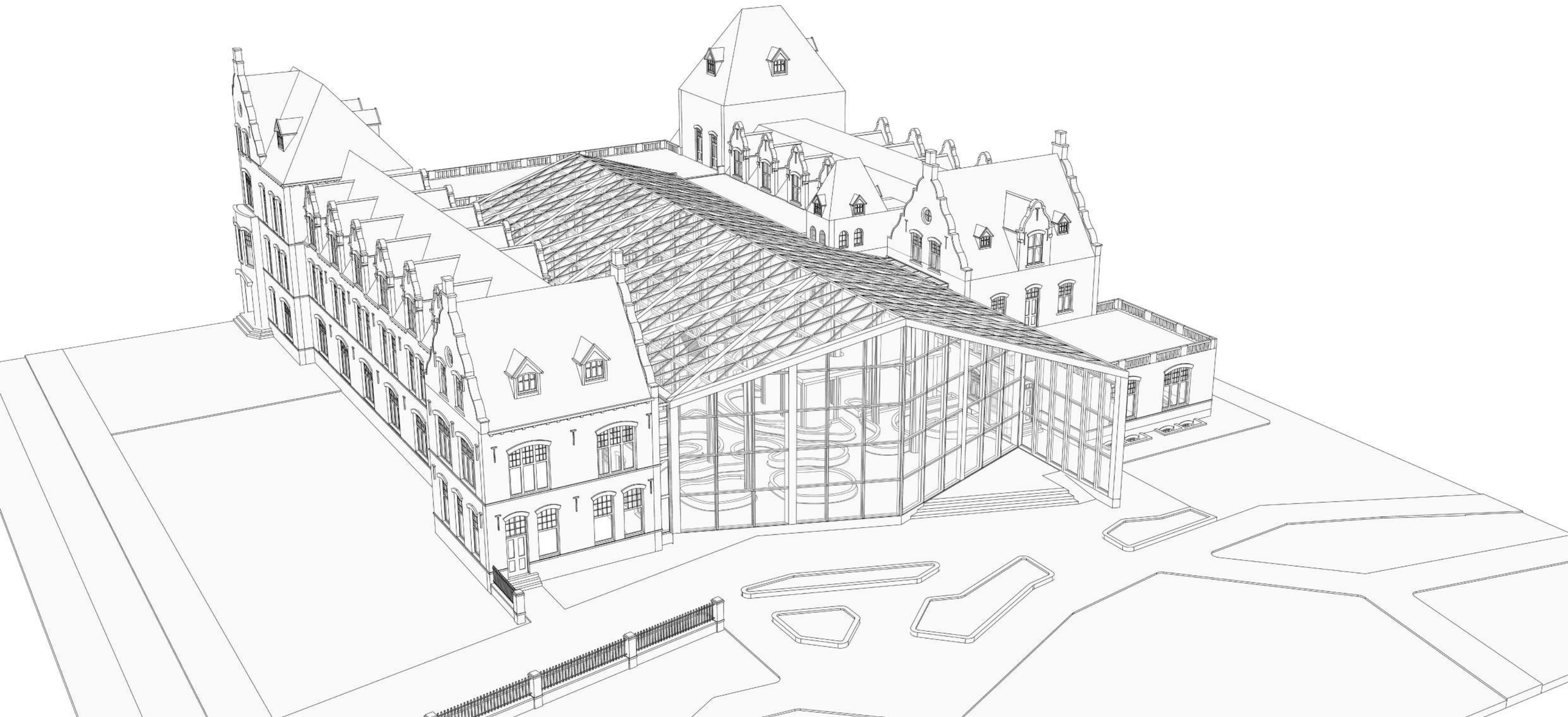
URBAN FARMING CENTRE

ARCHITECTURAL ENGINEERING

SCOTT SPOON
4675177



TU campus struggles

Connect with Delft

Reduce emissions

Activity at night

Social interactions

What is Urban farming?

Hydroponics

Aeroponics

Aquaculture

Community farm

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Hydroponics

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Aquaculture

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Hydroponics

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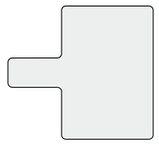
Community farm

Urban farming flows

Mushroom farming

Vertical farming

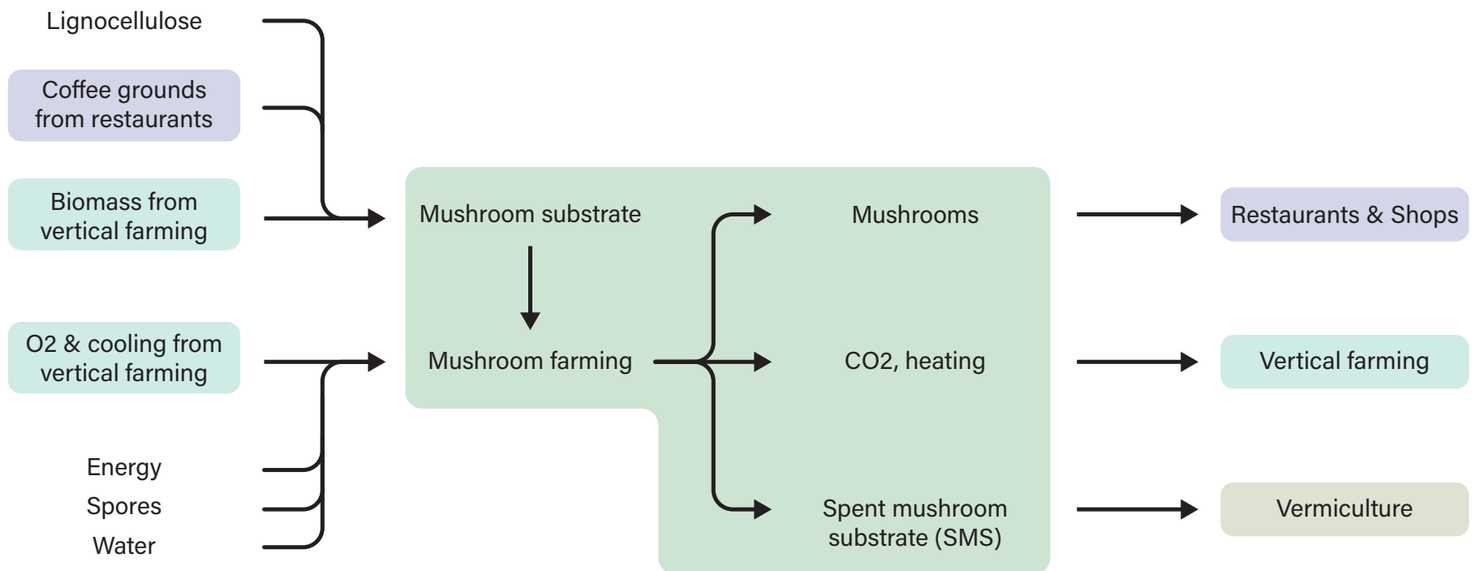


Aquaculture

Vermiculture

Social settings

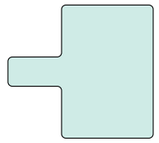
Housing



Urban farming flows

Mushroom farming

Vertical farming



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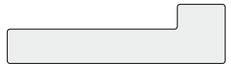

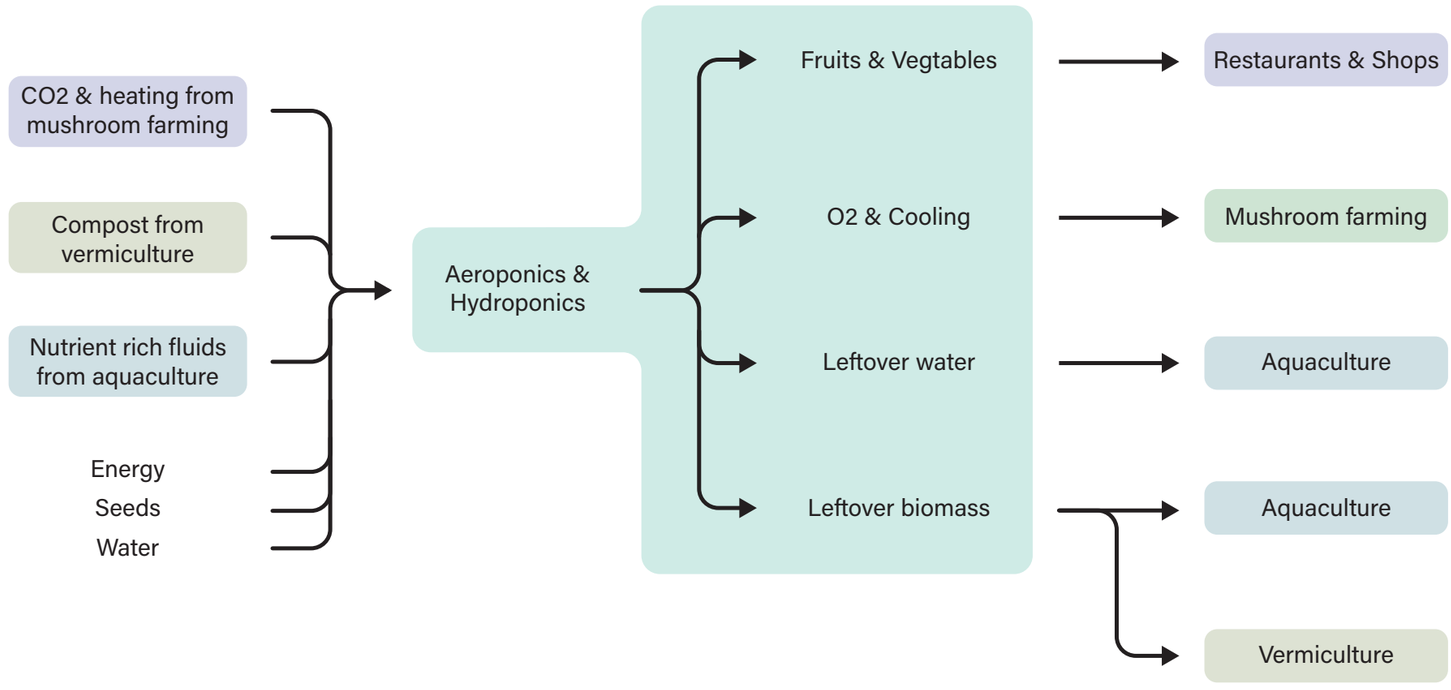

Urban farming flows

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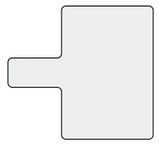

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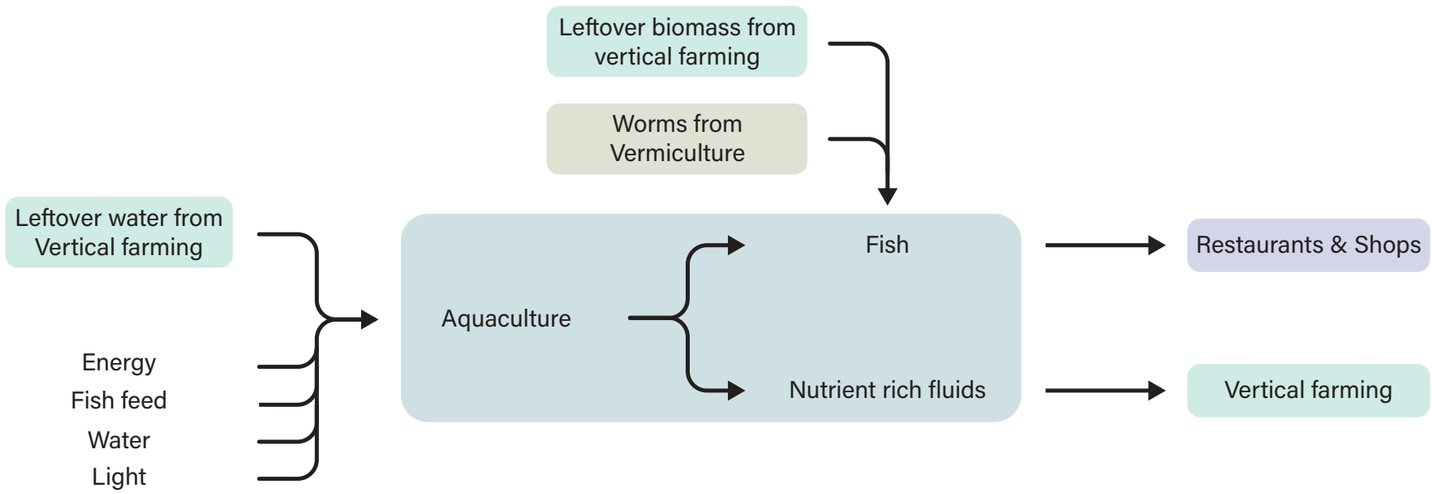

Urban farming flows

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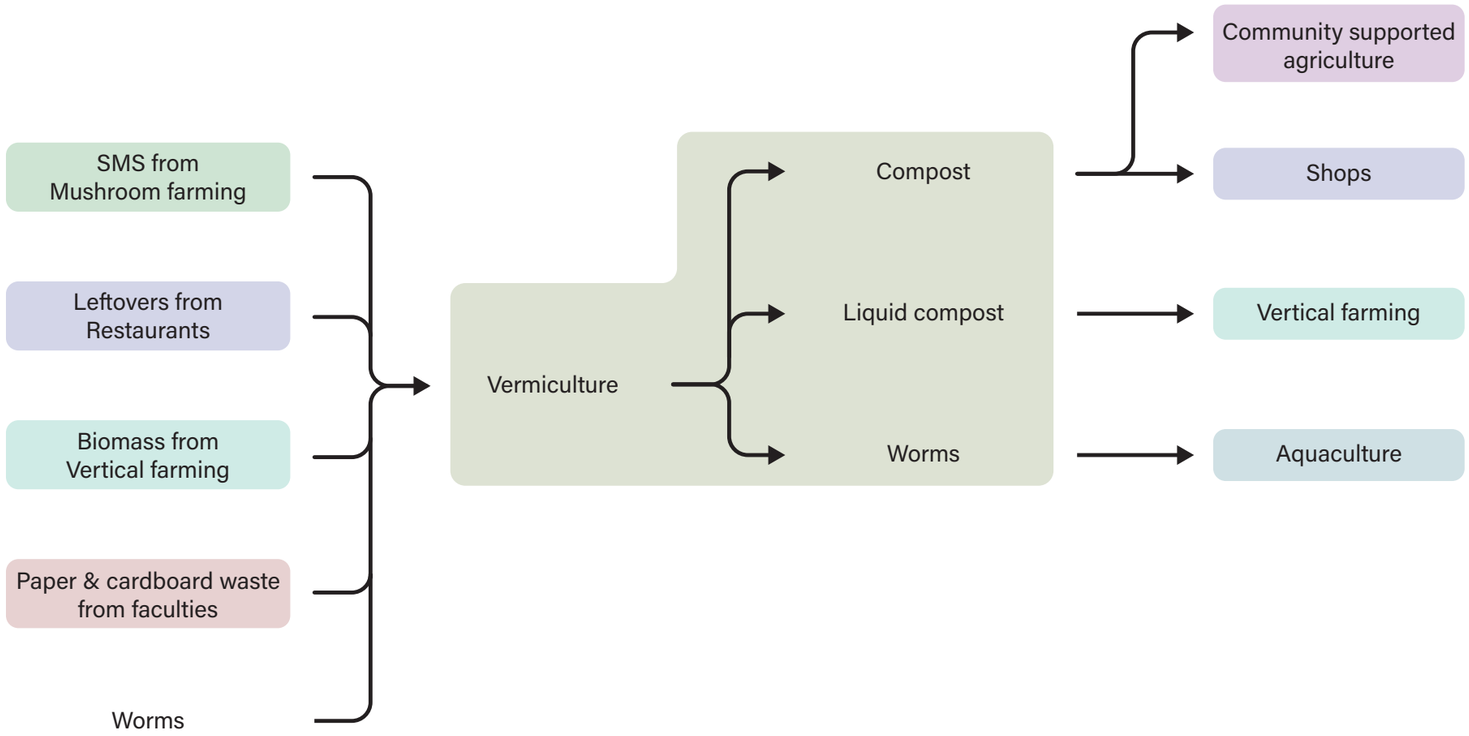

Urban farming flows

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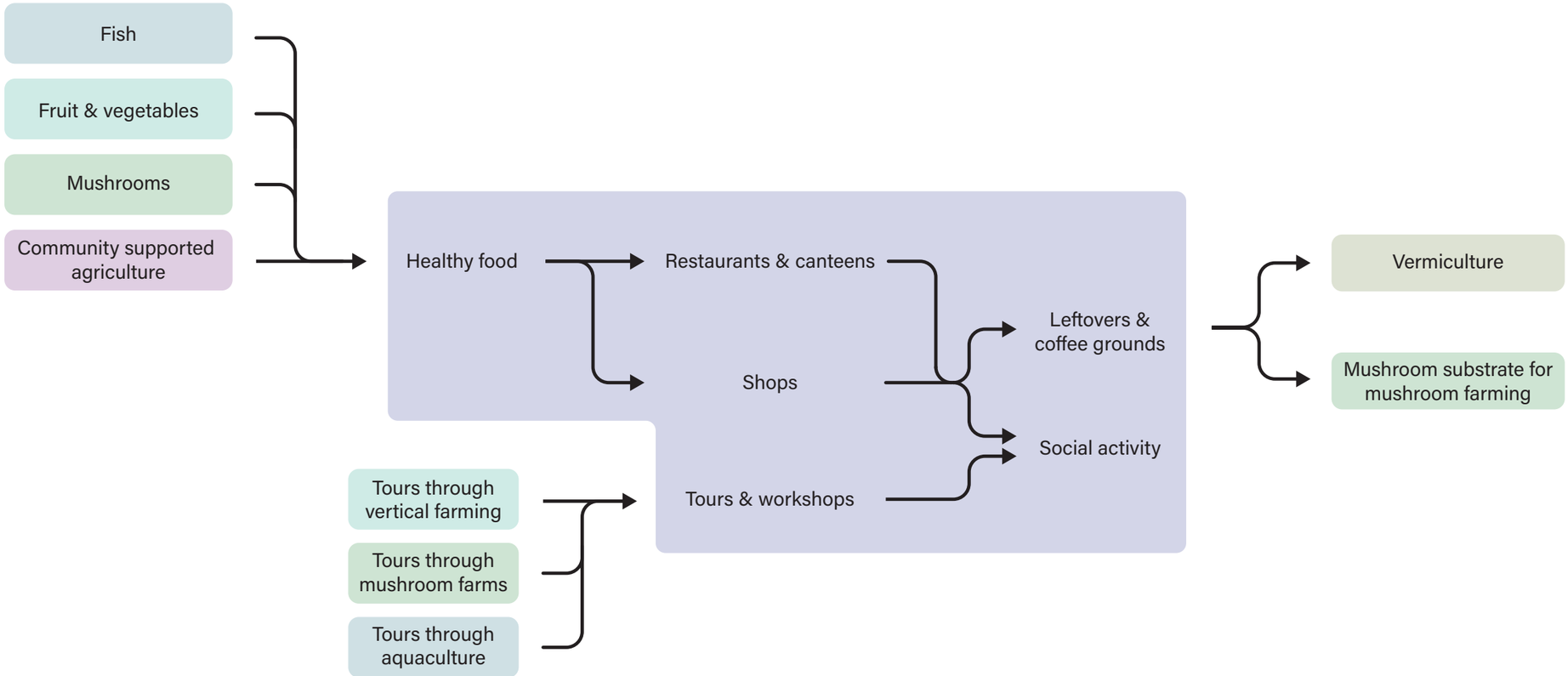
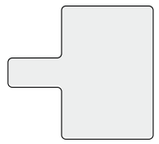


