

THE INCLUSIVE SUSTAINABLE SUPERMARKET OF THE FUTURE

Social circularity and synergy with its
local urban environment

Qiao-Ling Cendón Cunqueiro - P5 - Lidl company - June 2020

THE INCLUSIVE SUSTAINABLE SUPERMARKET OF THE FUTURE

Social circularity and synergy with its local urban environment

Student

Qiao-Ling Cendón Cunqueiro
4854950

1st mentor

Prof. Ir. Peter G. Luscuere

2nd mentor

Ir. R.J. Bob Geldermans

Delegate of the board of examiners

Ir. Stefan C. van der Spek

Delft, May 2020

Faculty of Architecture and the Built Environment
AE+T - Architectural Engineering + Technology

1- PROBLEM ANALYSIS:

- Problem analysis
- Lidl supermarket
- Case study (Spangen)

2- PROBLEM STATEMENT & R. QUESTION(S)

3- METHODOLOGY

- Methodology

4- BASELINE ANALYSIS

- Flows + Lidl position (flows selection)
- Social context

5- STRATEGY DEVELOPMENT:

- Circular solution routes
- Design framework
- Design options

6- IMPROVEMENT (PROPOSAL):

- Description
- Graphical representation
- Diagram of flows
- Evaluation

7- CONCLUSION

- Conclusion
- Room for discussion
- Further steps for P5

1- PROBLEM ANALYSIS:

- Problem analysis
- Lidl supermarket
- Case study (Spangen)

PROBLEM ANALYSIS: Sustainable development goals (SDGs)

Qiao-Ling Cendón- P5- Lidl Supermarket

GOAL 1: No Poverty

GOAL 2: Zero Hunger

GOAL 3: Good Health and Well-being

GOAL 4: Quality Education

GOAL 5: Gender Equality

GOAL 6: Clean Water and Sanitation

GOAL 7: Affordable and Clean Energy

GOAL 8: Decent Work and Economic Growth

GOAL 9: Industry, Innovation and Infrastructure

GOAL 10: Reduced Inequality

GOAL 11: Sustainable Cities and Communities

GOAL 12: Responsible Consumption and Production

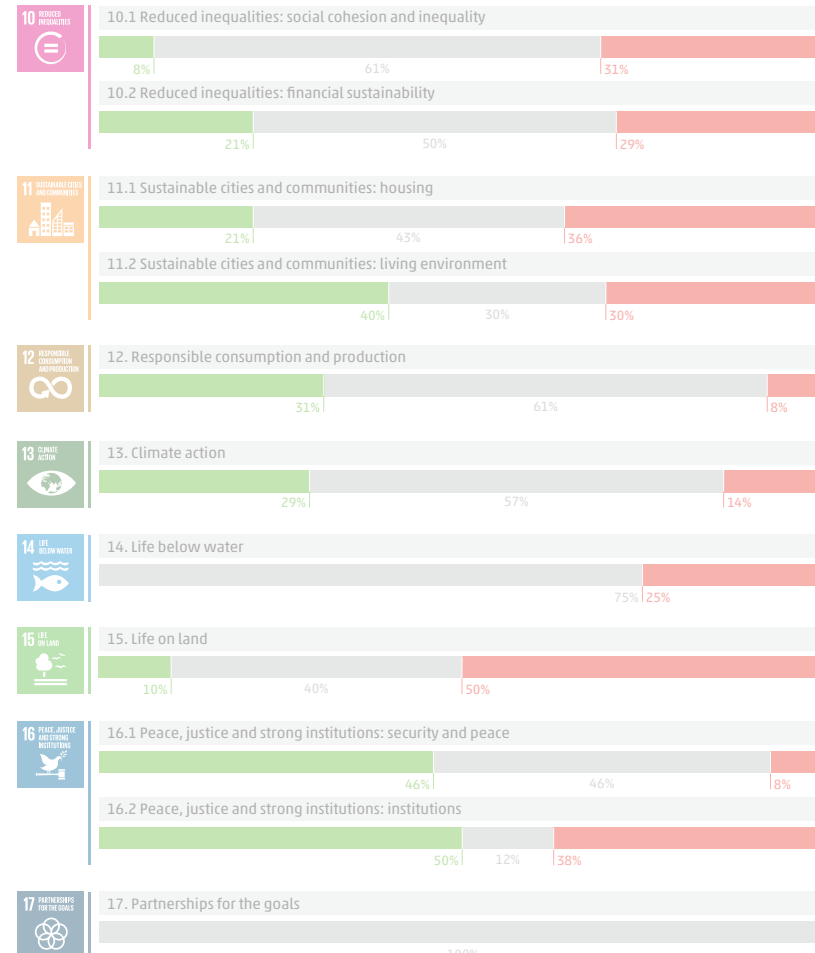
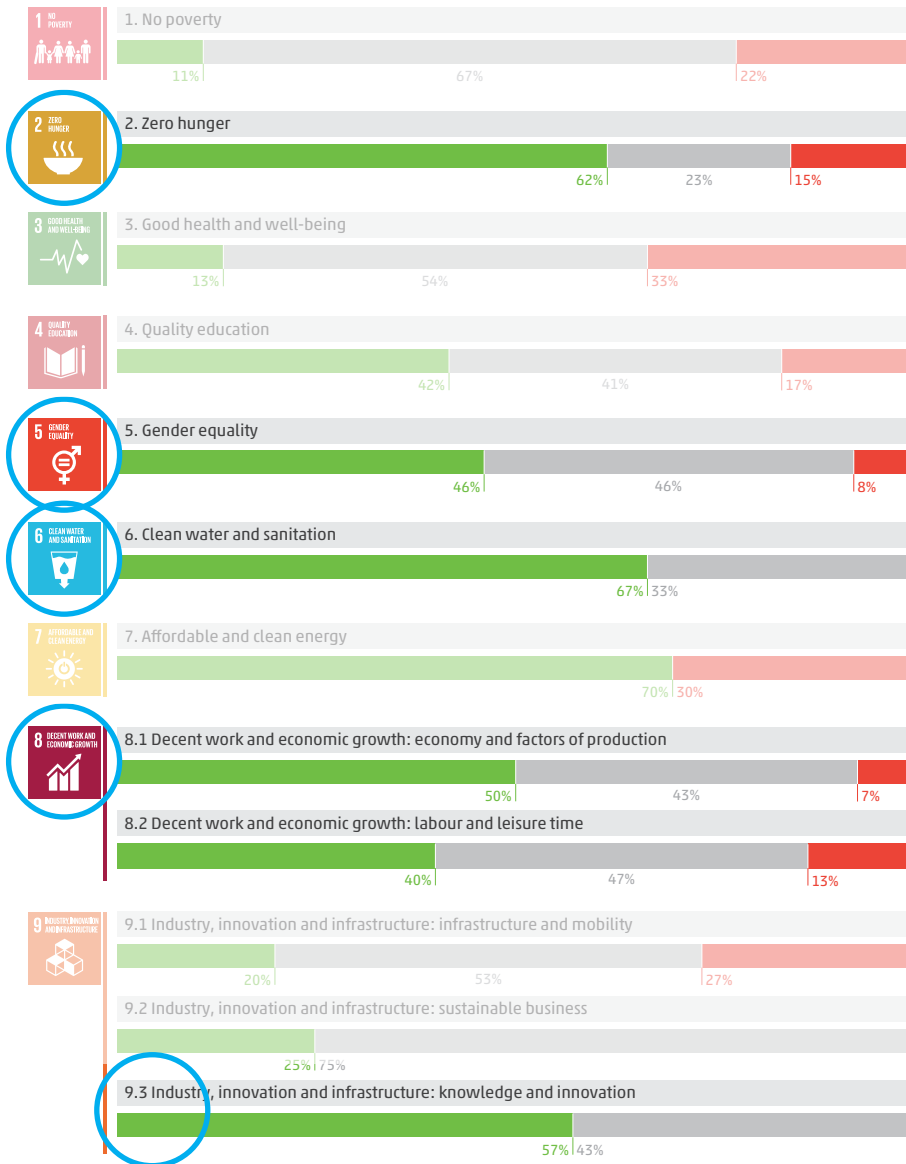
GOAL 13: Climate Action

GOAL 14: Life Below Water

GOAL 15: Life on Land

GOAL 16: Peace and Justice Strong Institutions

GOAL 17: Partnerships to achieve the Goal



(Source: CBS, 2019)



Current trend in NL

Current declining trends in NL

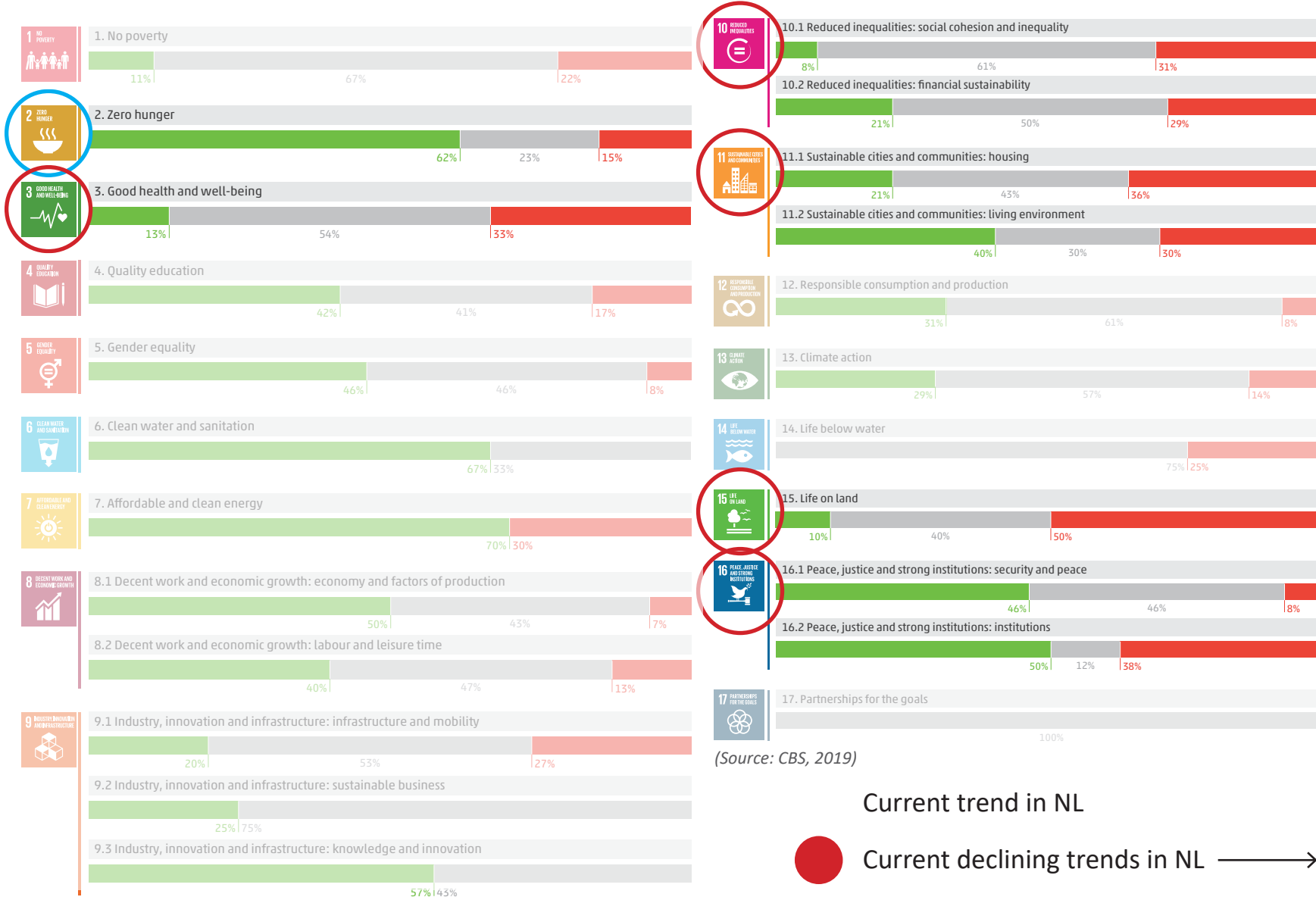
PROBLEM ANALYSIS: Sustainable development goals (SDGs)

- GOAL 1: No Poverty
- GOAL 2: Zero Hunger
- GOAL 3: Good Health and Well-being
- GOAL 4: Quality Education
- GOAL 5: Gender Equality
- GOAL 6: Clean Water and Sanitation

- GOAL 7: Affordable and Clean Energy
- GOAL 8: Decent Work and Economic Growth
- GOAL 9: Industry, Innovation and Infrastructure
- GOAL 10: Reduced Inequality

- GOAL 11: Sustainable Cities and Communities
- GOAL 12: Responsible Consumption and Production
- GOAL 13: Climate Action
- GOAL 14: Life Below Water

- GOAL 15: Life on Land
- GOAL 16: Peace and Justice Strong Institutions
- GOAL 17: Partnerships to achieve the Goal

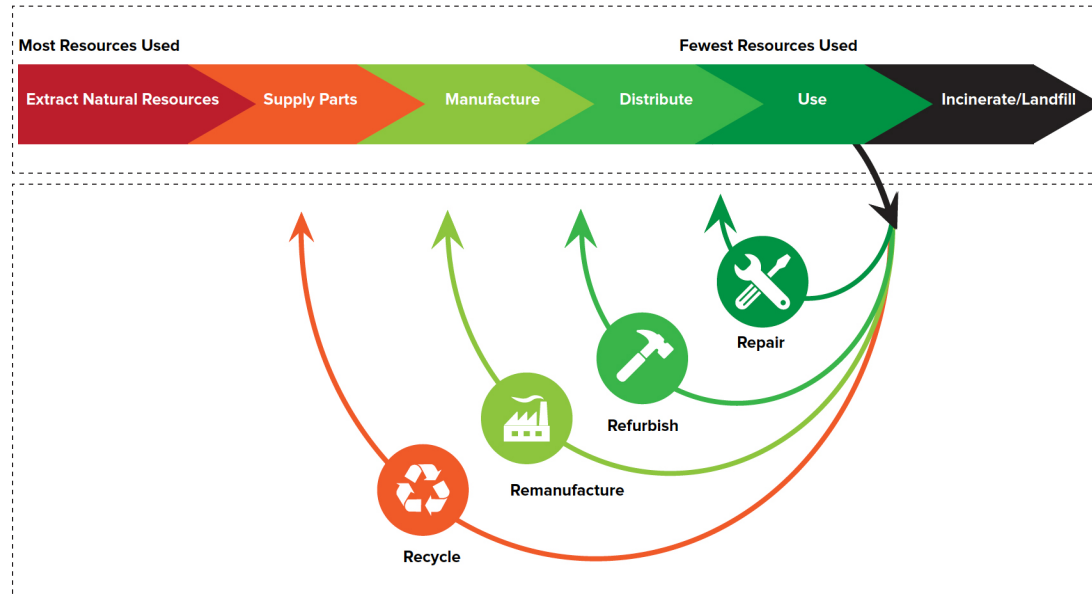


(Source: CBS, 2019)



1- ISOLATED BUILDINGS:

Linear model (LM)



(Source: Wastequip, n.d)

Circular economy (CE)

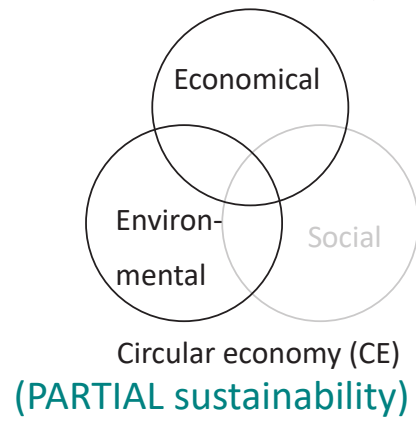
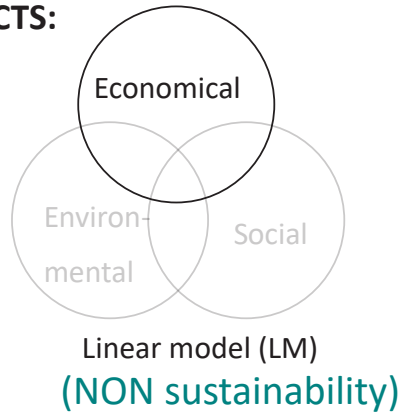


Isolation

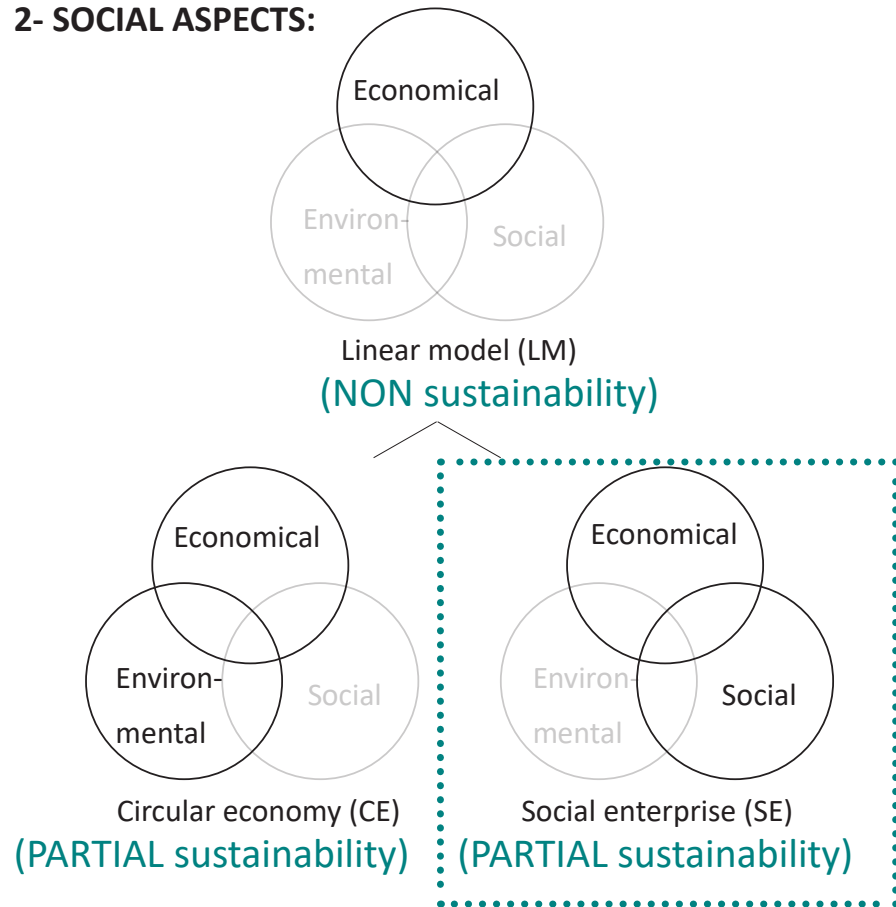


Integration with local context

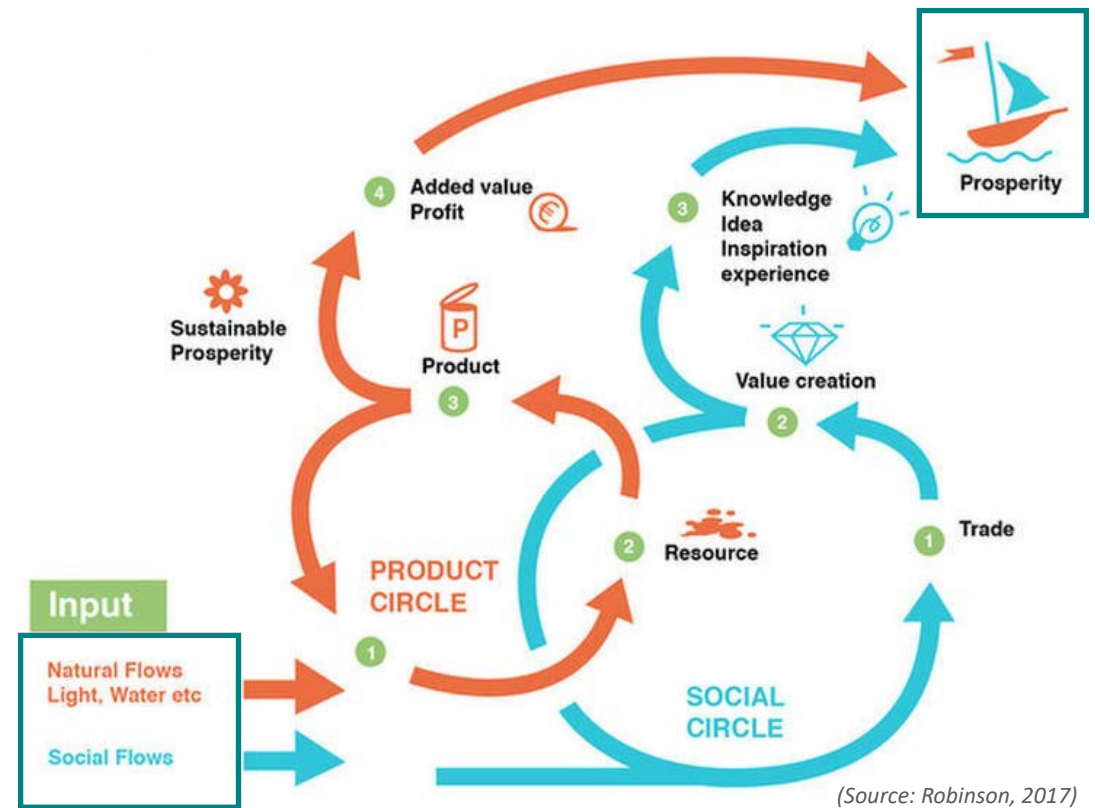
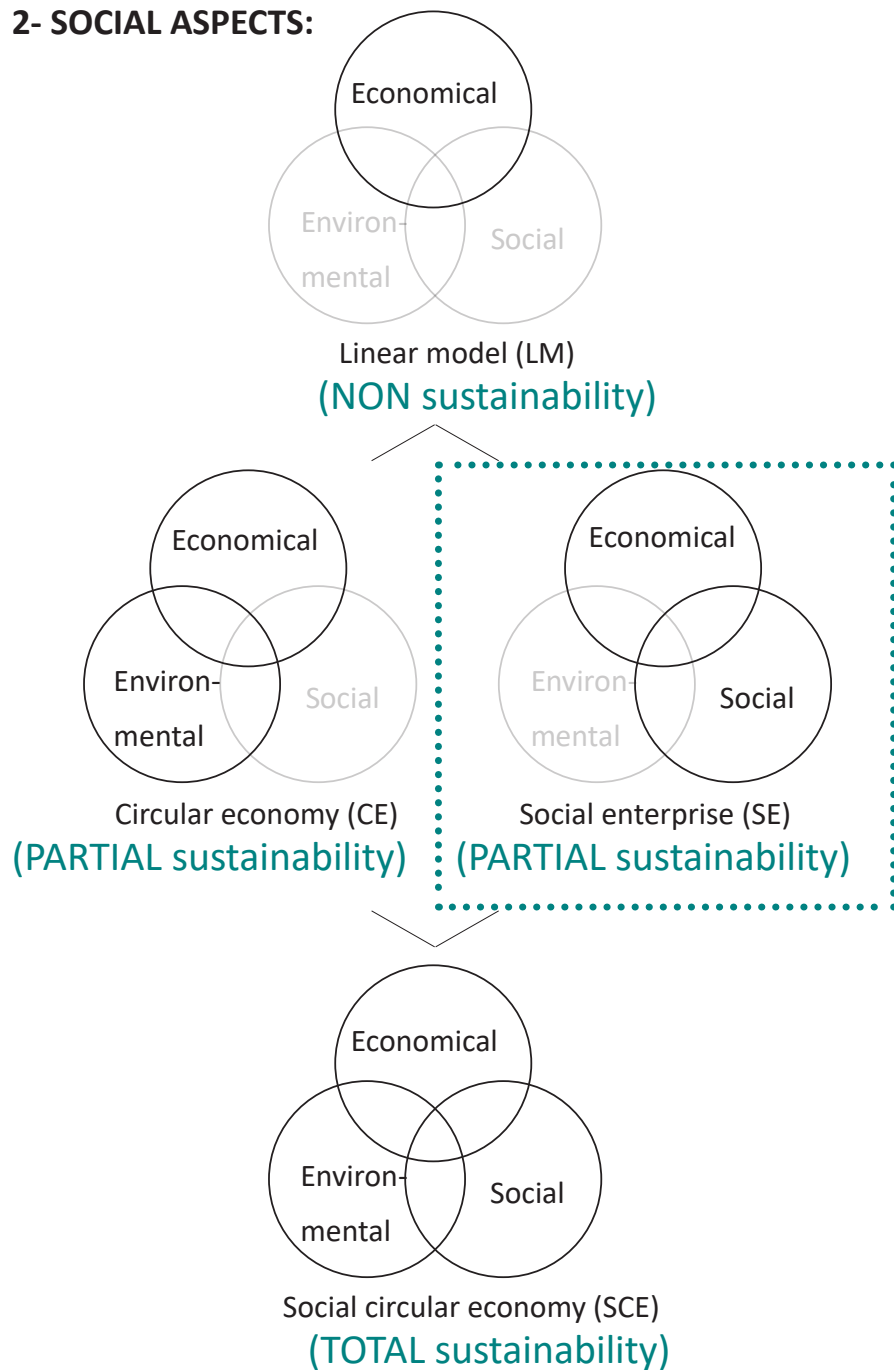
2- SOCIAL ASPECTS:



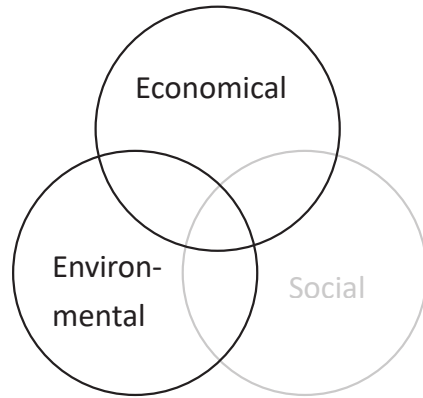
2- SOCIAL ASPECTS:



2- SOCIAL ASPECTS:



Final prosperity when applying SCE, with natural (CE) and social flows (SE).



