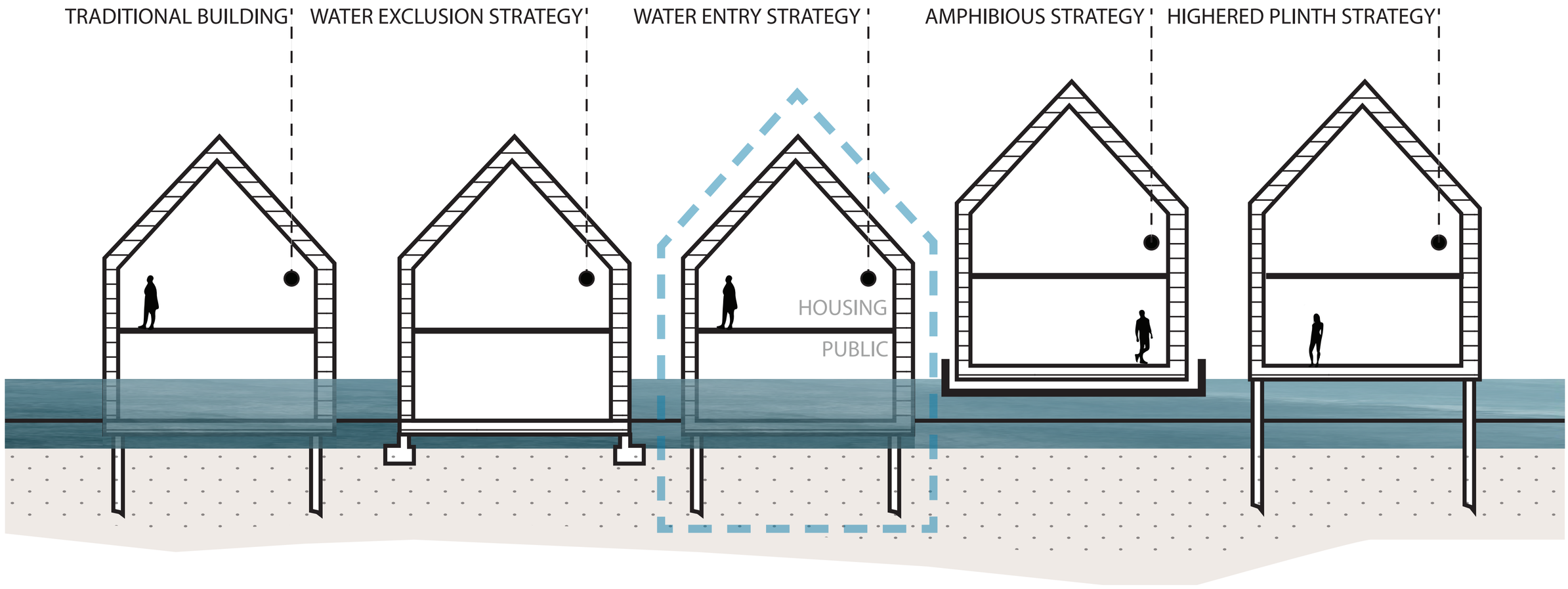


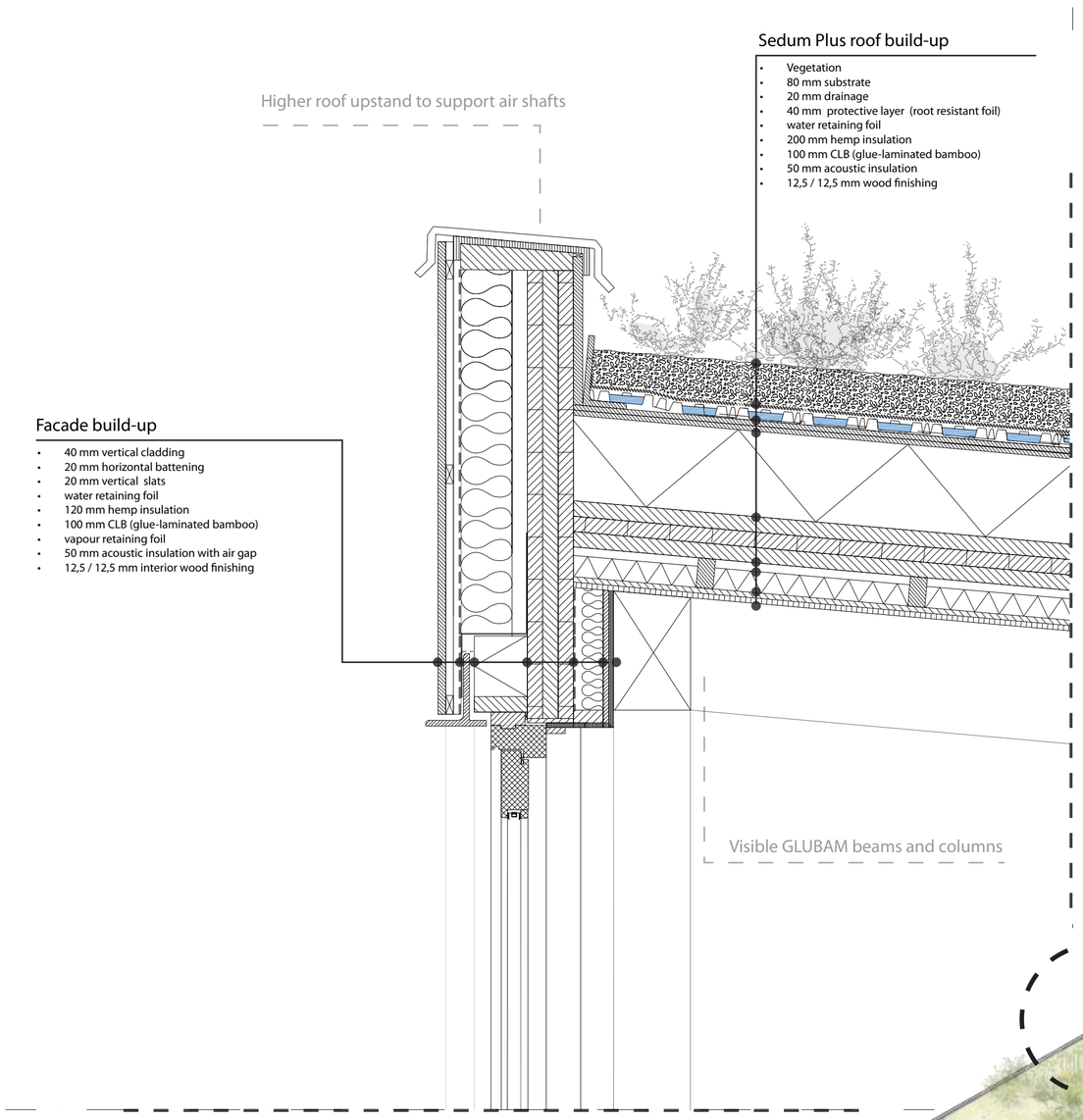
3D PERSPECTIVE OF WATER RESILIENT BUILDING PLAN - VENTILATION PRINCIPLE WITH HEATING SYSTEM