Urban farming flows

Mushroom farming

Vertical farming



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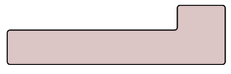
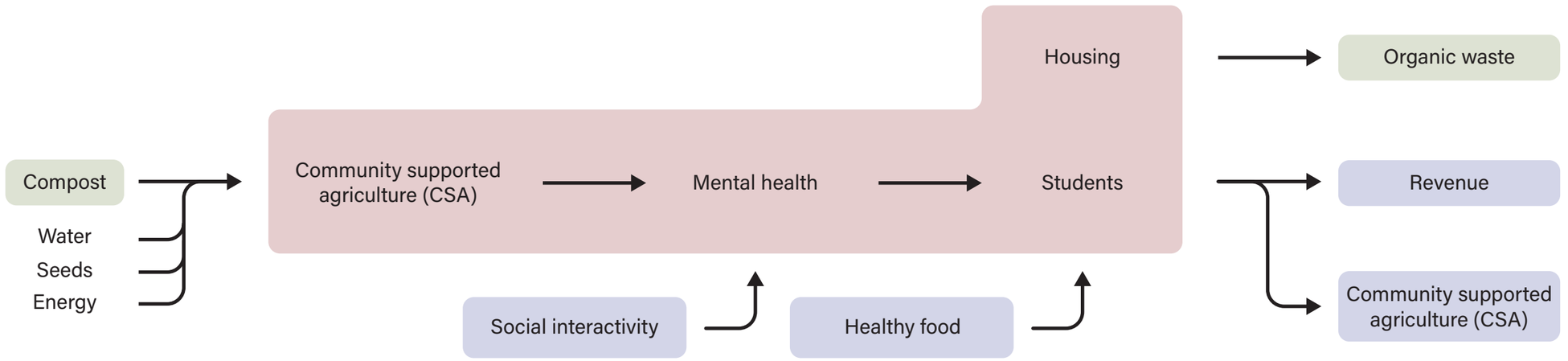
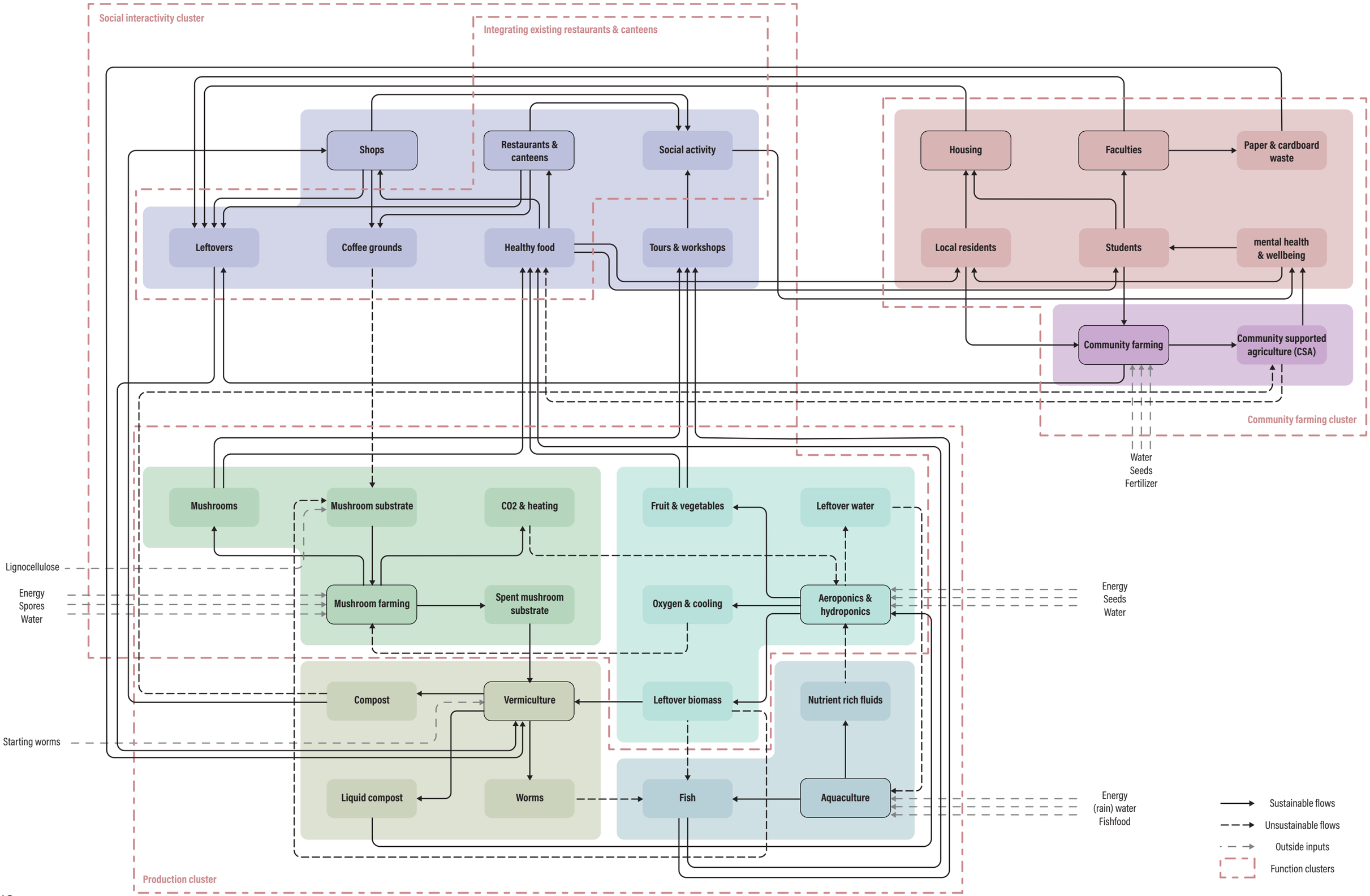




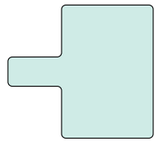
Flows combined



Flows combined | simplified

Mushroom farming

Vertical farming



Aquaculture

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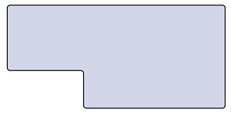
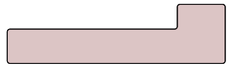
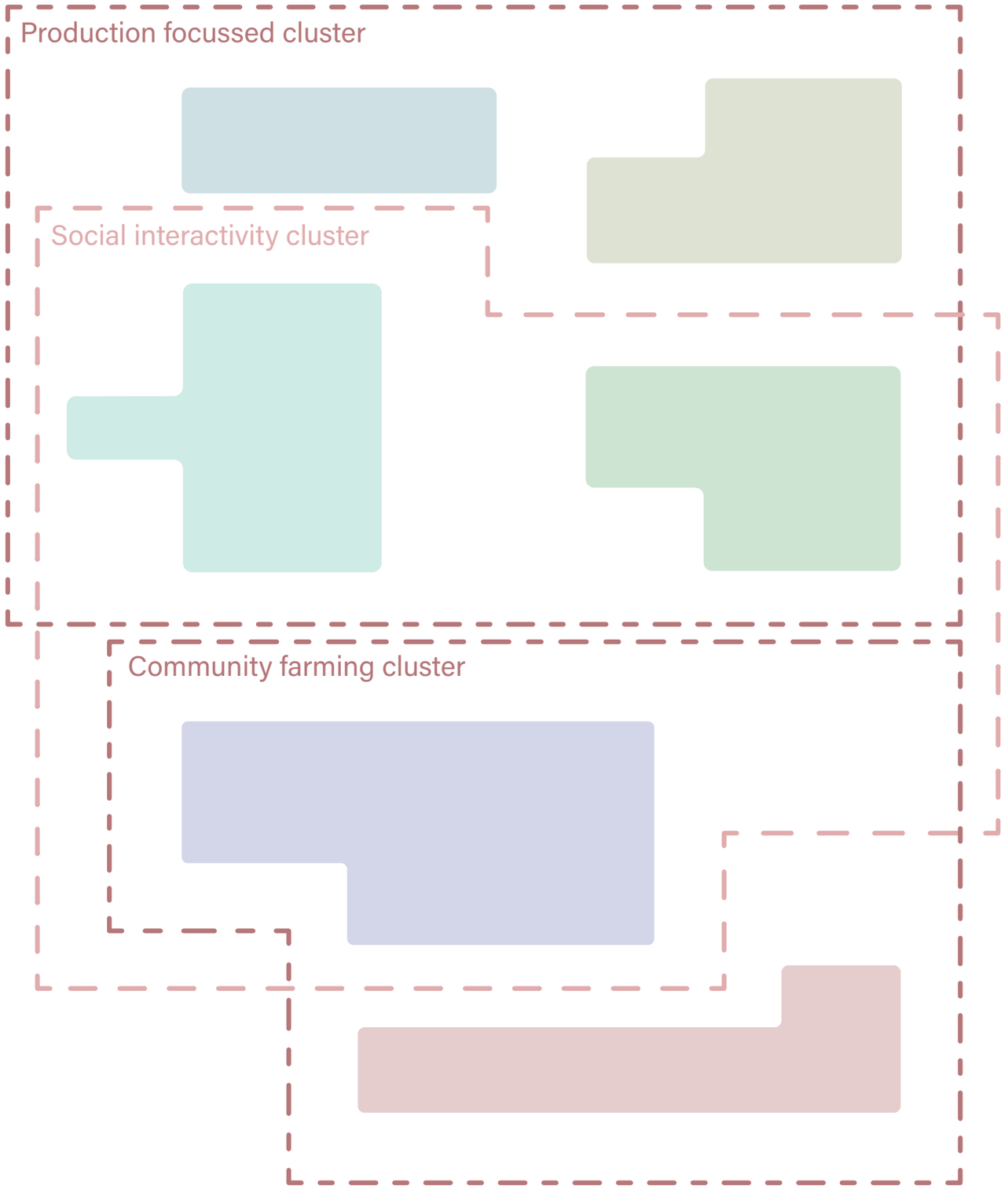
Social settings