Circular economy (CE)



“Robot”

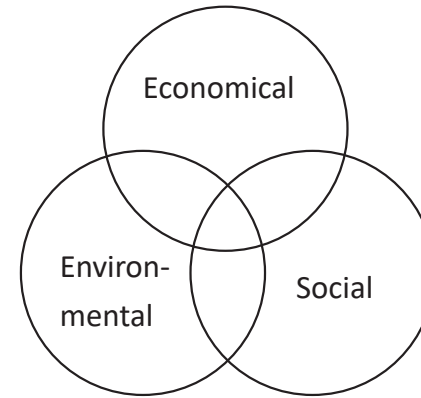


- Cheaper than LM
- Faster than LM
- Income to foreign bank



1 SDG

·SDG 12: Responsible consumption & production



Social circular economy (SCE)



“5 refugee women doing local repairs”



- Less efficiency
- Women & disadvantage people (Social inclusivity)
- Income for living & families (independent)
- Spend on local economy

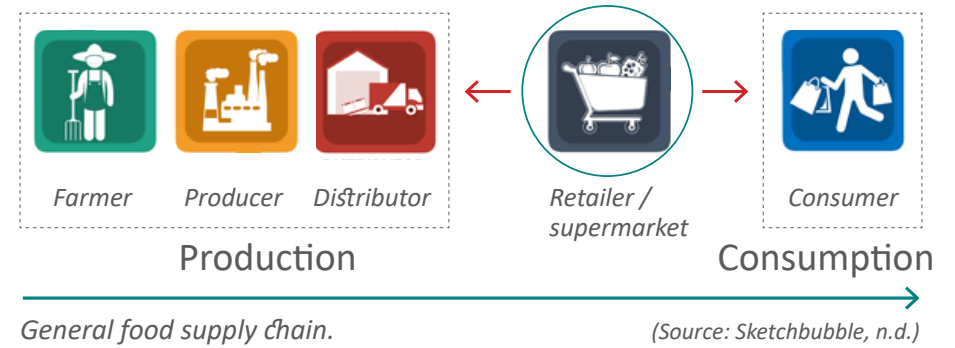


3 SDG

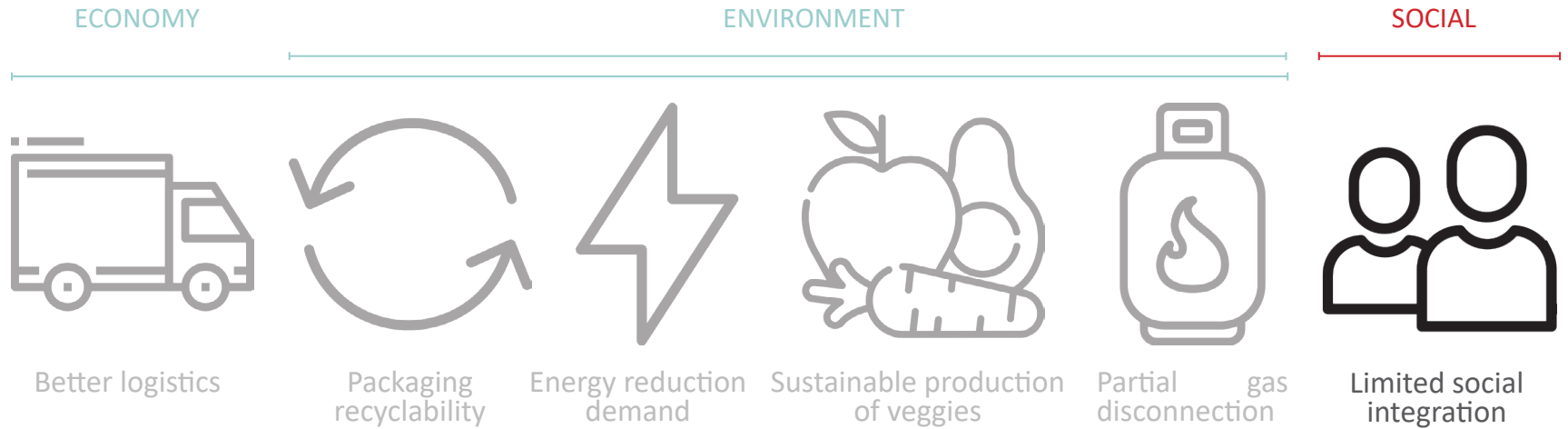
·SDG 5: Gender equality
 ·SDG 8: Decent work & economic growth
 ·SDG 10: Reduced inequalities



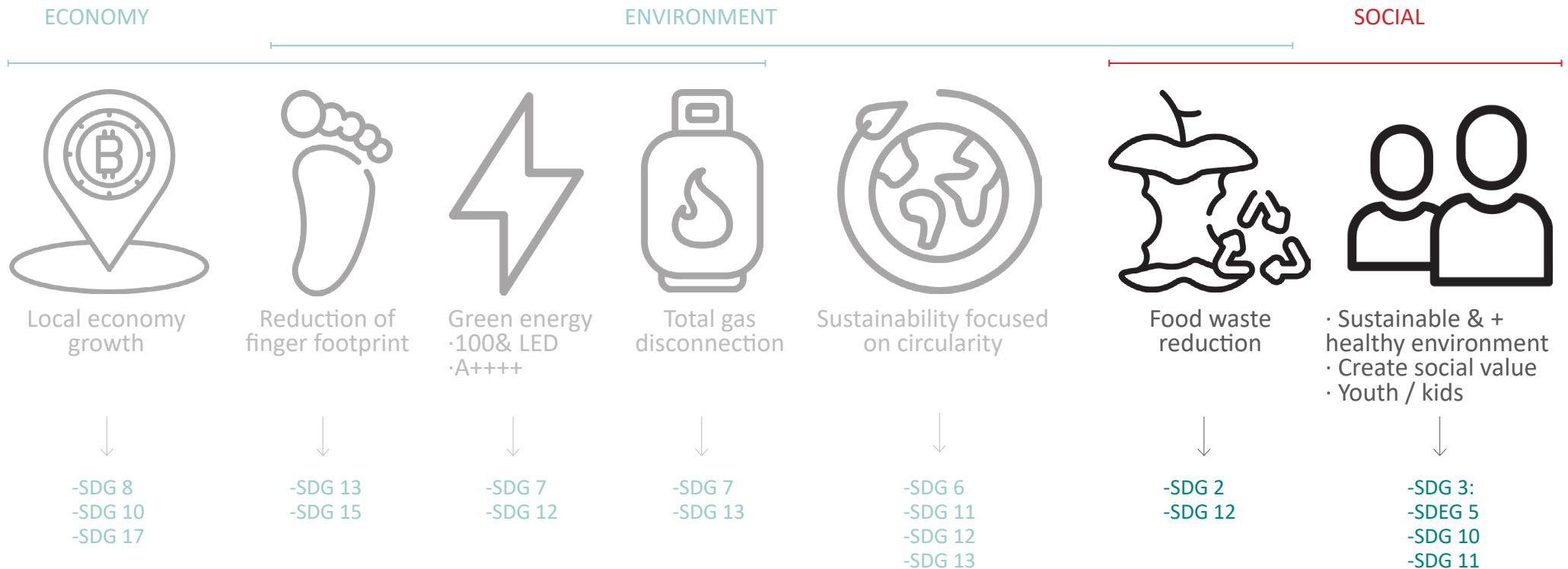
(Source: Werkenbijlidl, 2019)



ACHIEVEMENTS:



GOALS:



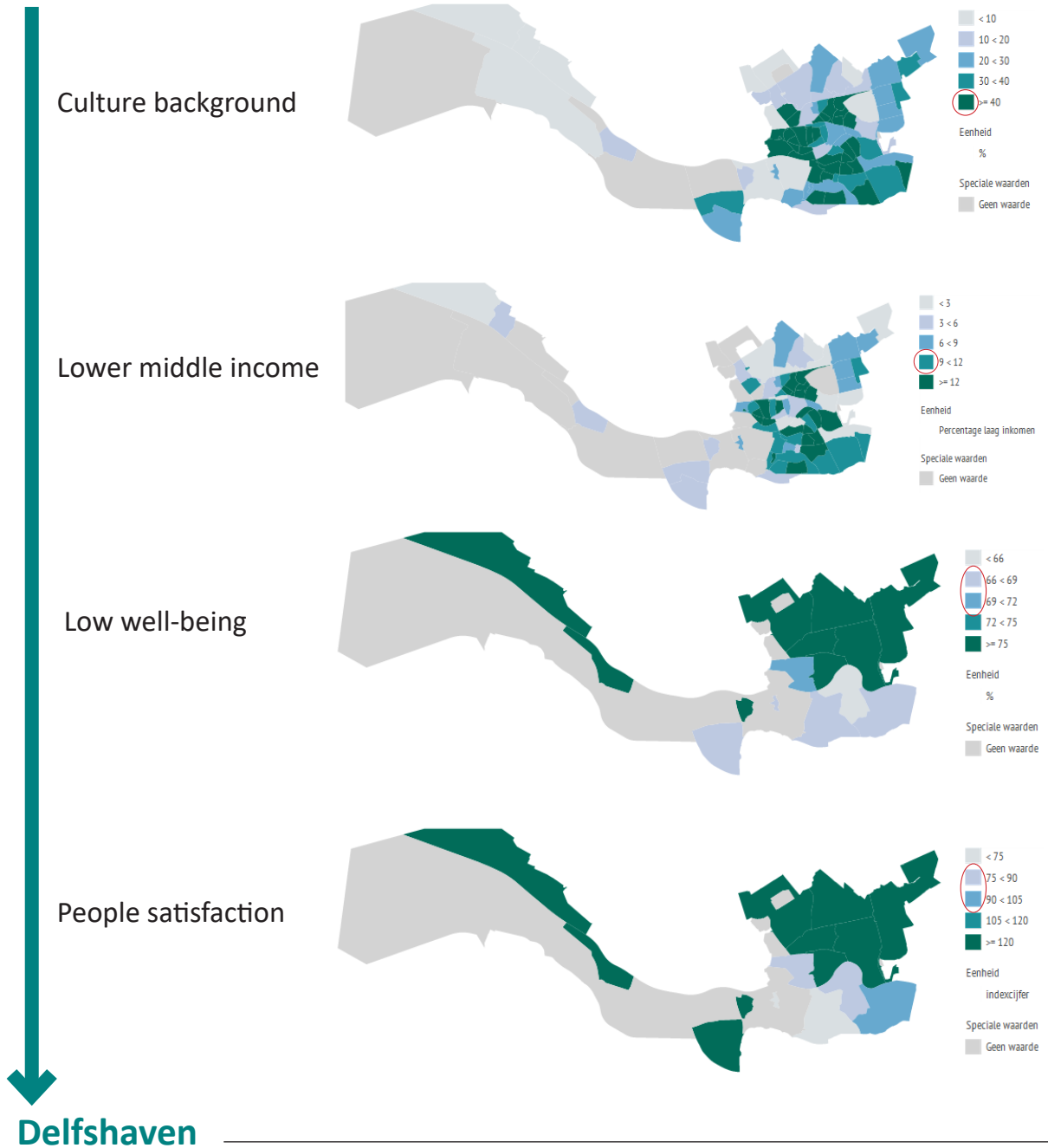
(Source: Flaticon, n.d.)

Selection depending on:



PROBLEM ANALYSIS: Study case (spangen)

Qiao-Ling Cendón- P5- Lidl Supermarket



(Source: Allecijfers.nl, n.d.)

Delfshaven:

- 1- Delfshaven
- 2- Bospolder
- 3- Tussendijken
- 4- Spangen
- 5- Nieuwe Westen
- 6- Middelland
- 7- Oud Mathenesse
- 8- Witte Dorp
- 9- Schiemond

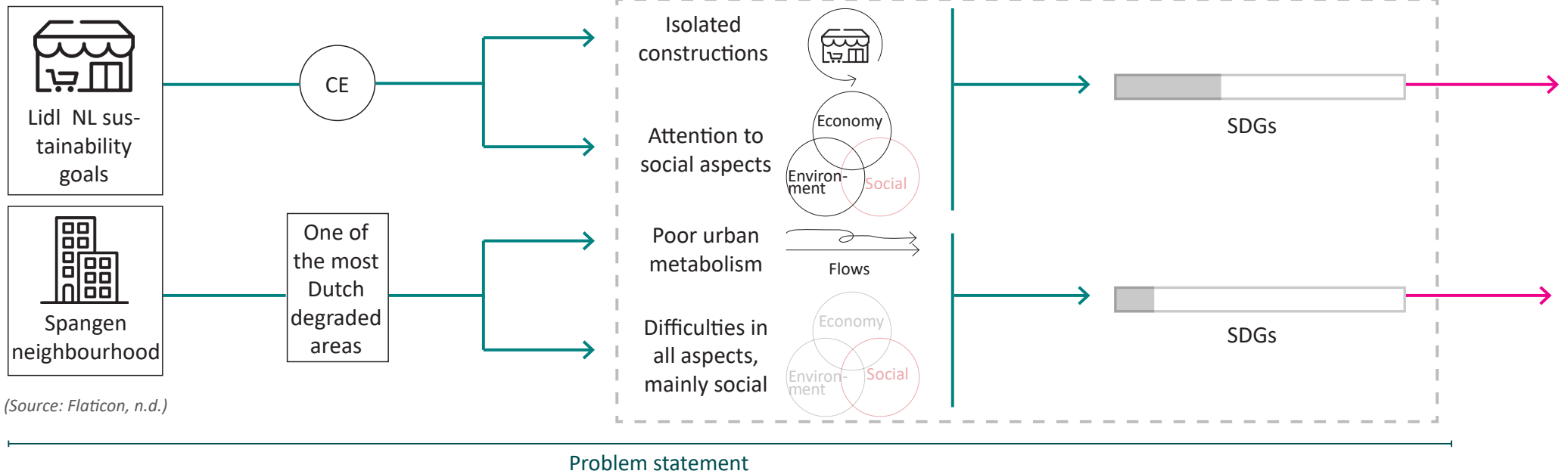
↓
Spangen
↓

(low income, satisfaction, well-being, interantional people & Lidl location)

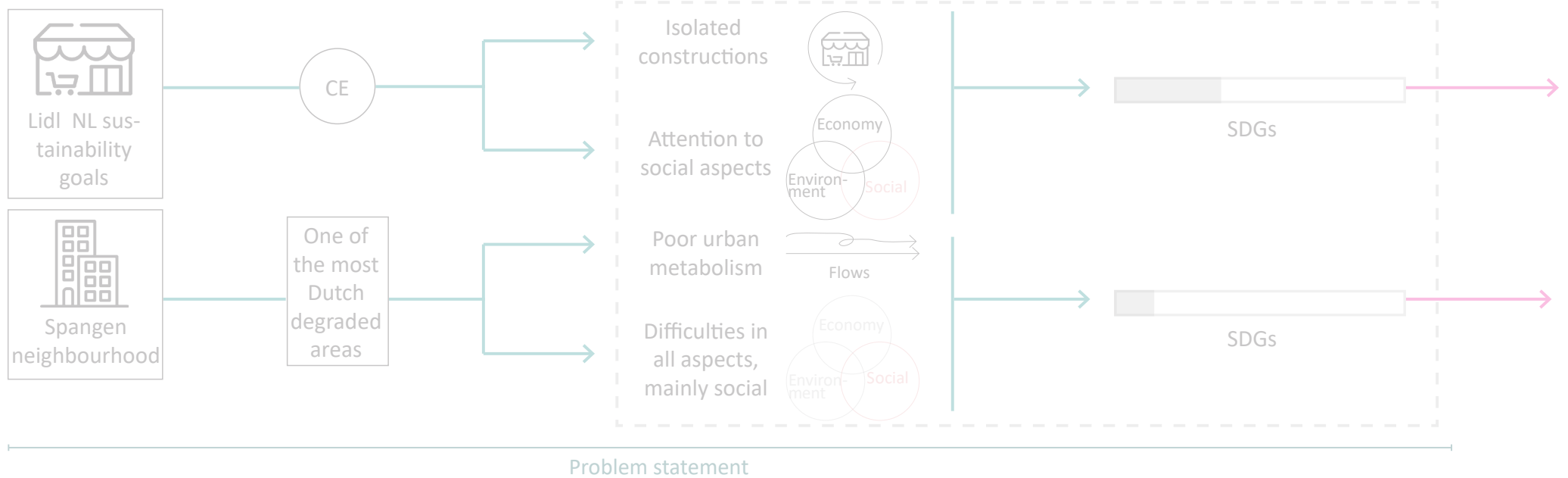
2- PROBLEM STATEMENT & R.QUESTION(S)

PROBLEM STATEMENT

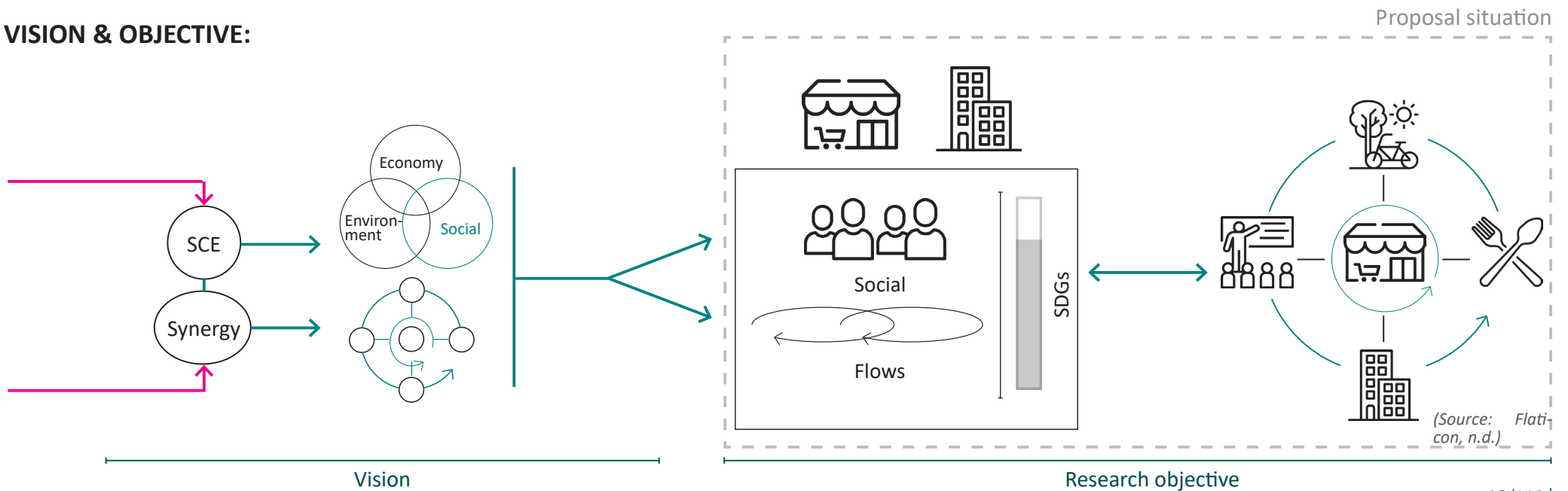
PROBLEM STATEMENT:



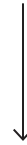
PROBLEM STATEMENT:



VISION & OBJECTIVE:



To what extent the sustainable redesign of Lidl supermarket can improve the social context, urban metabolism related to essential flows and help to achieve Sustainable Development Goals (SDGs) in Spangen?



Existing situation

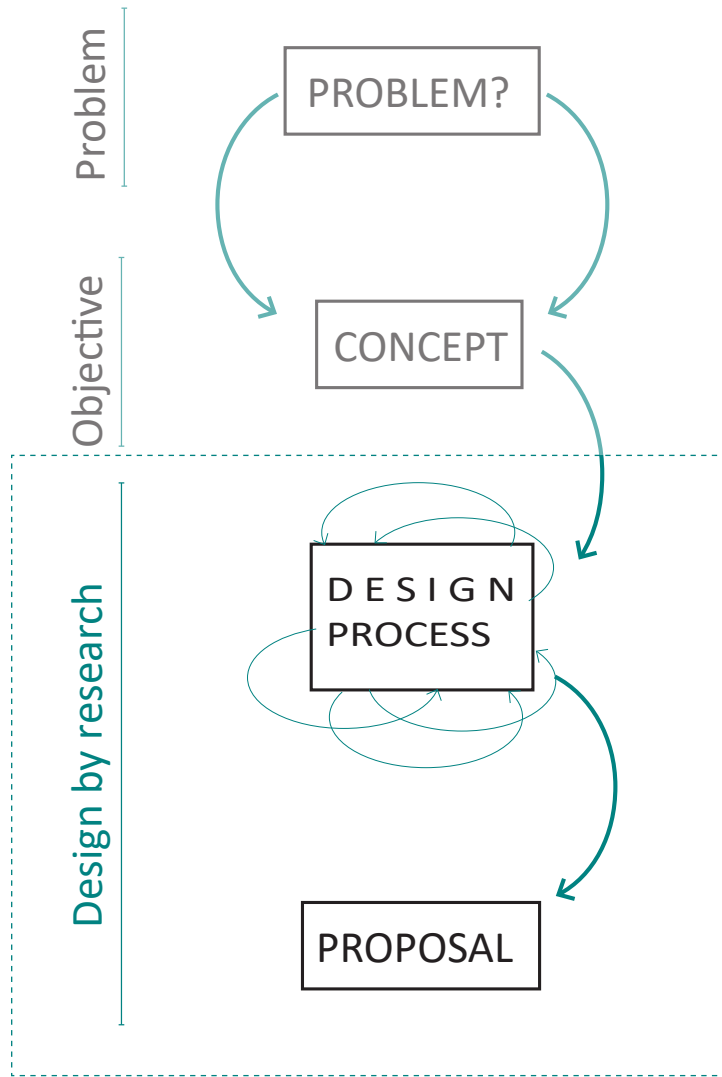
- 1- What are the essential flows of interest for Spangen neighbourhood and Lidl supermarket regarding SDGs?
- 2- What is the current urban metabolism, related to essential flows, between Lidl supermarket and the local neighbourhood?
- 3- What are the existing social initiatives for the local community and which ones could be improved or introduced through Lidl redesign?

Proposal situation

- 4- What are the main circular opportunities that can be achieved through Lidl redesign for the improvement of the urban metabolism and according to the socio-economic context of Spangen?
- 5- Which Sustainable Development Goals result from the synergy between Lidl redesign and the neighbourhood?

3- METHODOLOGY:

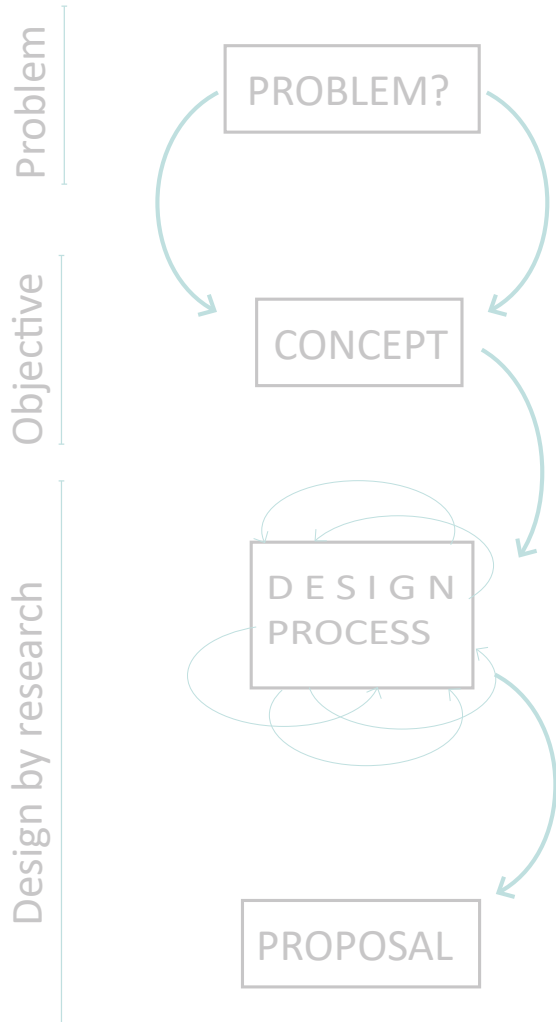
- Methodology

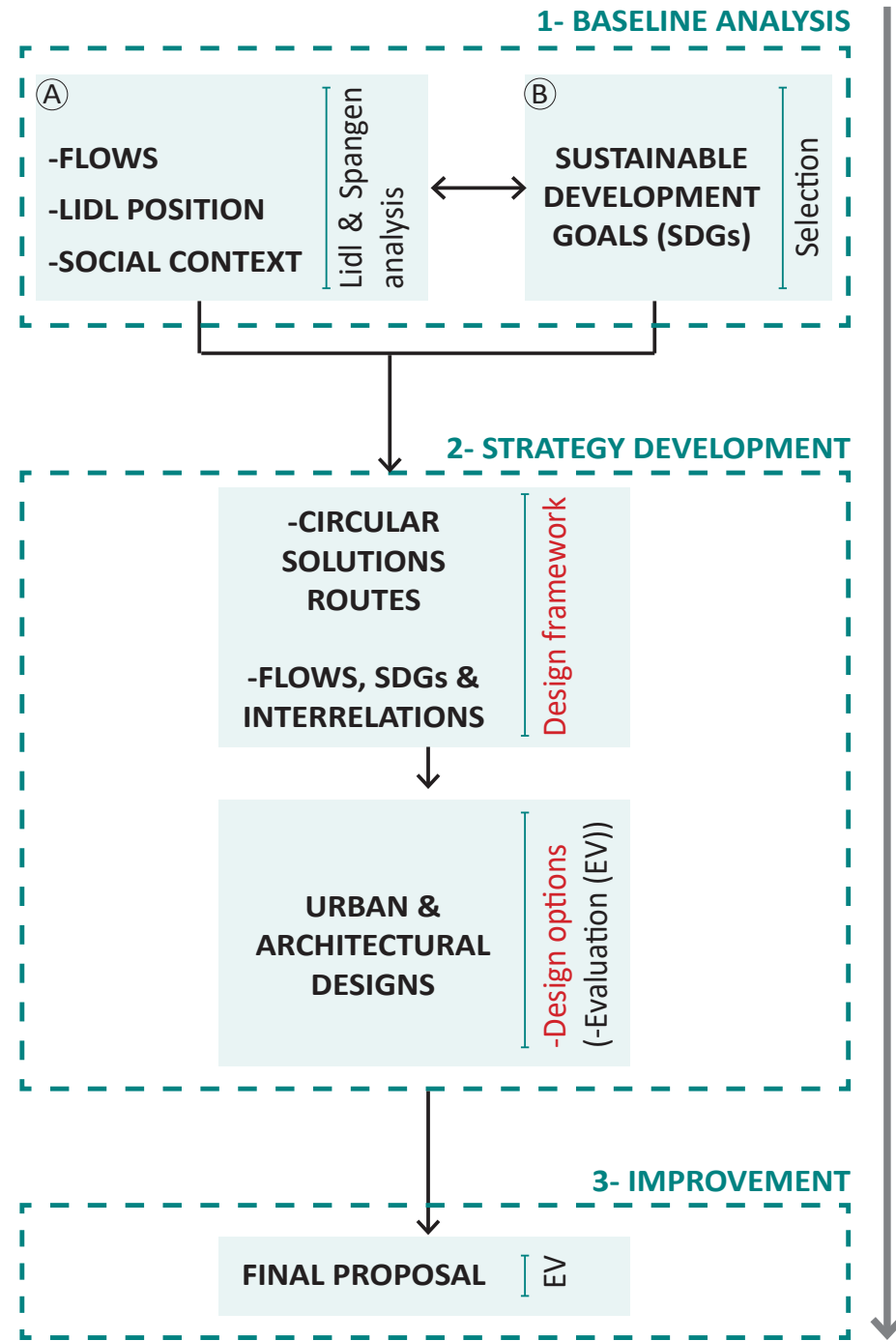
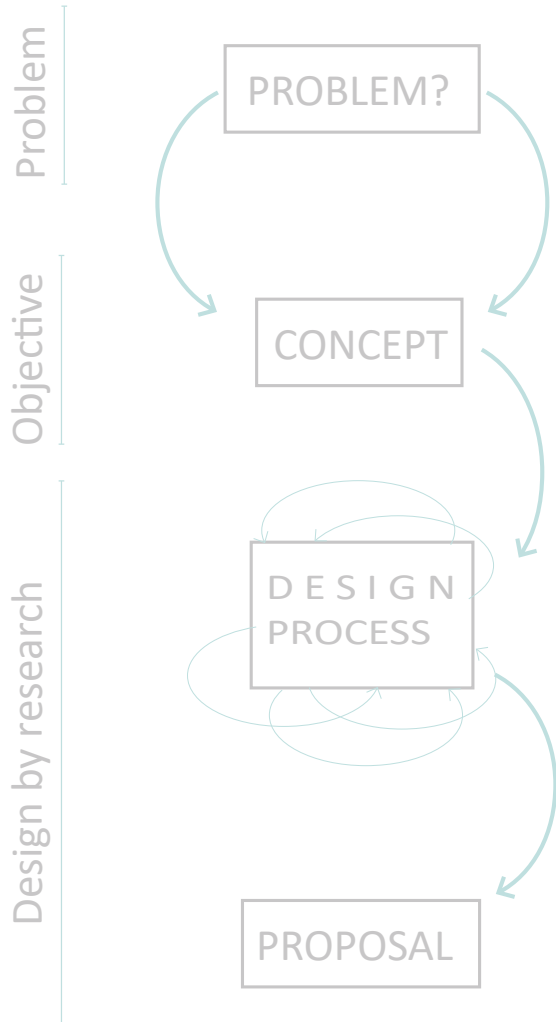