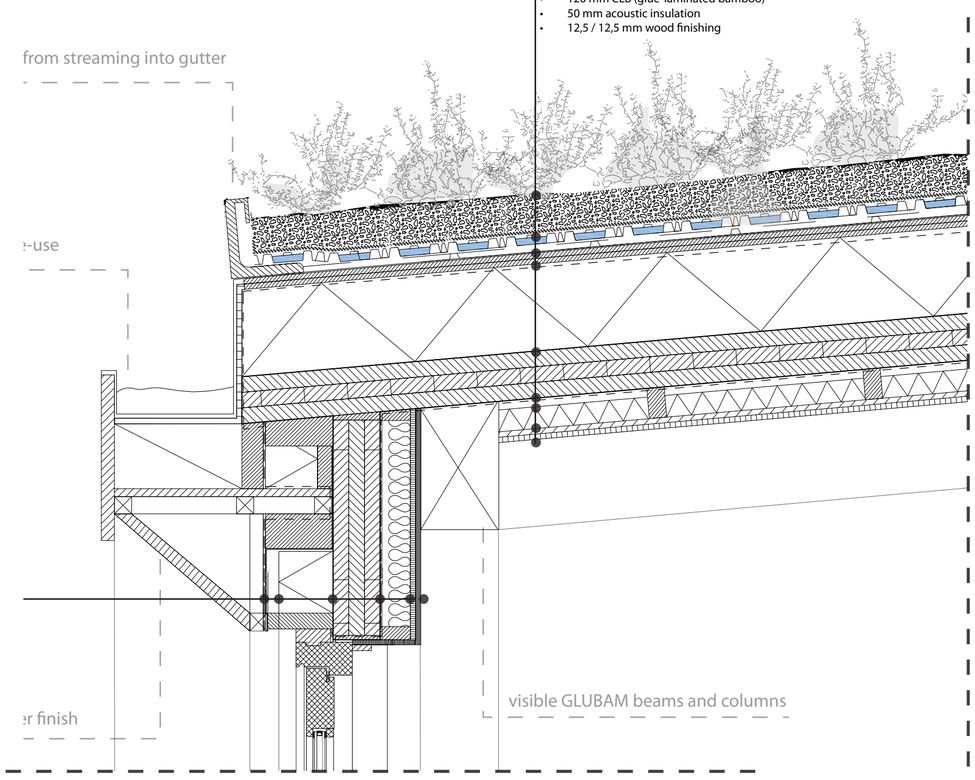
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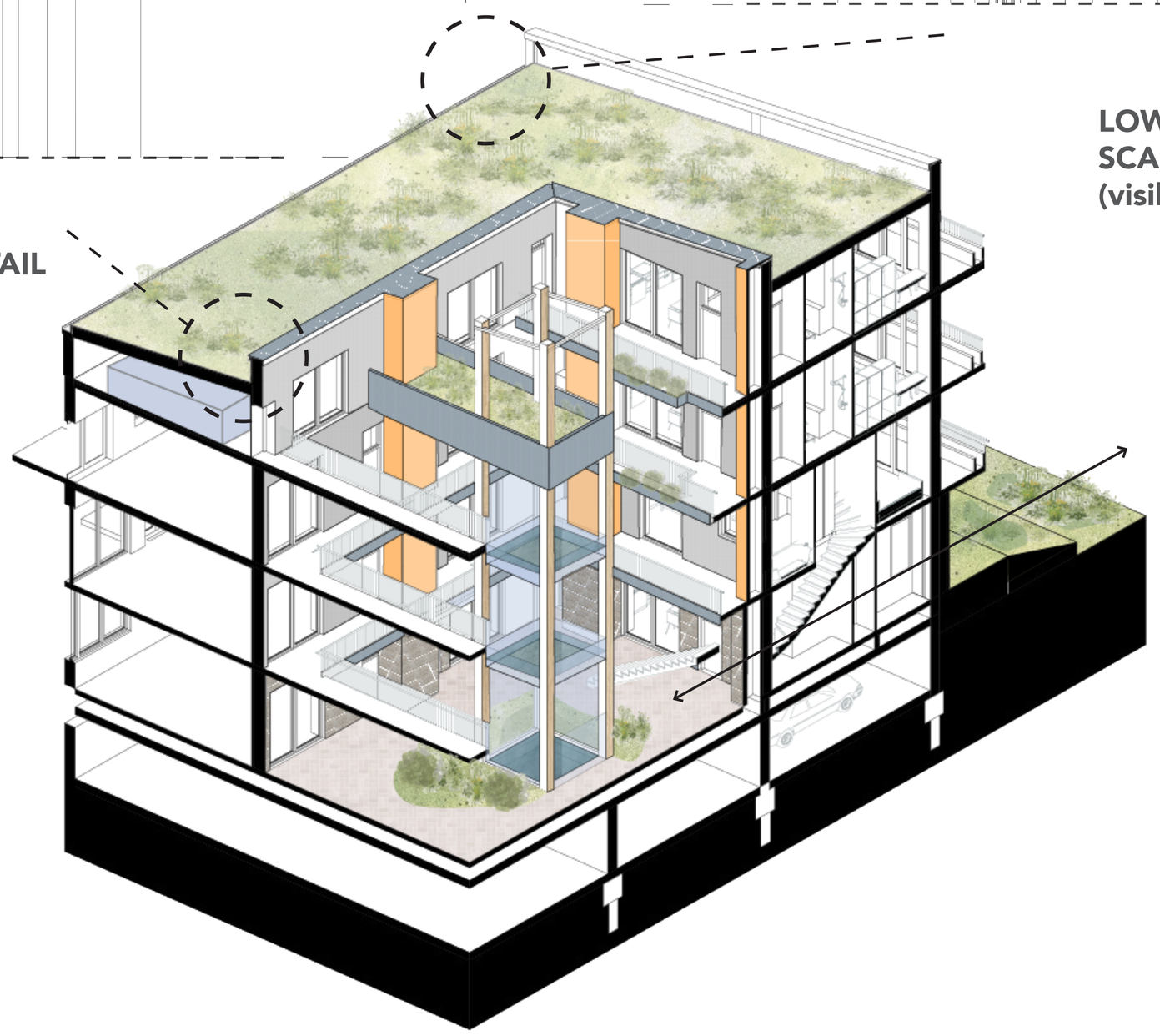
WATER-RESILIENT BUILDINGS