Housing





Functions overview

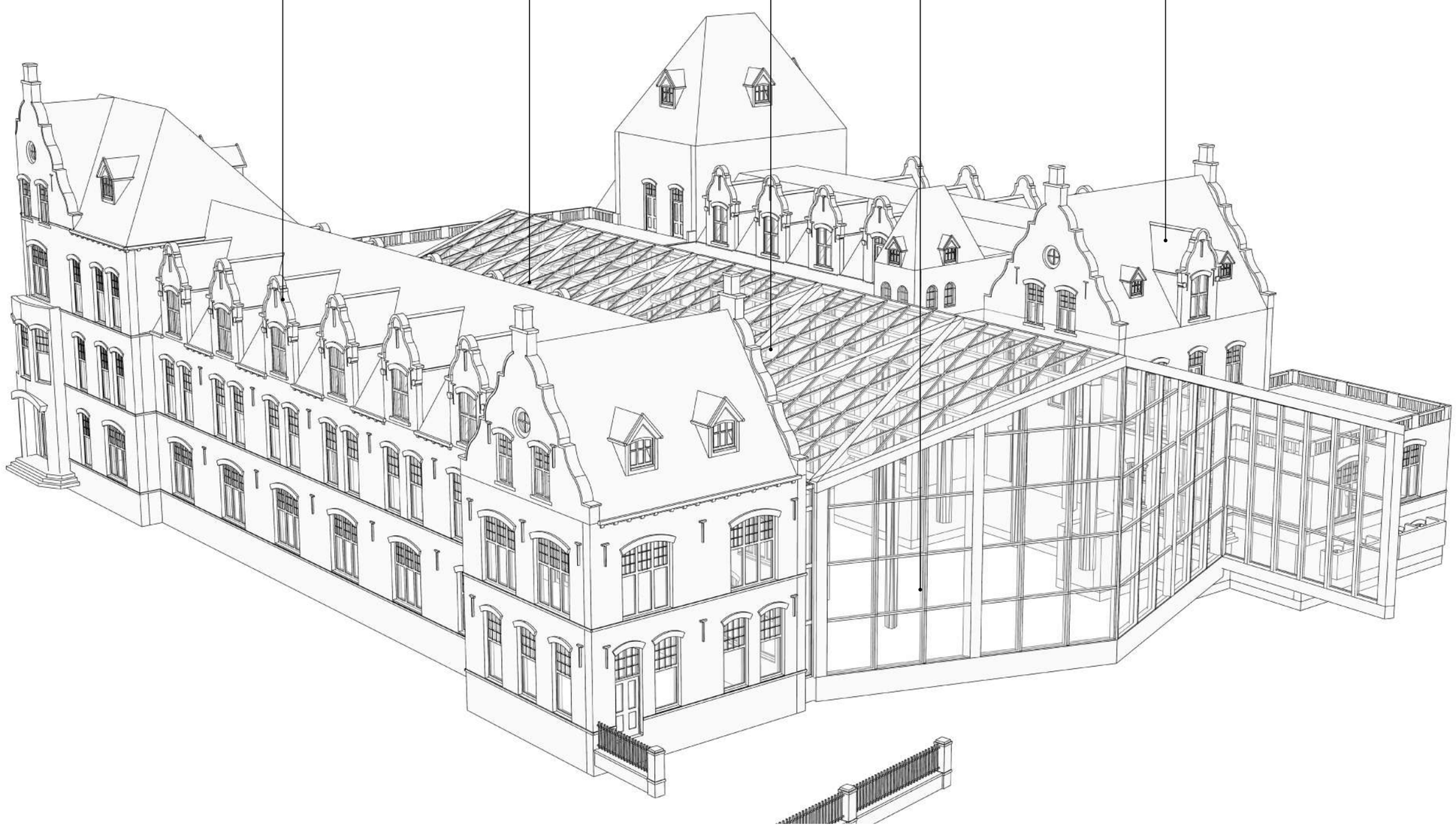
Workshops

Aero- & Hydroponics

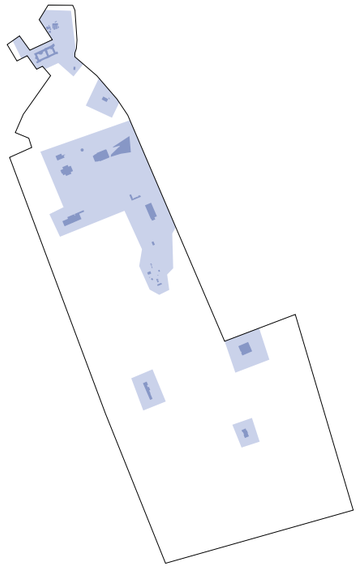
Mushroom farming

Restaurant

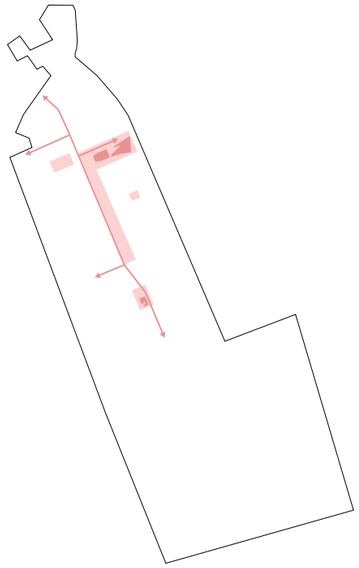
Housing



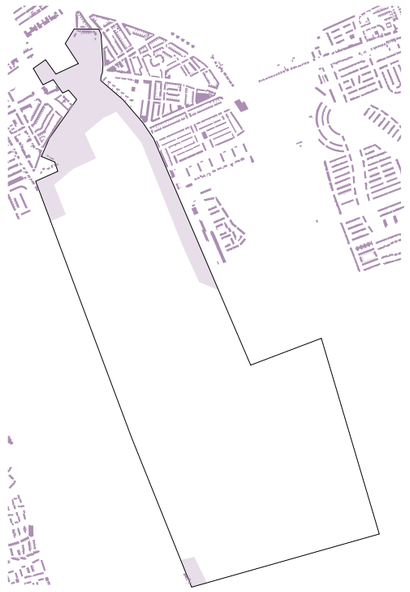
Campus analyses



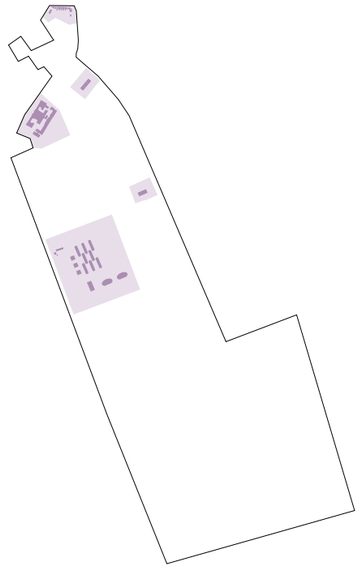
Public functions



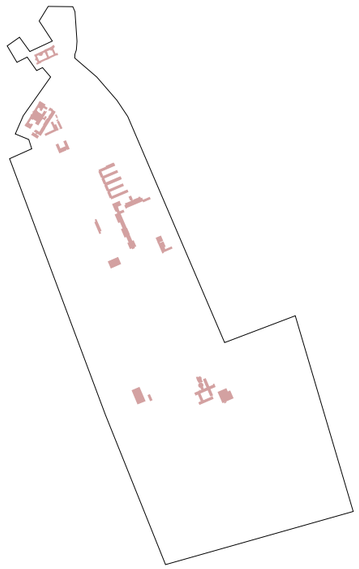
Hotspots



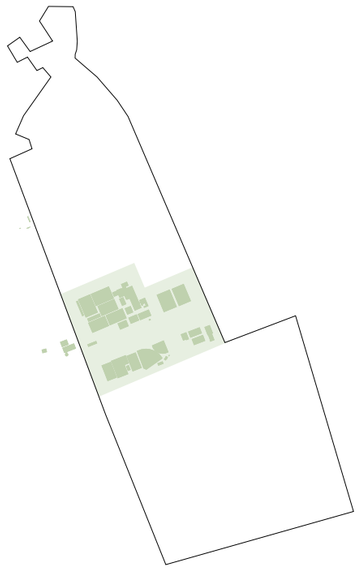
Local housing



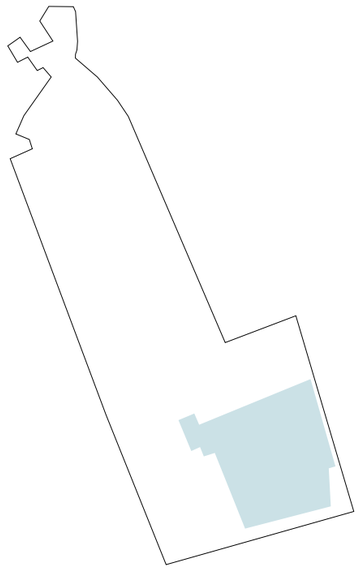
On-campus housing



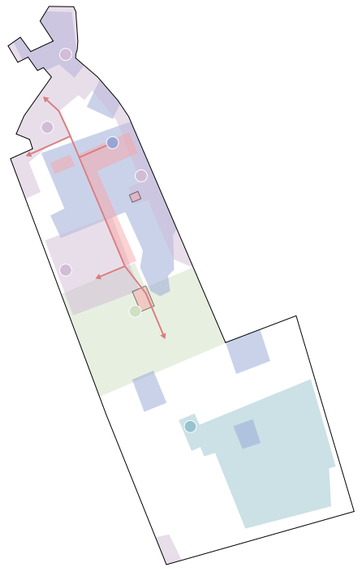
Renovations



Sport functions

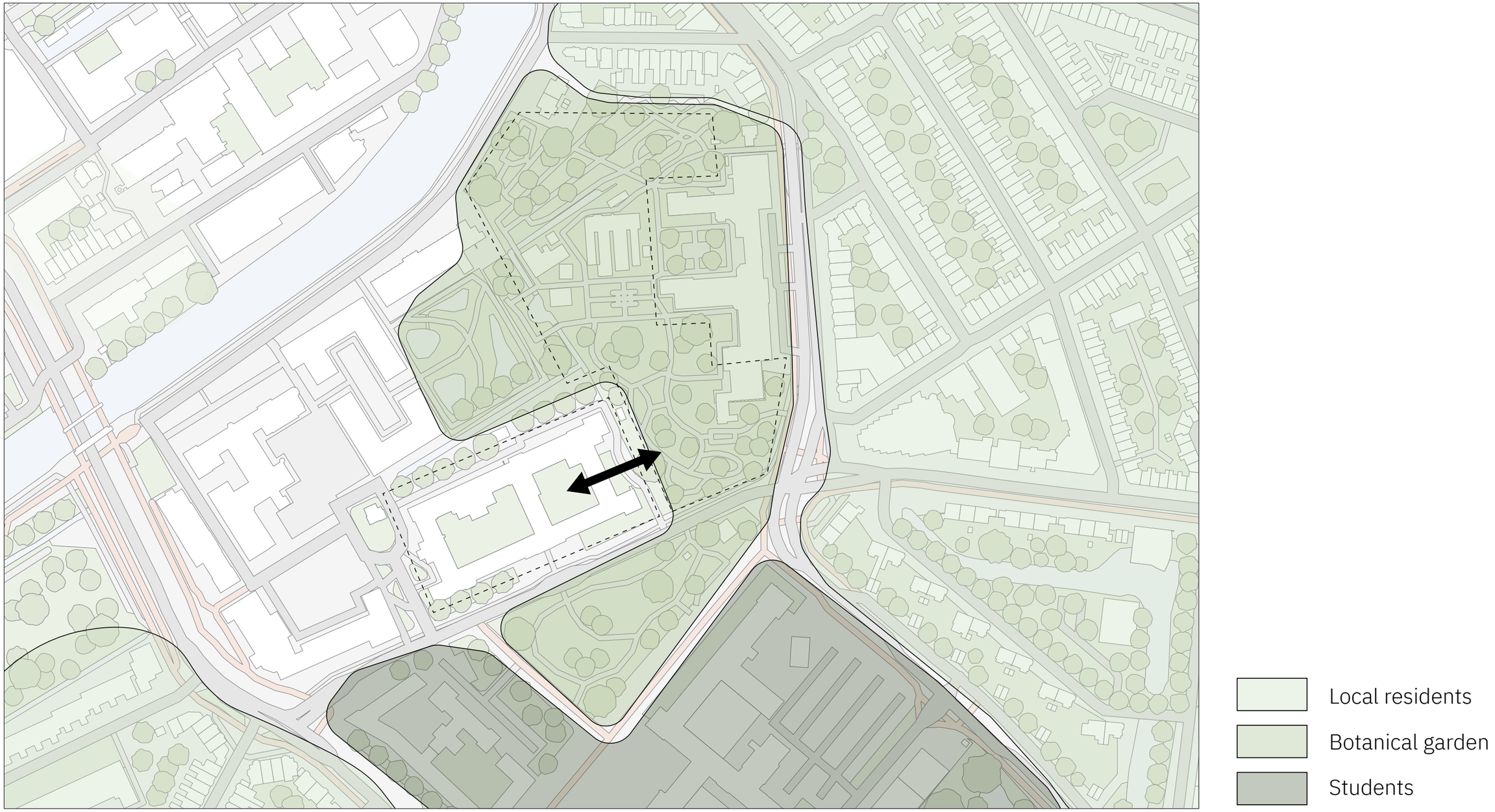


Vacant space



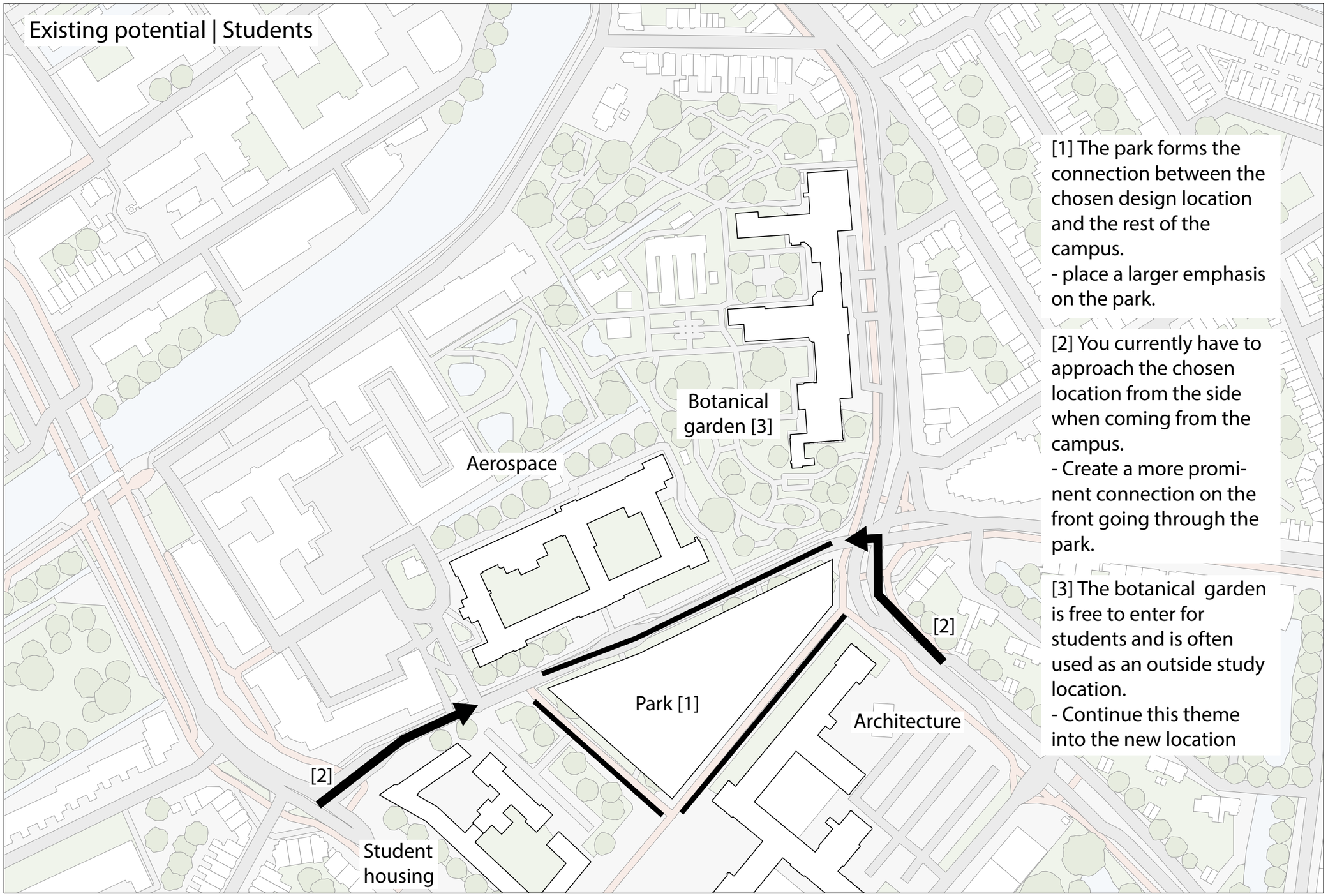
Combined

Location analyses | Functions

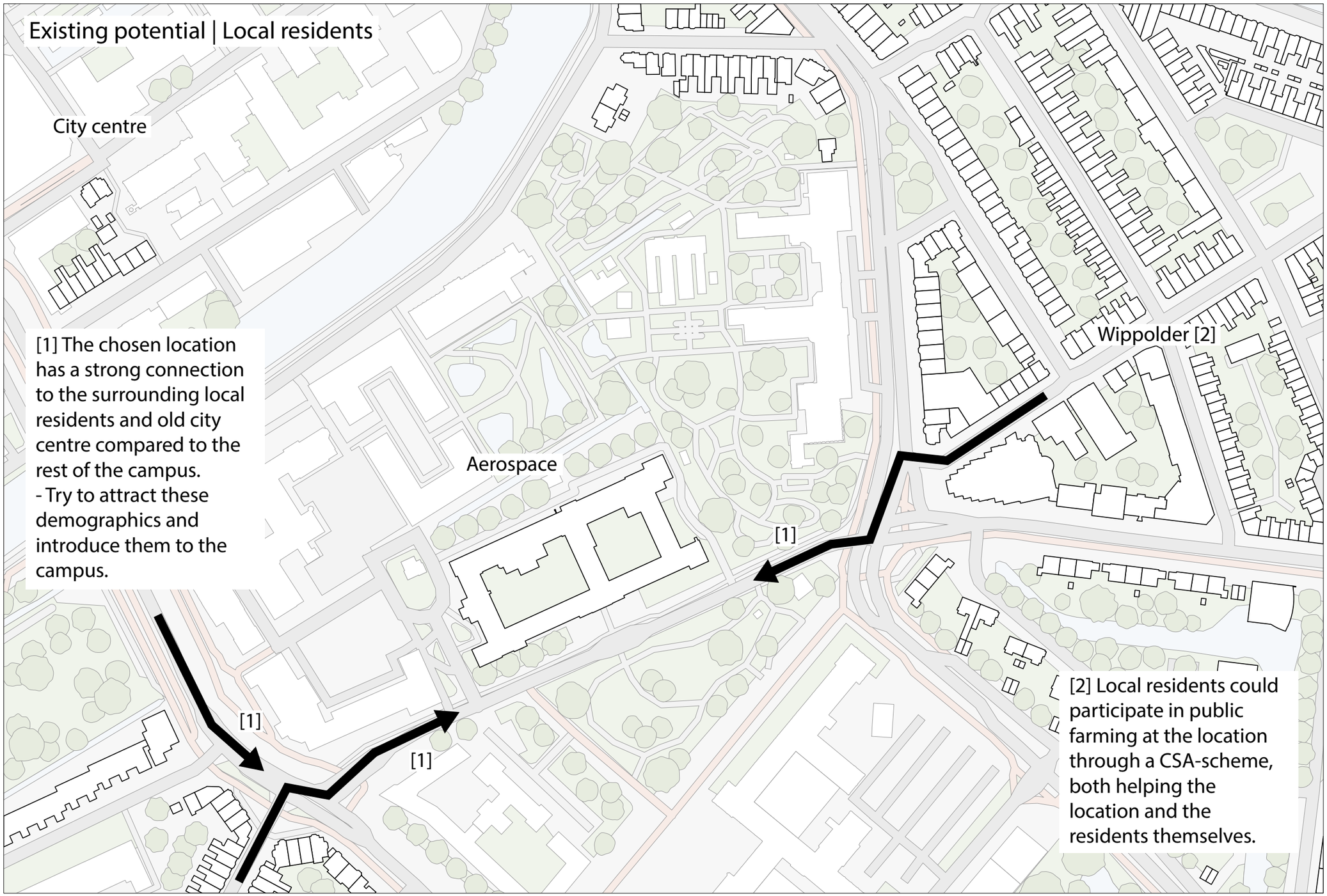


Function clusters

Location analyses | Students



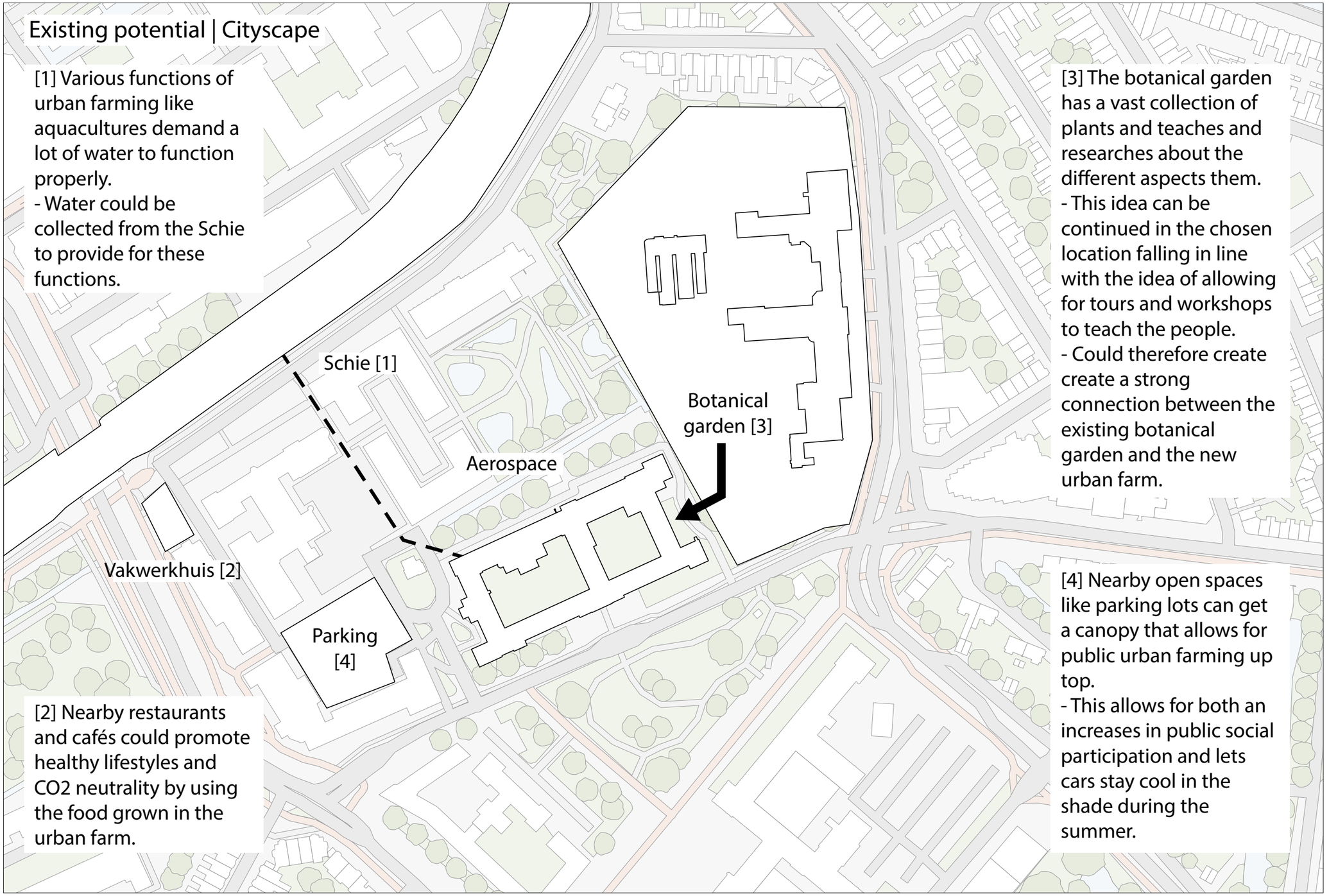
Location analyses | Local residents



Local residents interaction

100m

Location analyses | Cityscape



Surrounding potential

100m

Urban farming flows

Mushroom farming

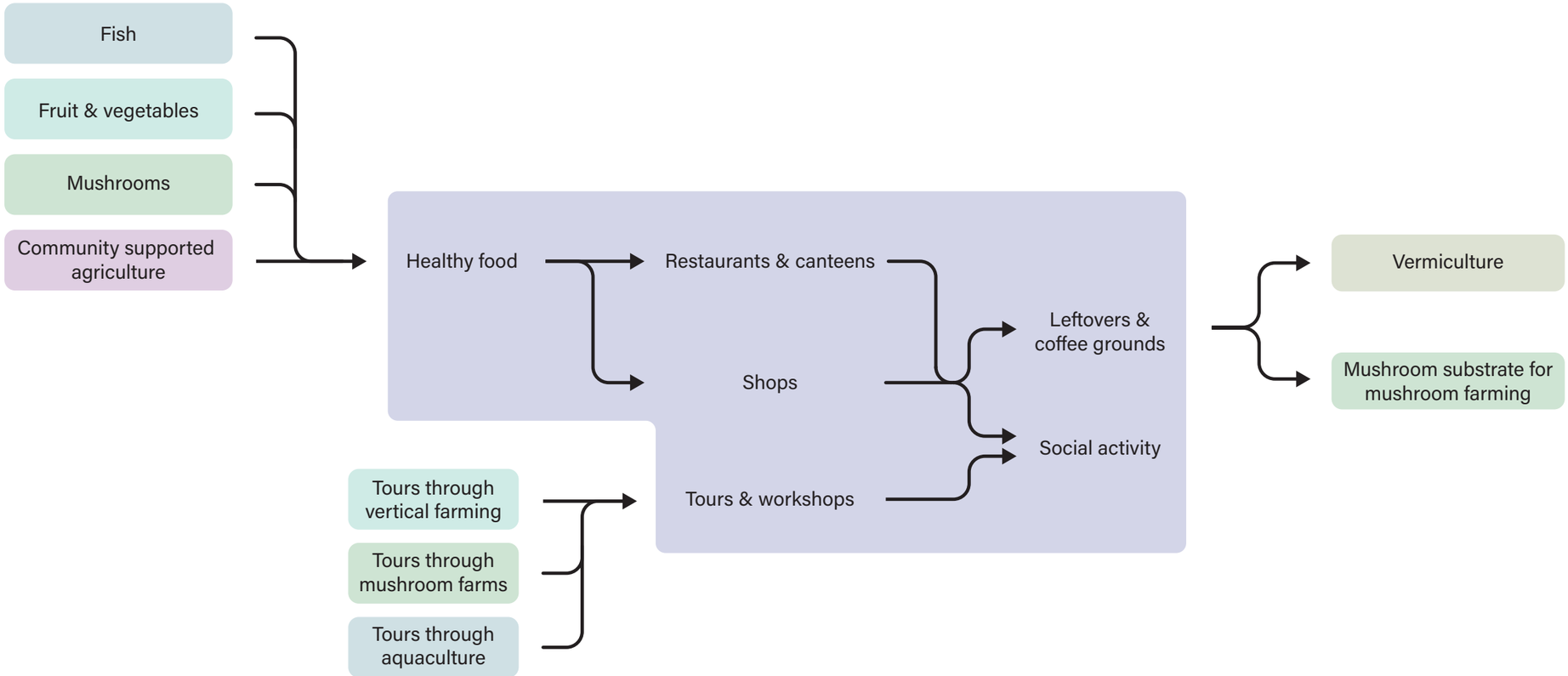
Vertical farming

Aquaculture

Vermiculture

Social settings

Housing



Urban farming flows | Extended

Mushroom farming