1- BASELINE ANALYSIS

2- STRATEGY DEVELOPMENT

3- IMPROVEMENT

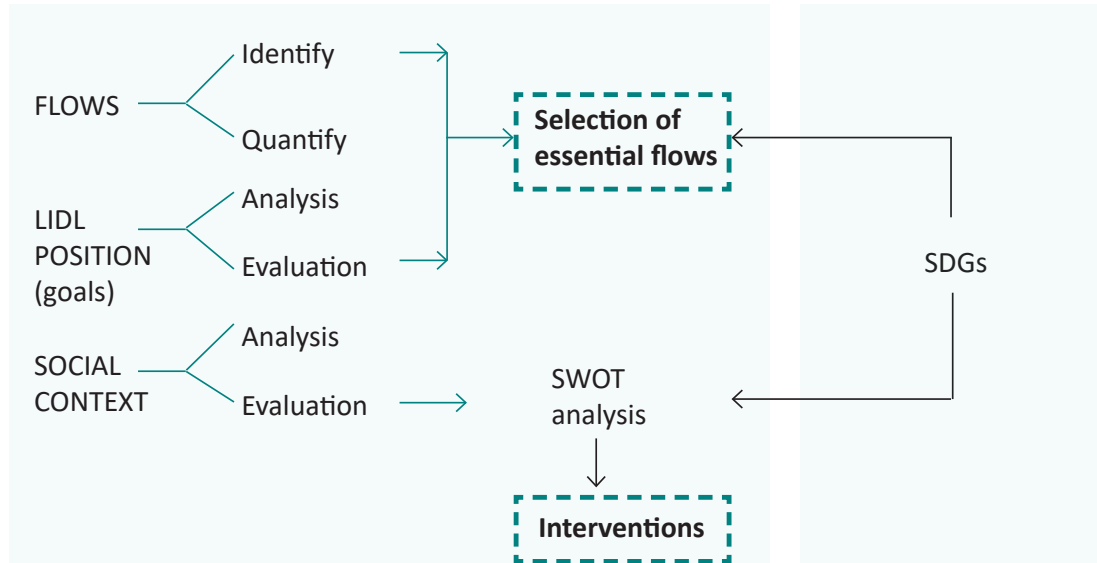




1- BASELINE ANALYSIS:

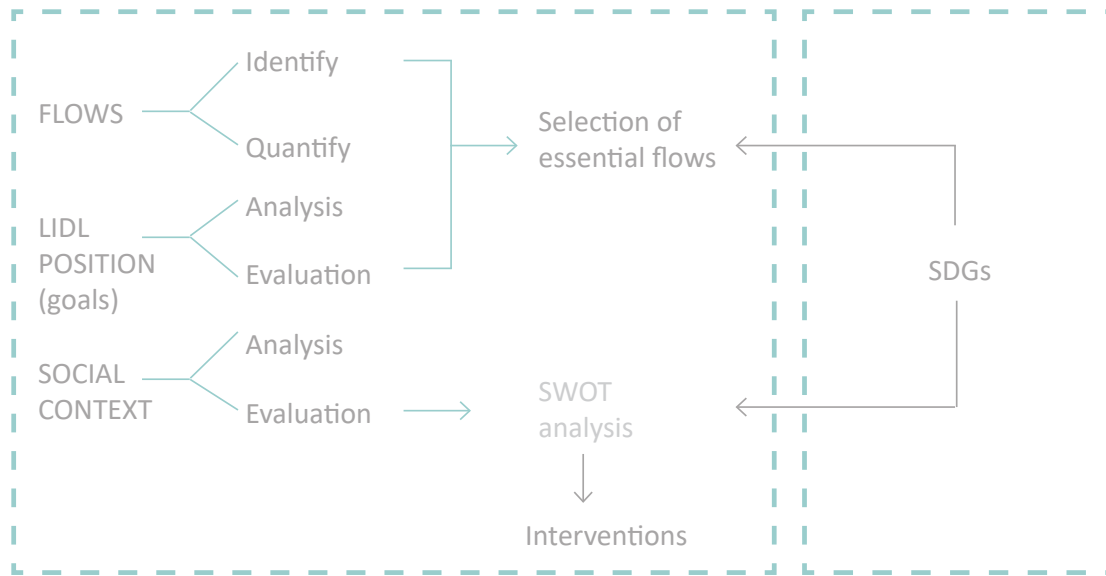
A- Lidl and Spangen analysis:

B- SDGs:



1- BASELINE ANALYSIS:

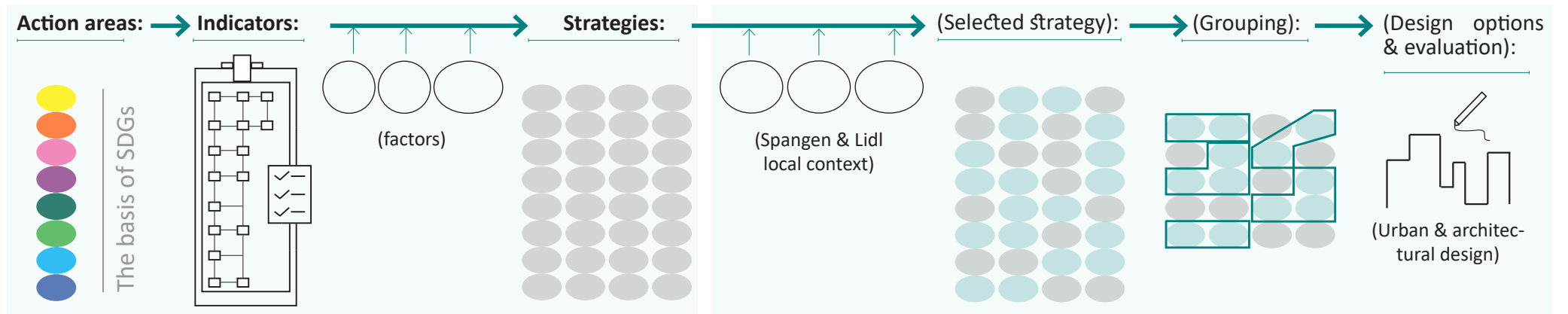
A- Lidl and Spangen analysis:



2- STRATEGY DEVELOPMENT:

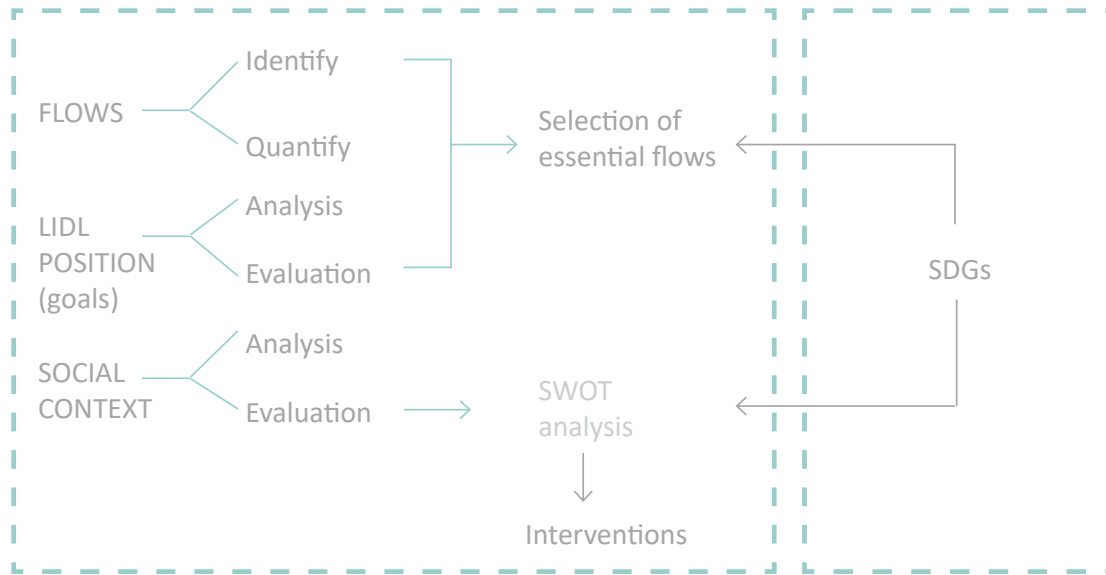
Design framework

Design options



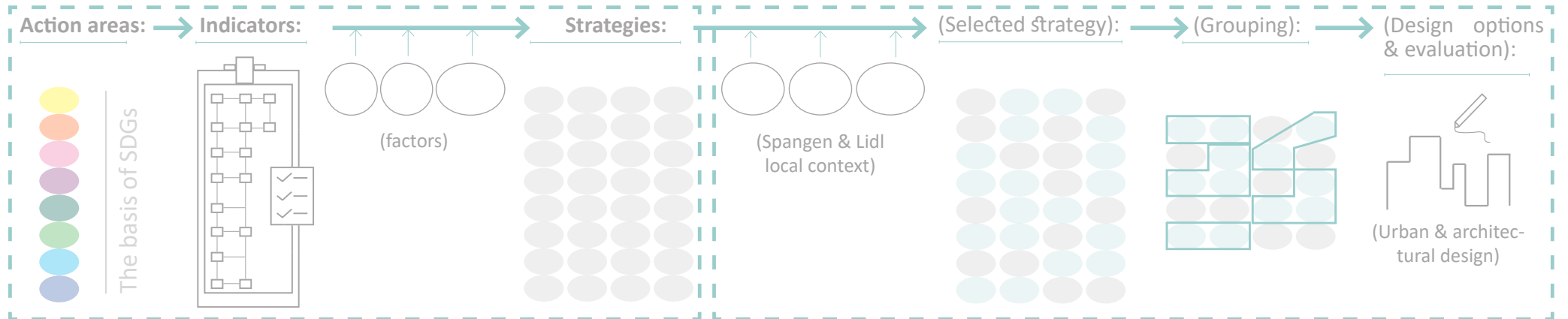
1- BASELINE ANALYSIS:

A- Lidl and Spangen analysis:



2- STRATEGY DEVELOPMENT:

Design framework

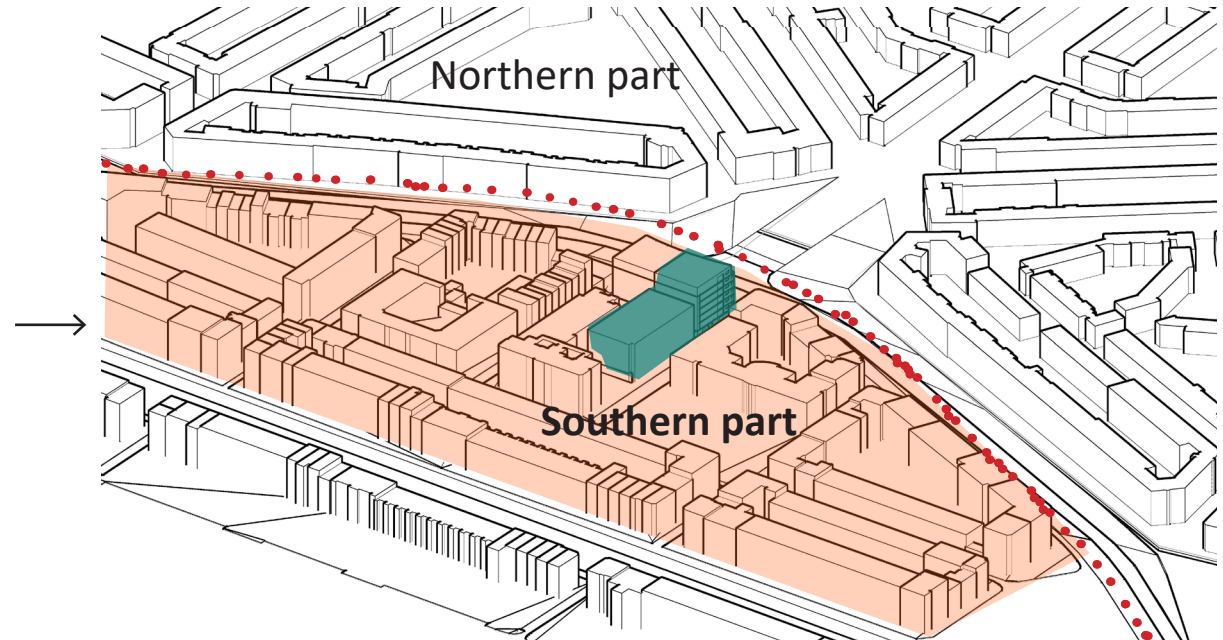


3- IMPROVEMENT:



RESEARCH BOUNDARIES:

	CONSIDERED	LEFT OUT
-SCALE:	Building (Lidl) & neighbourhood (Spangen)	City scale
-SMALL AREA:	2,000 habitants (Southern part of Spangen)	Northern part of Spangen
-FOCUS:	Technical & spatial planning	Financial aspects
-BENEFITS:	For general neighbourhood & Lidl	Private households



4- BASELINE ANALYSIS:

- Flows + Lidl position (flows selection)
- Social context

FLOWS:



Energy



Materials



Water



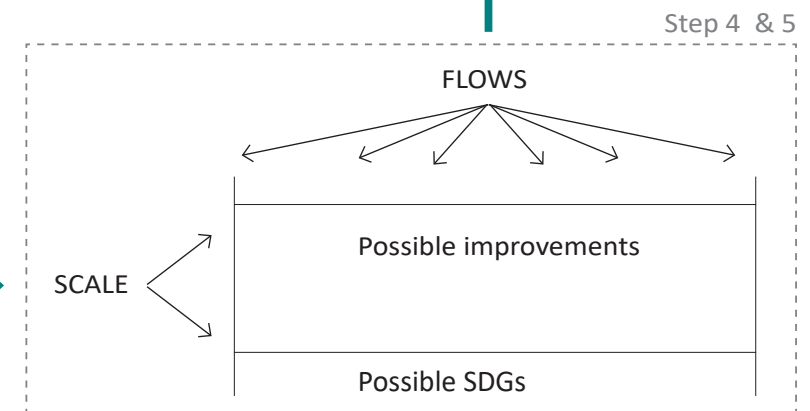
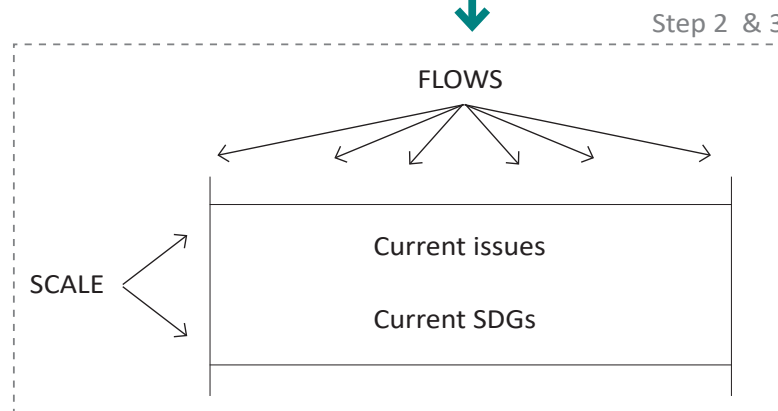
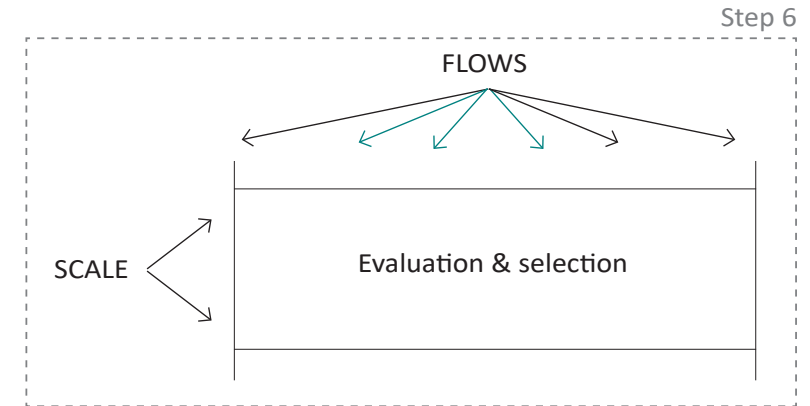
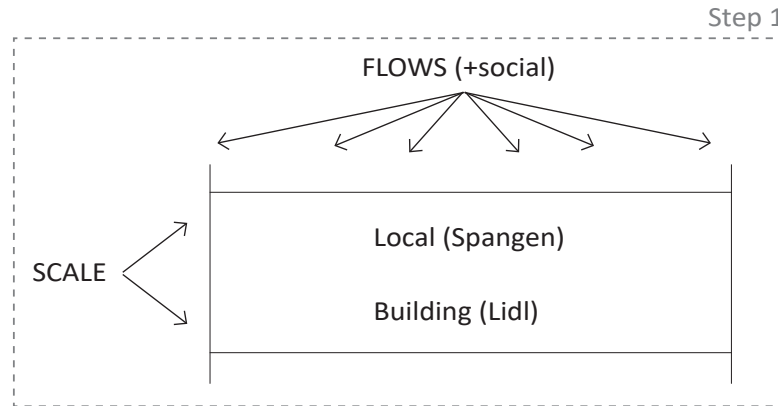
Air



Soil → Food

(Source: Flaticon, n.d.)

SELECTION OF FLOWS:



2 & 3: CURRENT CHALLENGES & SDG

CHALLENGES (current situation)

SCALE	LOCATION	ENERGY	WATER	FOOD	AIR	MATERIALS	(SOCIAL)	
CITY	(Rotterdam)							
LO-CAL	Modular approach Span-gen	Issues	<ul style="list-style-type: none"> · High consumption · No exchange of flows · E.recovery · No energy saving · No local E.prod. 	<ul style="list-style-type: none"> · High waste · No water-saving · Rainwater not collected · No reuse 	<ul style="list-style-type: none"> · High FW · No local production · Non fresh 	<ul style="list-style-type: none"> · Pollution · Low health 	<ul style="list-style-type: none"> · No material passport · No recyclability 	<ul style="list-style-type: none"> · Criminality & vandalism · No cohesion · Disatisfaction · No well-being · Loneliness · Deprivation · Social exclusion
		Partial SDGs	-	12 13 14 15	-	-	-	2 3 4 5 10
BUILDING	Lidl	Issues	<ul style="list-style-type: none"> · Limited E.neutral 	<ul style="list-style-type: none"> · High consumption 	<ul style="list-style-type: none"> · High FW · Little donations 	<ul style="list-style-type: none"> · High ventilation · No purification · No fresh air 	<ul style="list-style-type: none"> · Not totally circular 	<ul style="list-style-type: none"> · Social initiatives for employees · Little social activities
		Partial SDGs	7 12 13	-	2 13	-	12 13	11 17
		Goals	<ul style="list-style-type: none"> · E. neutral · Total gas disconnection (SDG: 7, 12, 13) 	- (SDG: -)	<ul style="list-style-type: none"> · -FW · Trasparent FW data (SDG: 13, 15) 	<ul style="list-style-type: none"> · -CO2 · Carbon footprint (SDG:11, 15) 	<ul style="list-style-type: none"> · Material circularity & passport (SDG:11, 15, 17) 	<ul style="list-style-type: none"> · Sustainable environment · Social value · Youth / kids (SDG:3, 11)

SUMMARY (SDGs)

SCALE	LOCATION	ENERGY	WATER	FOOD	AIR	MATERIALS	(SOCIAL)
LO-CAL	Spangen						
BUILDING	Lidl						

4 & 5: POTENTIAL IMPROVEMENTS & SDG

POTENTIALS (proposal si-

SCALE	LOCATION		ENERGY	WATER	FOOD	AIR	MATERIALS	(SOCIAL)
LO-CAL	Span-gen	First measures	·Local energy production ·Lidl waste heat reuse ·Heat exchanges ·Energy saving ·Insulations, double glass...	·Rainwater collection ·Local treatment ·Water saving ·Greywater & blackwater reuse	·FW distribution ·Workshops ·Local food production	·Greenery · Photocatalysts materials	·Recyclable materials	· Social spaces ·Social activity ·Life on streets
		SDGs	7 11 12 13	6 12 13 14	2 11 13 15 17	3 11 15 17	11 15 17	3 5 10 11
BUILDING	Lidl	First measures	·Energy exchange	·Rainwater collection ·On-site treatment ·Exchange	·Food demands device ·On-site FW reprocess ·Local food production	·Green walls	·Multifunction packaging ·Universal connections ·Local recyclable material ·Standard size ·Material passport	· Social indoor spaces for inclusion, integration.. ·Workshops
		SDGs	7 11 12 13	6 12 13 14	2 11 13 15 17	3 13	11 12 15 17	3 5 8 10 11



SUMMARY (SDGs)

SCALE	LOCATION	ENERGY	WATER	FOOD	AIR	MATERIALS	(SOCIAL)
LO-CAL	Spangen						
BUILDING	Lidl						

Challenges

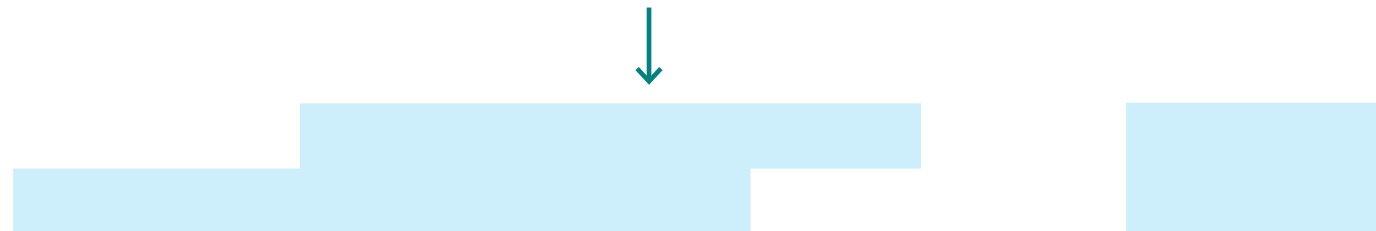
Potentials

SCALE	LOCATION	ENERGY	WATER	FOOD	AIR	MATERIALS	(SOCIAL)
LOCAL	Spangen						
BUILDING	Lidl						
LOCAL	Spangen						
BUILDING	Lidl						

Challenges

Potentials

SCALE	LOCATION	ENERGY	WATER	FOOD	AIR	MATERIALS	(SOCIAL)
LOCAL	Spangen	Red	Orange	Red	Red	Red	Orange
BUILDING	Lidl	White	Red	Orange	Red	White	Orange
LOCAL	Spangen	Teal	Teal	Teal	Teal	White	Teal
BUILDING	Lidl	Teal	Teal	Teal	White	Teal	Teal



6: EVALUATION + SELECTION

Other factors



CRITERIAS	ENERGY	WATER	FOOD	AIR	MATERIALS	(SOCIAL)
Unsearched flows						
Existing research						
Basics flows for life						
Social benefits						
Potential synergy						

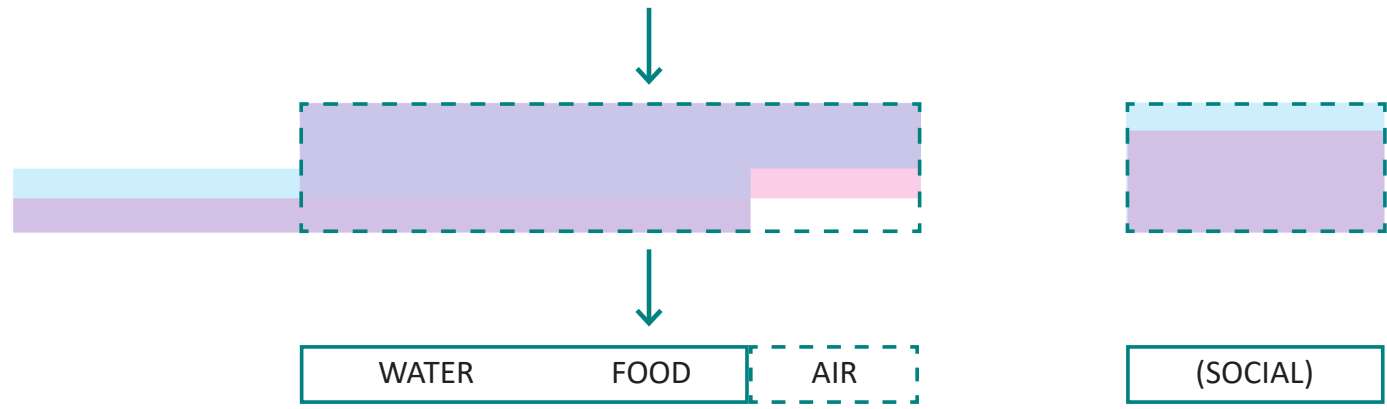


6: EVALUATION + SELECTION

SCALE	LOCATION	ENERGY	WATER	FOOD	AIR	MATERIALS	(SOCIAL)
LOCAL	Spangen						
BUILDING	Lidl						
LOCAL	Spangen						
BUILDING	Lidl						

+

CRITERIAS	ENERGY	WATER	FOOD	AIR	MATERIALS	(SOCIAL)
Unsearched flows						
Existing research						
Basics flows for life						
Social benefits						
Potential synergy						



SOCIAL CONTEXT: SWOT

	There are no problems	3
	Connectivity feeling	11
	Population growth	3
	Responsibility sense (awareness)	11
	Indefinite or long term contract jobs	8
	Return of Dutch population	-
	Decrease of crime	3
	Safety	11
	Cultural facilities visits & events	3

(S) STRENGTHS

(O) OPPORTUNITIES

	Elderly (reduce loneliness & disintegration).	10
	Children, young and adult (integration by diversity)	11
	Migrants (multicultural cohesion)	5
		10
		11
		10
		11

Lidl
SDGs

	Low income	8
	Loneliness	3
	Unemployed people	8
	Robbery	3
	Exodus of Dutch	-
	Elderly with bad health	3
	Satisfaction	3
	Problems with Dutch language	11
	Scarcity /bad management of greenery spaces	3

(W) WEAKNESSES

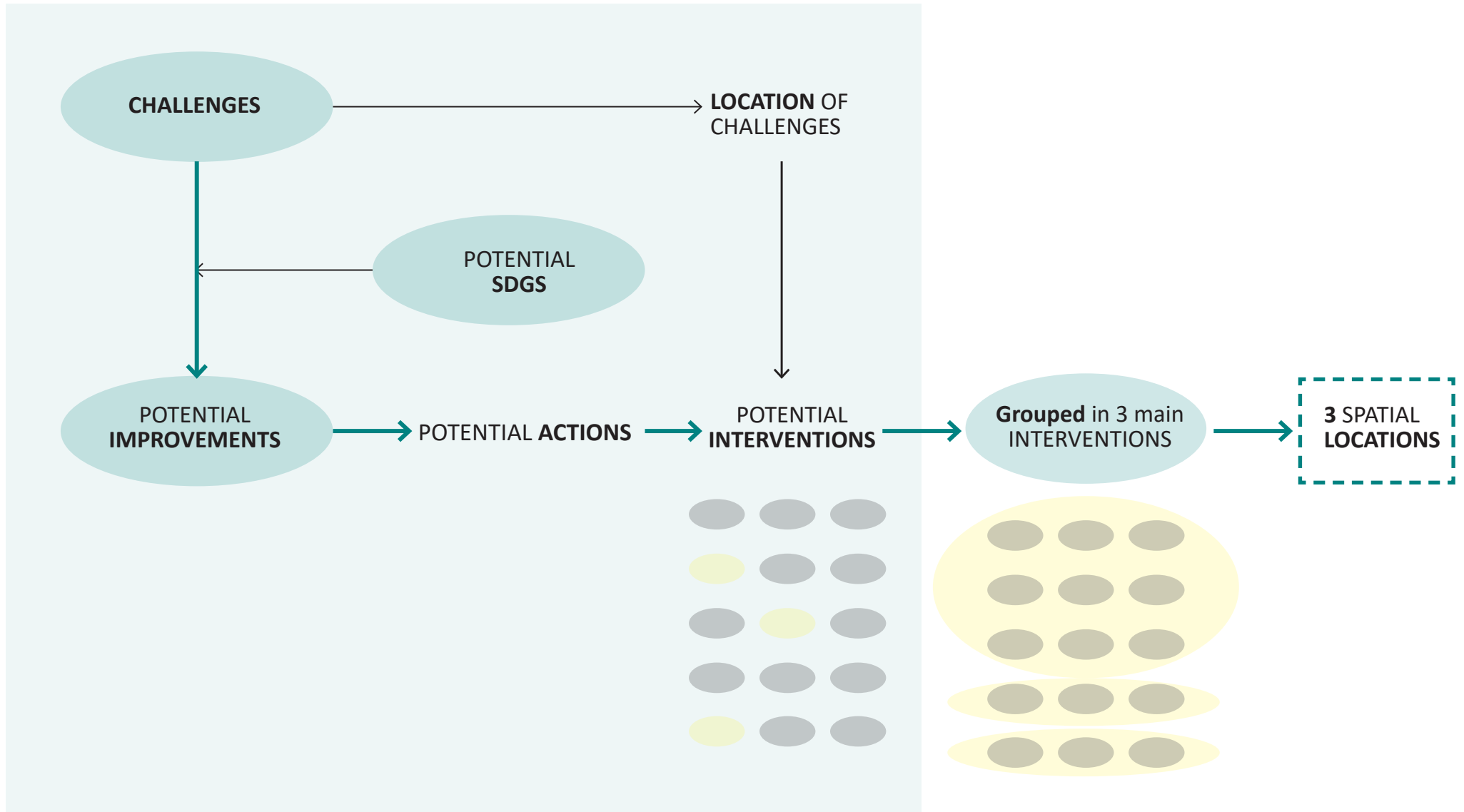
(T) THREATENS











	Drug dealers & vandalism (violence)	15
	Racism	11
	Urban & housing degradation	3
	Price housing	10
	Exodus of Dutch	11
		-
		-











Lidl
SDGs











Lidl
SDGs

(Source: Flaticon, n.d.)