TECHNICAL INTERVENTIONS TO SLOW DOWN WATERSTREAM AND PROTECTION CONSTRUCTION









HIGHEST POINT ROOF DETAIL
SCALE 1:10

On the roof, water is collected in the gutter and then guided to the water reservoir, where the water is being filtered. It can then be re-used for toilets within the building.

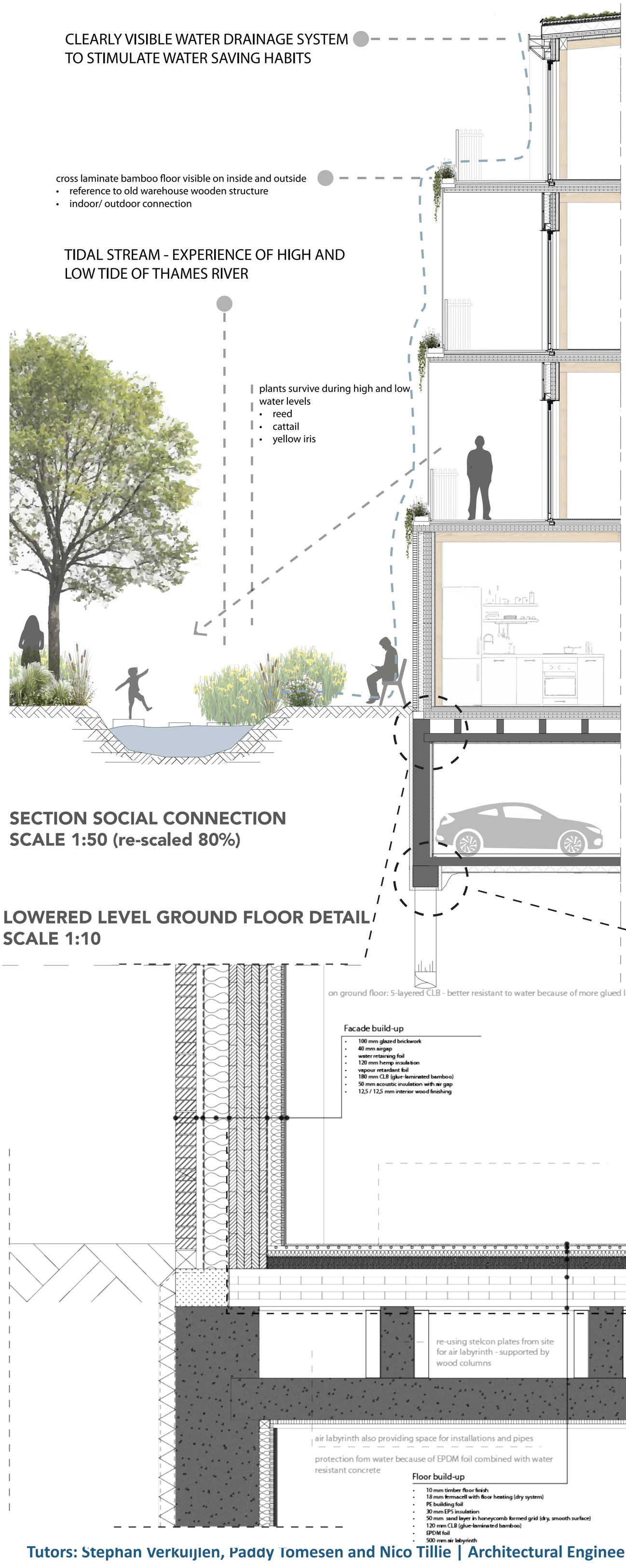
LOWEST POINT ROOF DETAIL
SCALE 1:10
(visible water collection)

Cross ventilation is an extra addition during summers, because windows are opposite of each other. Moreover, there is a direct connection between the courtyard and watergarden.