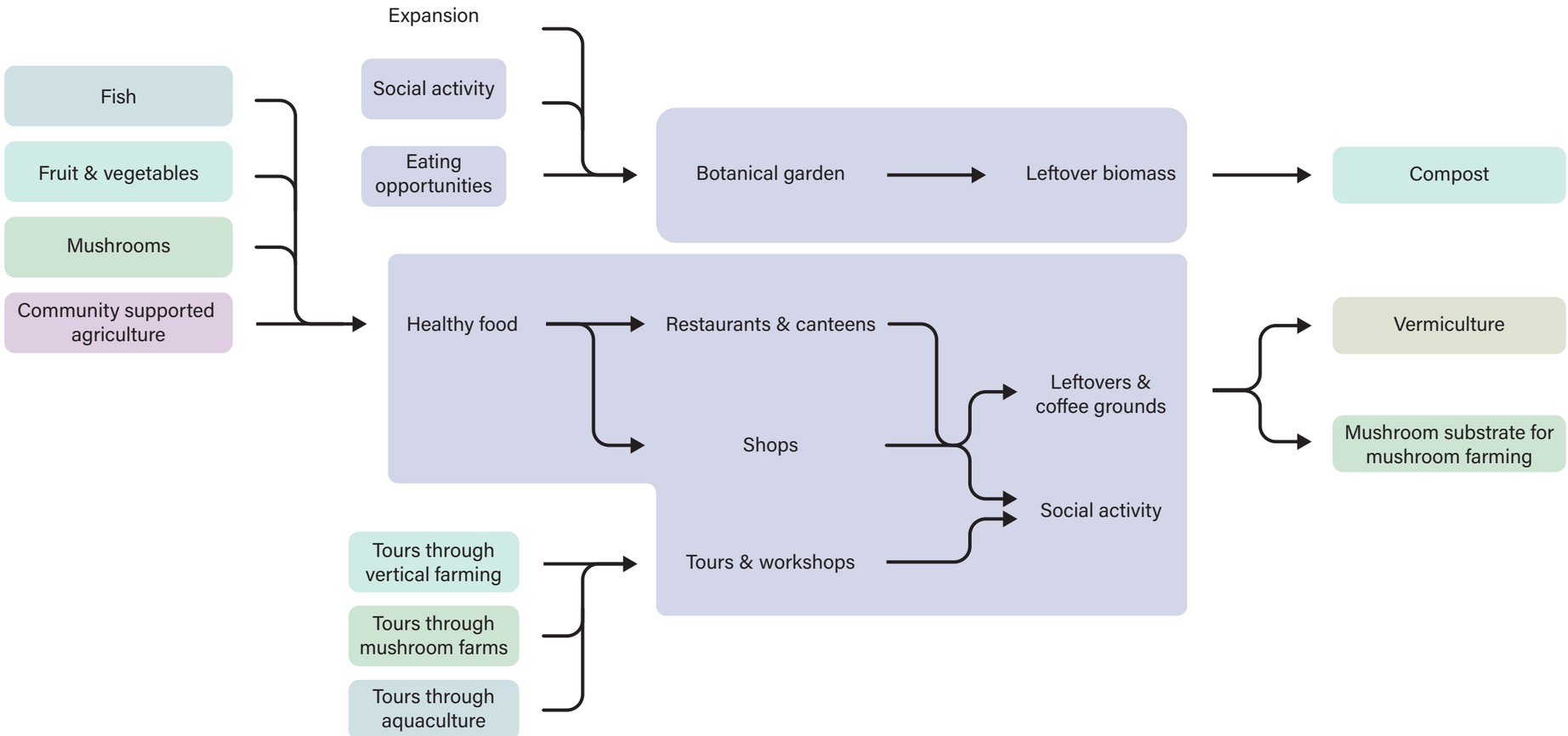
Vertical farming

Aquaculture

Vermiculture

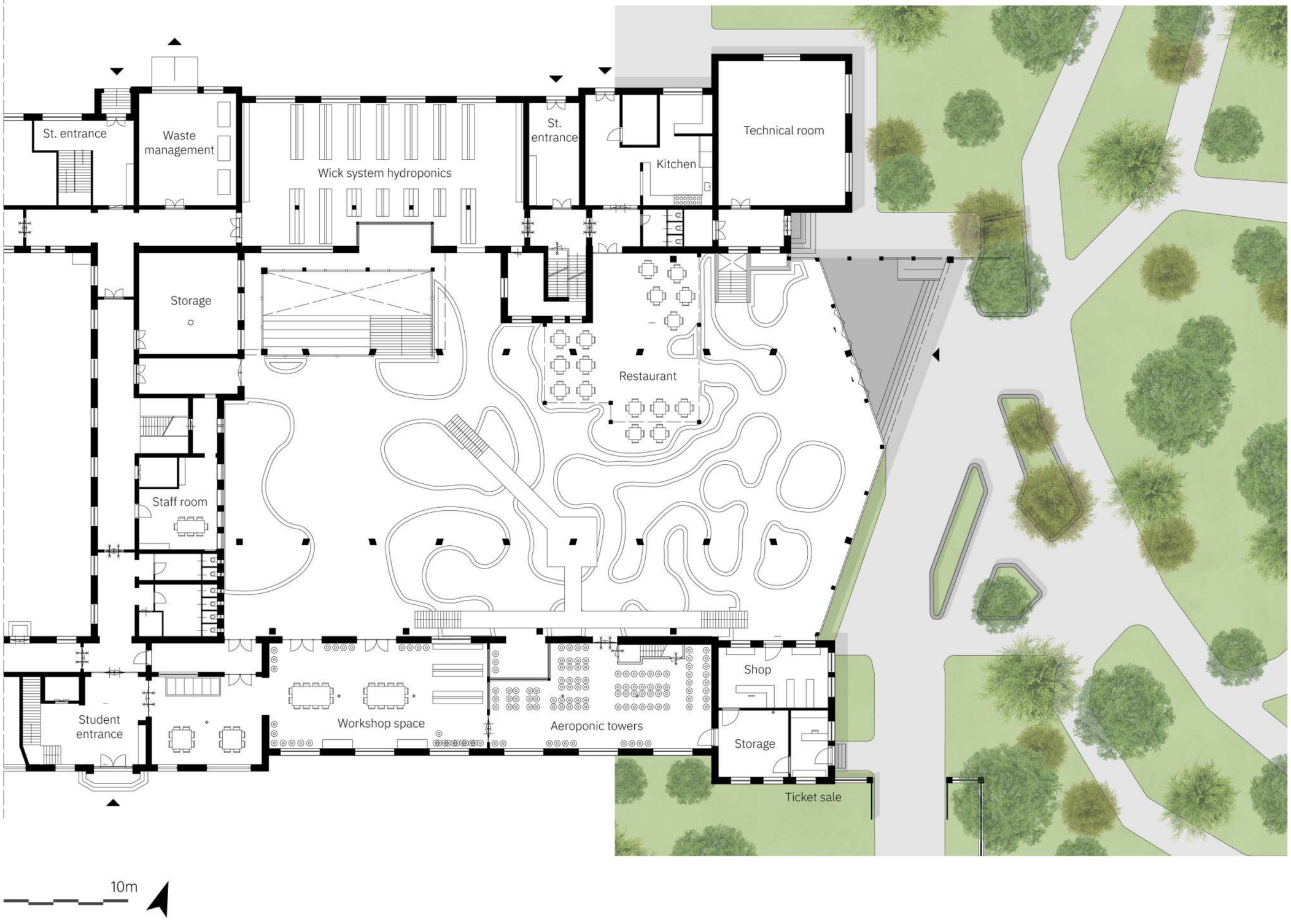
Social settings

Housing

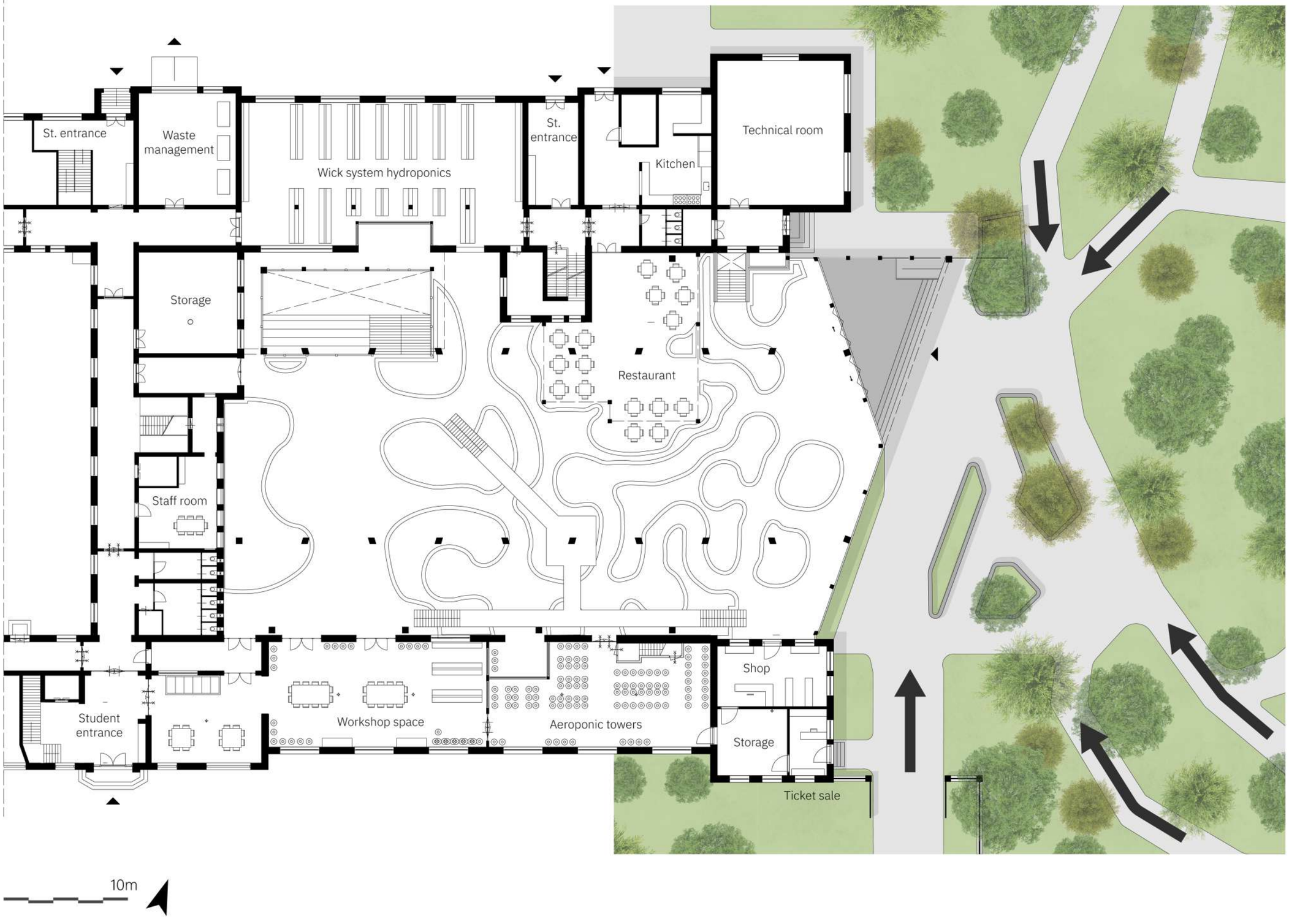


Render | Front side

Floor plan | Ground floor

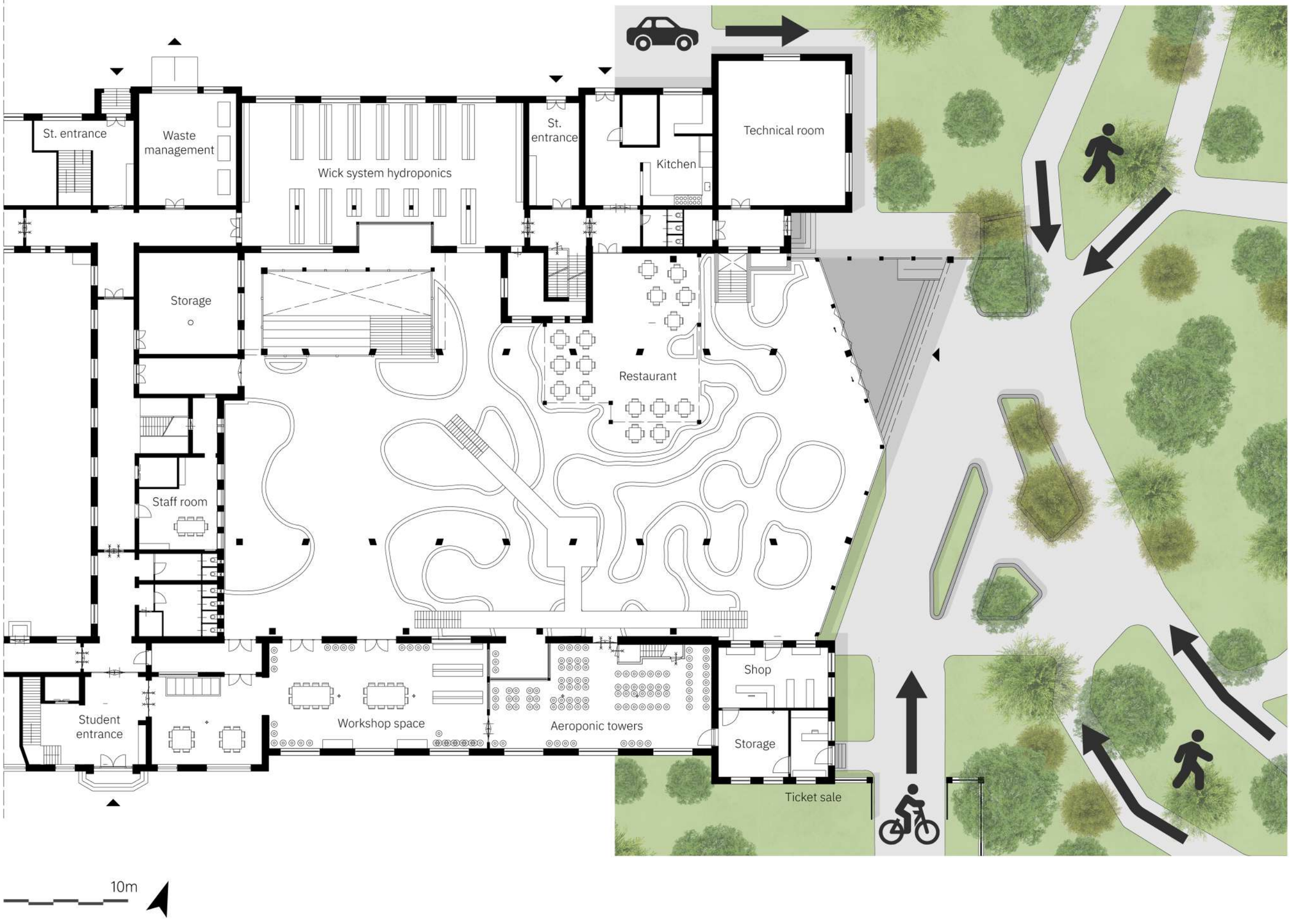


Floor plan | Ground floor

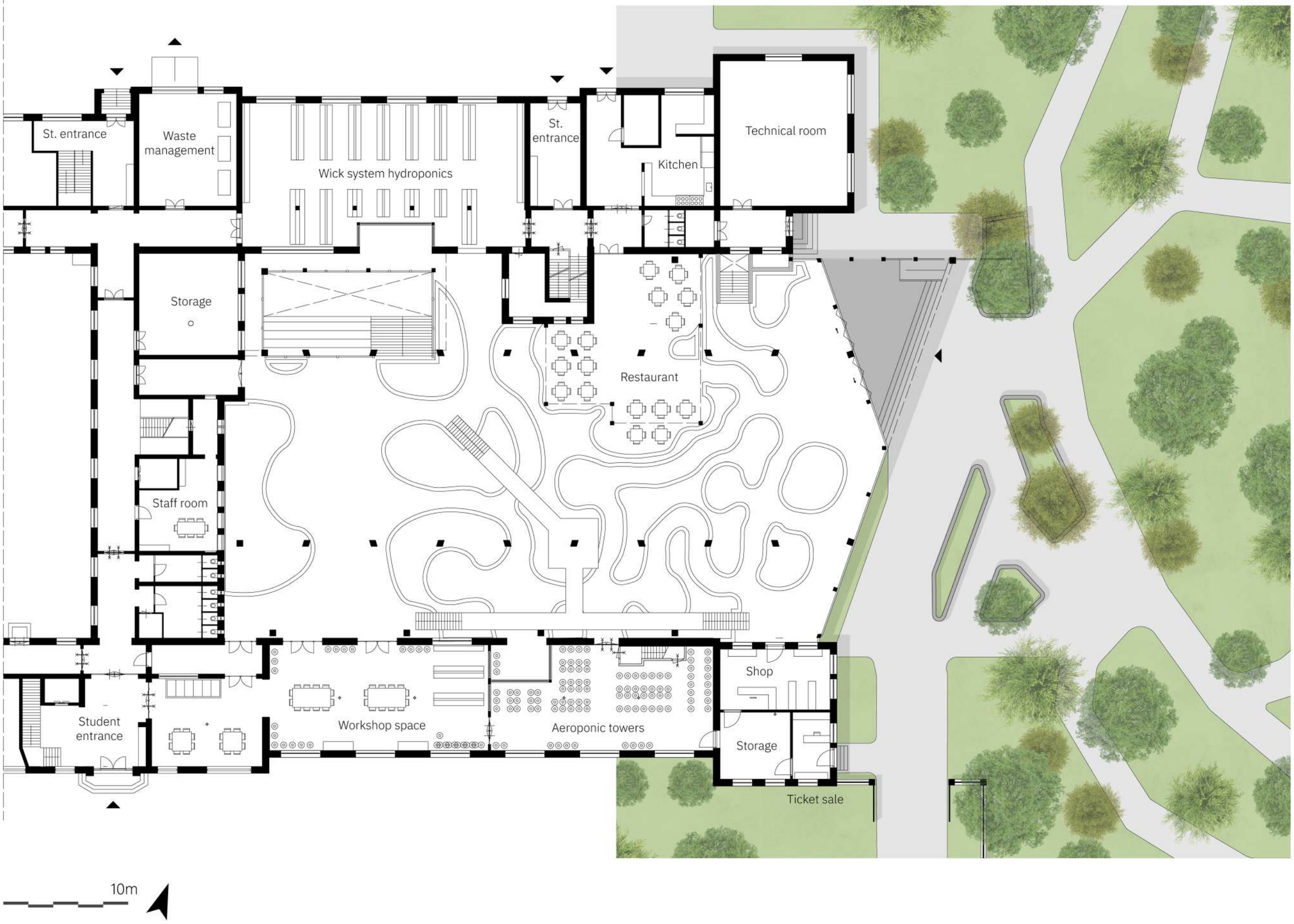


Render | Arrival

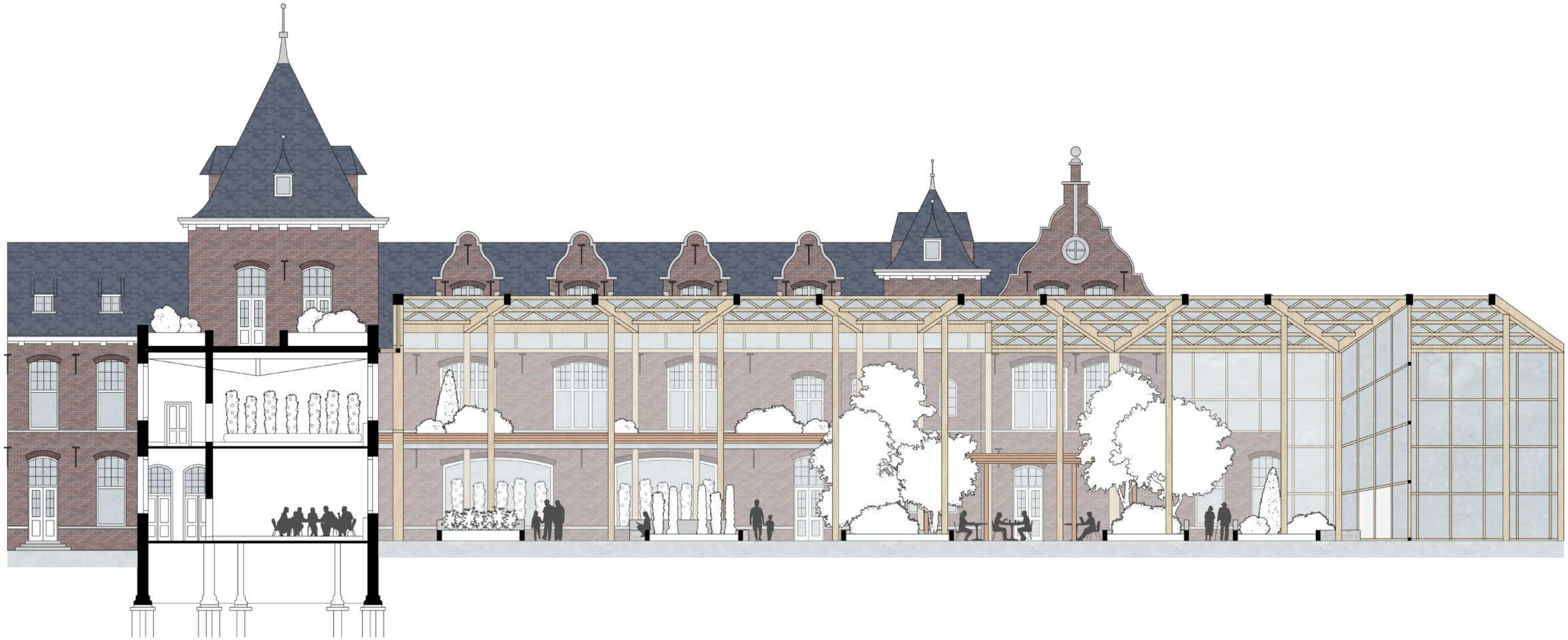
Floor plan | Ground floor



Floor plan | Ground floor



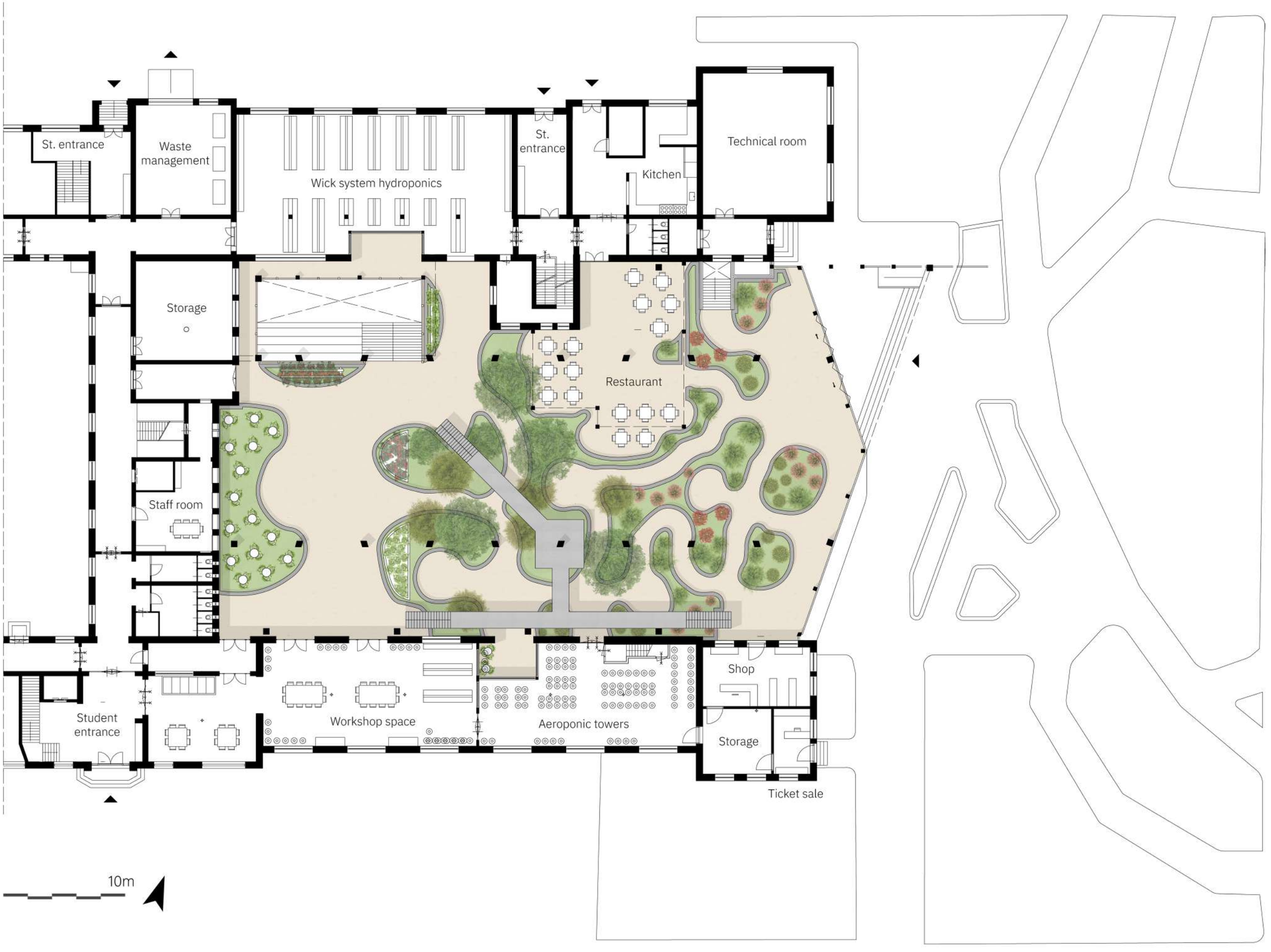
Section | West to east



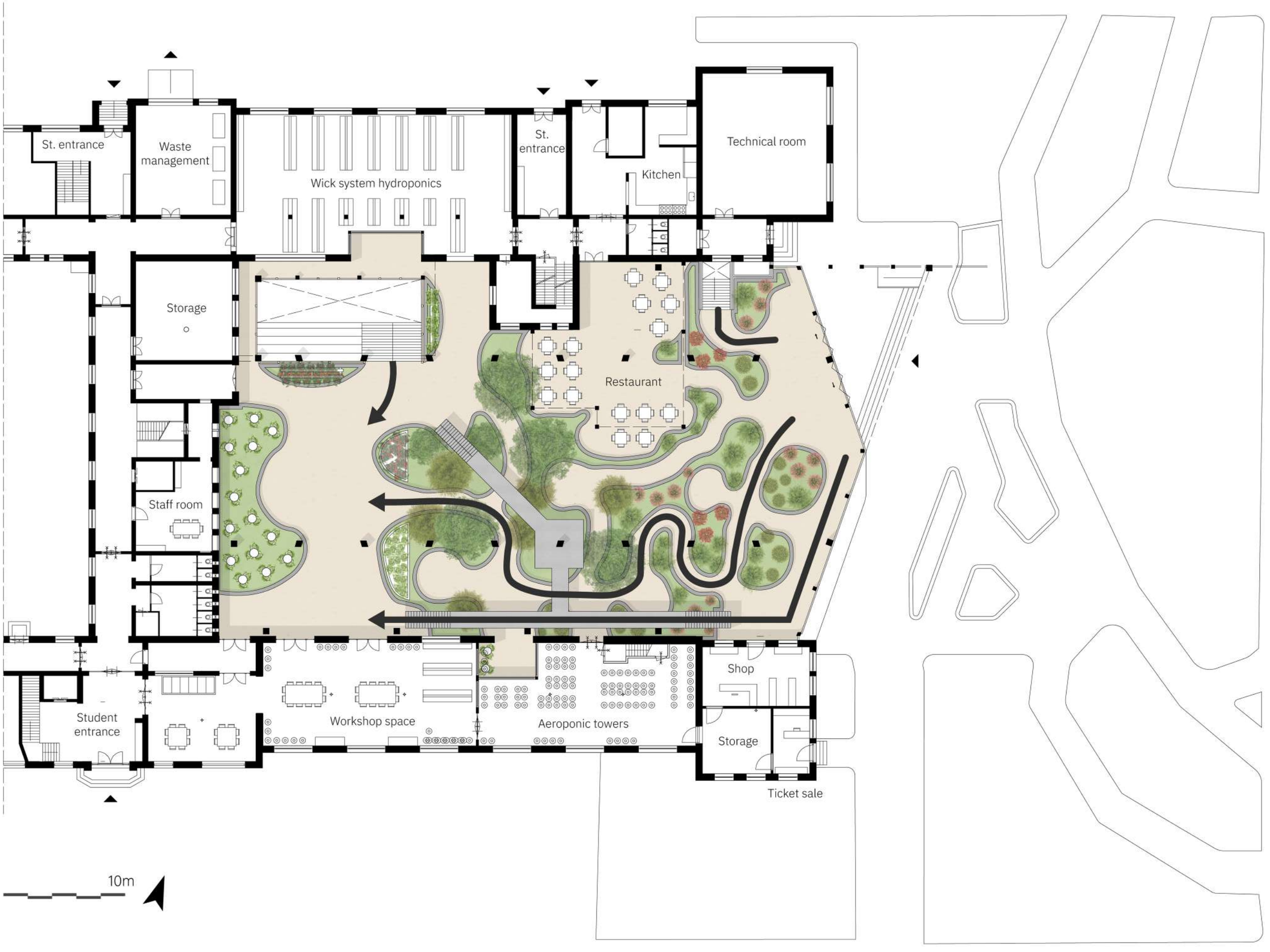
Section | West to East

Render | Courtyard

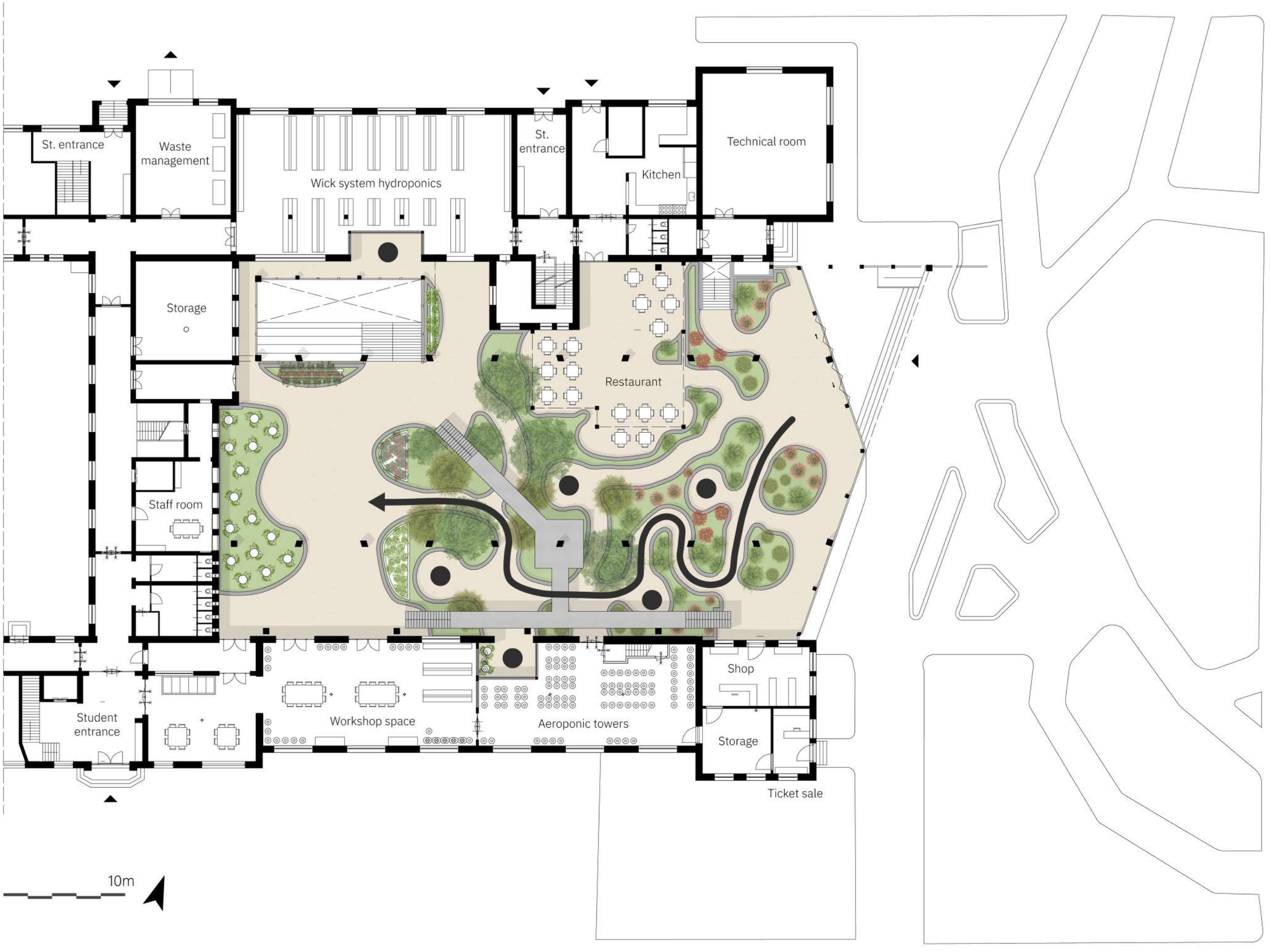
Floor plan | Ground floor



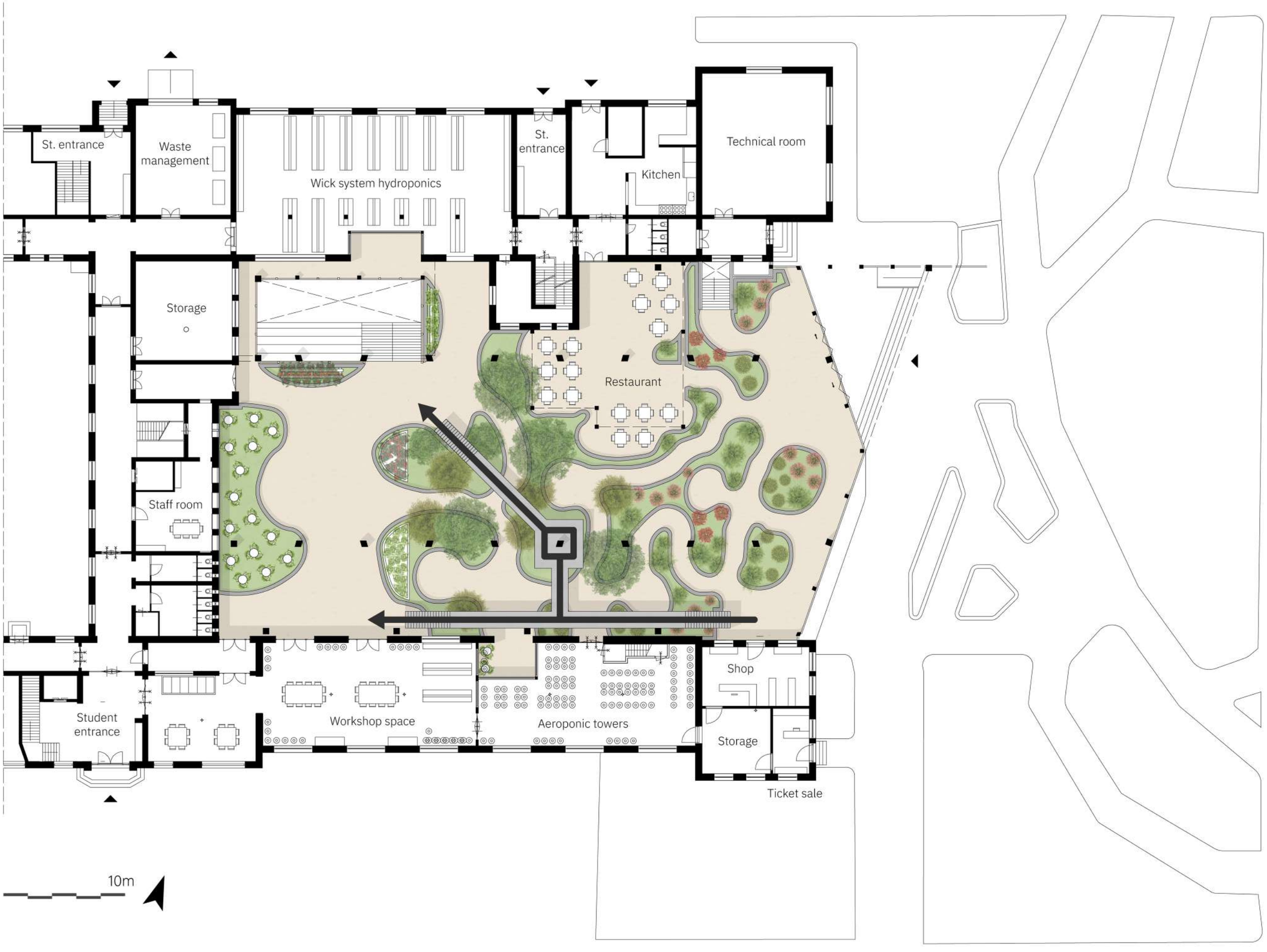
Floor plan | Ground floor



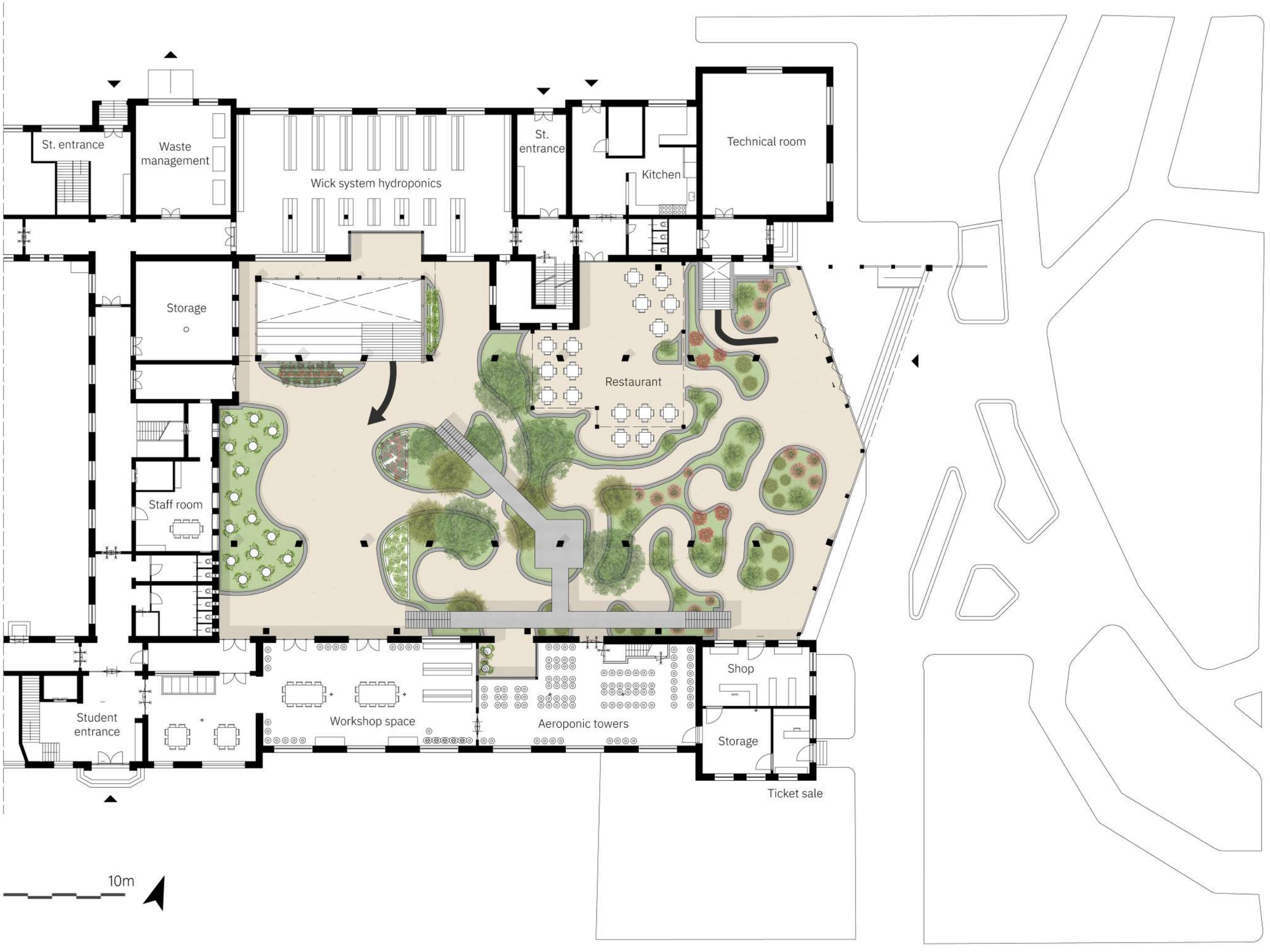
Floor plan | Ground floor



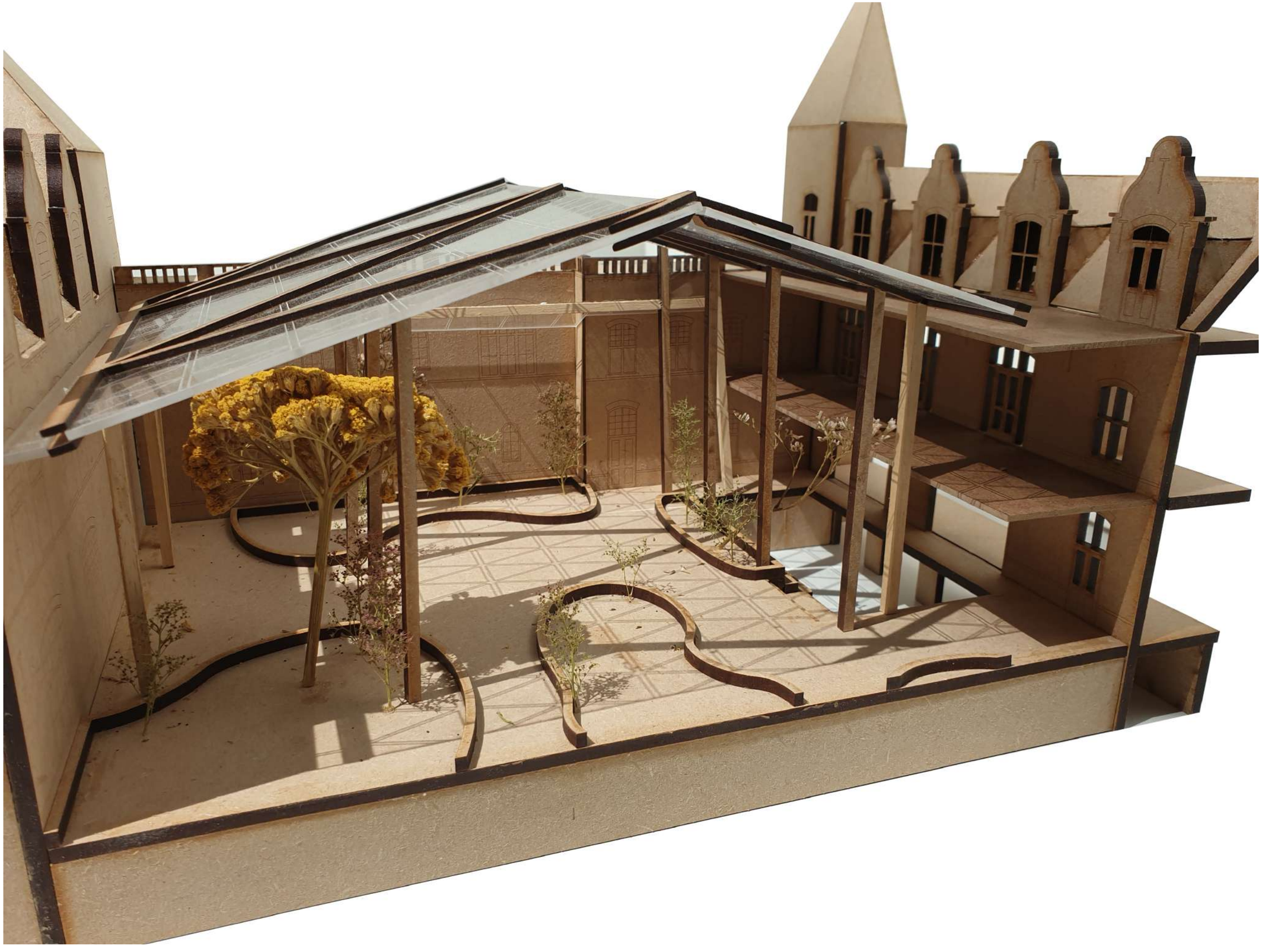
Floor plan | Ground floor



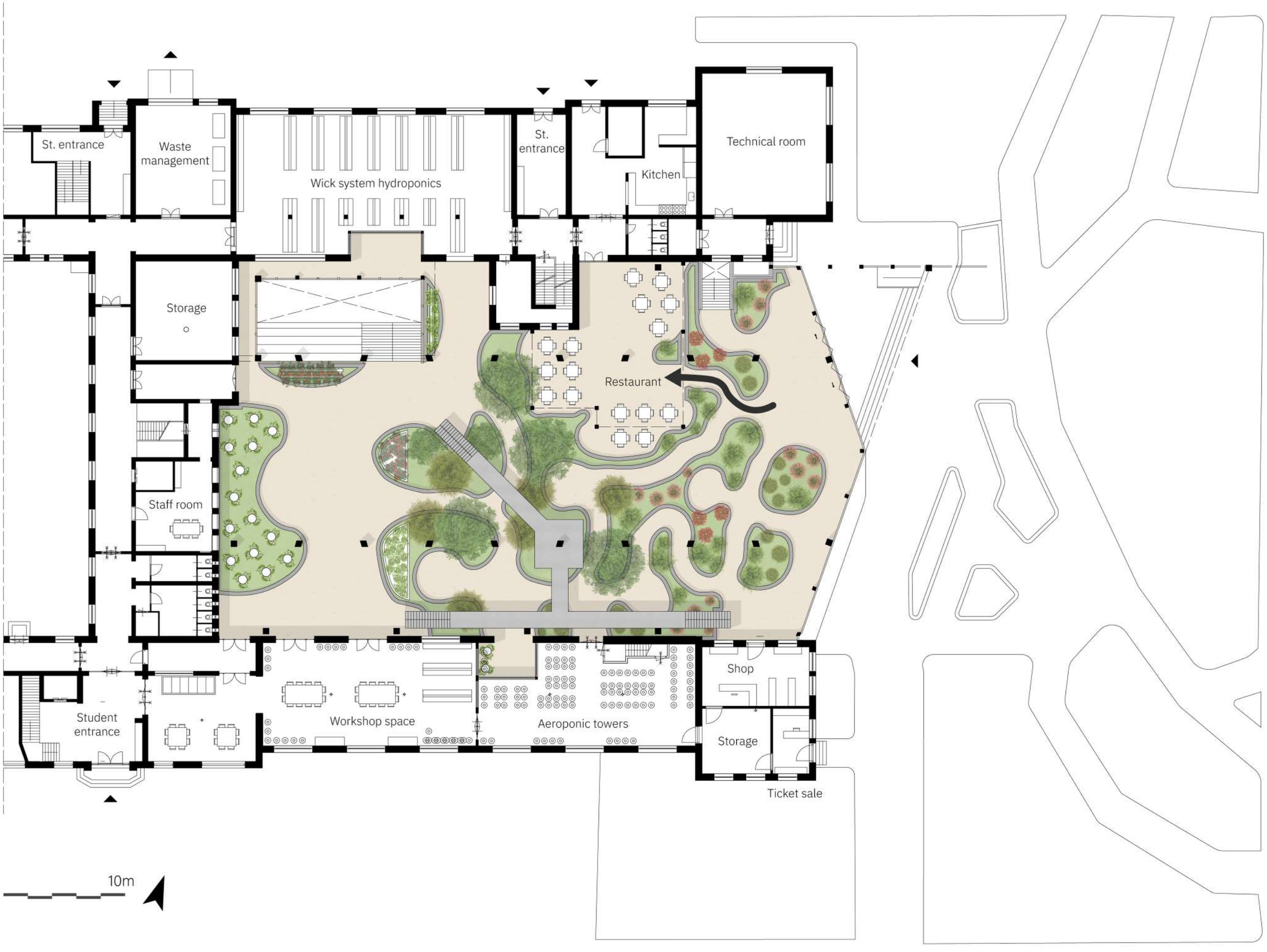
Floor plan | Ground floor



Model | The back of the courtyard

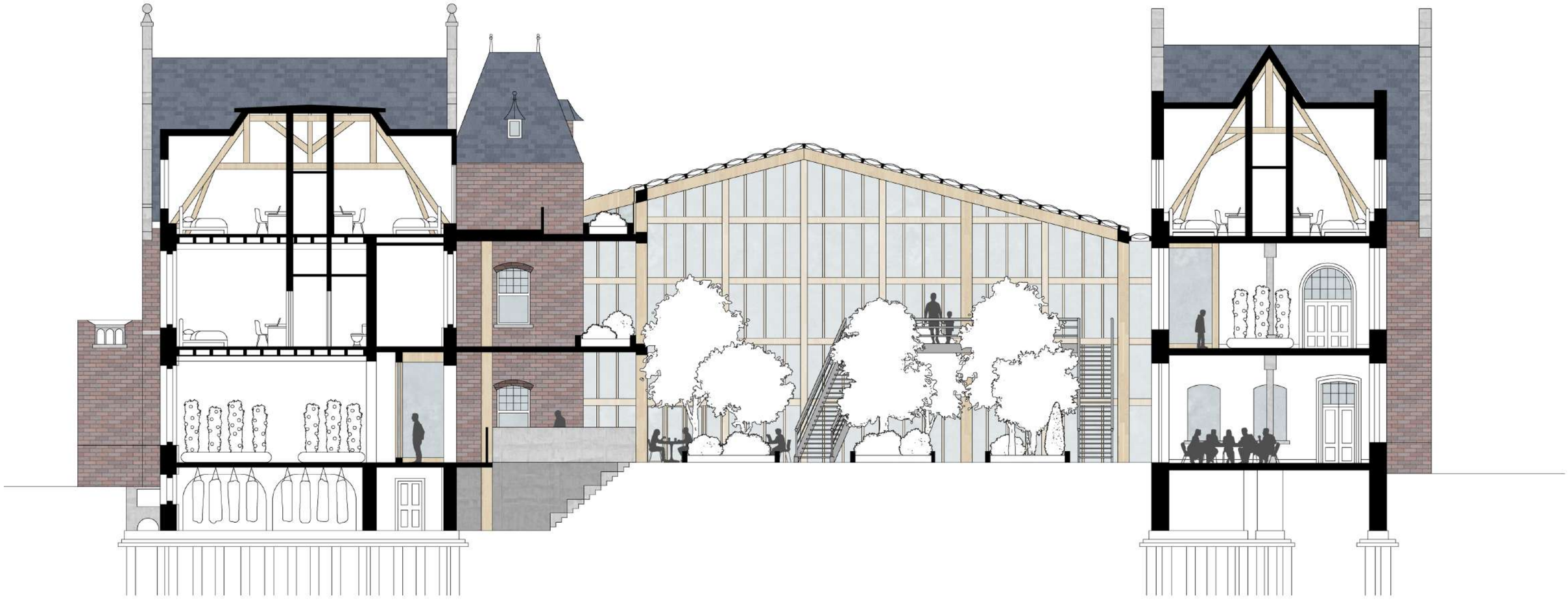


Floor plan | Ground floor



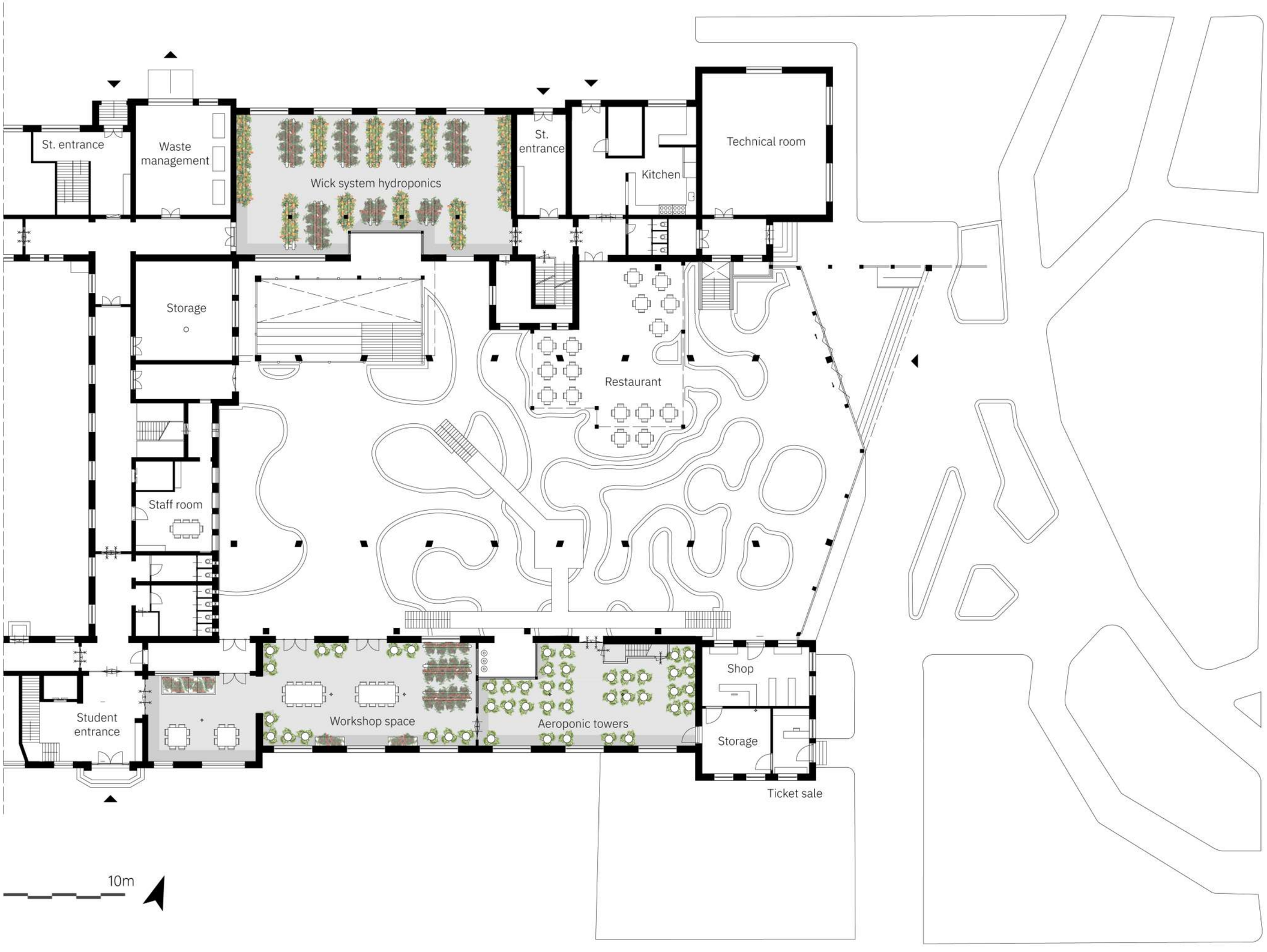
Render | Courtyard

Section | North to south

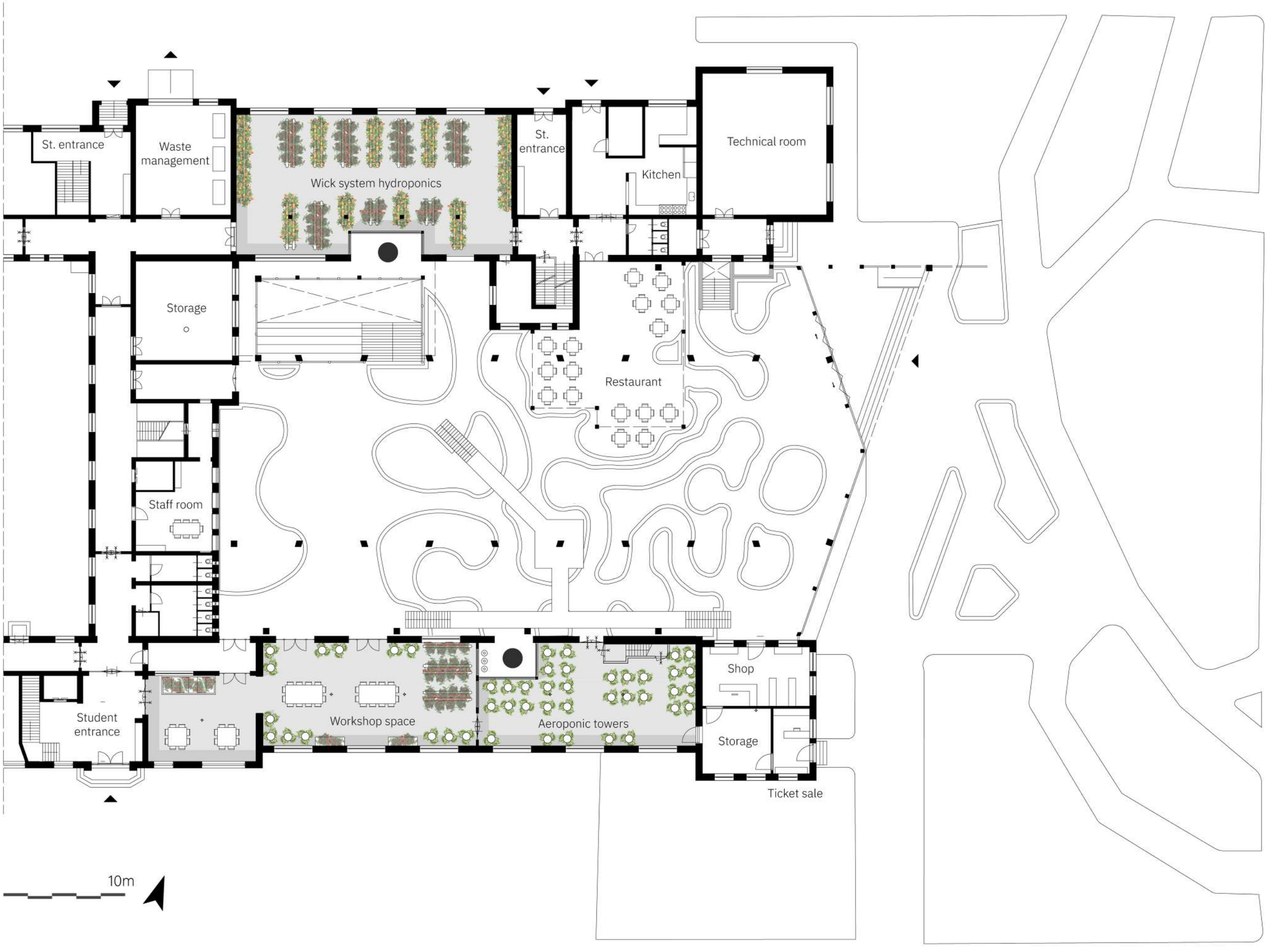