CHALLENGES & NEEDS (what):	SPATIAL CHALLENGES (where):	POTENTIAL SDGs
 1- Low income & unemployment  2- Criminality & vandalism  3- Bad health, scarcity & bad management of greenery spaces  4- Loneliness, disaggregation, racism, dissatisfaction, difficulties for integration (Dutch language)  5- Sustainability unawareness and ignorance	1- Neighbourhood (citizens) 2- Outdoor spaces (streets, housing, parks, etc) 3- Outdoor spaces (parks, streets) 4- Neighbourhood (citizens) 5- Households, Lidl, outdoor spaces (urban infrastructures)	8, 17 3, 10 3, 15 3, 5, 10 2, 6, 7, 9, 11, 12, 13, 14, 15
POTENTIAL IMPROVEMENTS (what):	POTENTIAL ACTIONS (how):	POTENTIAL INTERVENTIONS (where)
 1- Boost employment (local economy)  2- <u>Cohesion and integration</u> through <u>employment opportunities</u> , <u>talent's</u> improvement possibilities...  3- Satisfaction regarding air purification, experience through 5 senses.  4- <u>Cohesion, participation, integration, connectivity</u>  5- Climate awareness & <u>education</u> , recyclability and reduction of waste, <u>learning innovations...</u> (sense of commitment, responsibility and positive feeling)	1- ·Chef, waiter, staff, maintenance assistant, ... ·Teacher, repairman, carpenter ... ·Farmer, cleaner, chef, staff, .. ·Maintenance, bodyguard, baby sitter... 2- ·Bodyguard, carpenter... ·Construction worker, maintenance, repairman, .. 3- ·Greenery parks, trees, biodiversity, recreation for everyone ·Purification of indoor air (greenery) 4- ·Cultural events, dinner gatherings, musical lessons, art decoration, painting, photography, language lessons ·Physical & social activities, group games & activities, open gym ·Cooking, fresh & organic food ·Group study, gathering, social activity ·Workshops in collaboration with local companies, conferences, ·Fair and market 5- ·Education through sustainable workshops (cooking with FW, composting..), recyclability and upcycle processes (mushrooms from coffee grounds, soap from oil..) ·Sustainability education (aquaponics, air exchange, PV, phytoremediation, water cycle...)	·Cafeteria, restaurant ·Workshop rooms, physical activity area ·Urban greenhouse ·Lidl ·Lidl, cafeteria, GH ·Outdoor space, GH ·Outdoor space ·Lidl, cafeteria, GH ·Outdoor space, workshop rooms, art exposition space, dining area ·Outdoor space, Lidl, meeting & social rooms ·Kitchen room, GH ·Social rooms ·Workshop rooms, gathering space ·Outdoor area ·Composting zone, kitchen room, GH, upcycling processes area, communal garden ·Outdoor space, GH

CHALLENGES & NEEDS (what):	SPATIAL CHALLENGES (where):	POTENTIAL SDGs
 1- Low income & unemployment  2- Criminality & vandalism  3- Bad health, scarcity & bad management of greenery spaces  4- Loneliness, disaggregation, racism, dissatisfaction, difficulties for integration (Dutch language)  5- Sustainability unawareness and ignorance	1- Neighbourhood (citizens) 2- Outdoor spaces (streets, housing, parks, etc) 3- Outdoor spaces (parks, streets) 4- Neighbourhood (citizens) 5- Households, Lidl, outdoor spaces (urban infrastructures)	8, 17 3, 10 3, 15 3, 5, 10 2, 6, 7, 9, 11, 12, 13, 14, 15
POTENTIAL IMPROVEMENTS (what):	POTENTIAL ACTIONS (how):	POTENTIAL INTERVENTIONS (where)
 1- Boost employment (local economy)  2- Cohesion and integration through employment opportunities, talent's improvement possibilities...  3- Satisfaction regarding air purification, experience through 5 senses.  4- Cohesion, participation, integration, connectivity  5- Climate awareness & education, recyclability and reduction of waste, learning innovations... (sense of commitment, responsibility and positive feeling)	1- ·Chef, waiter, staff, maintenance assistant, ... ·Teacher, repairman, carpenter ... ·Farmer, cleaner, chef, staff, .. ·Maintenance, bodyguard, baby sitter.. 2- ·Bodyguard, carpenter... ·Construction worker, maintenance, repairman, .. 3- ·Greenery parks, trees, biodiversity, recreation for everyone ·Purification of indoor air (greenery) 4- ·Cultural events, dinner gatherings, musical lessons, art decoration, painting, photography, language lessons ·Physical & social activities, group games & activities, open gym ·Cooking, fresh & organic food ·Group study, gathering, social activity ·Workshops in collaboration with local companies, conferences, ·Fair and market 5- ·Education through sustainable workshops (cooking with FW, composting..), recyclability and upcycle processes (mushrooms from coffee grounds, soap from oil..) ·Sustainability education (aquaponics, air exchange, PV, phytoremediation, water cycle...)	·Cafeteria, restaurant ·Workshop rooms, physical activity area ·Urban greenhouse ·Lidl ·Lidl, cafeteria, GH ·Outdoor space, GH · Outdoor space ·Lidl, cafeteria, GH ·Outdoor space, workshop rooms, art exposition space, dining area ·Outdoor space, Lidl, meeting & social rooms ·Kitchen room, GH ·Social rooms ·Workshop rooms, gathering space ·Outdoor area ·Composting zone, kitchen room, GH, upcycling processes area, communal garden ·Outdoor space, GH

CHALLENGES & NEEDS (what):	→ SPATIAL CHALLENGES (where):	→ POTENTIAL SDGs
 1- Low income & unemployment  2- Criminality & vandalism  3- Bad health, scarcity & bad management of greenery spaces  4- Loneliness, disaggregation, racism, dissatisfaction, difficulties for integration (Dutch language)  5- Sustainability unawareness and ignorance	1- Neighbourhood (citizens) 2- Outdoor spaces (streets, housing, parks, etc) 3- Outdoor spaces (parks, streets) 4- Neighbourhood (citizens) 5- Households, Lidl, outdoor spaces (urban infrastructures)	8, 17 3, 10 3, 15 3, 5, 10 2, 6, 7, 9, 11, 12, 13, 14, 15
POTENTIAL IMPROVEMENTS (what):	→ POTENTIAL ACTIONS (how):	→ POTENTIAL INTERVENTIONS (where)
 1- Boost employment (local economy)  2- Cohesion and integration through employment opportunities, talent's improvement possibilities...  3- Satisfaction regarding air purification, experience through 5 senses.  4- Cohesion, participation, integration, connectivity  5- Climate awareness & education, recyclability and reduction of waste, learning innovations... (sense of commitment, responsibility and positive feeling)	1- ·Chef, waiter, staff, maintenance assistant, ... ·Teacher, repairman, carpenter ... ·Farmer, cleaner, chef, staff, .. ·Maintenance, bodyguard, baby sitter.. 2- ·Bodyguard, carpenter.. · Construction worker, maintenance, repairman, .. 3- ·Greenery parks, trees, biodiversity, recreation for everyone ·Purification of indoor air (greenery) 4- ·Cultural events, dinner gatherings, musical lessons, art decoration, painting, photography, language lessons ·Physical & social activities, group games & activities, open gym ·Cooking, fresh & organic food ·Group study, gathering, social activity ·Workshops in collaboration with local companies, conferences, ·Fair and market 5- ·Education through sustainable workshops (cooking with FW, composting..), recyclability and upcycle processes (mushrooms from coffee grounds, soap from oil..) ·Sustainability (aquaponics, air exchange, PV, phytoremediation, water cycle...)	·Cafeteria, restaurant ·Workshop rooms, physical activity area ·Urban greenhouse ·Lidl ·Lidl, cafeteria, GH ·Outdoor space, GH · Outdoor space ·Lidl, cafeteria, GH ·Outdoor space, workshop rooms, art exposition space, dining area ·Outdoor space, Lidl, meeting & social rooms ·Kitchen room, GH ·Social rooms ·Workshop rooms, gathering space ·Outdoor area ·Composting zone, kitchen room, GH, upcycling processes area, communal garden ·Outdoor space, GH

- Phytoremediation, water cycle, physical activity area, art exposition space, .. → ·Outdoor space
- Cafeteria, meeting and social rooms, gathering space.. → ·Lidl refurbishment
- Workshop rooms, restaurant, dining area, composting zone, upcycling processes area, meeting and social rooms, kitchen room, communal garden.. → ·Urban greenhouse

↓
Grouped in 3 main interventions

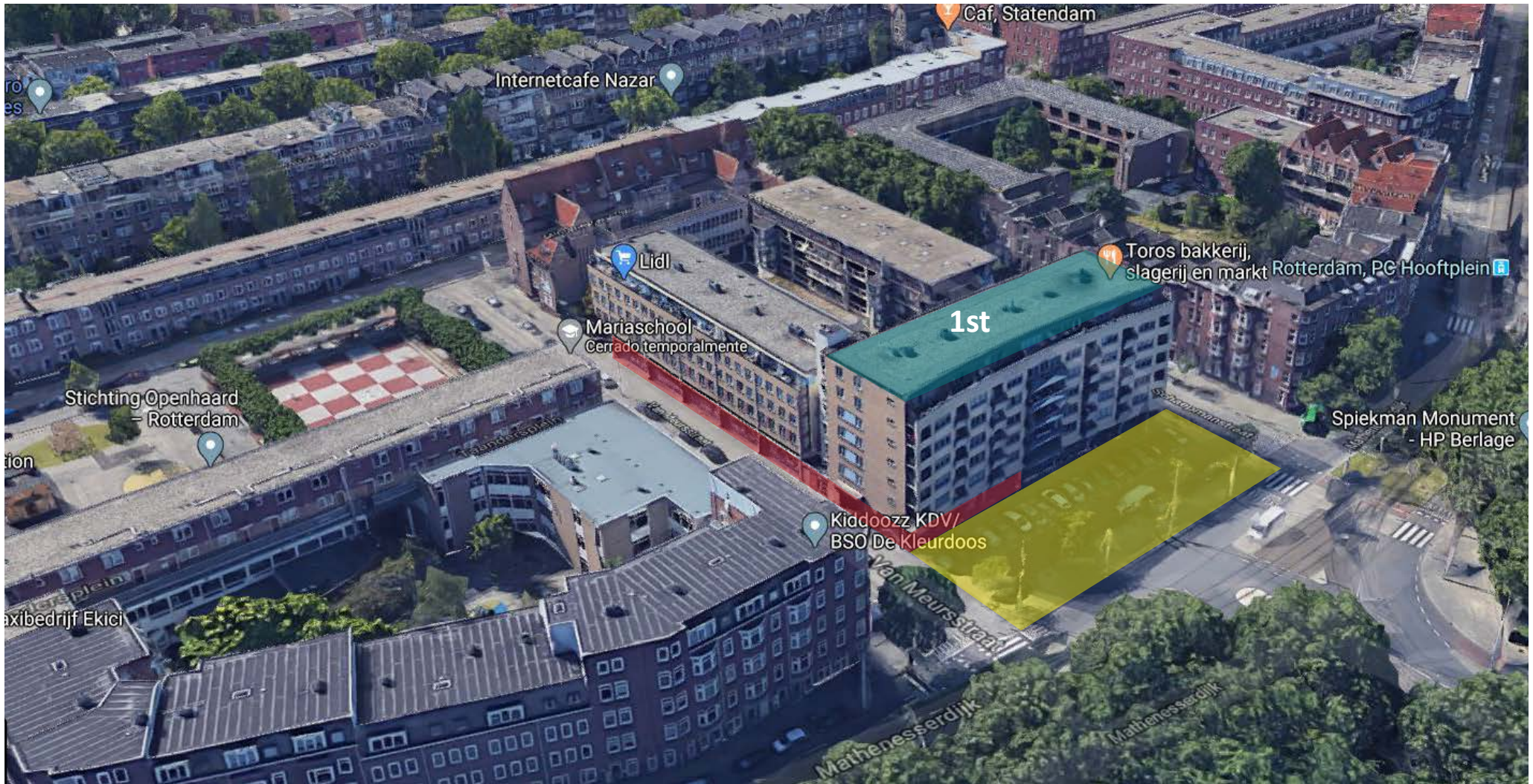


(Source: Google maps, n.d.)

- Phytoremediation, water cycle, physical activity area, art exposition space, .. → ·Outdoor space
- Cafeteria, meeting and social rooms, gathering space.. → ·Lidl refurbishment
- Workshop rooms, restaurant, dining area, composting zone, upcycling processes area, meeting and social rooms, kitchen room, communal garden.. → ·Urban greenhouse

Grouped in 3 main interventions

- 1- Outdoor space
- 2- Lidl refurbishment
- 3- GH

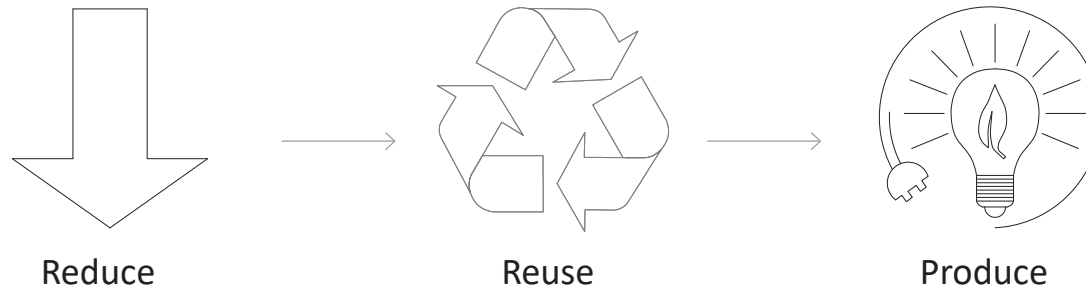
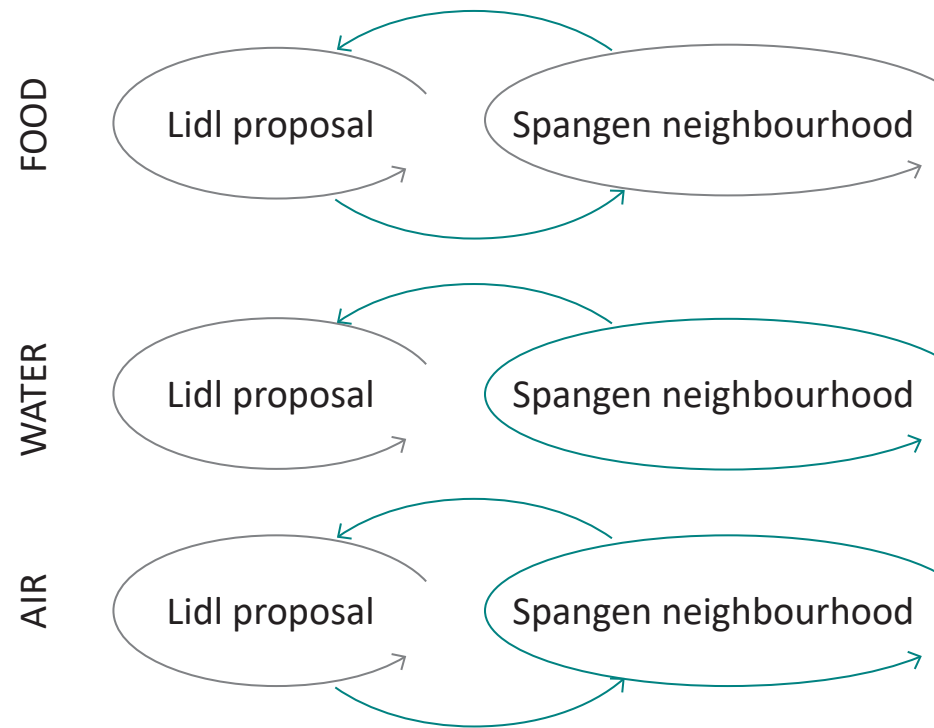


(Source: Google maps, n.d.)

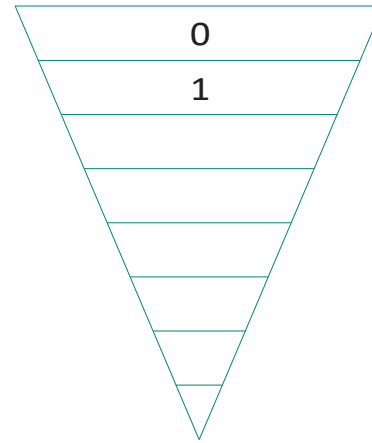
- | | | |
|--|------------------------|--|
| <ul style="list-style-type: none"> ·Outdoor space ·Lidl refurbishment ·Urban greenhouse | <p>3 interventions</p> | <ul style="list-style-type: none"> ·1- Outdoor space ·2- Lidl refurbishment ·3- GH |
|--|------------------------|--|

5. STRATEGY DEVELOPMENT:

- Circular solution routes
- Design framework
- Design options ↻ N



REDUCE: -Teaching
-Direct donation



Most preferred

Least preferred

FW reduction

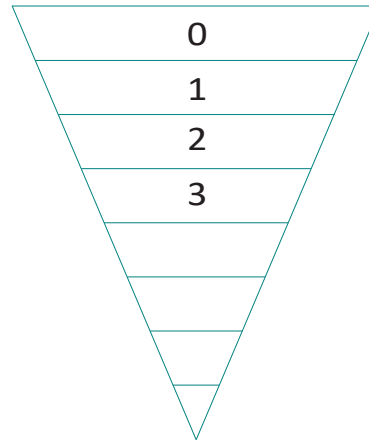


0- Prevention
1- Donation

Neighborhood

REDUCE: -Teaching
-Direct donation

REUSE: -Food recovery
-Upcycling: By-products (soap)



Most preferred

Least preferred

FW reduction



0- Prevention

1- Donation

2- Cooking

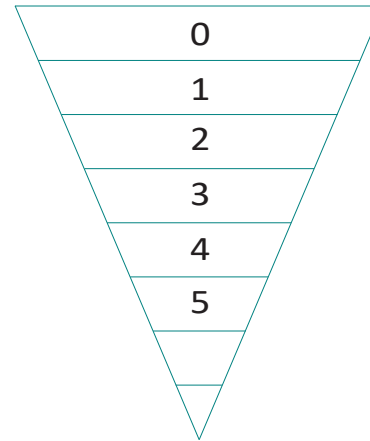
3- Upcycling

New addition

Neighbourhood
Design proposal

REDUCE: -Teaching
-Direct donation

REUSE: -Food recovery
-Upcycling: By-products (soap)
-Animal feeding (new bins)
-Vermicompost with worms (new bins)



Most preferred

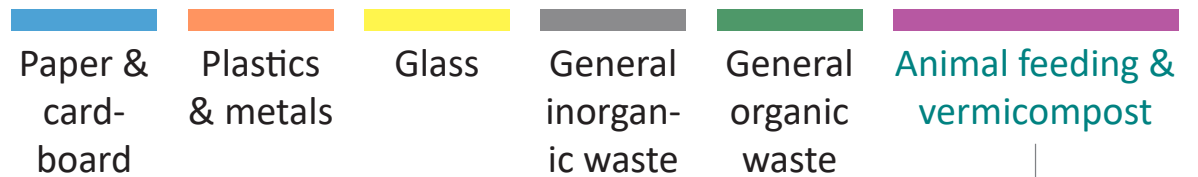
Least preferred

FW reduction

- 0- Prevention
- 1- Donation
- 2- Cooking
- 3- Upcycling
- 4- Animal feeding
- 5- Vermicompost

New addition

Neighbourhood
Design proposal

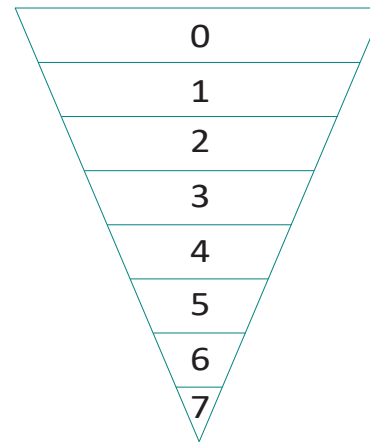


- All vegetables & fruits
- Everything (meat, bones, fish, peels, shells, pasta...)
- Exceptions: avocado, oil, citrics, onion

REDUCE: -Teaching
-Direct donation

REUSE: -Food recovery
-Upcycling: By-products (soap)
-Animal feeding (new bins)
-Vermicompost with worms (new bins)
-Livestock waste as fertilizer

PRODUCE: -Local food production



Most preferred

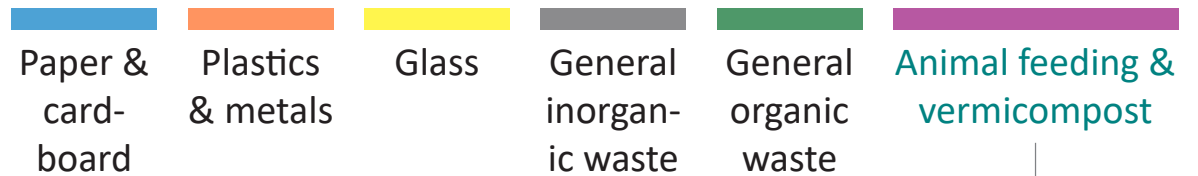
Least preferred

FW reduction

- 0- Prevention
- 1- Donation
- 2- Cooking
- 3- Upcycling
- 4- Animal feeding
- 5- Vermicompost
- 6- Biodigester
- 7- Dispose

New addition

Neighbourhood
Design proposal
Lidl company



- All vegetables & fruits
- Everything (meat, bones, fish, peels, shells, pasta...)
- Exceptions: avocado, oil, citrics, onion

WATER:

REDUCE: -Aquaponics NFT system



(Source: Türkel, 2008)

WATER:

REDUCE: -Aquaponics NFT system

REUSE: -Greywater (halophyte)
-Evaporated water from NFT



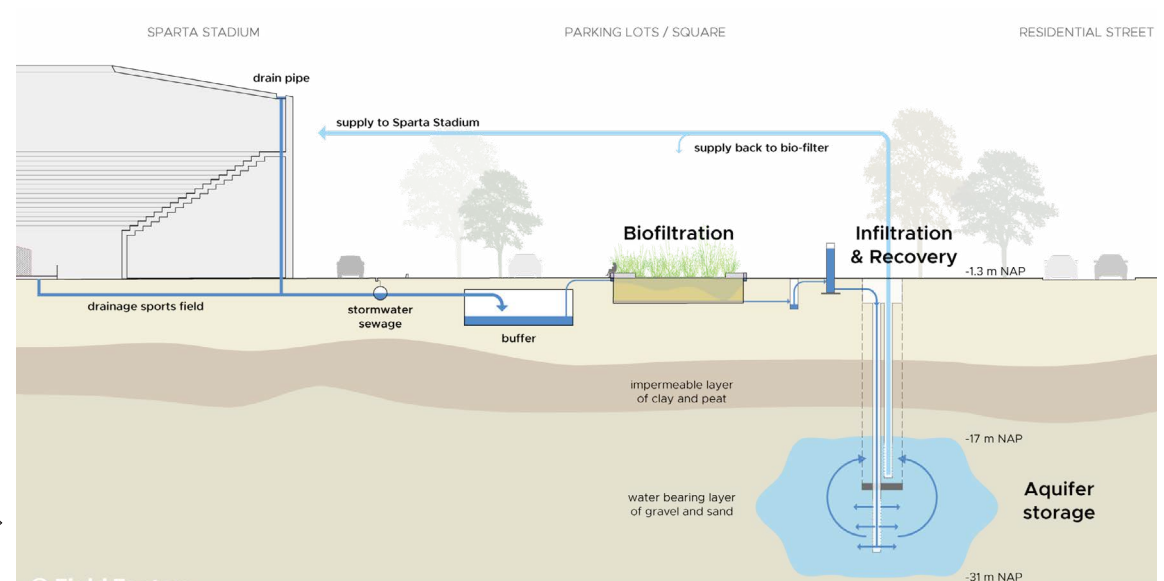
(Source: Struykverwoinfra, 2019)

WATER:

REDUCE: -Aquaponics NFT system

REUSE: -Greywater (halophyte)
-Evaporated water from NFT

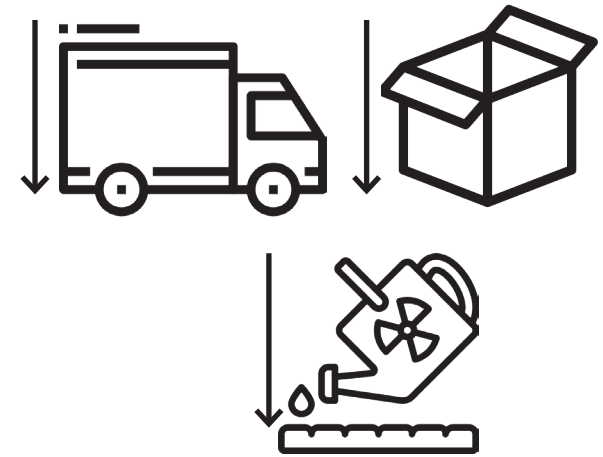
PRODUCE: -Rainwater (Phytoremediation) →



(Source: Struykverwoinfra, 2019)

AIR:

REDUCE: -Greenhouse gas emissions (GCG) (by local food production)
-CO2 & particles



(Source: Flaticon, n.d.)

AIR:

REDUCE: -Greenhouse gas emissions (GCG)
-CO₂ & particles

REUSE: -Exchange of CO₂-O₂ (livestock-crop) →



(Source: Glimm, n.d.)