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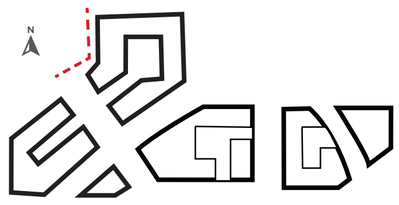
WATER-RESILIENT BUILDINGS

TEACHING ABOUT WATER SAVING HABITS AND WATER COLLECTING SYSTEMS





The parkside facade has balconies that capture water underneath the planters, making it a automatic irrigation system

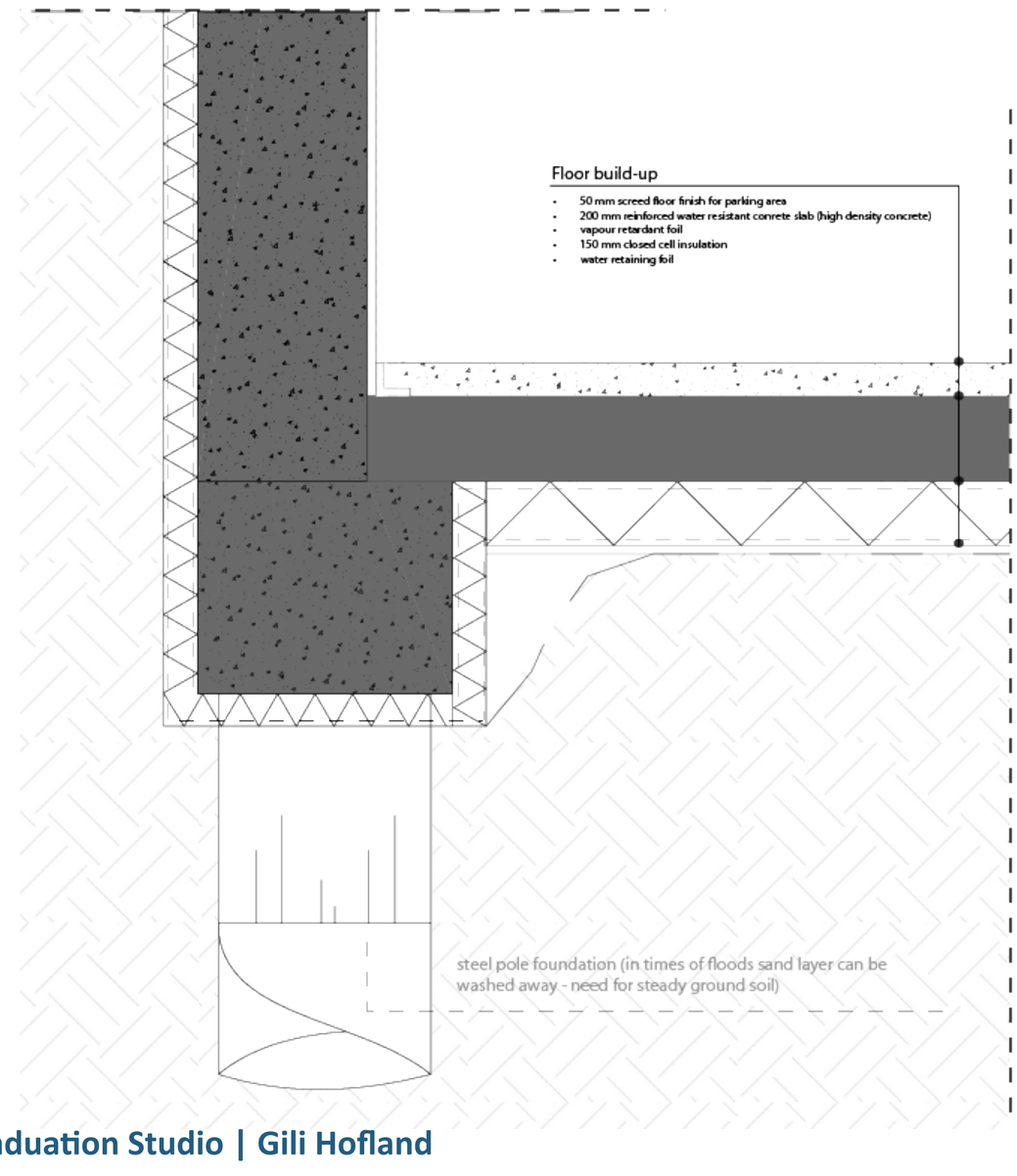