Section | North to south

Floor plan | Ground floor

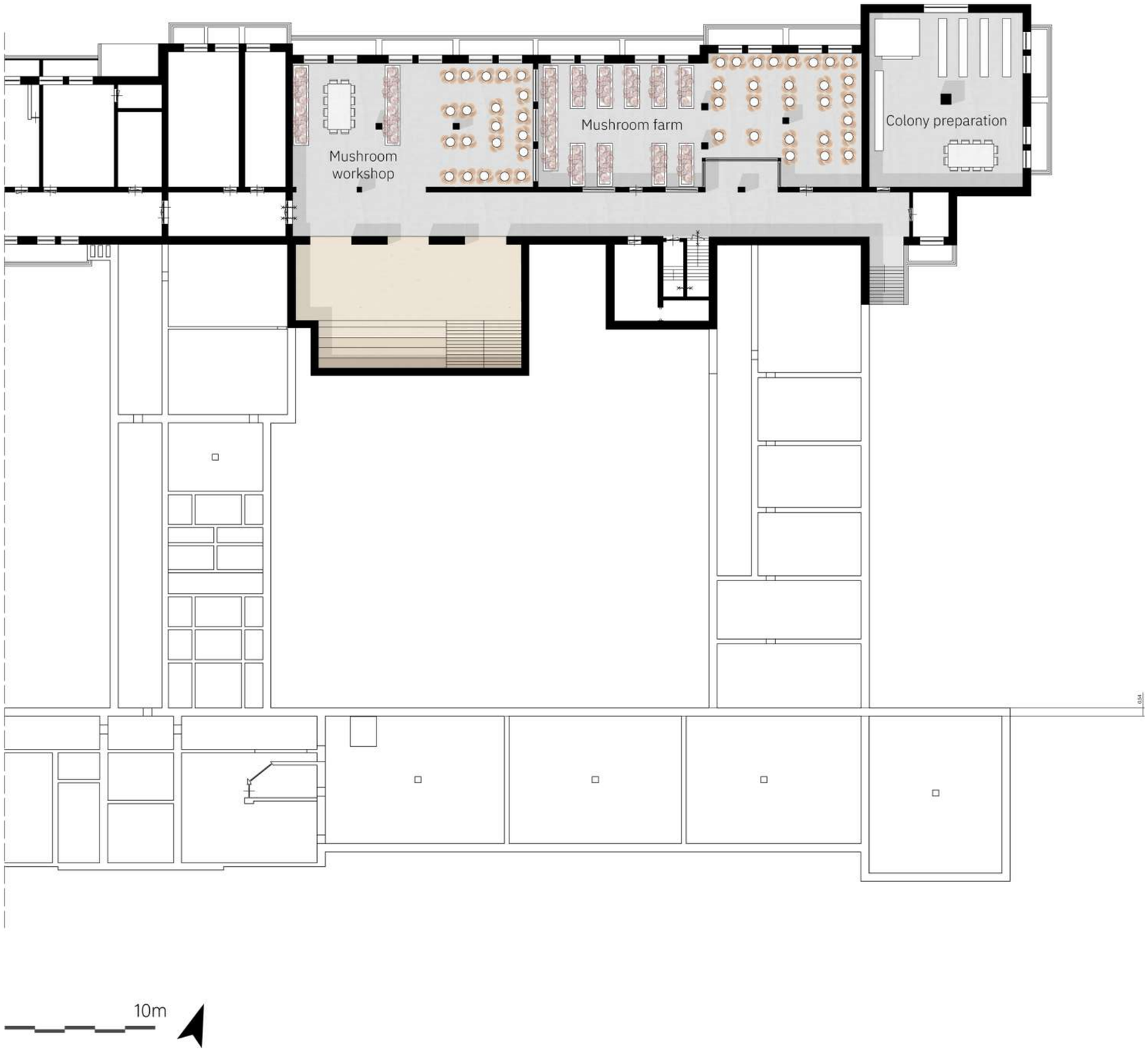


Floor plan | Ground floor

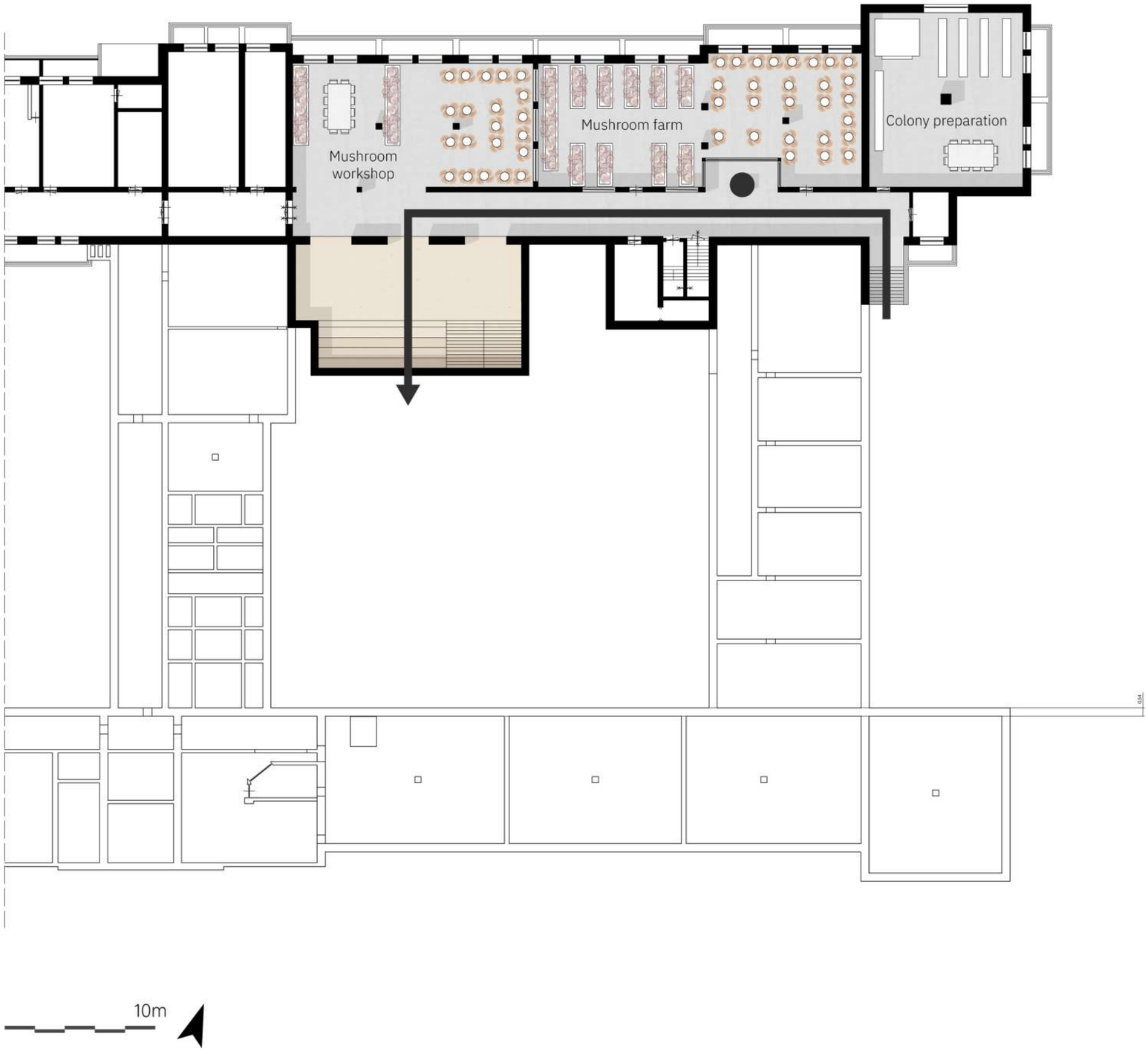


Floor plan | Ground floor

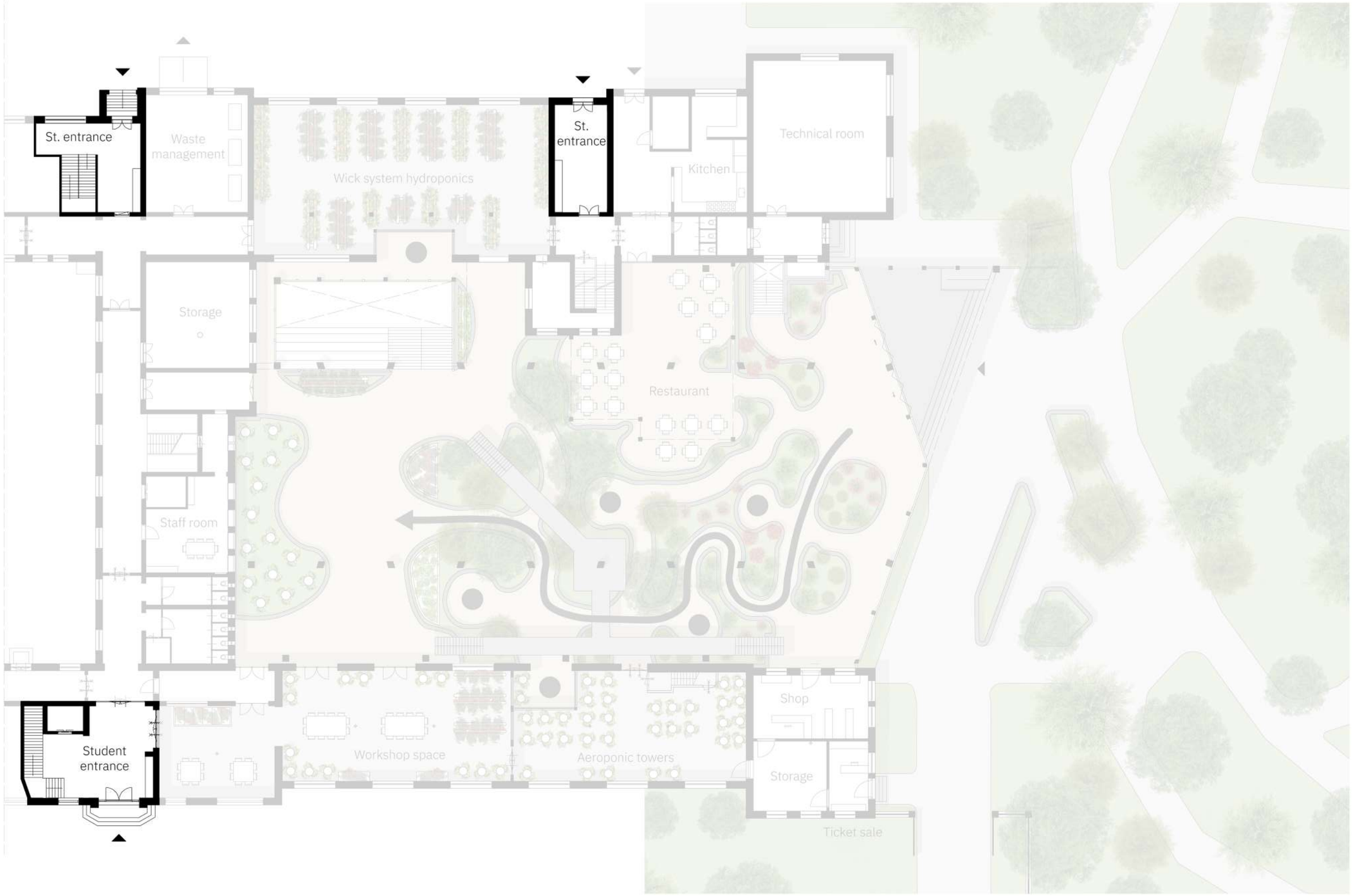
Floor plan | Basement



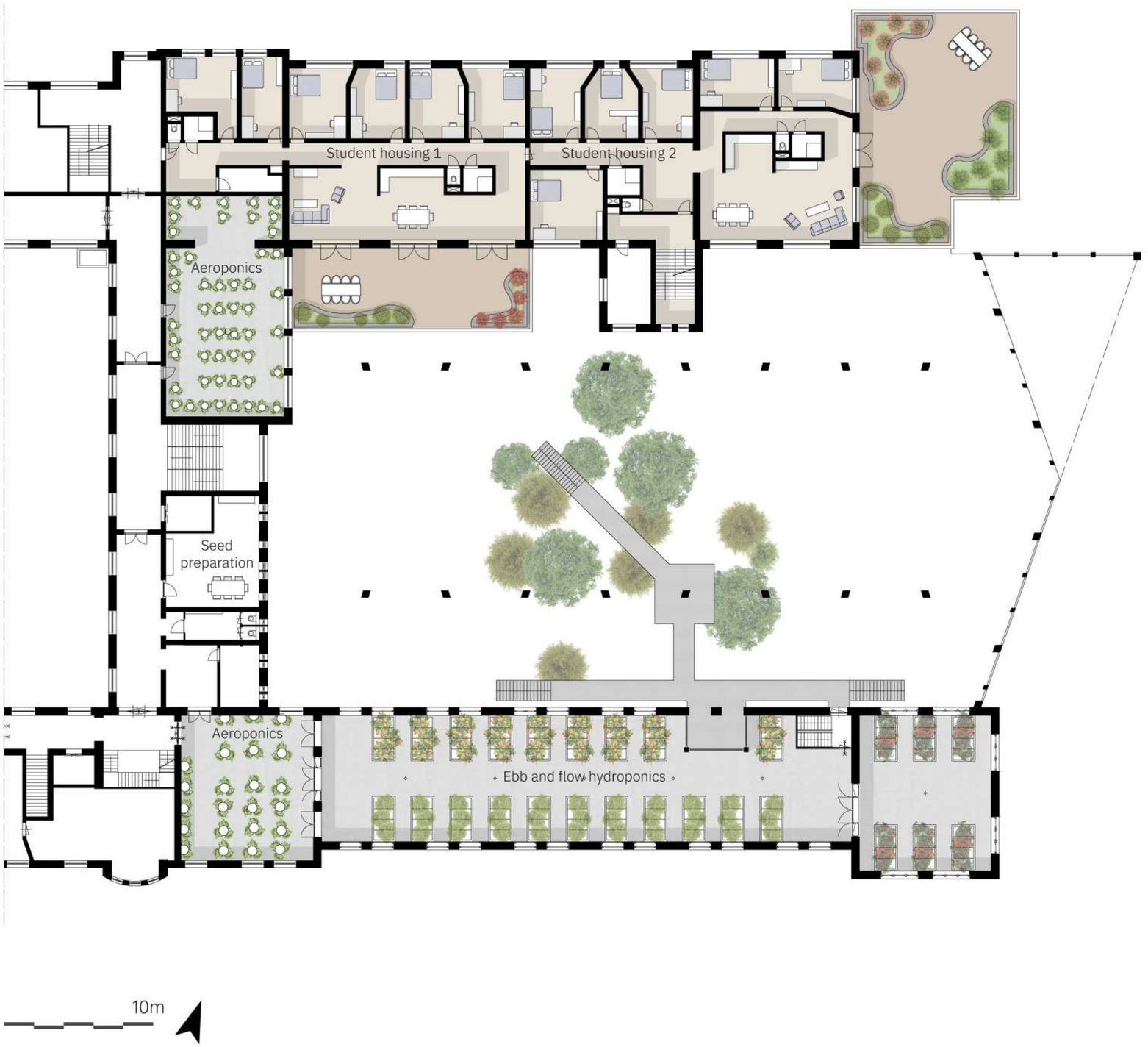
Floor plan | Basement



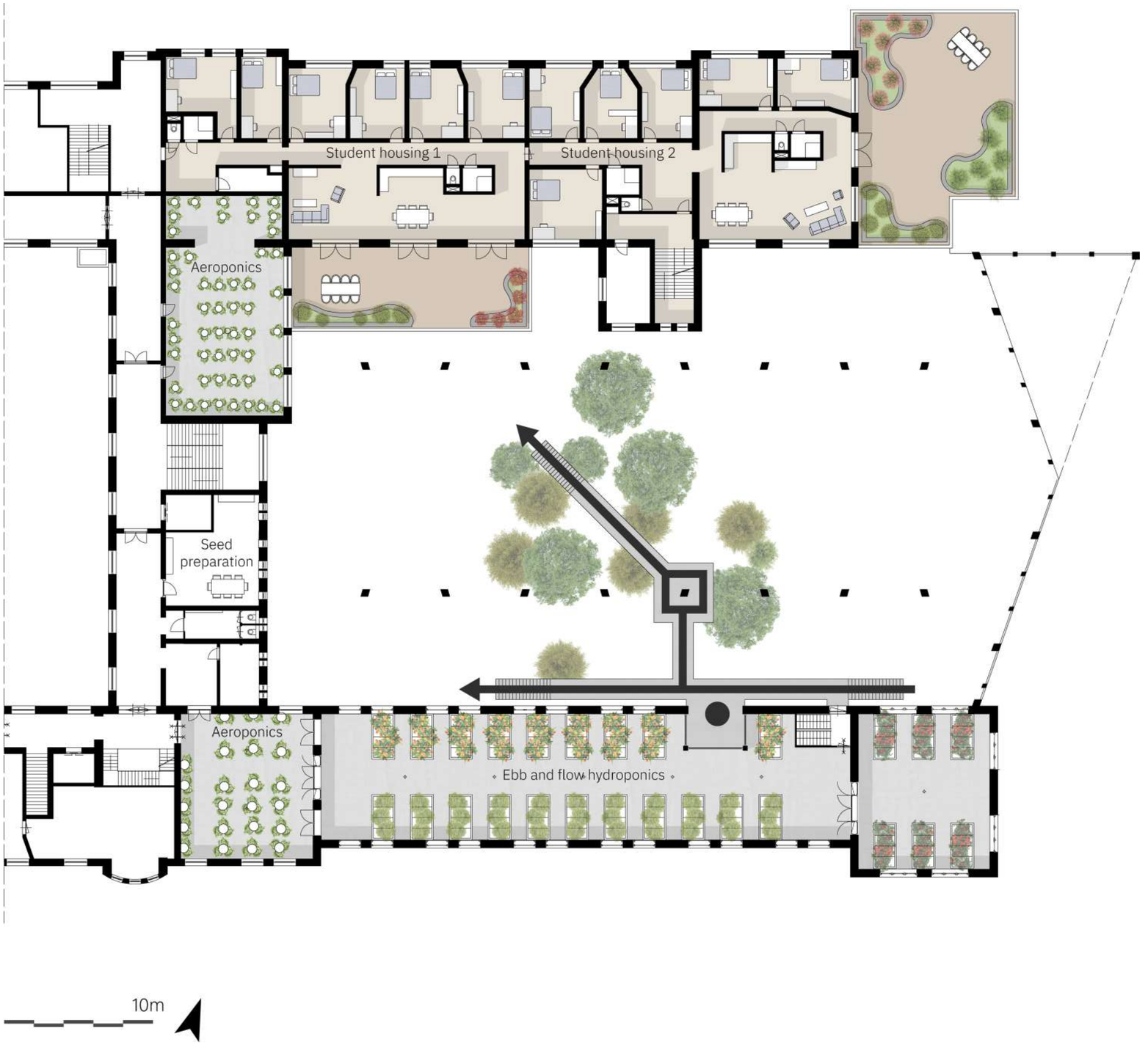
Floor plan | Ground floor



Floor plan | First floor



Floor plan | First floor



Floor plan | Second floor

Render | Living room

Table | Urban farming production numbers

Hydroponics	Crops grown	Biomass production	Oxygen production	Compost reduction*	Water usage*	Energy usage**	Land use	Notes
Water culture	1 kg	0.5 to 3 kg	0.21 kg	55% to 80%	21.4 to 13.3 L	38.8 to 60 kWh	0.15 to 0.06 m2	The roots are directly placed in the water
Ebb & Flow technique	1 kg	0.5 to 3 kg	0.21 kg	55% to 80%	21.4 to 13.3 L	38.8 to 60 kWh	0.15 to 0.06 m2	The plants are placed in a medium which floods and drains in intervalls
Aeroponics	1 kg	0.5 to 3 kg	0.21 kg	85%	2.6 L	60 to 180 kWh	0.06 to 0.03 m2	Uses mist to spray onto the plants instead of water