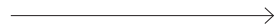
(Source: Archdaily, 2019)

AIR:

REDUCE: -Greenhouse gas emissions (GCG) (by local food production)
-CO₂ & particles

REUSE: -Exchange of CO₂-O₂ (livestock-crop)

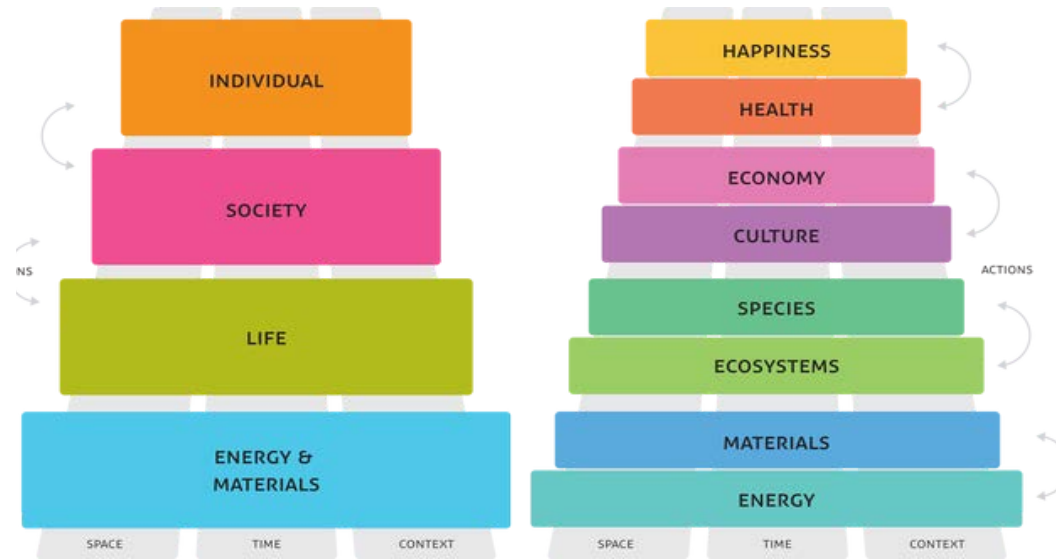
PRODUCE: -O₂ (greenery)
-Good smells (by aromatic plants)



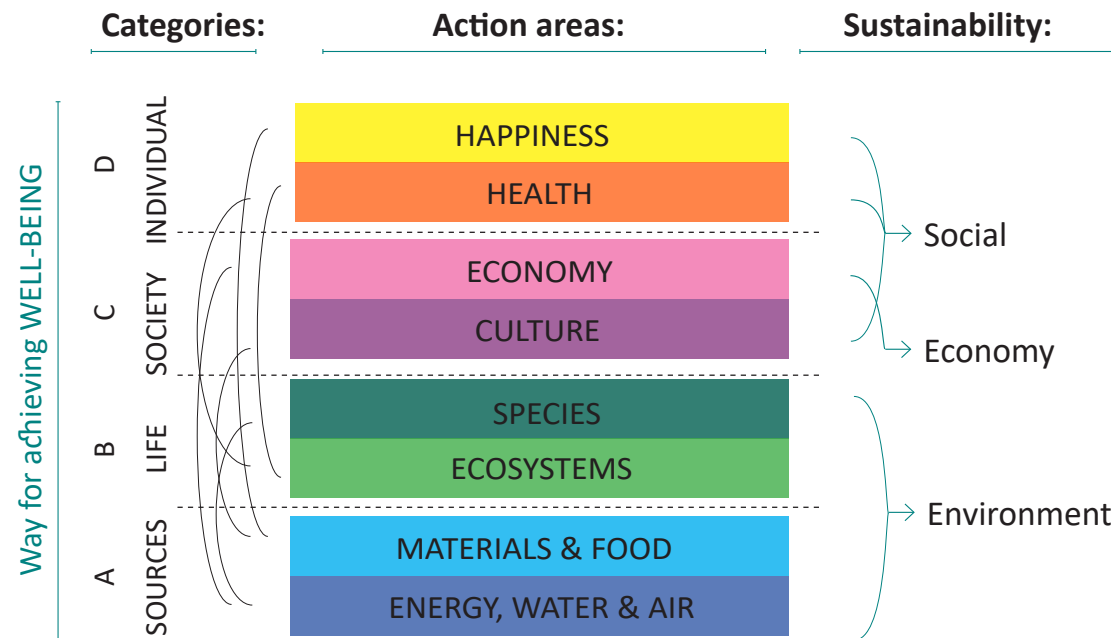
(Source: Innatcascade, n.d.)



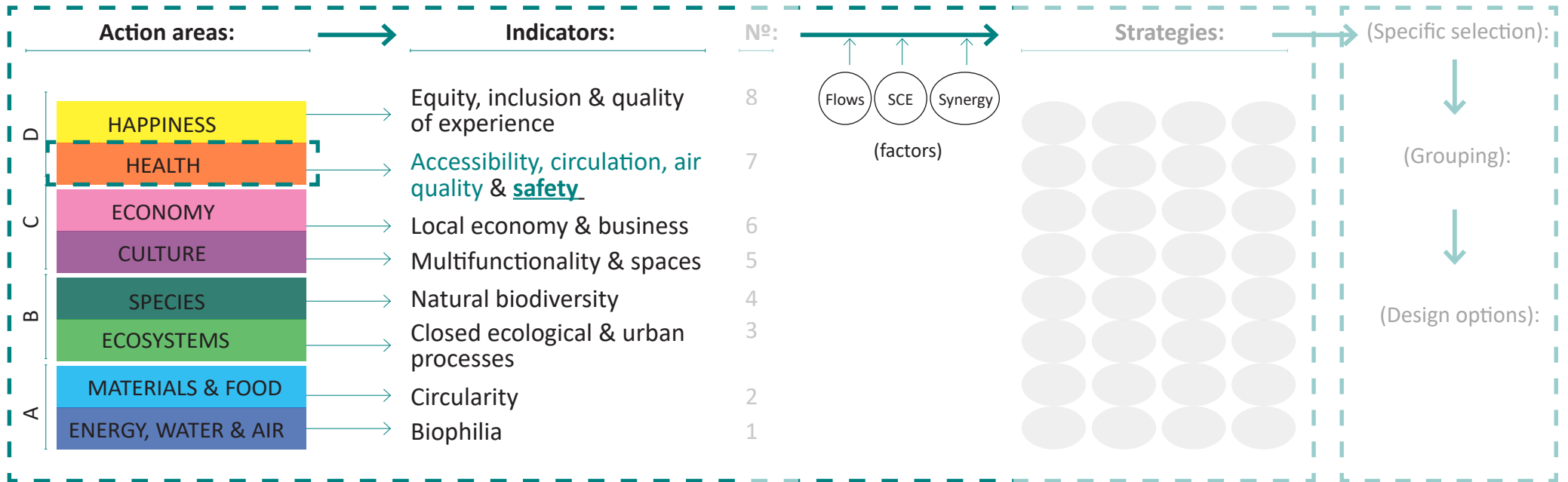
(Source: Spiio, 2019)



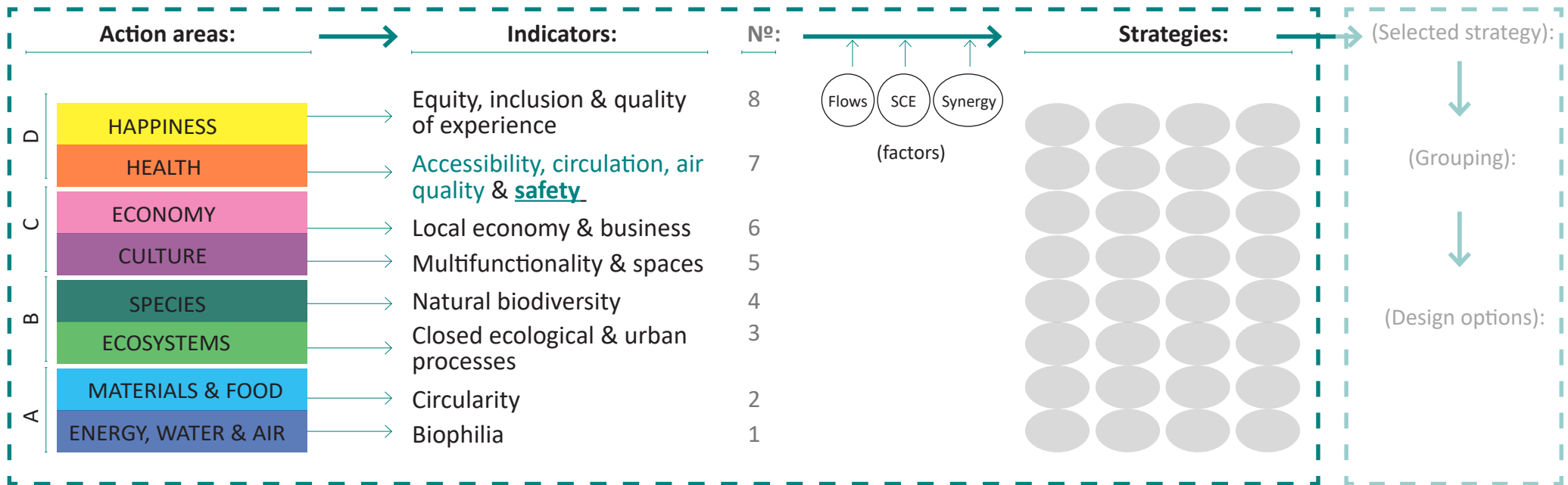
(Source: Bosschaert & van Zutem, 2018).



Design framework



Design framework



D- Health & happiness (Individual):

Indicator	Strategy	Code	Description of reasons
7- Safety	Traffic protection	D8	The existence of motor vehicles within the project should be reduced, ensuring <u>safety among vulnerable users</u> . Moreover, this should be performed by using the <u>least barriers as possible, avoiding obstructing pedestrian circulation</u> .
	Lighting (& well maintenance of spaces)	D9	During the night, lighting is essential in order to provide a sense of <u>protection</u> among users. It is important to use lamps with appropriate tone and value of light, avoiding contrasts between bright and dark areas.
	Connection between interior-exterior	D10	<u>Indoor activities and outdoor activities</u> should be <u>mixed and interconnected</u> through the facade. By having a closed facade, outdoor spaces could enter in desolation condition or insecurity and vice versa. Moreover, <u>views improve security</u> and perception of the space.
	Active and lively spaces 18h/day	D11	Keeping active spaces during the whole day ensure <u>safety</u> and can <u>reduce criminality and vandalism</u> .

STRATEGIES:

A- Sources & materials (Sources):

Indicator	Strategy	Code
1-Biophilia	Smart use of local natural resources	A1
	Profit of climatology	A2
	Shelter against climatology	A3
2- Circularity	Low tech measures & water circularity	A5
	Low tech measures & circularity of food	A7
	Low tech measures & circularity of air	A8

B- Species & ecosystems (Life):

Indicator	Strategy	Code
3-Closed ecological & urban process	Connection to natural system	B1
	Visible ecological processes	B2
	Understanding ecosystem and preserve them	B3
4- Natural biodiversity	Natural biodiversity	B5
	Local species	B6

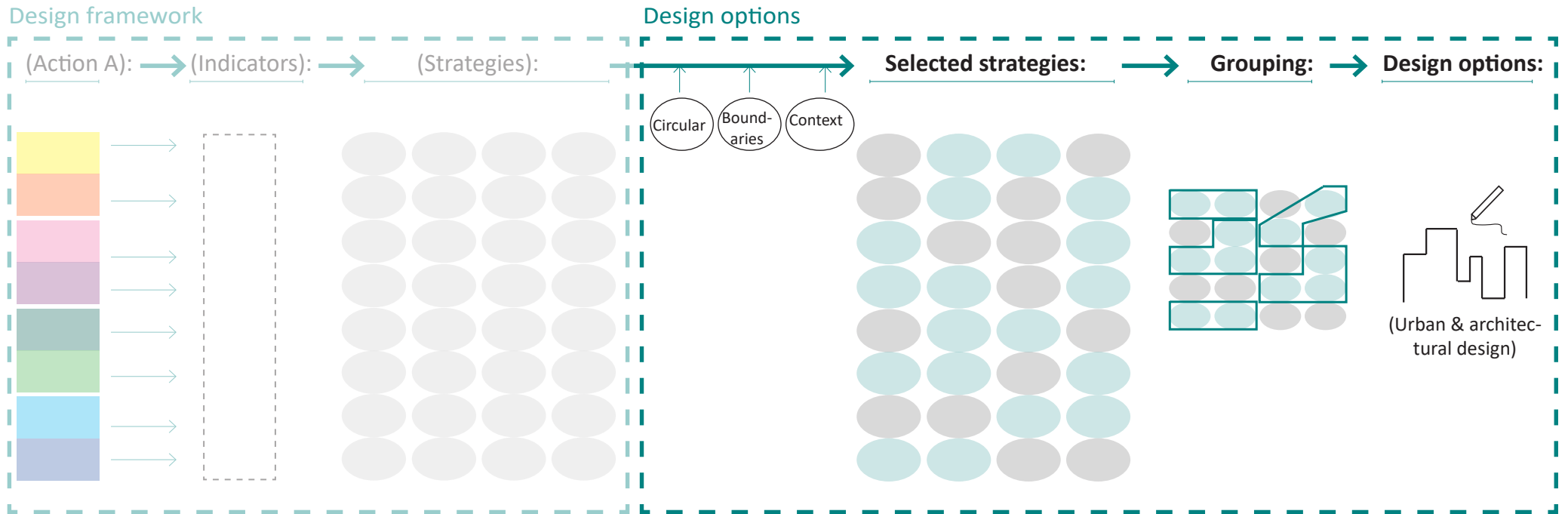
C- Culture & economy (Society):

Indicator	Strategy	Code
5-Multifunctionality	Multifunctionality	C1
	Active spaces	C2
	Passive spaces	C3
5-Comfort spaces	Human scale	C5
	Avoid sudden changes in level	C7

Indicator	Strategy	Code
6- Local economy & business	Climate	C8
	Business ecology	C10
	Gastronomy	C13
	Local employment	C14

D- Health & happiness (Individual):

Indicator	Strategy	Code	
7-Accessibility	Direct and welcoming access	D2	
	Universal accessibility	D3	
7-Circulation	People circulation	D5	
7- Air quality	Air purification	D7	
	Safety	Traffic protection	D8
7- Safety	Active and lively spaces 18h/day	D11	
	8-Equity & inclusion	Integration over segregation	D12
		Diversity	D13
		Gradients in privacy & public spaces	D14
8- Quality of experience	Visible identity	D15	
	Stimulation of sight	D16	
	Stimulation of hearing	D17	
	Stimulation of smell	D18	
	Stimulation of touch	D19	
	Stimulation of taste	D20	



1-Selection:

		Indicator	Strategy	Code	
A- Sources & materials	Biophilia		Smart use of local natural resources	A1	
			Profit of climatology	A2	
			Shelter against climatology	A3	
	Circularity		Low tech measures and circularity of water	A5	
			Low tech measures and circularity of food	A7	
			Low tech measures and circularity of air	A8	
	B- Species & ec.	Closed ecological processes		Connection to natural system	B1
				Visible ecological processes	B2
Understanding ecosystem and preserve them				B3	
Natural biodiversity			Natural biodiversity	B5	
			Local species	B6	
C- Culture & economy	Multi-functionality		Multifunctionality	C1	
			Active spaces	C2	
			Passive spaces	C3	
	Comfort spaces		Human scale	C5	
			Avoid sudden changes in level	C7	
			Climate	C8	
	Local economy & business		Business ecology	C10	
			Gastronomy	C13	
			Local employment	C14	

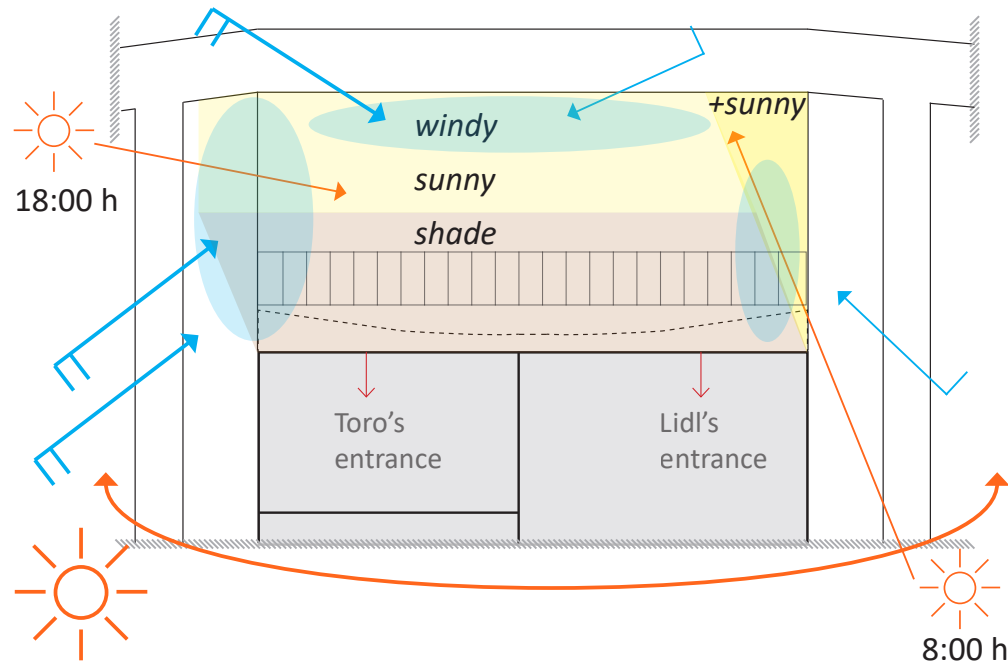
D- Health & happiness

		Indicator	Strategy	Code
D- Health & happiness	Accessibility		Direct and welcoming access	D2
			Universal accessibility	D3
	Circulation		People circulation	D5
	Air quality		Air purification	D7
	Safety		Traffic protection	D8
			Active and lively spaces 18h/day	D11
	Equity & inclusion		Integration over segregation	D12
			Diversity	D13
			Gradients in privacy & public spaces	D14
			Visible identity	D15
Quality experience		Stimulation of sight	D16	
		Stimulation of hearing	D17	
		Stimulation of smell	D18	
		Stimulation of touch	D19	
		Stimulation of taste	D20	

2-Grouping:

- 1º **A2+A3**
- 2º A1+B1+A8+B5+B6+D7
- 3º **D5+D2+D3+C7**
- 4º D8
- 5º C2+C8+D14
- 6º C3+C8+D14
- 7º C10+C13+D18+D20
- 8º A1+B1+A5+B2+B3+D16+D17+D18
- 9º C1+D12+D13+C5
- 10º D15+D16
- 11º D19
- 12º (Retouches)

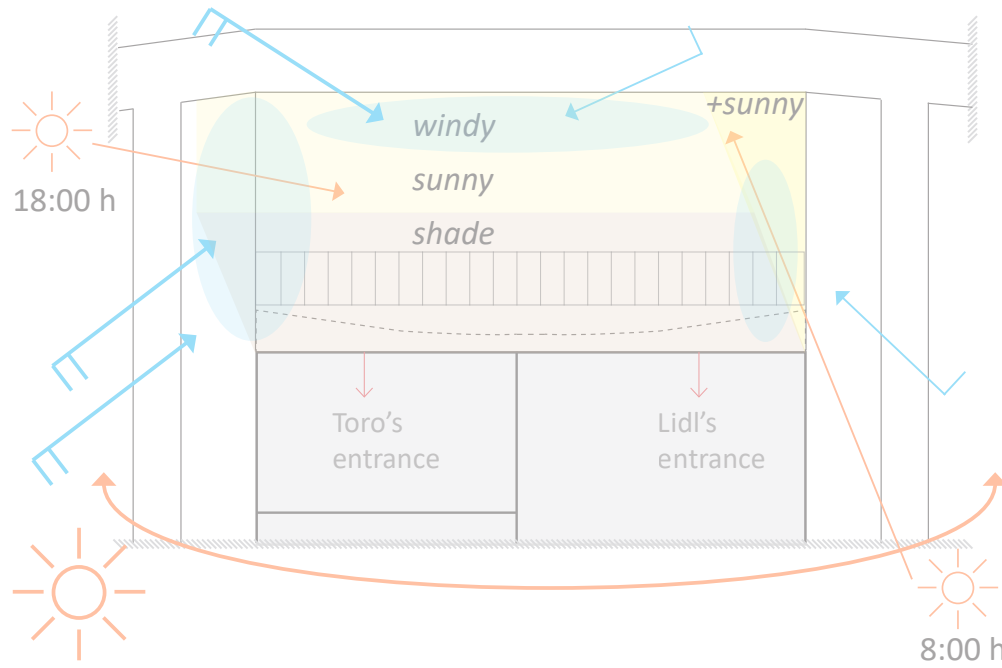
.19: A2+A3 (Profit of climatology & shelter against climatology):



Orientation (sun, shadow, wind).

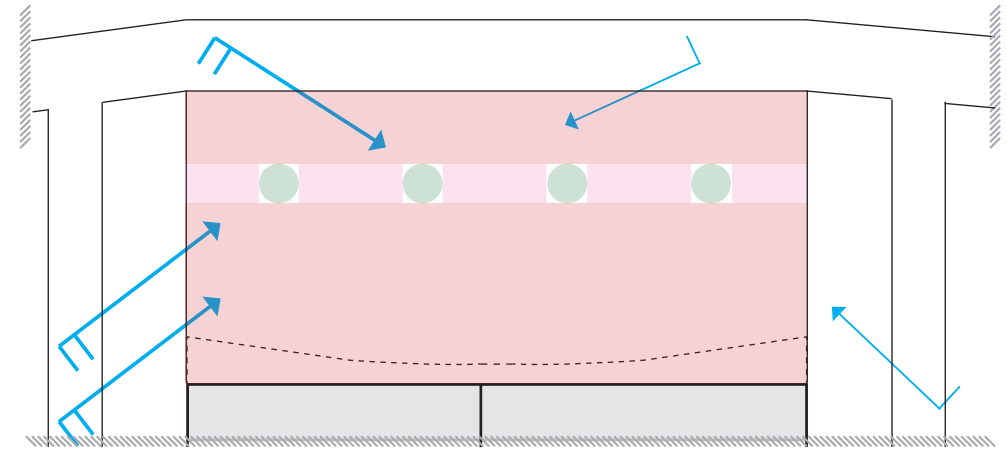
DESIGN PROCESS: Square

19: A2+A3 (Profit of climatology & shelter against climatology):

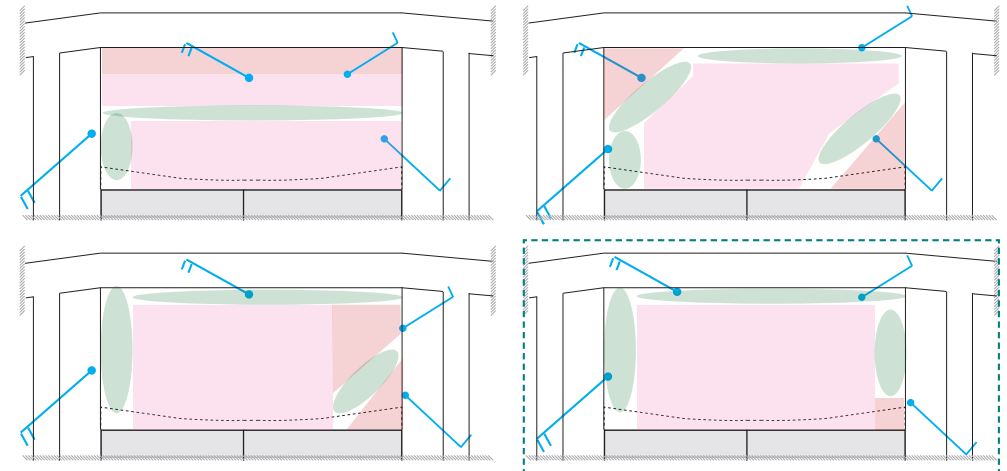


Orientation (sun, shadow, wind).

29: A1+B1+A8+B5+B6+D7 (Smart use of local natural resources, connection to the natural system, low tech measures and circularity of air, biodiversity, local species, air purification):

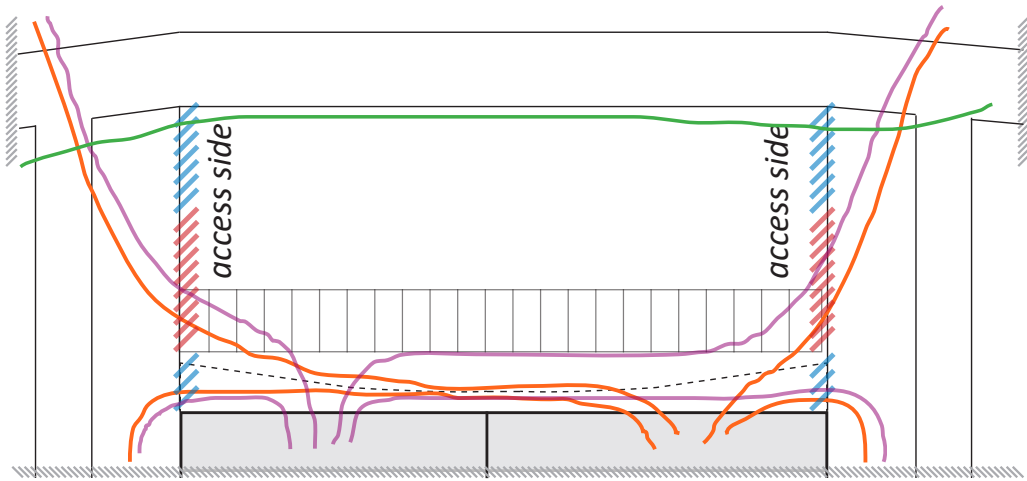


Current state.

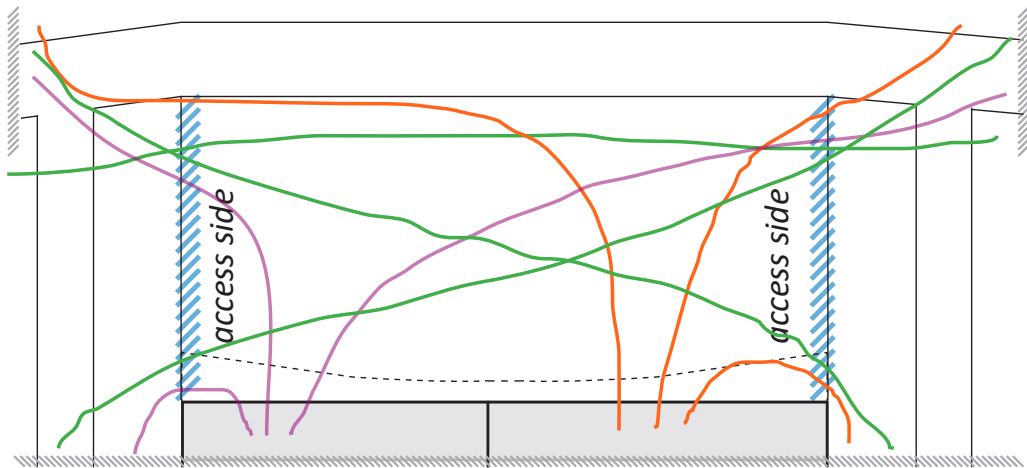


Several options for greenery wind barriers (green colour) and remain protected (pink) and unprotected area (red).

3º: D5+D2+D3+C7 (People circulation, direct access, universal accessibility, avoid sudden change in levels):



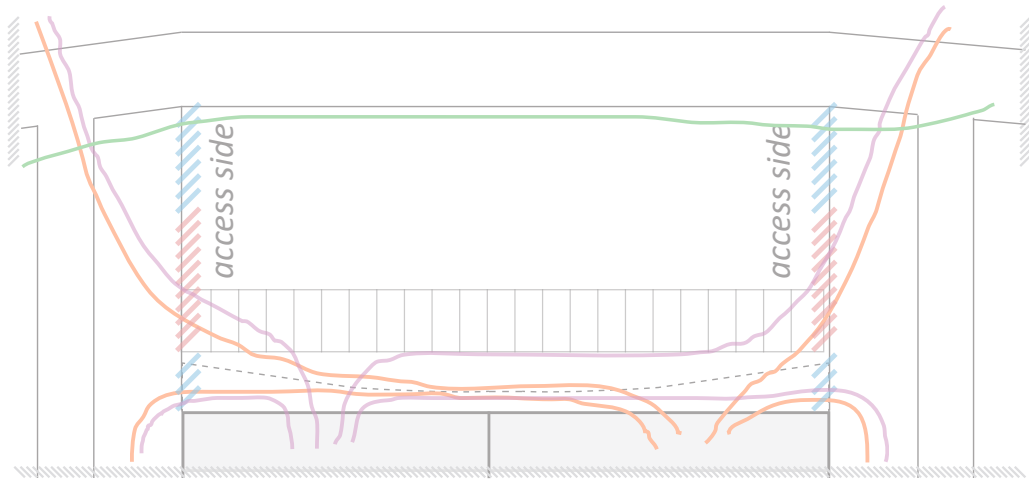
Current Lidl's (orange) and Toro's (purple) customer circulation, other people flows (green) and limited accessibility (red line).