Facade part on park side

SECTION SOCIAL CONNECTION
SCALE 1:50 (re-scaled 80%)

LOWERED LEVEL GROUND FLOOR DETAIL
SCALE 1:10

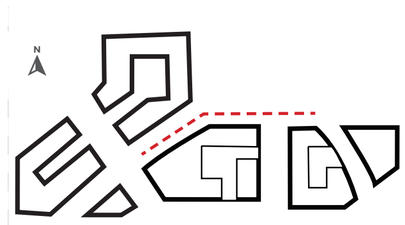
LOWERED LEVEL FOUNDATION DETAIL
SCALE 1:10



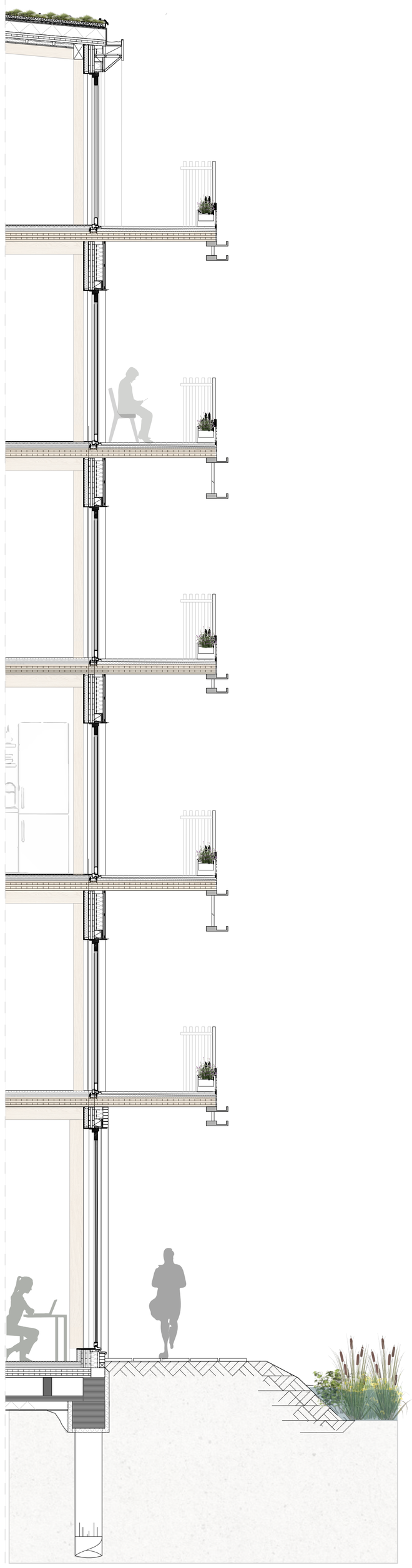
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THE SOCIAL BUILDING SCALE