Nutrient film technique	1 kg	0.5 to 3 kg	0.21 kg	55% to 80%	21.4 to 13.3 L	38.8 to 60 kWh	0.15 to 0.06 m2	The nutrient solution flows along the plants and excess is recirculated
Drip	1 kg	0.5 to 3 kg	0.21 kg	68% to 85%	10.7 to 6.1 L	38.8 to 60 kWh	0.15 to 0.06 m2	A tube drips exact measurements of nutrients solution onto the plants
Conventional farming	1 kg	0.5 to 3 kg	0.21 kg	0%	214 L	0.3 to 0.7 kWh	0.89 to 0.38 m2	Conventional outdoor farming on fields
Greenhouse farming	1 kg	0.5 to 3 kg	0.21 kg	0%	132 to 75 L	5.4 kWh	0.60 to 0.24 m2	Crops that are grown conventionally inside of greenhouses

* The lower number is used when the water is recirculated
** Most energy in urban farming is needed for LED lighting (55%), airconditioning (30%) and dehumidifiers (10%), meaning little variance between the different forms
Average dutch household uses 2810 kwh per year
Conventional farming uses an average of 0.03 kg of fertilizer per kg of crop

	Mushrooms grown	SMS production	CO_2 production	Necessary substrate	Water usage	Energy usage	Land use	Notes
Mushroom farming	1 kg	2 kg	5 kg	5 kg	2.9 L	1.9 kWh	0.15 m2	Mushroom colonies can be grown on substrates from other leftovers

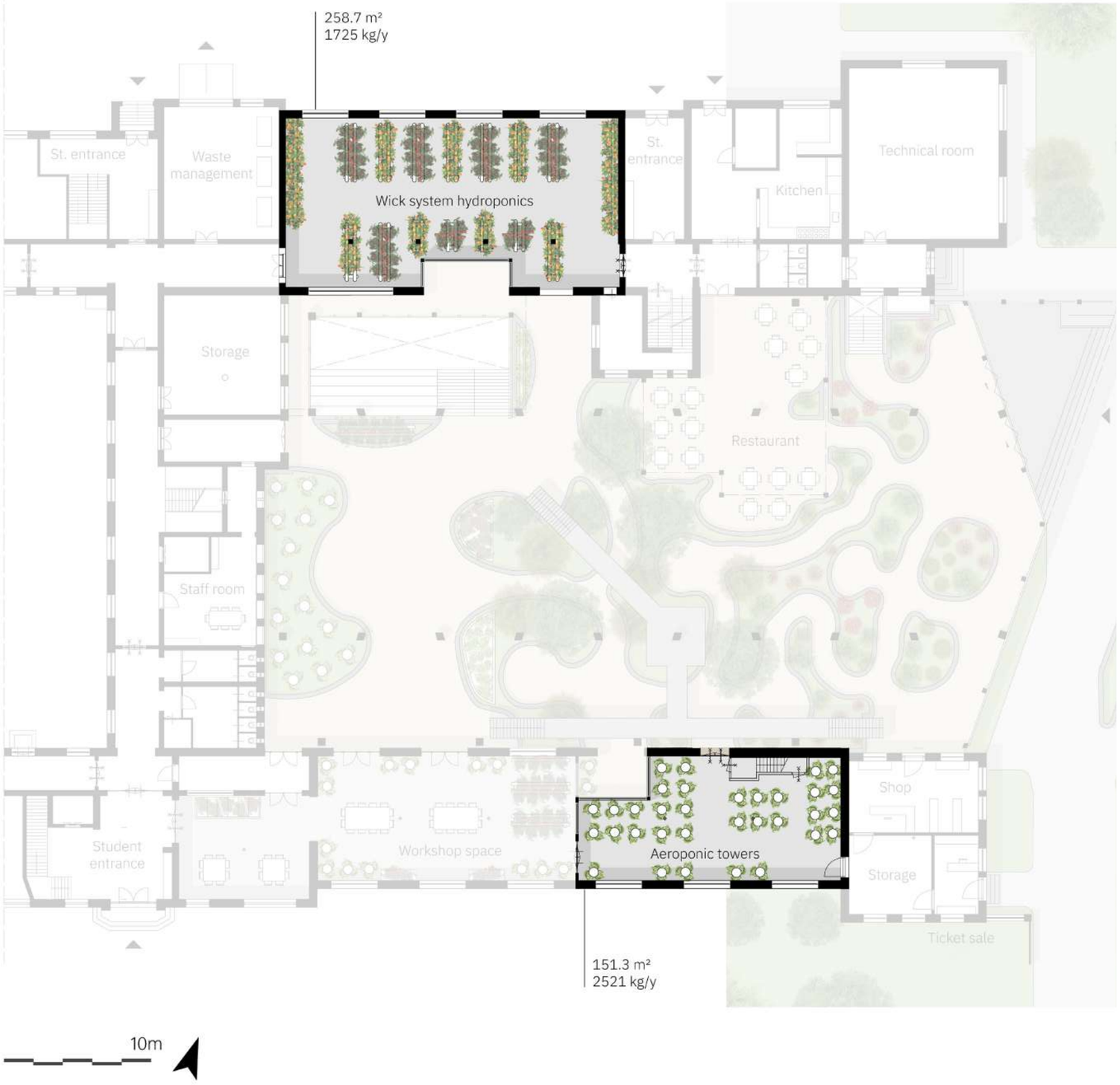
	Fish grown	Can sustain how many crops	Necessary fish feed	(Rain) water usage	Energy usage	Land use	Notes