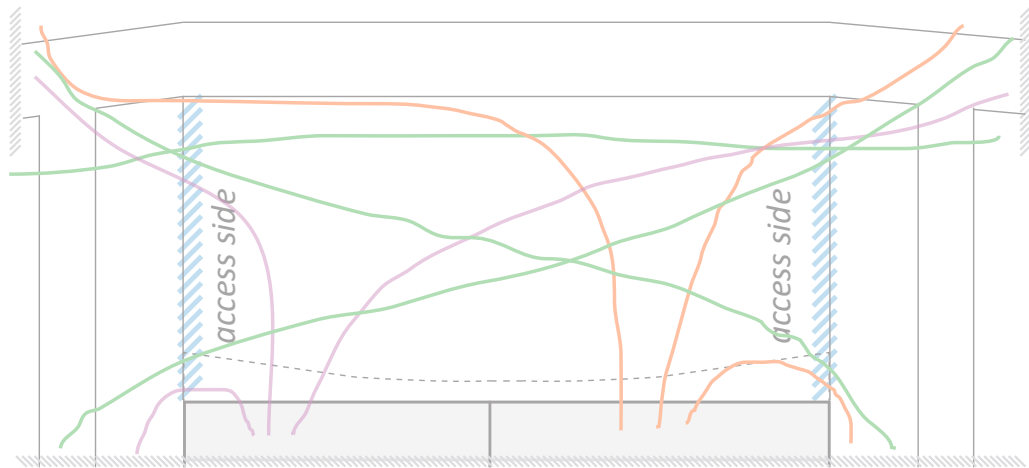
Desired Lidl's (orange) and Toro's (purple) customer circulation, other people flows (green) and universal accessibility (blue).

DESIGN PROCESS: Square

3: D5+D2+D3+C7 (People circulation, direct access, universal accessibility, avoid sudden change in levels):

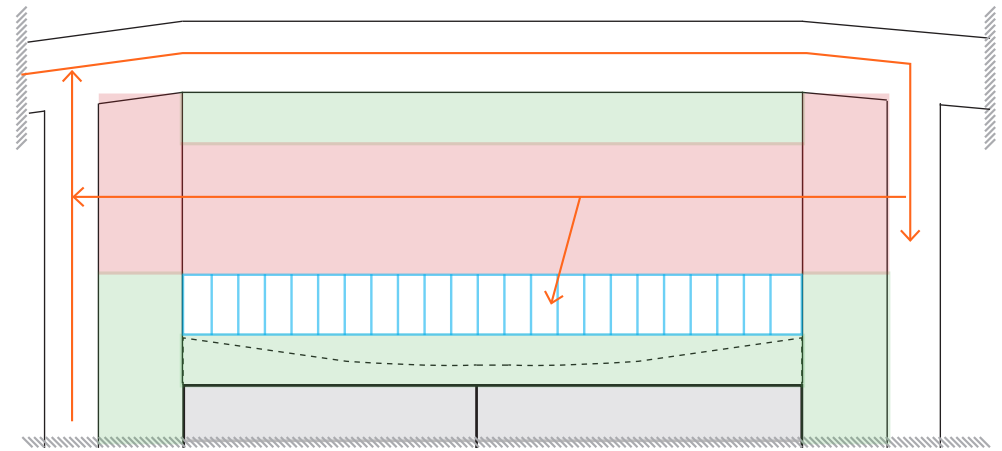


Current Lidl's (orange) and Toro's (purple) customer circulation, other people flows (green) and limited accessibility (red line).

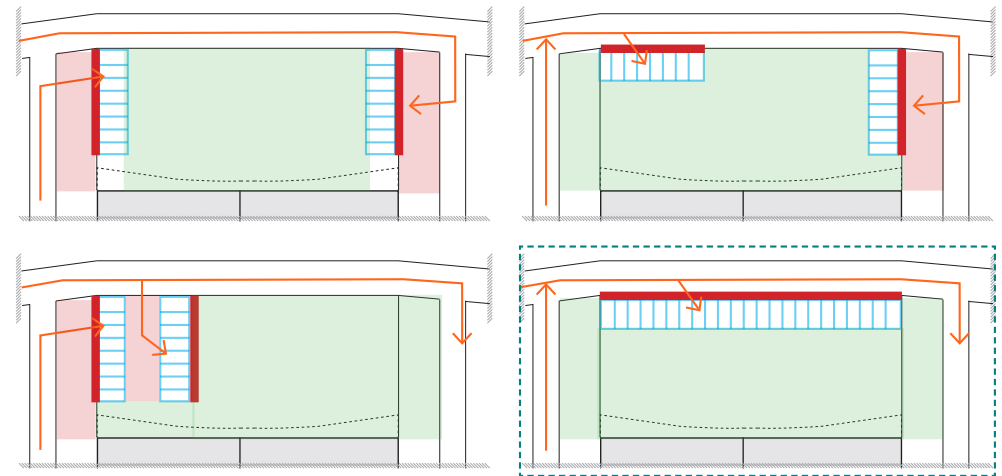


Desired Lidl's (orange) and Toro's (purple) customer circulation, other people flows (green) and universal accessibility (blue).

4: D8 (Traffic protection):

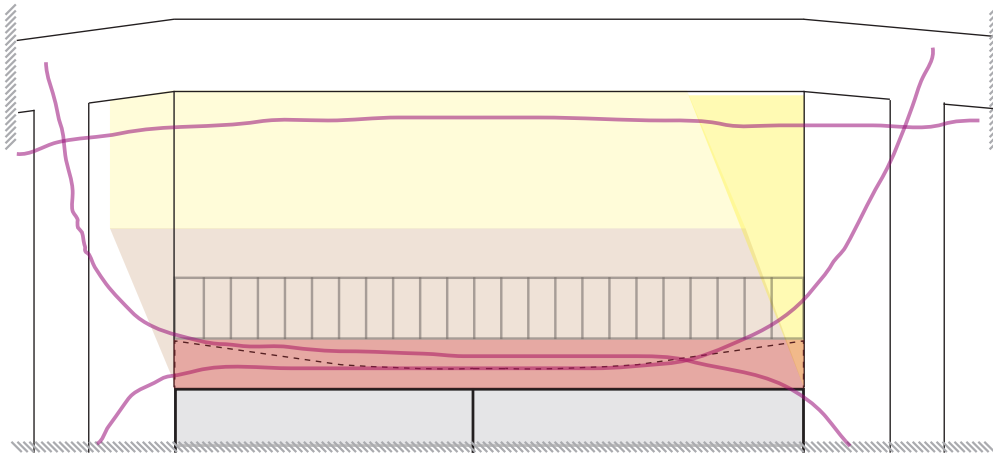


Current car parking.

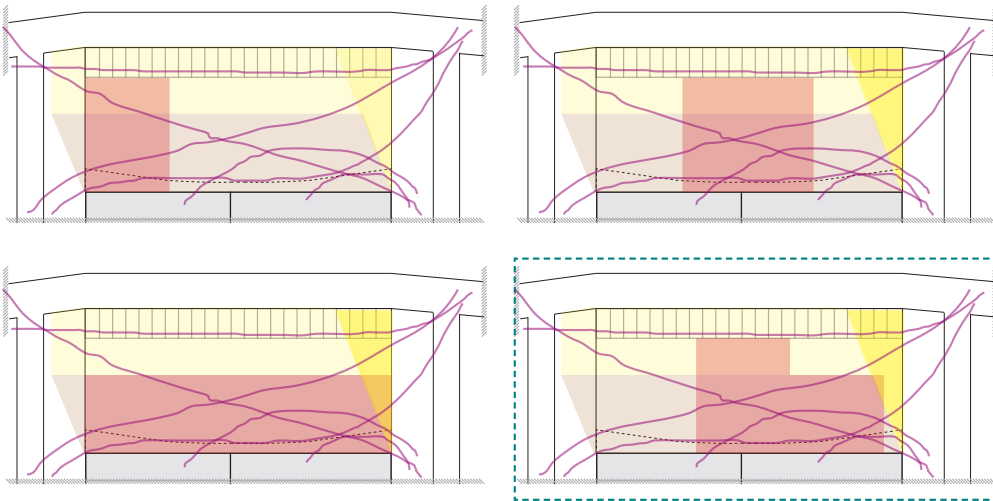


Car parking possibilities with pedestrian barriers (red line), car flows (orange arrows), safe (green) and no safe (red) areas.

5: C2+C8+D14 (Active spaces, climate, gradients in privacy & public spaces):

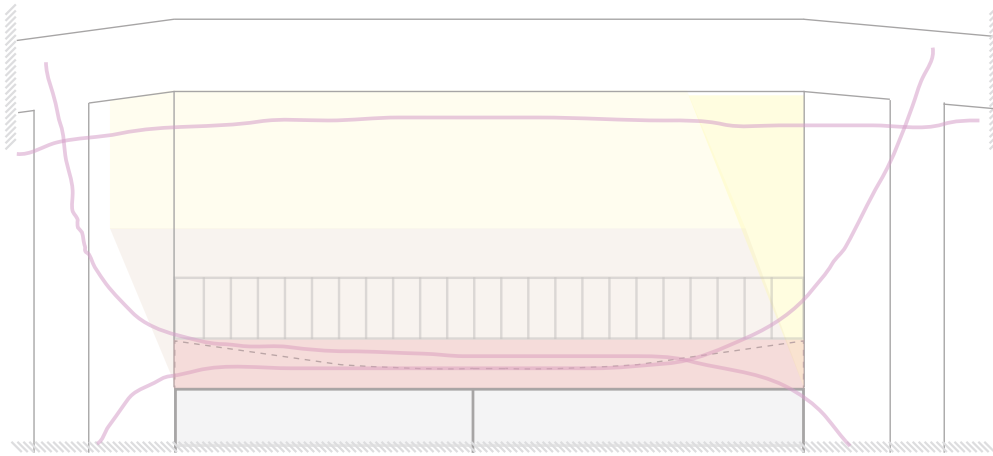


Current active areas (red colour) with people flows (purple).

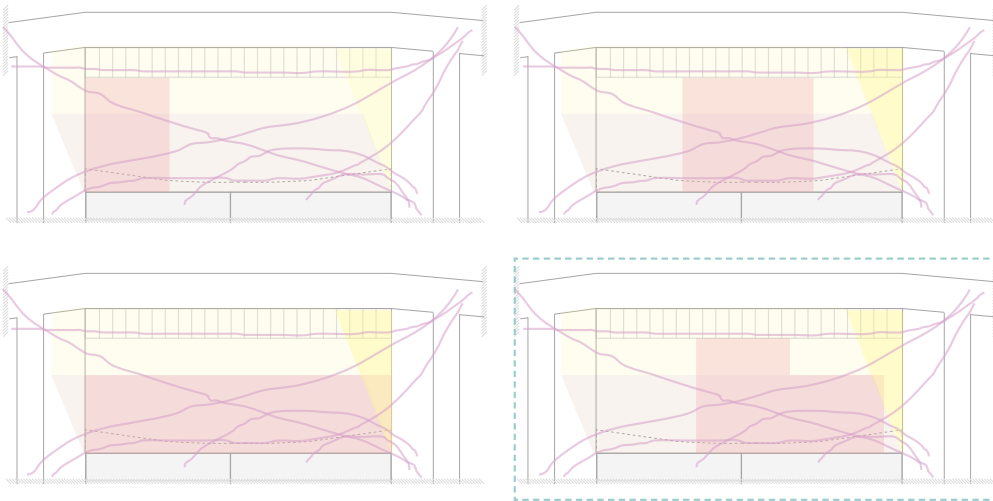


Active spaces possibilities (red), profiting shadow areas and higher concentration of new people flows (purple).

5°: C2+C8+D14 (Active spaces, climate, gradients in privacy & public spaces):

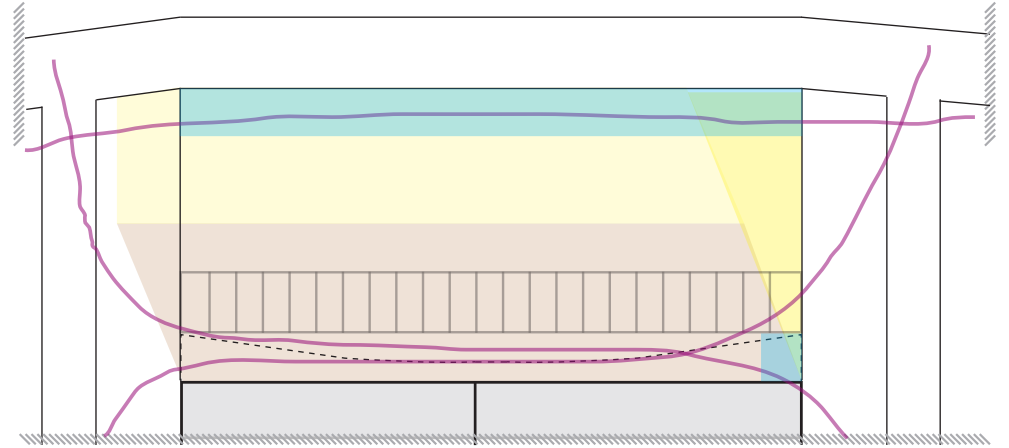


Current active areas (red colour) with people flows (purple).

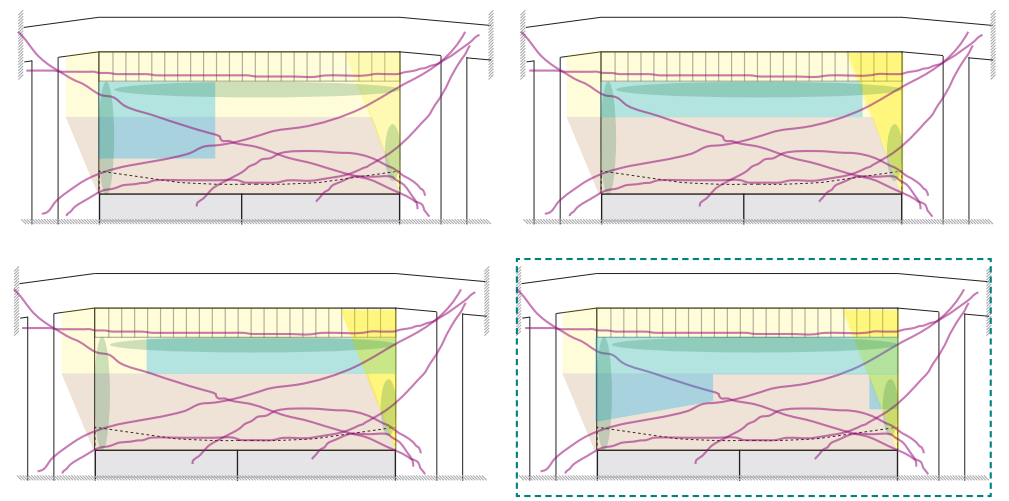


Active spaces possibilities (red), profiting shadow areas and higher concentration of new people flows (purple).

6°: C3+C8+D14 (Passive spaces, climate, privacy, gradients in privacy & public spaces):



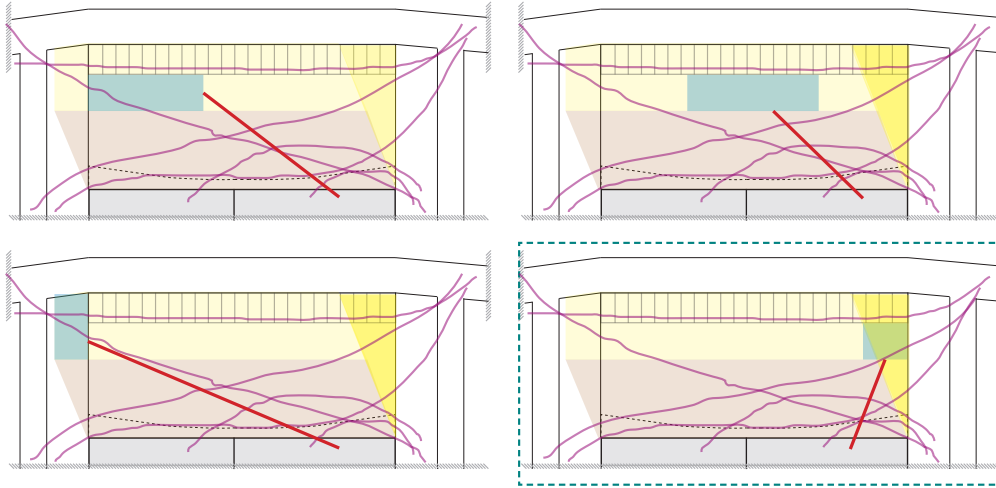
Current passive areas (blue colour) and people flows (purple), having low rate of attractiveness.



Passive spaces possibilities (blue), profiting sunny and protective areas due to windy barriers (green), and far from high concentration of new people flows (purple).

DESIGN PROCESS: Square

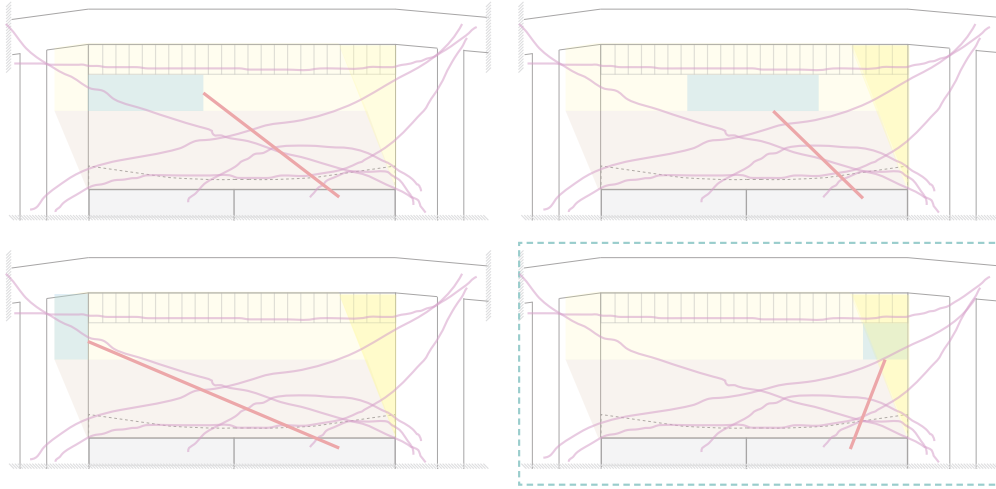
79: C10+C13+D18+D20 (Business ecology, gastronomy, stimulation of smell and taste):



Terrace location possibilities (blue), next to Lidl entrance (red line), profiting sunny areas and a bit distant from high concentration of new people flows (purple).

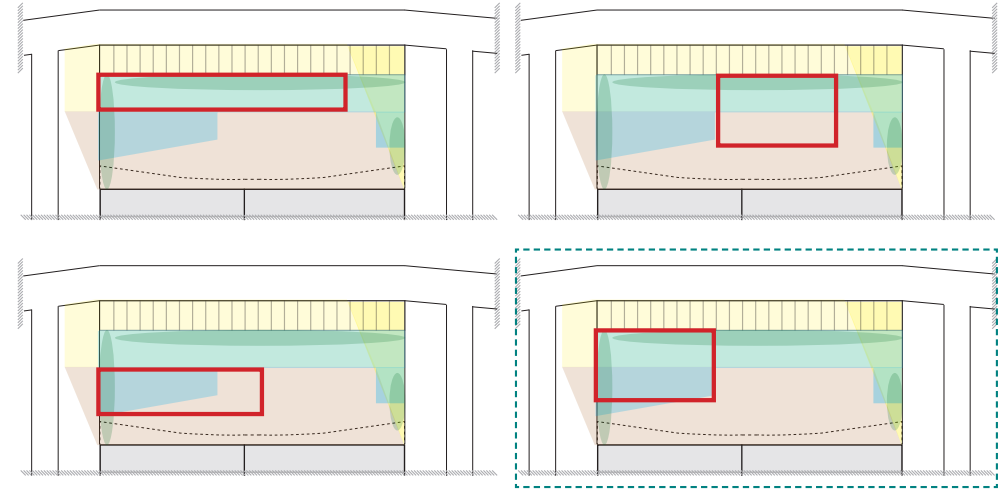
DESIGN PROCESS: Square

7: C10+C13+D18+D20 (Business ecology, gastronomy, stimulation of smell and taste):



Terrace location possibilities (blue), next to Lidl entrance (red line), profiting sunny areas and a bit distant from high concentration of new people flows (purple).

8: A1+B1+A5+B2+B3+D16+D17+D18 (Smart use of local natural resources, connection to natural system, low tech measures and circularity of water, visible ecological processes, understanding ecosystem and preserve them, stimulation of sight, hearing and smell):



Final passive spaces (blue) and phytoremediation/halophyte possible locations (red square).

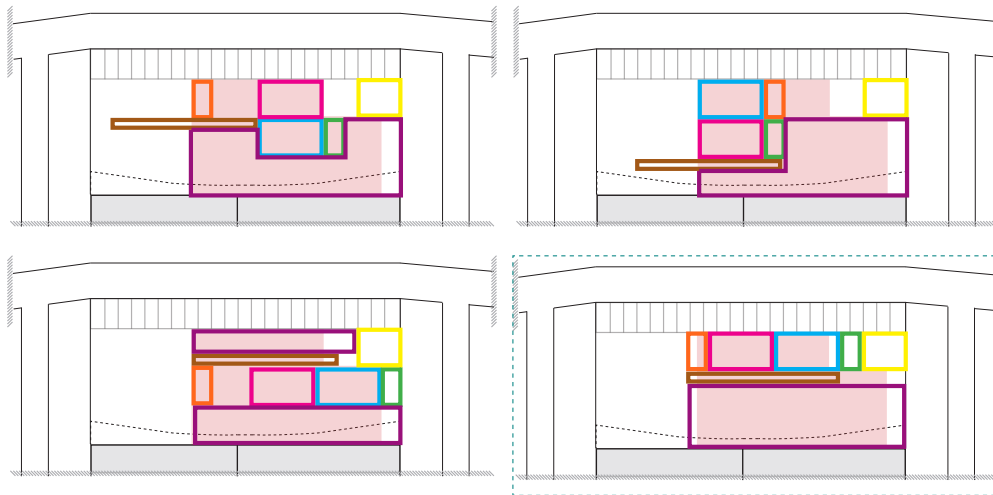
9: C1+D12+D13+C5 (Multifunctionality, integration over segregation, diversity, human scale):

· Active:

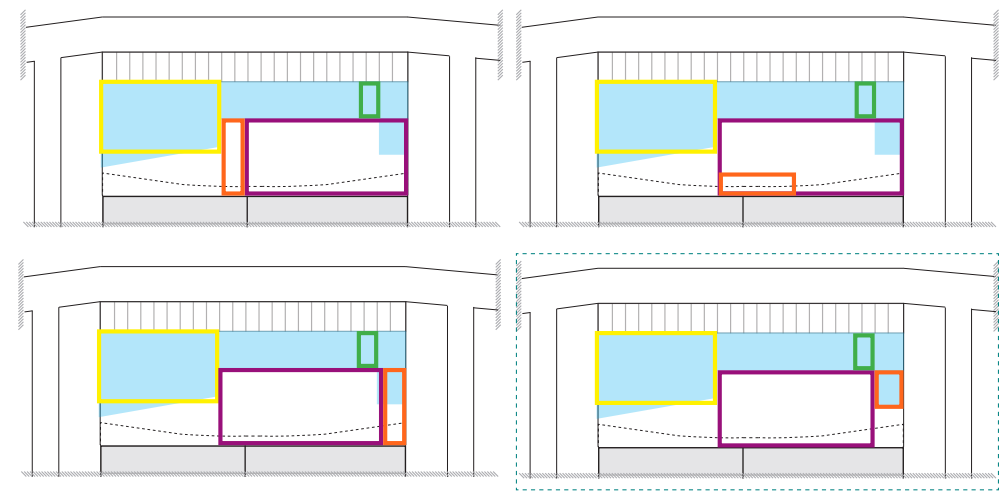
- (0)- Terrace
- 1- Sand playground: For kids or playing boules (petanque)
- 4- Open gym: For young and elderly
- 5- Open field: For doing frisbee, football or ball games, BBQ, picnic
- 6- Mini greenery elevations: Playing
- 7- Fountain: To attract biodiversity (animals) and people (playing, washing, refreshing...).
- 8- Canal: For recreation, biodiversity attractor and visible climate awareness

· Passive:

- 10- Open field: For doing yoga, taichi, mediation, reading, having expositions, laying down, talking and gathering.
- 11- Mini greenery elevations: Resting
- 12- Benches and tables: For resting, eating, playing table games, etc.
- 14- Phytoremediation/halophyte tanks: Climate awareness and resting



Spatial possibilities for active spaces and activities.



Spatial possibilities for passive spaces and activities.

.10º: D15+D16 (Visible identity, stimulation of sight):

- Benches and furniture of terrace with flag colours/images of the different ethnicities.
- Names or logo of the countries written on floor.
- Tiles with colours, etc.



(Source: Explore Beaufort, 2020)



(Source: Howard, 2011)

DESIGN PROCESS: Square

Qiao-Ling Cendón- P5- Lidl Supermarket

.10º: D15+D16 (Visible identity, stimulation of sight):

- Benches and furniture of terrace with flag colours/images of the different ethnicities.
- Names or logo of the countries written on floor.
- Tiles with colours, etc.

.11º: D19 (Stimulation of touch):

- Wood for the path on top of biofilter tanks,
- Stone of biofilter tanks
- Sand
- Gras
- Metal from open gym equipment, etc



(Source: Royal Haskoning, 2019)



(Source: Karresenbrands, 2019)

.12º: Retouches.