TEACHING ABOUT WATER SAVING HABITS AND WATER COLLECTING SYSTEMS



Facade part on garden side

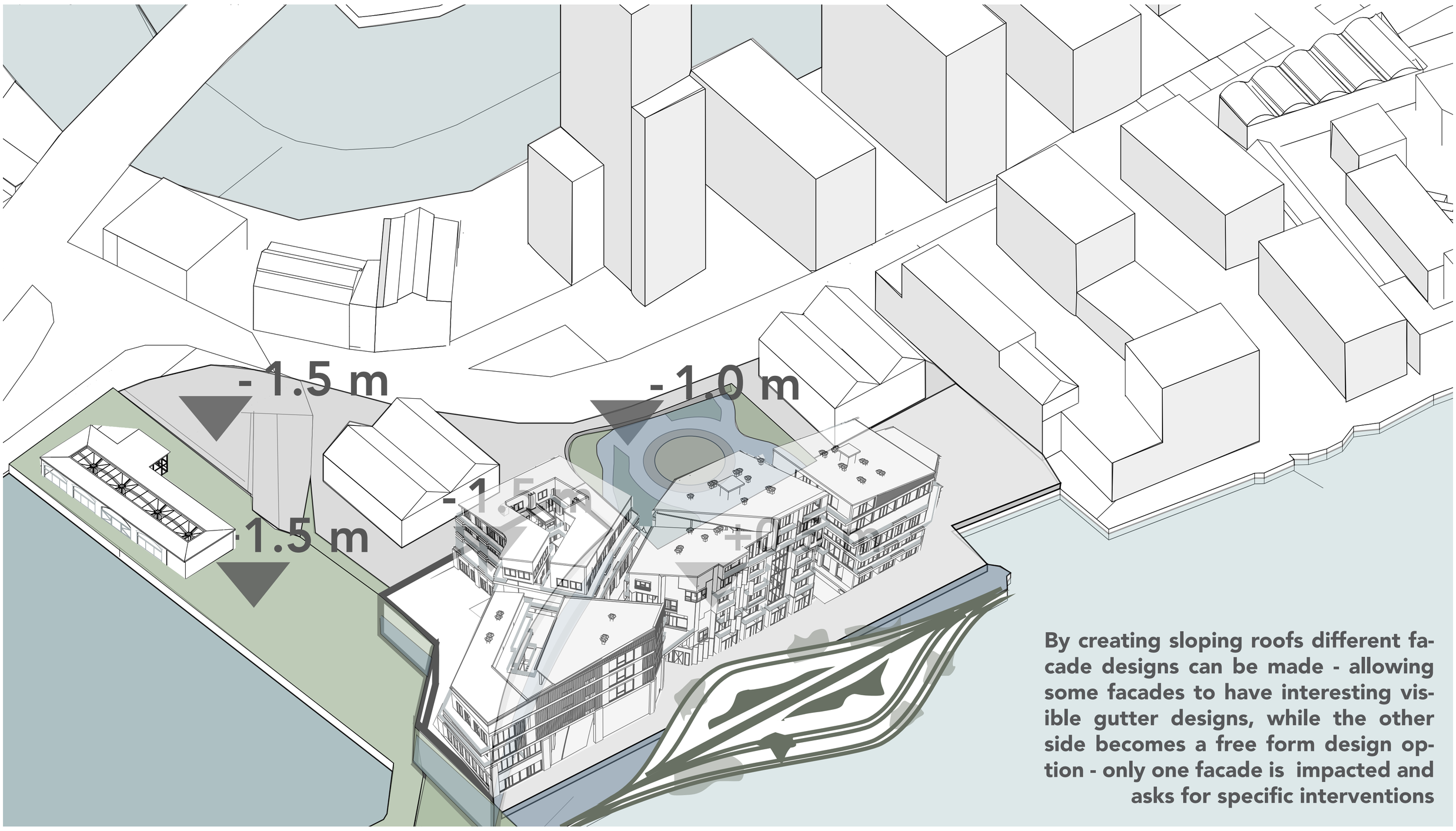




SECTION RAINWATER DRAINAGE
SCALE 1:50 (re-scaled from 1:20)

FACADE DESIGN SOCIAL BUILDING SCALE

CREATING VISIBLE INTERVENTIONS ON HOW WATER IS BEING COLLECTED AND GUIDED TOWARDS THE GROUND



By creating sloping roofs different facade designs can be made - allowing some facades to have interesting visible gutter designs, while the other side becomes a free form design option - only one facade is impacted and asks for specific interventions



TOP VIEW - TERRACED WATERFRONT



HIGHEST POINT ROOF - FREE FORM FACADE
SCALE 1:100

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THE SOCIAL BUILDING SCALE

VISBLE TRANSLATION OF SUSTAINABLE URBAN DRAINAGE SYSTEM



IMAGE OF TERRACED WATERFRONT OF THE THAMES RIVER - EVERYDAY HIGH AND LOW TIDE



IMAGE OF WATERGARDEN SIDE - VISIBLE WATER COLLECTING GUTTER