Aquaponics	1 kg	6.5 kg	1.3 kg	292 L	159 kWh*	8.41 m2	Amonia waste from the fish is turned into nutrients for the plants

* Most energy usage is for heating the water

	Worms grown	Compost production	Necessary leftover biomass	Water usage	Energy usage	Land use*	Notes
Vermiculture	1 kg	15 kg	30 kg	21 L	-	-	The worms turn waste organic matter into compost

* The land use of Vermicomposting is negligible compared to other functions

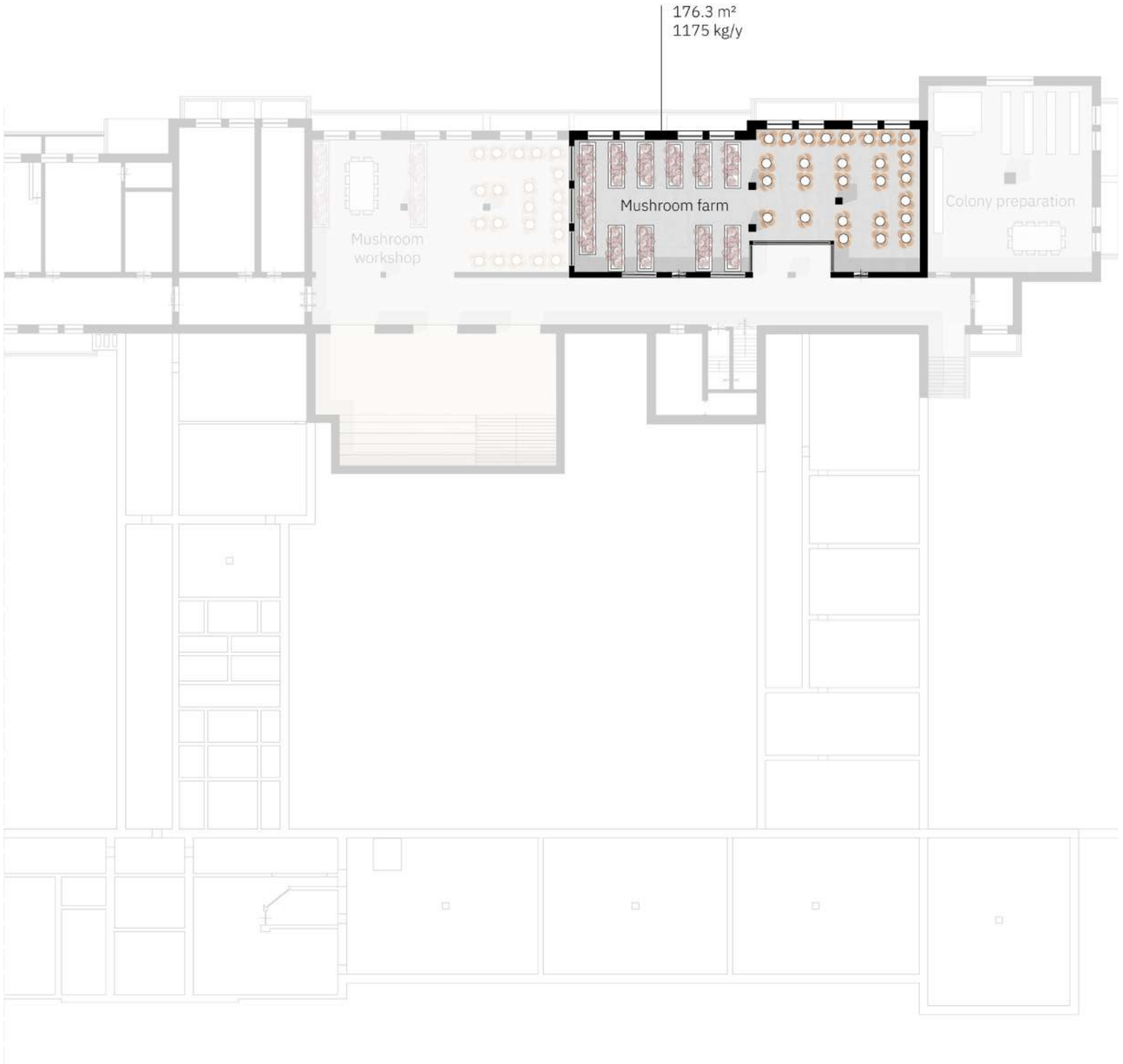
Production per section



<u>Ground floor</u>

Aeroponics:	151.3 m²	2521 kg/y
Wick system hydroponics:	258.7m²	1725 kg/y

Production per section



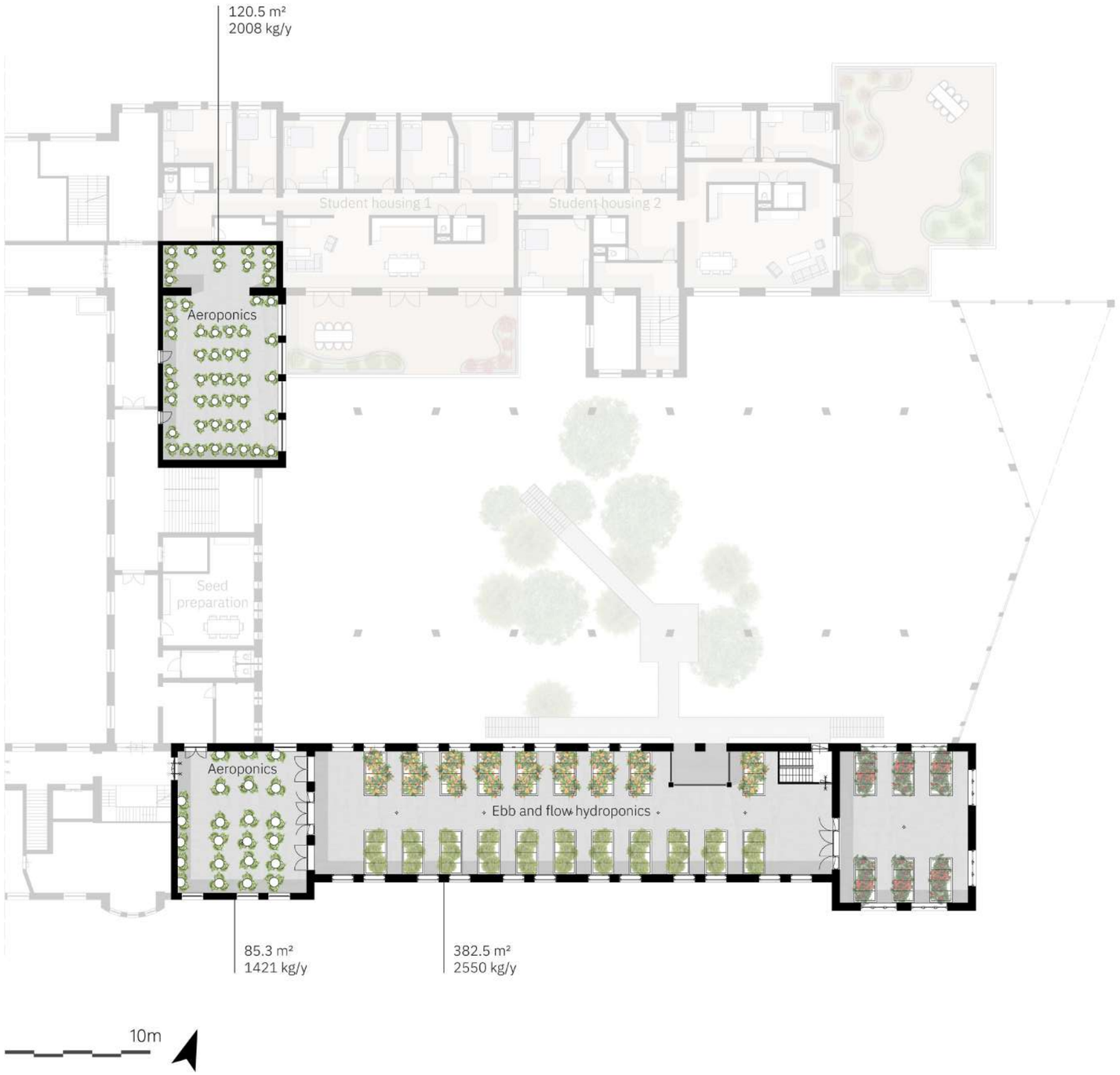
<u>Ground floor</u>

Aeroponics:	151.3 m² | 2521 kg/y
Wick system hydroponics:	258.7m² | 1725 kg/y

<u>Basement</u>

Mushroom farming:	176.3 m² | 1175 kg/y

Production per section



<u>Ground floor</u>

Aeroponics:	151.3 m² | 2,521 kg/y
Wick system hydroponics:	258.7m² | 1,725 kg/y

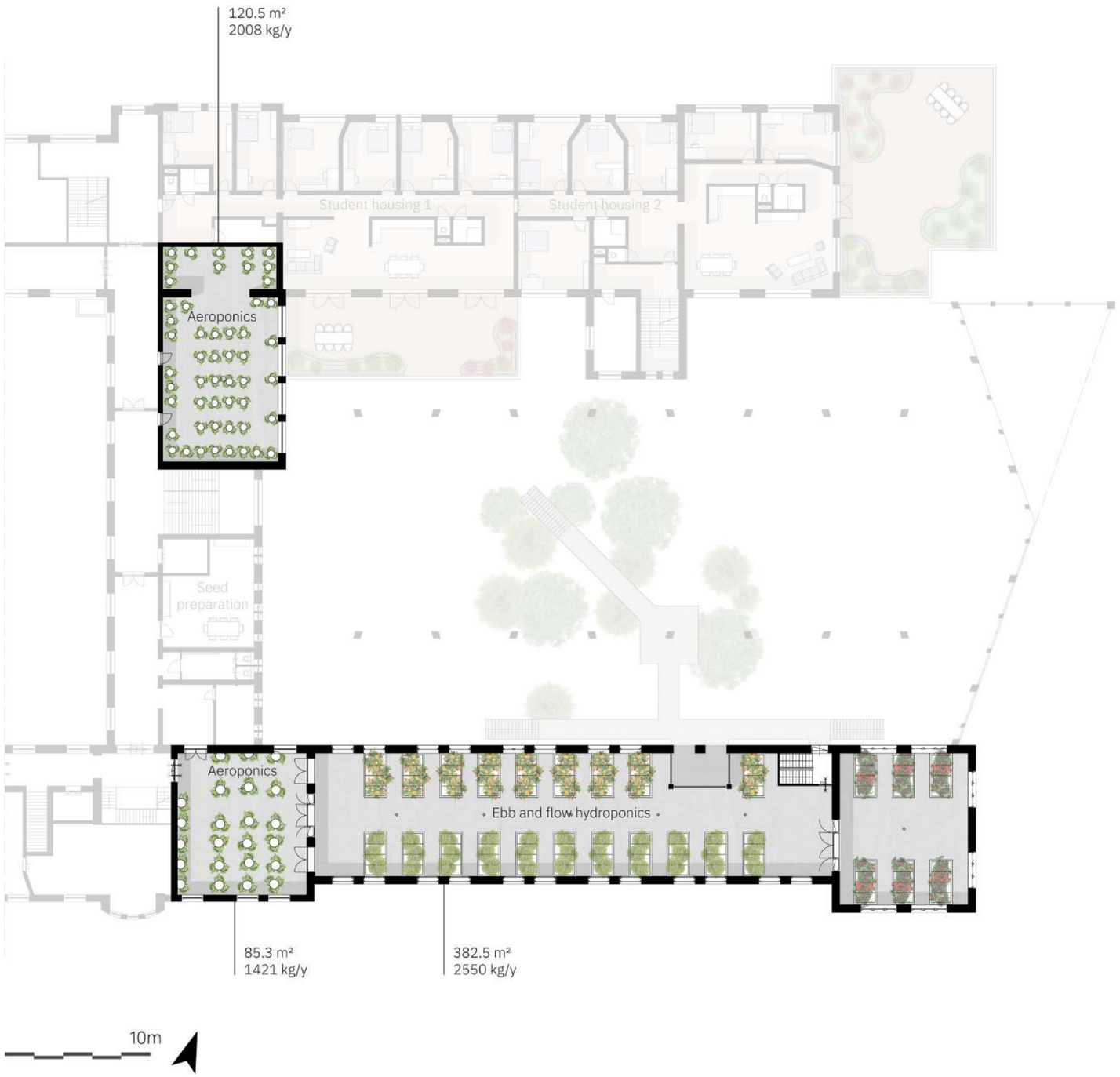
<u>Basement</u>

Mushroom farming:	176.3 m² | 1,175 kg/y

<u>First floor</u>

Ebb and flow hydroponics:	382.5 m² | 2,550 kg/y
Aeroponics :	205.8 m² | 3,429 kg/y