- Bike lane
- Pedestrian sidewalk
- Trees
- Grades in biofilter tanks



(Source: Grandslamfitness2, 2019)

6- IMPROVEMENT (PROPOSAL):

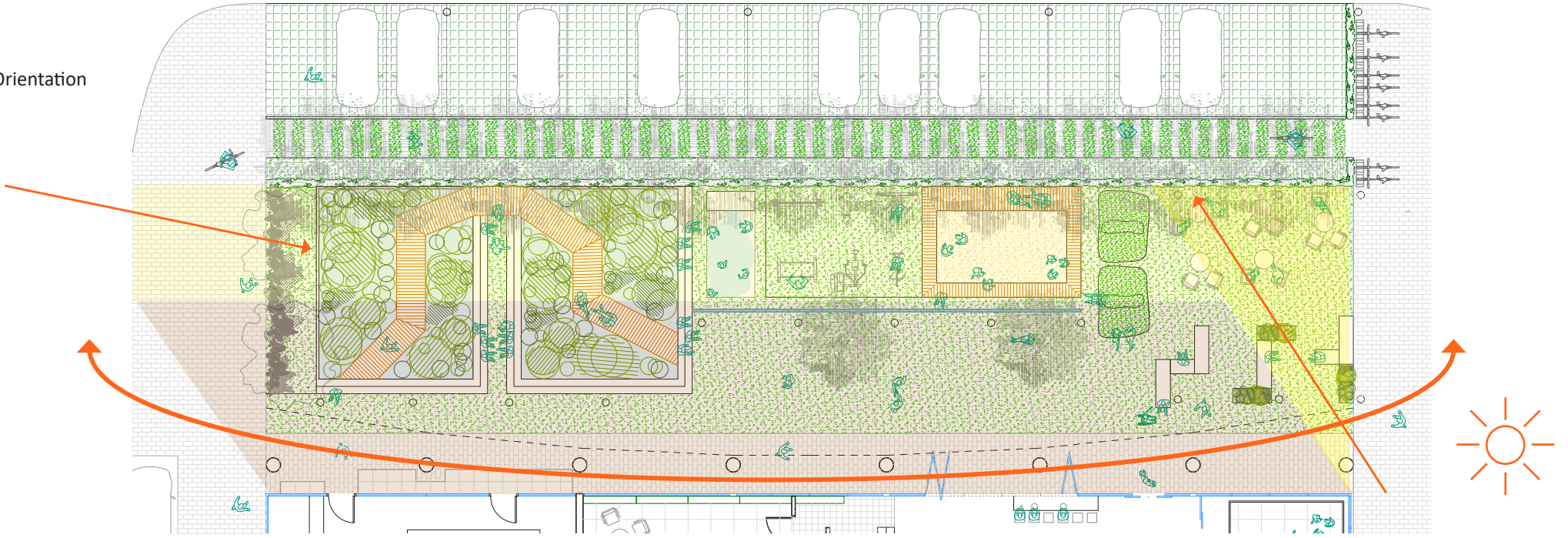
- Description
- Graphical representation
- Diagram of flows
- Evaluation