Production per section



<u>Ground floor</u>

Aeroponics:	151.3 m² | 2,521 kg/y
Wick system hydroponics:	258.7m² | 1,725 kg/y

<u>Basement</u>

Mushroom farming:	176.3 m² | 1,175 kg/y

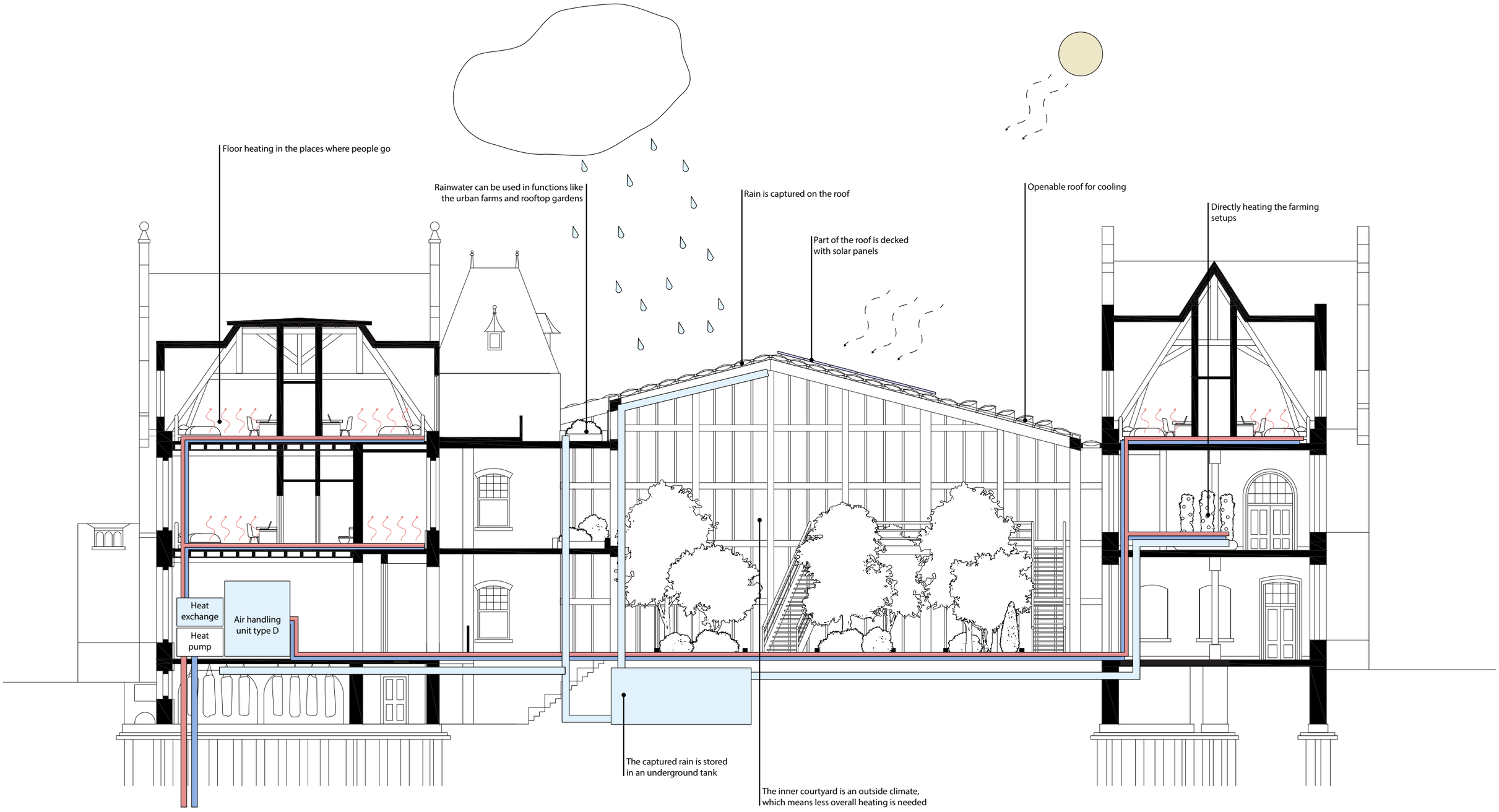
<u>First floor</u>

Ebb and flow hydroponics:	382.5 m² | 2,550 kg/y
Aeroponics :	205.8 m² | 3,429 kg/y

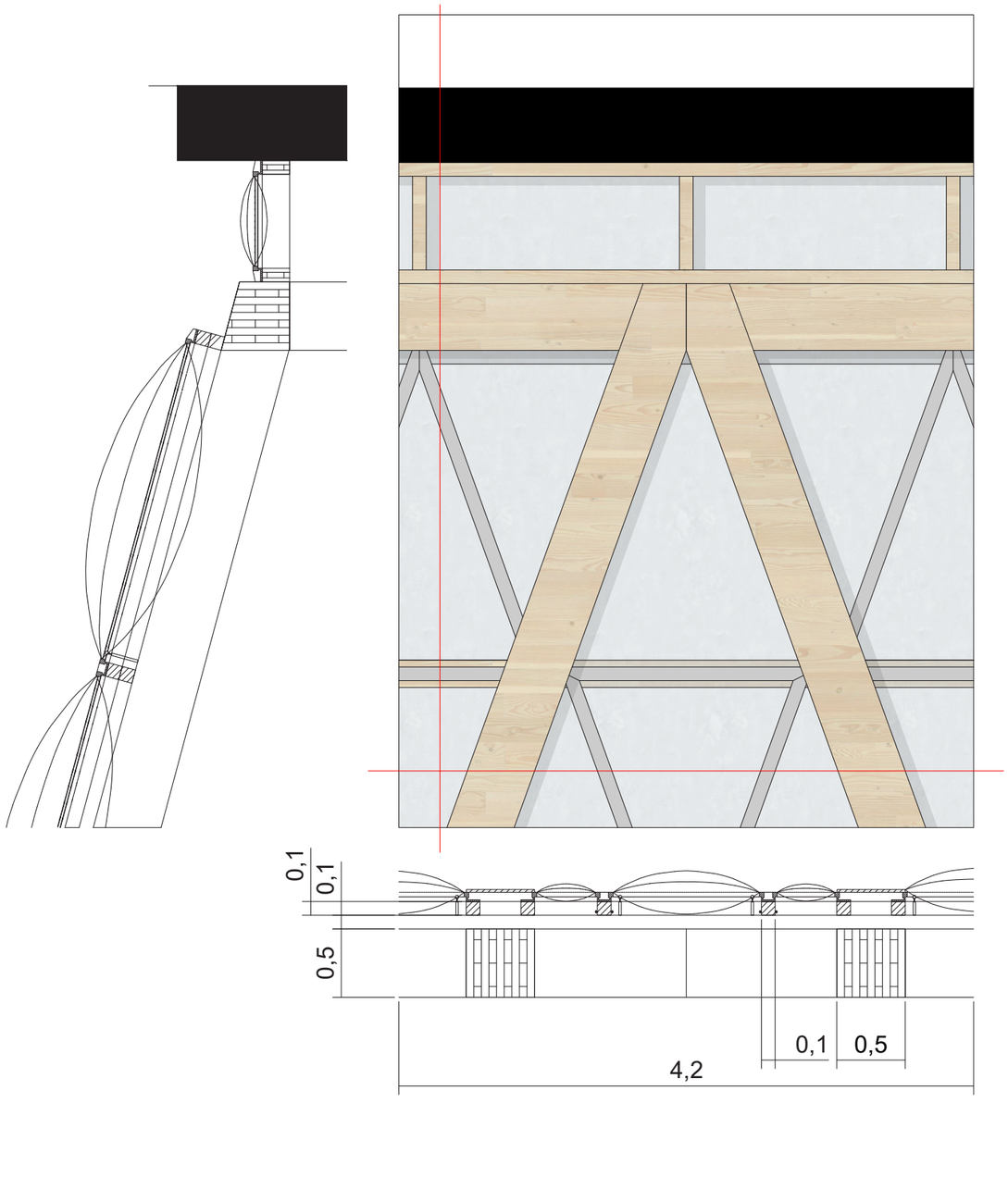
<u>Total:</u>	1,174.6 m² | 11,400 kg/y
People fed:	94

Conventional farming:	1,174.6 m² | 1305 kg/y
People fed:	11

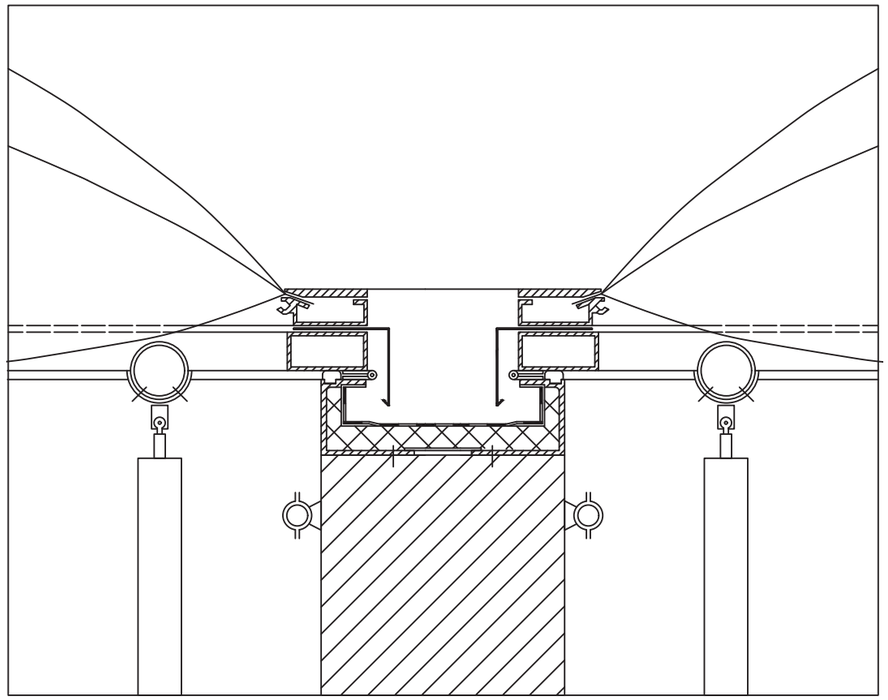
Section | Climate



Details | Roof courtyard



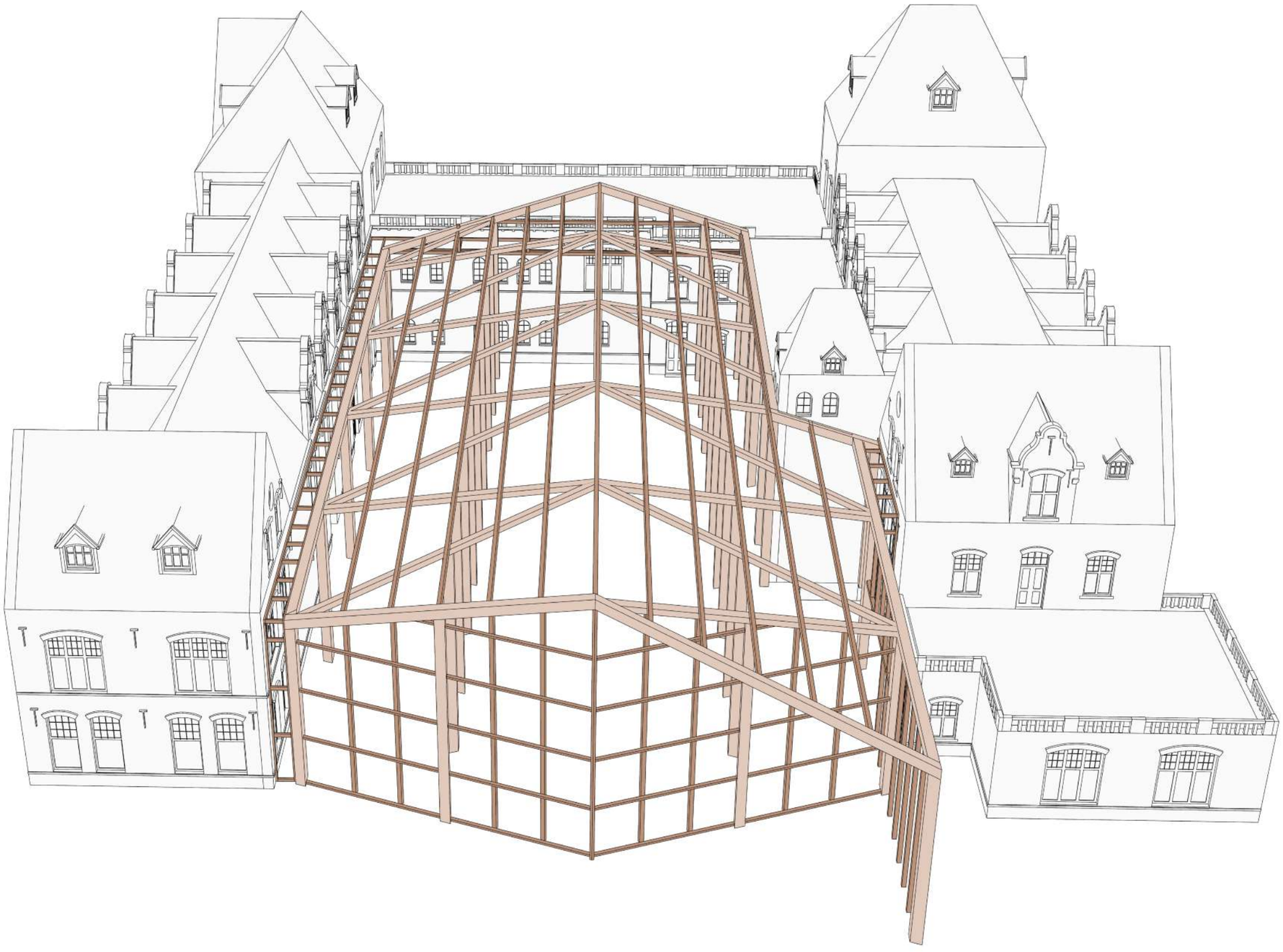
Roof fragment



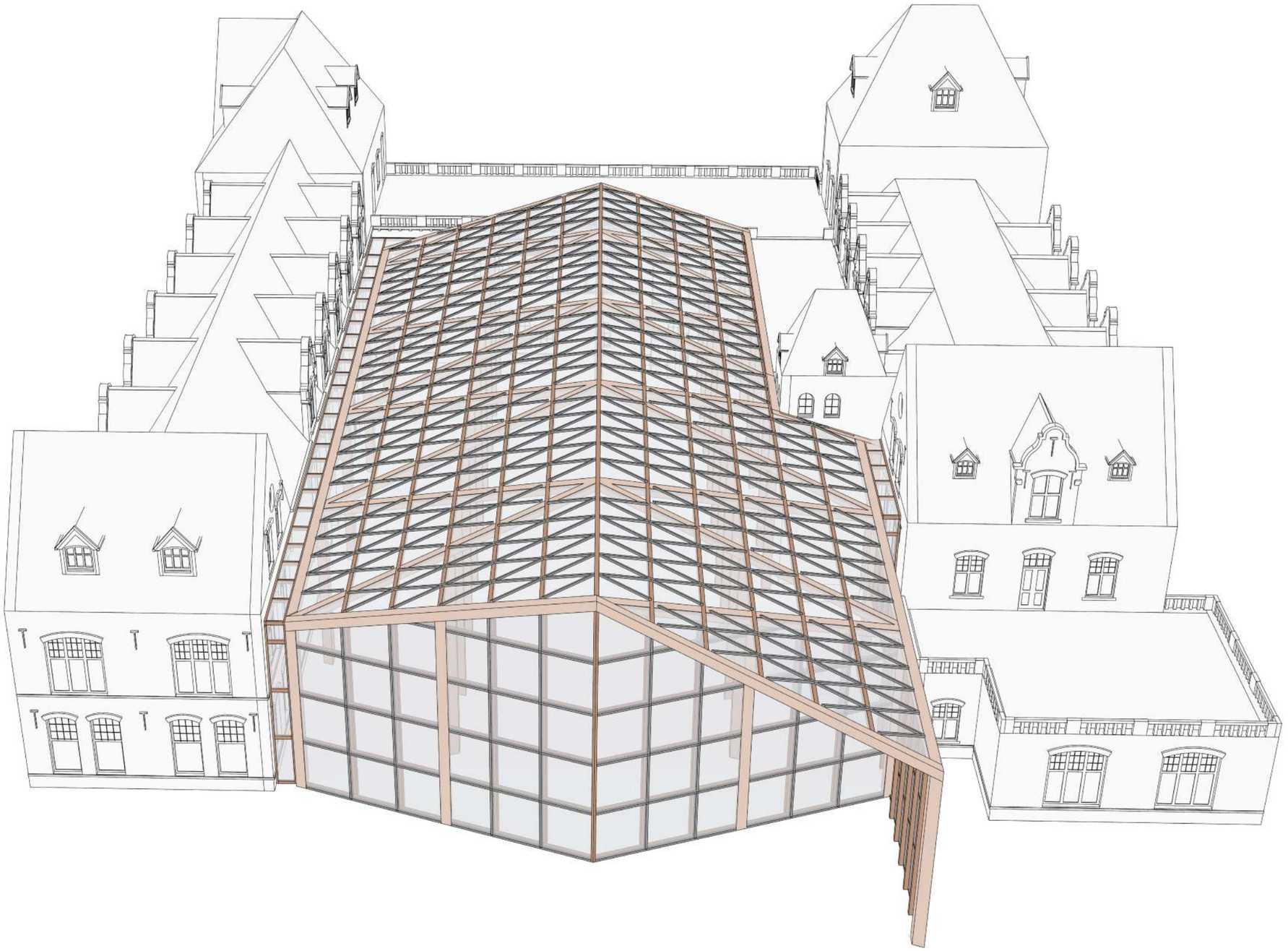
1 : 10 | ETFE connection

Construction method | Courtyard

Construction method | Courtyard



Construction method | Courtyard



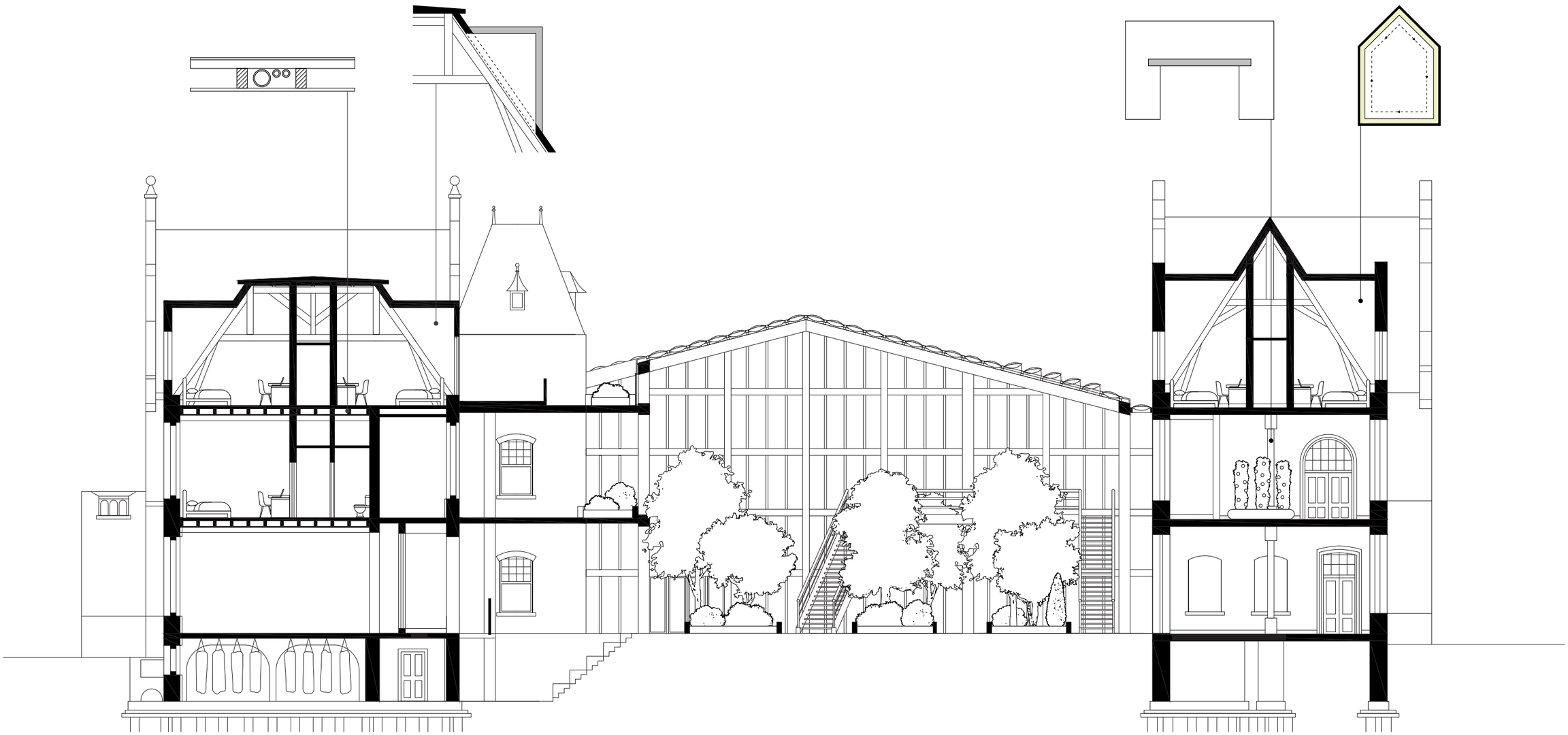
Section | Changes existing structure

Plumbing

Dormers

Openings

Isolation



Questions