DESCRIPTION: Square

⊙ N 0 1 5 10 m

Qiao-Ling Cendón- P5- Lidl Supermarket

Orientation

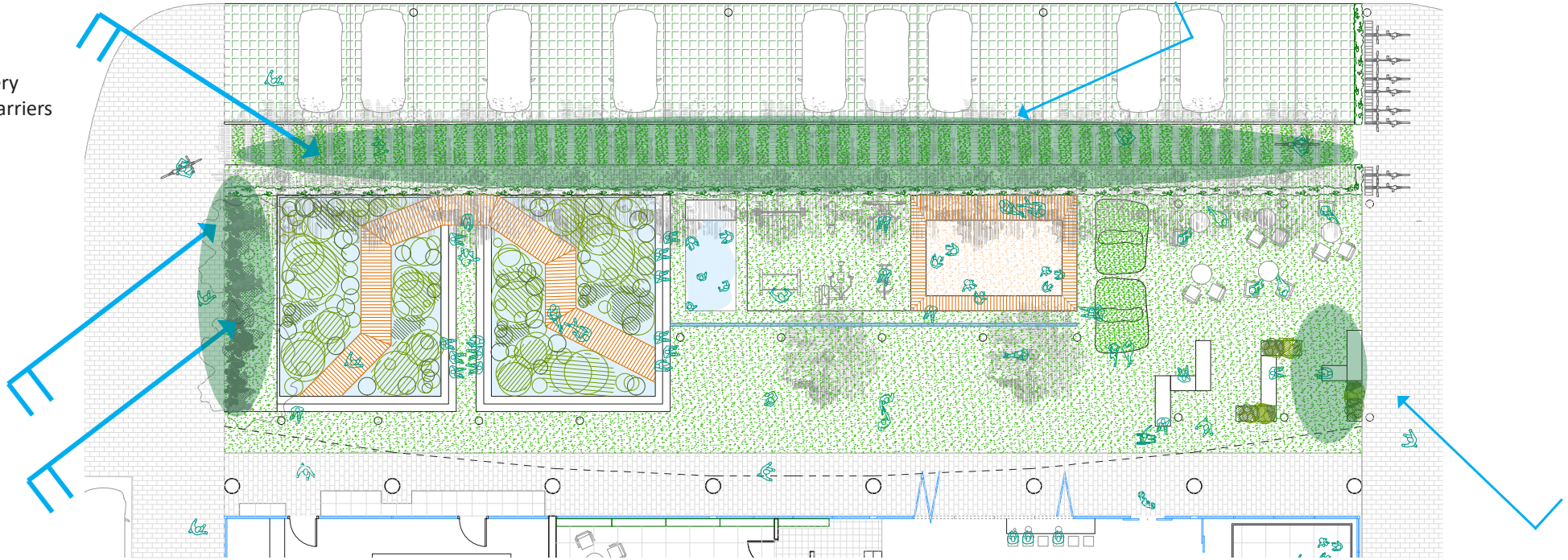


DESCRIPTION: Square

N 0 1 5 10 m

Qiao-Ling Cendón- P5- Lidl Supermarket

Greenery
wind barriers



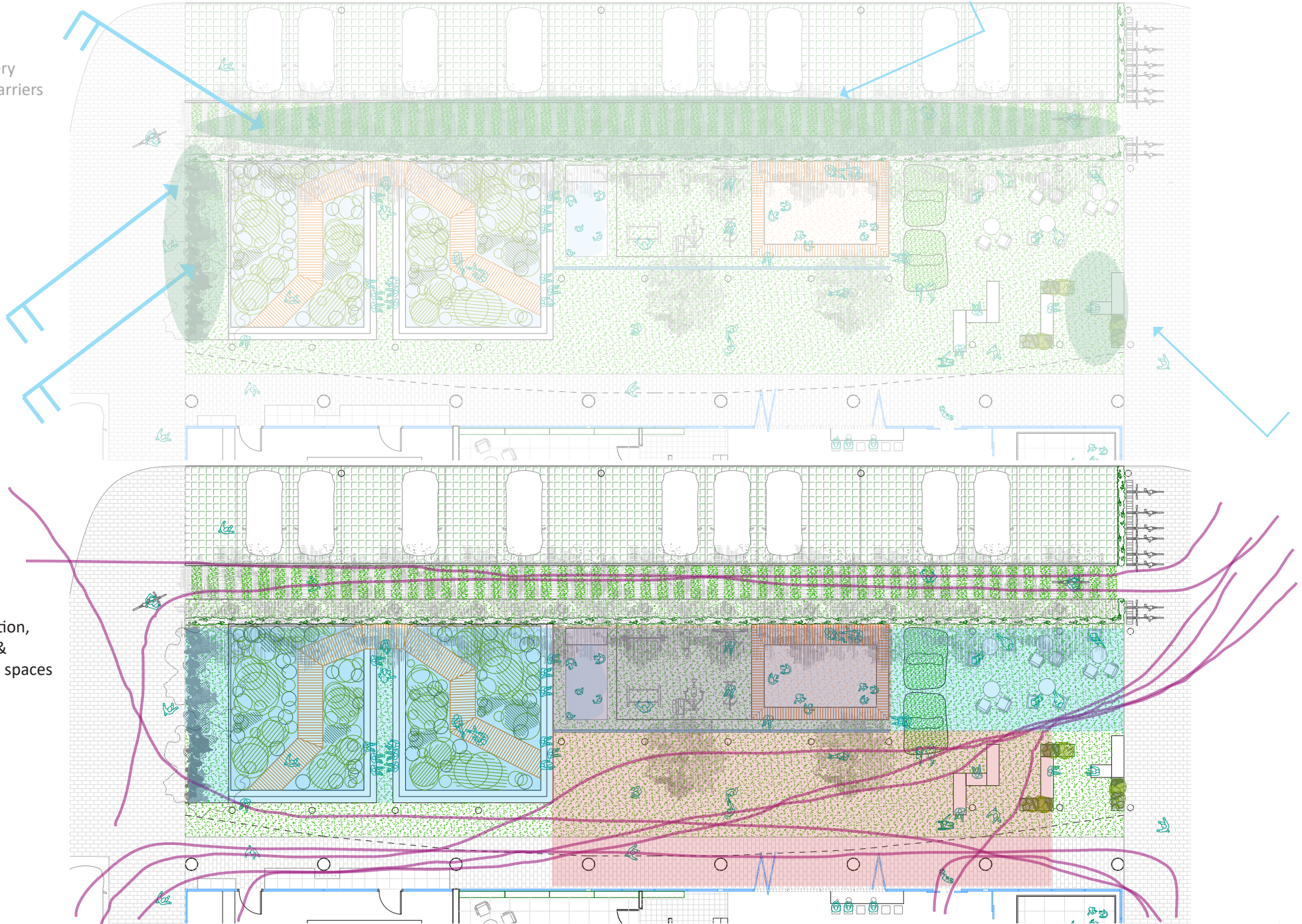
DESCRIPTION: Square

N 0 1 5 10m

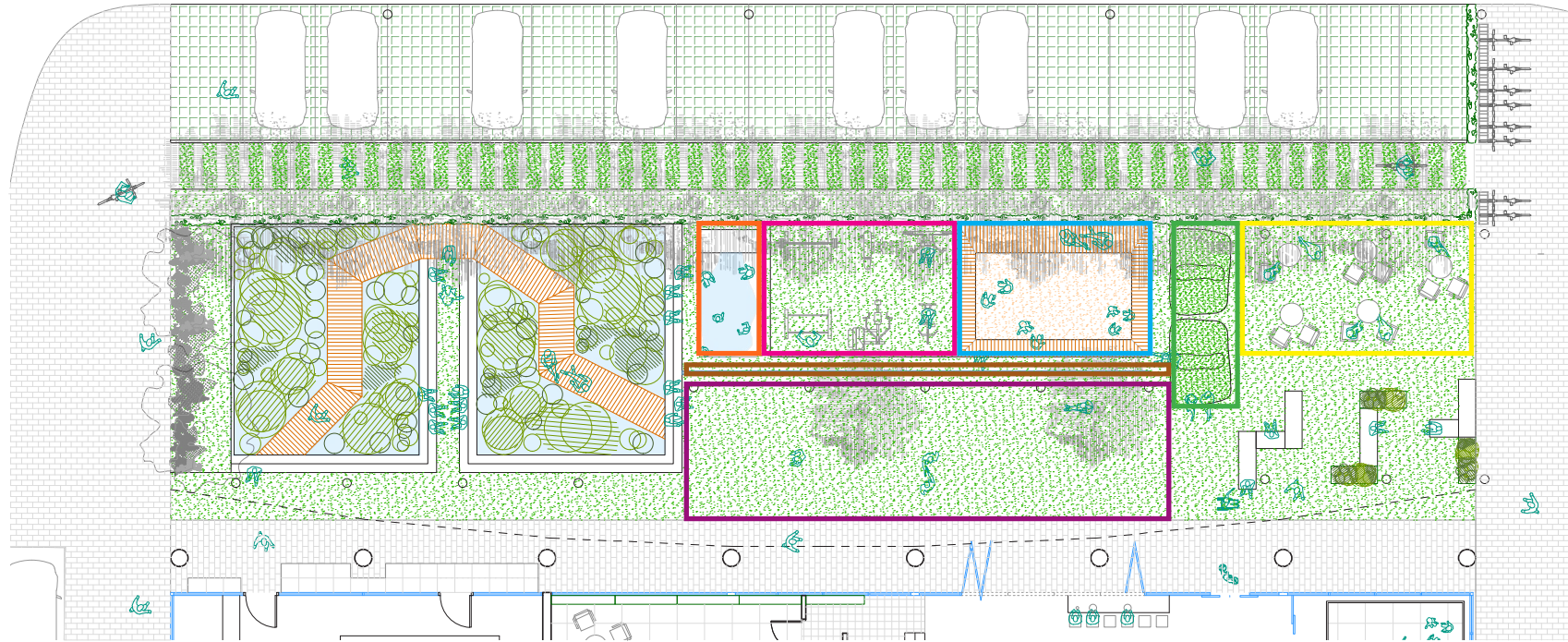
Qiao-Ling Cendón- P5- Lidl Supermarket

Greenery
wind barriers

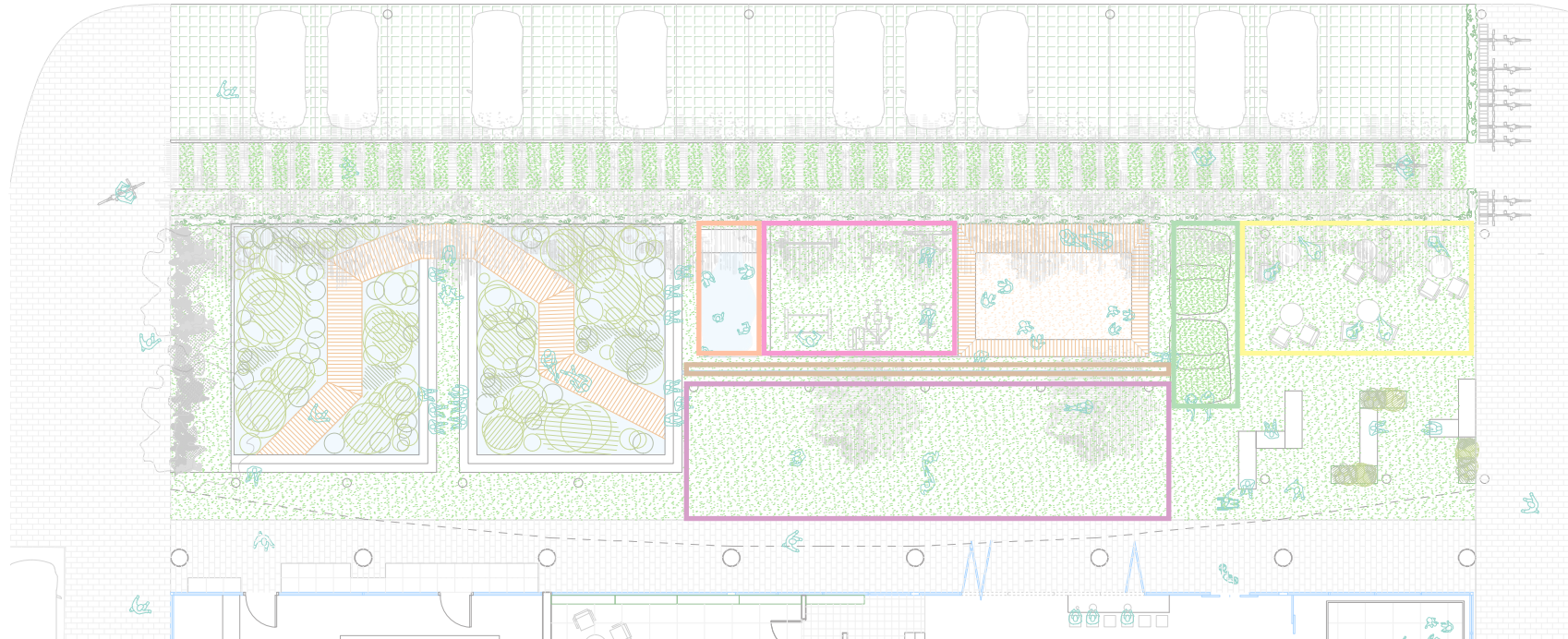
Circulation,
active &
passive spaces



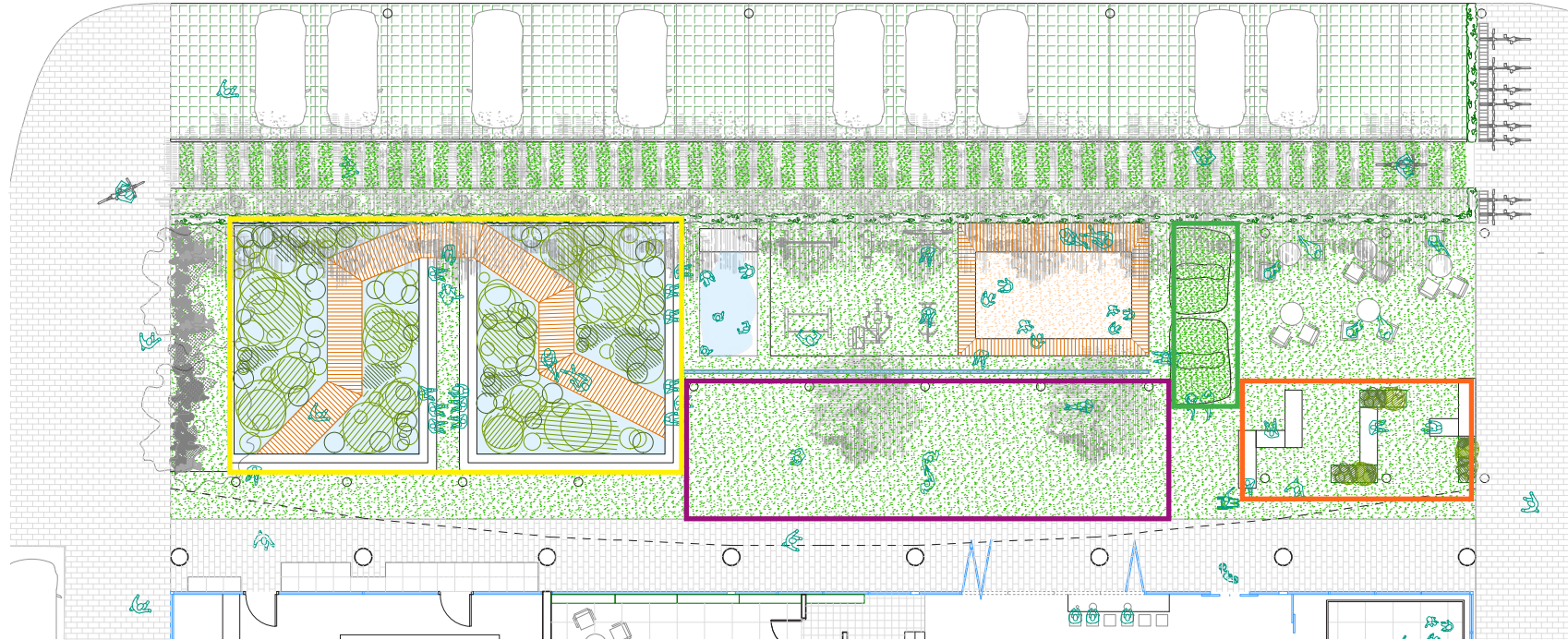
Active activities



Active activities



Passive activities

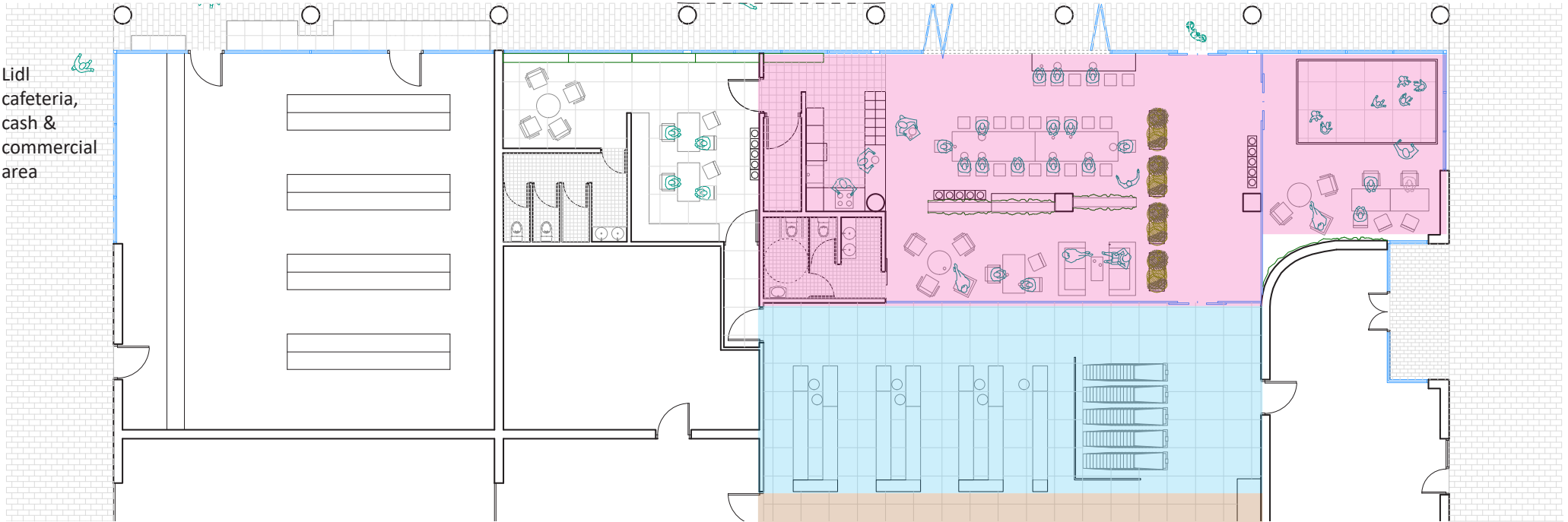


DESCRIPTION: Lidl refurbishment

N 0 1 5 10 m

Qiao-Ling Cendón- P5- Lidl Supermarket

Lidl cafeteria, cash & commercial area

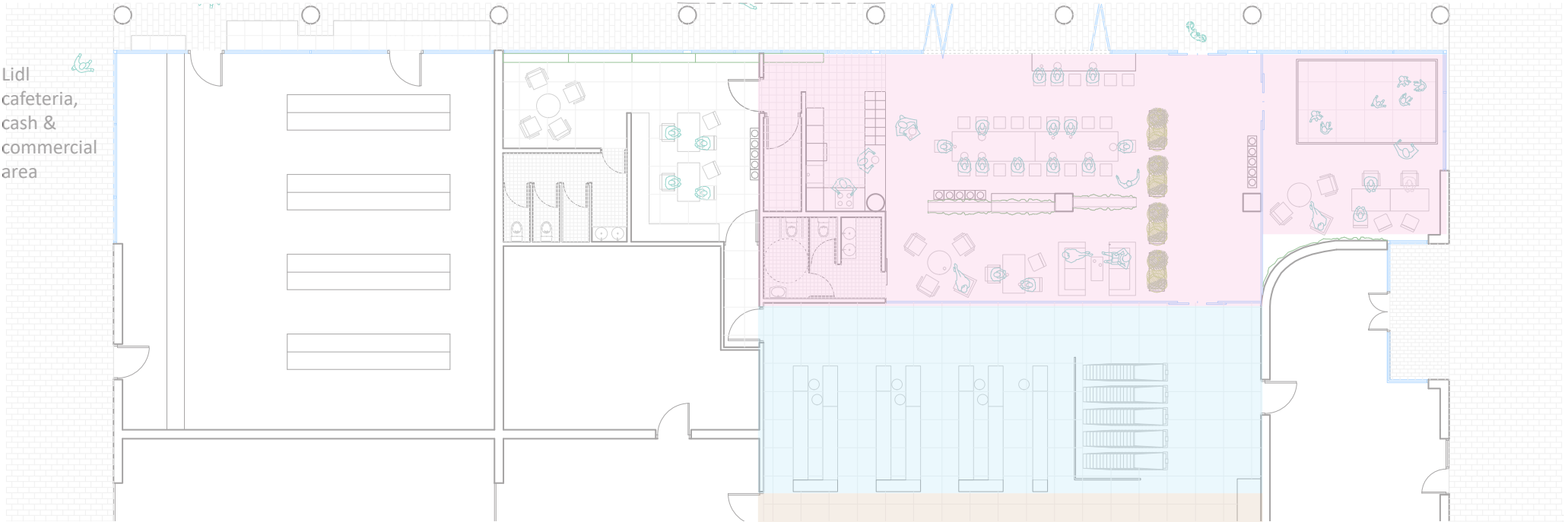


DESCRIPTION: Lidl refurbishment

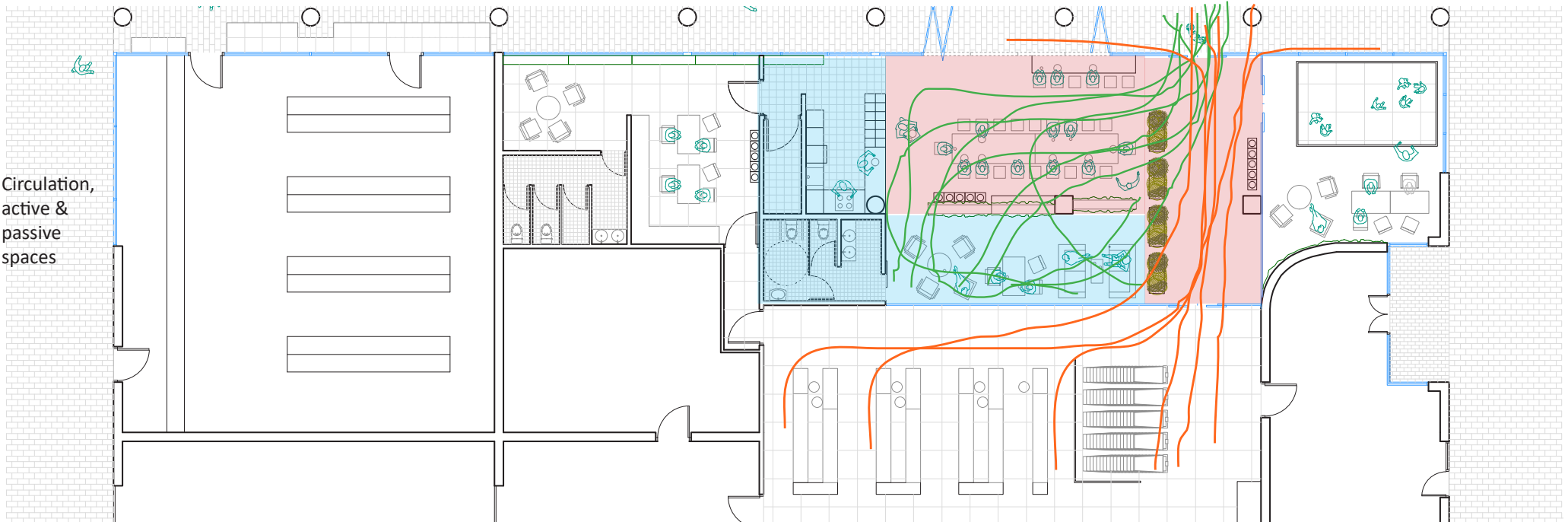
⊙ N 0 1 5 10 m

Qiao-Ling Cendón- P5- Lidl Supermarket

Lidl cafeteria, cash & commercial area



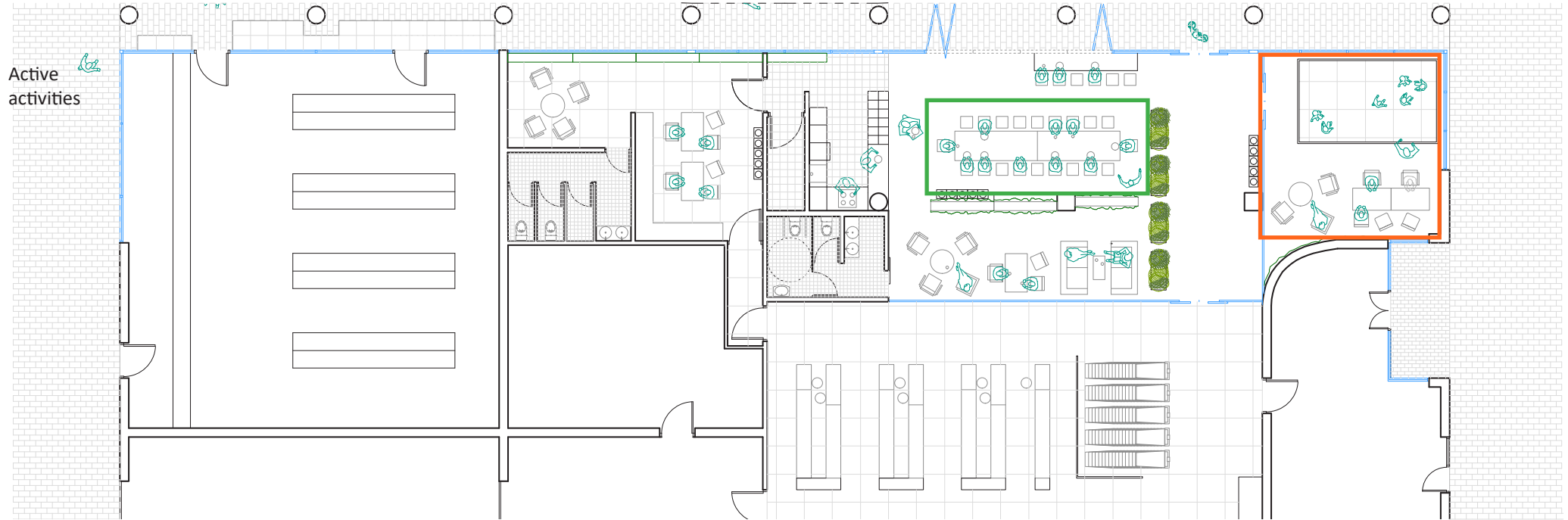
Circulation, active & passive spaces



DESCRIPTION: Lidl refurbishment

N 0 1 5 10 m

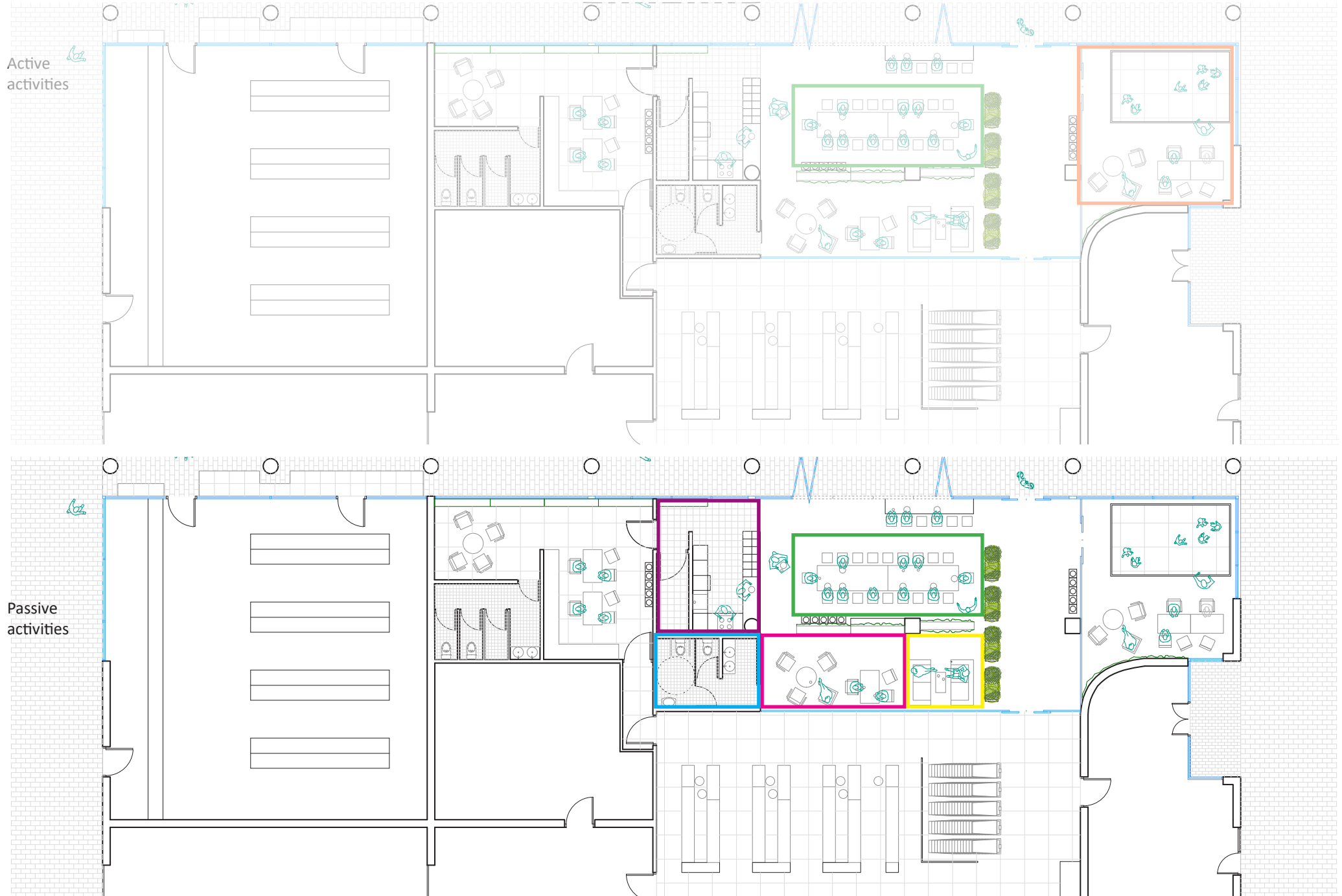
Qiao-Ling Cendón- P5- Lidl Supermarket



DESCRIPTION: Lidl refurbishment

N 0 1 5 10 m

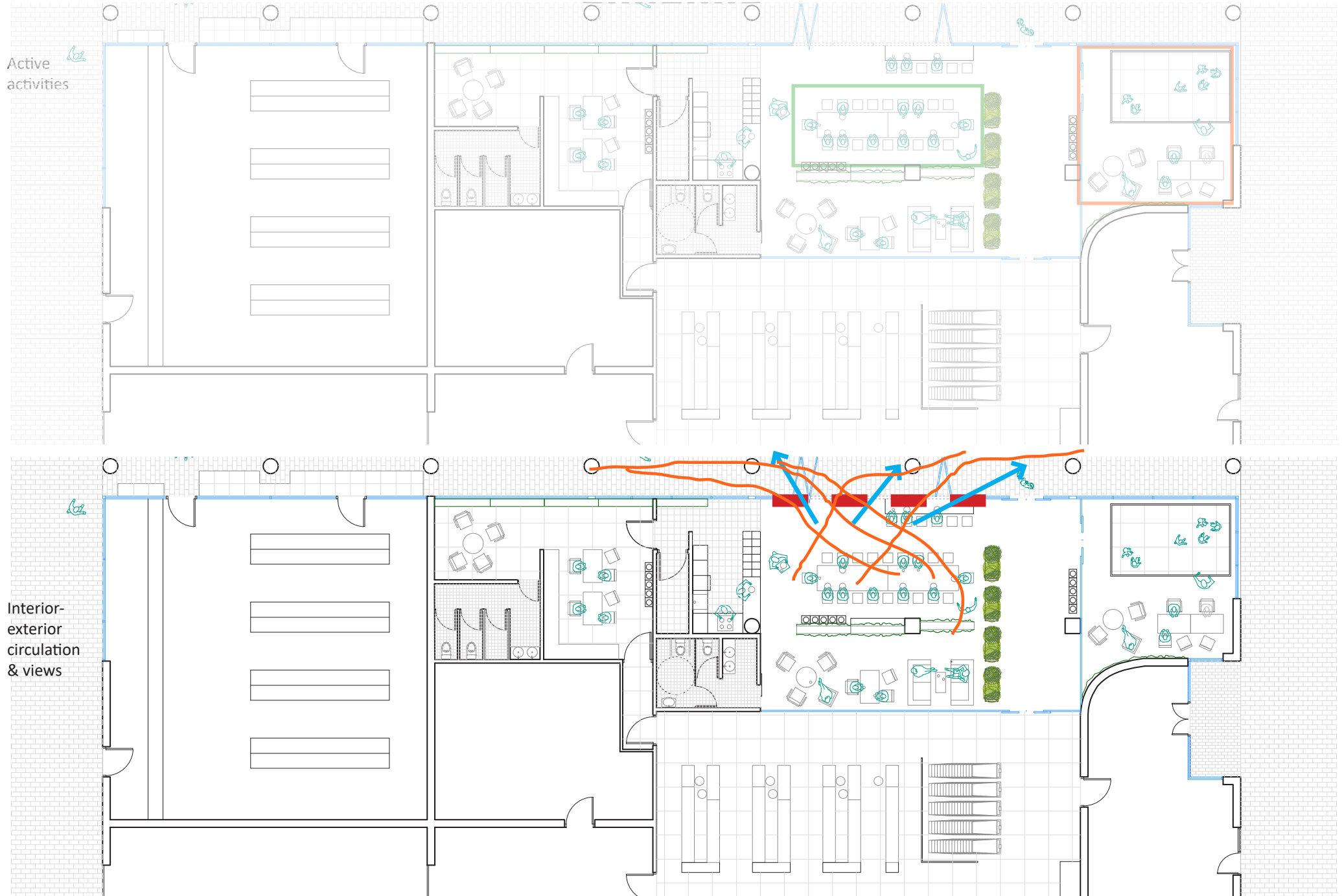
Qiao-Ling Cendón- P5- Lidl Supermarket



DESCRIPTION: Lidl refurbishment

N 0 1 5 10 m

Qiao-Ling Cendón- P5- Lidl Supermarket



Active activities

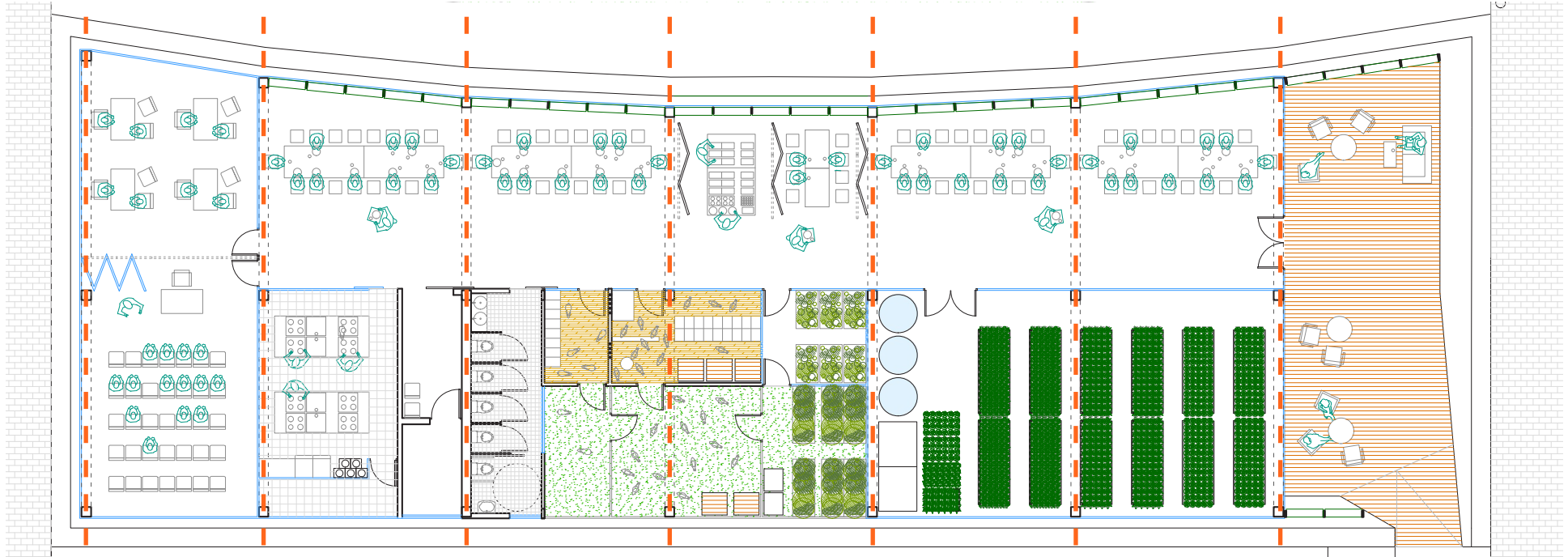
Interior-exterior circulation & views

DESCRIPTION: Greenhouse

N 0 1 5 10 m

Qiao-Ling Cendón- P5- Lidl Supermarket

Existing structure

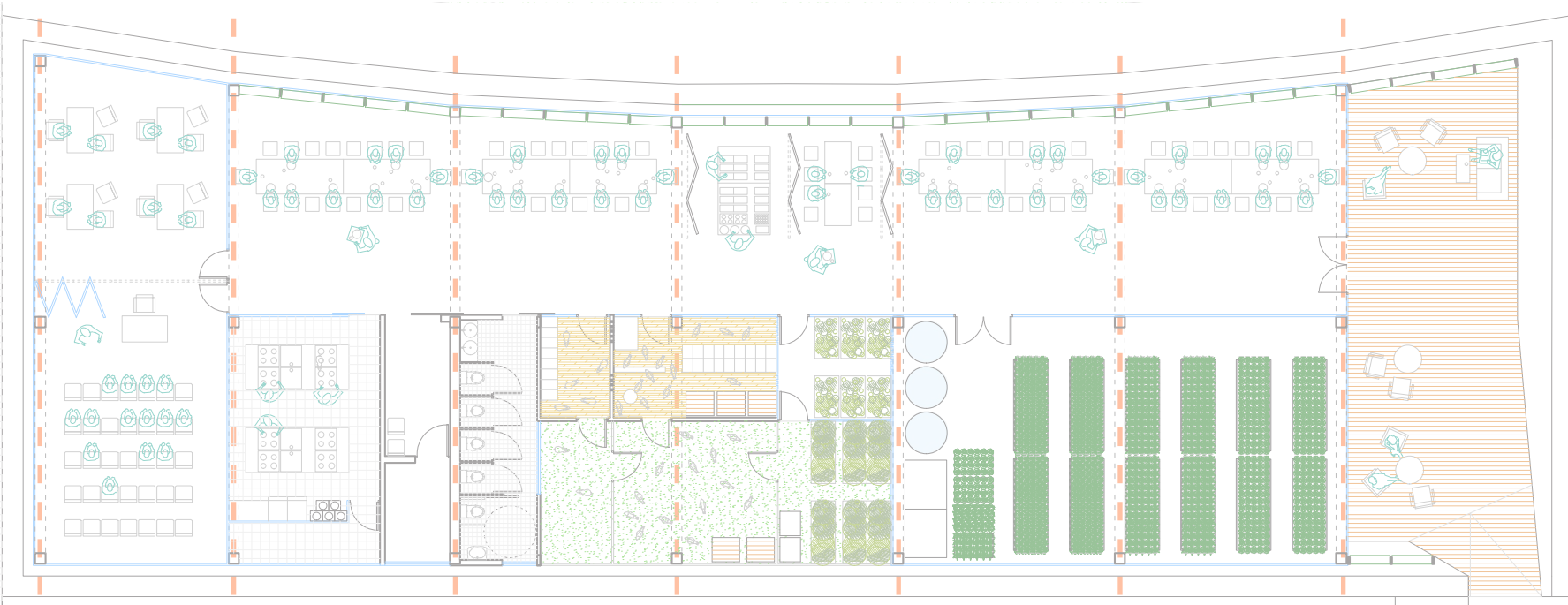


DESCRIPTION: Greenhouse

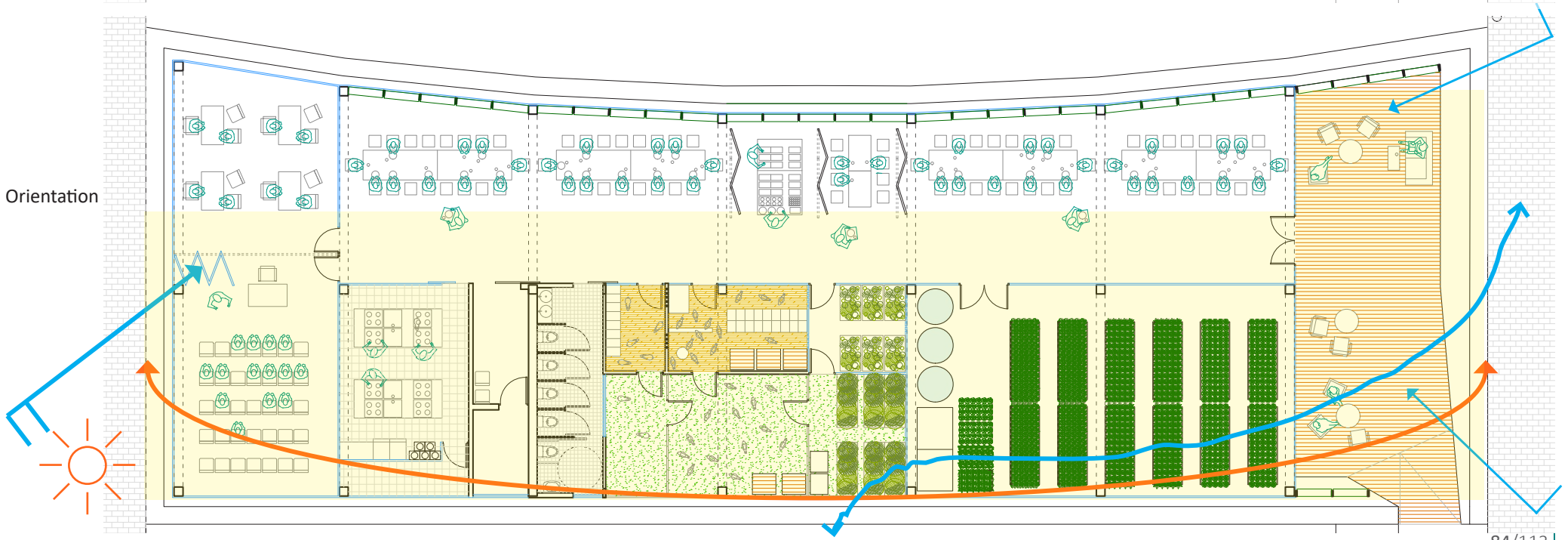
⊙ N 0 1 5 10 m

Qiao-Ling Cendón- P5- Lidl Supermarket

Existing structure



Orientation

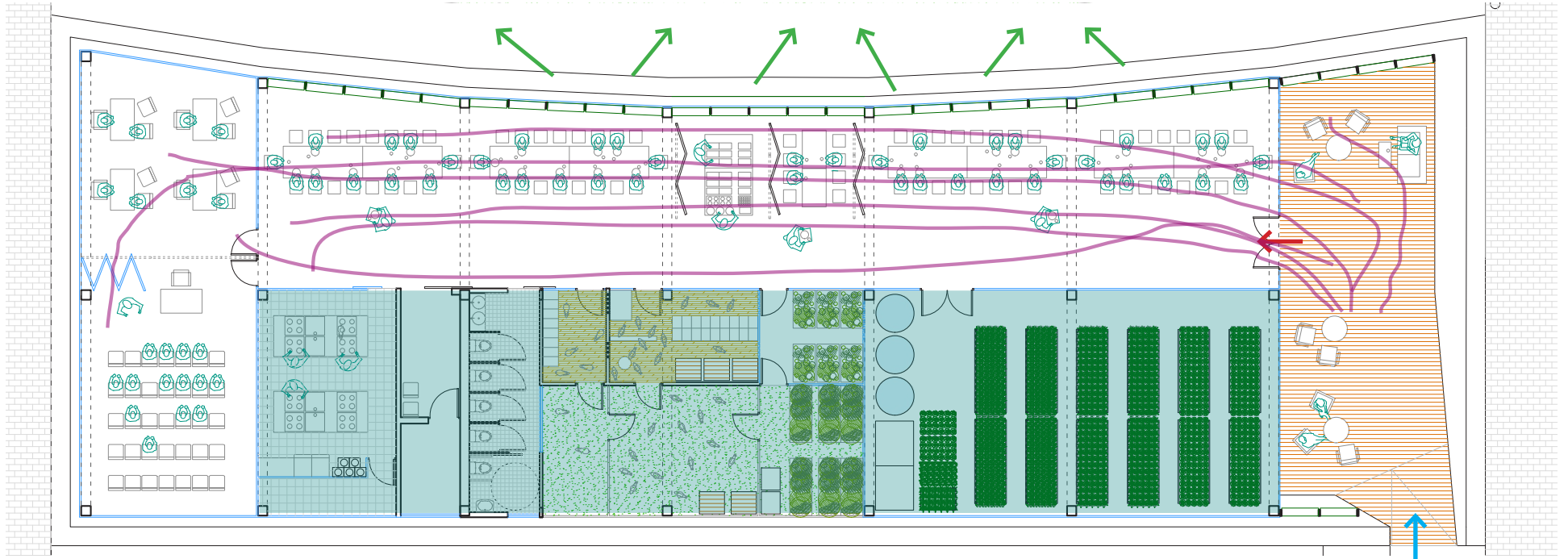


DESCRIPTION: Greenhouse

⊙ N 0 1 5 10 m

Qiao-Ling Cendón- P5- Lidl Supermarket

Circulation,
views,
privacy

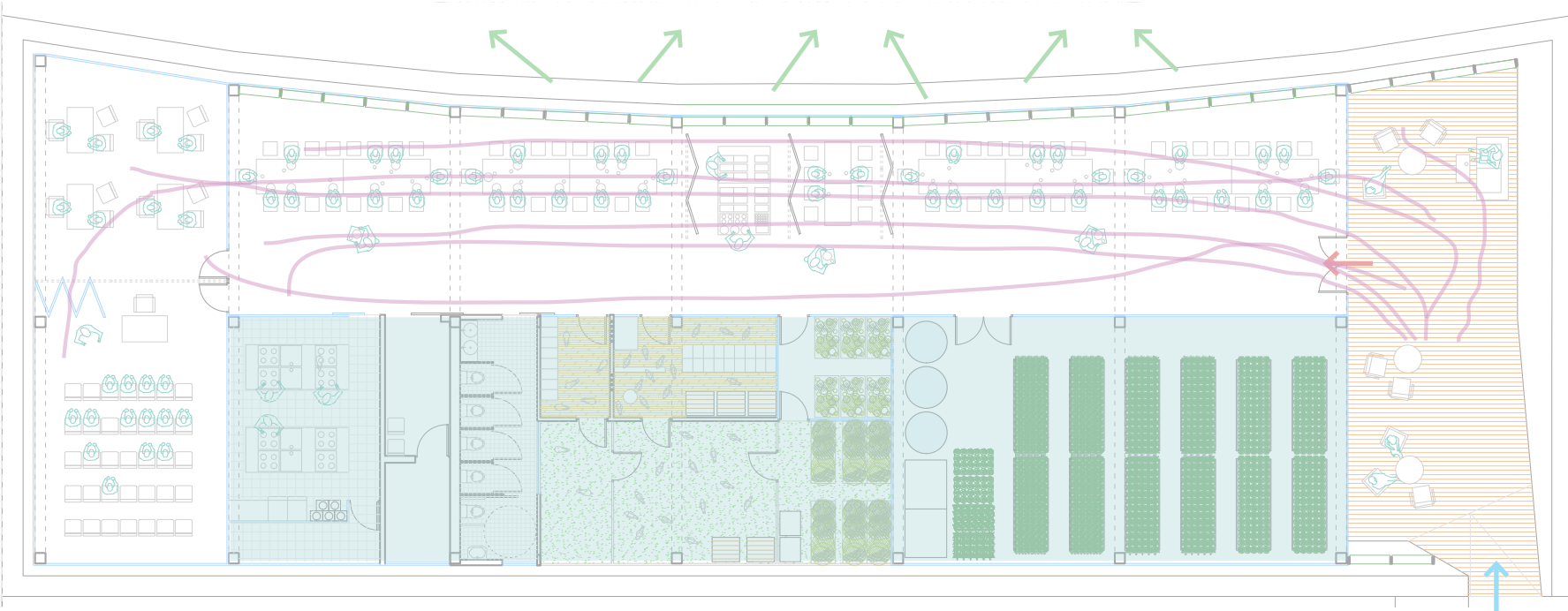


DESCRIPTION: Greenhouse

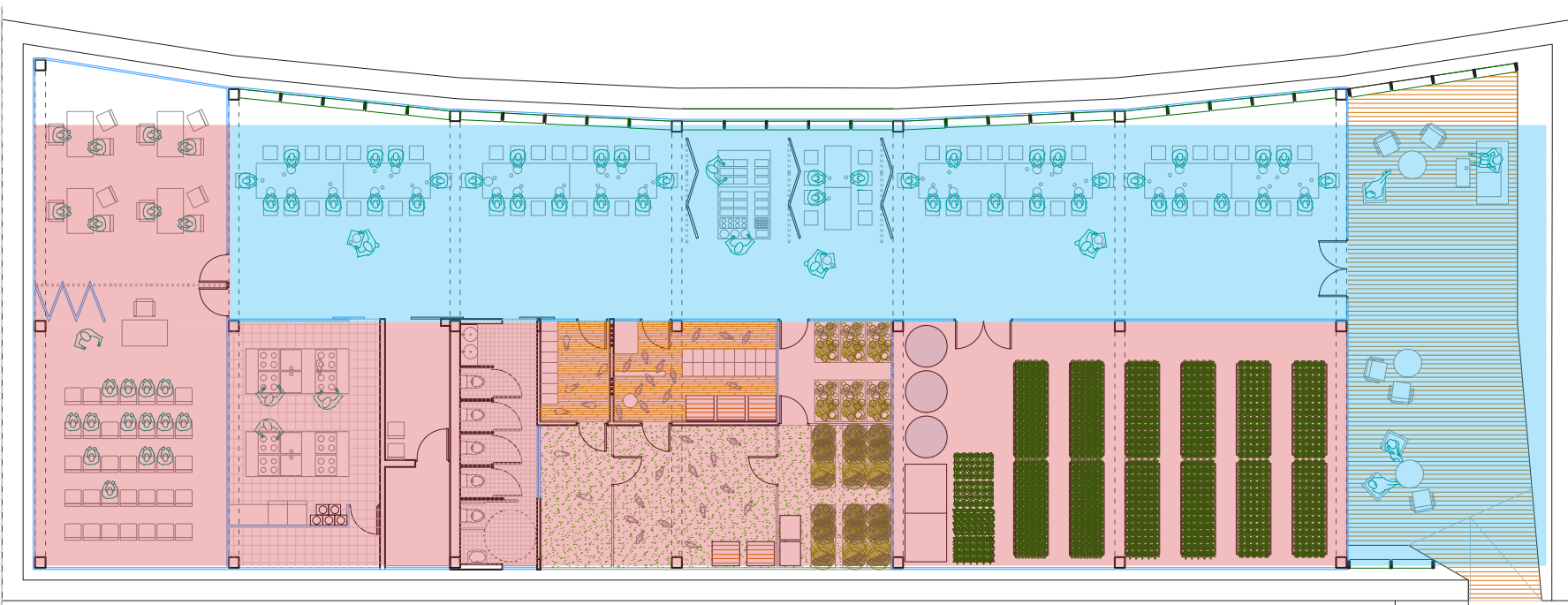
⊙ N 0 1 5 10 m

Qiao-Ling Cendón- P5- Lidl Supermarket

Circulation, views, privacy



Active & passive spaces

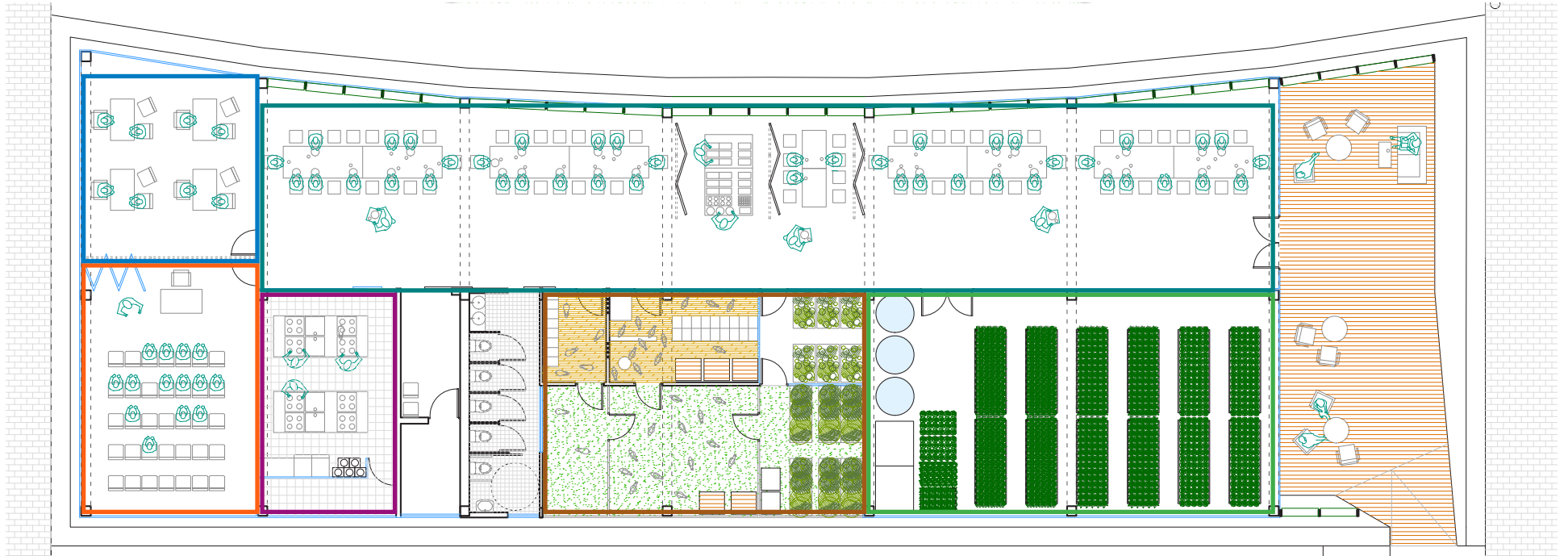


DESCRIPTION: Greenhouse

N 0 1 5 10 m

Qiao-Ling Cendón- P5- Lidl Supermarket

Active activities

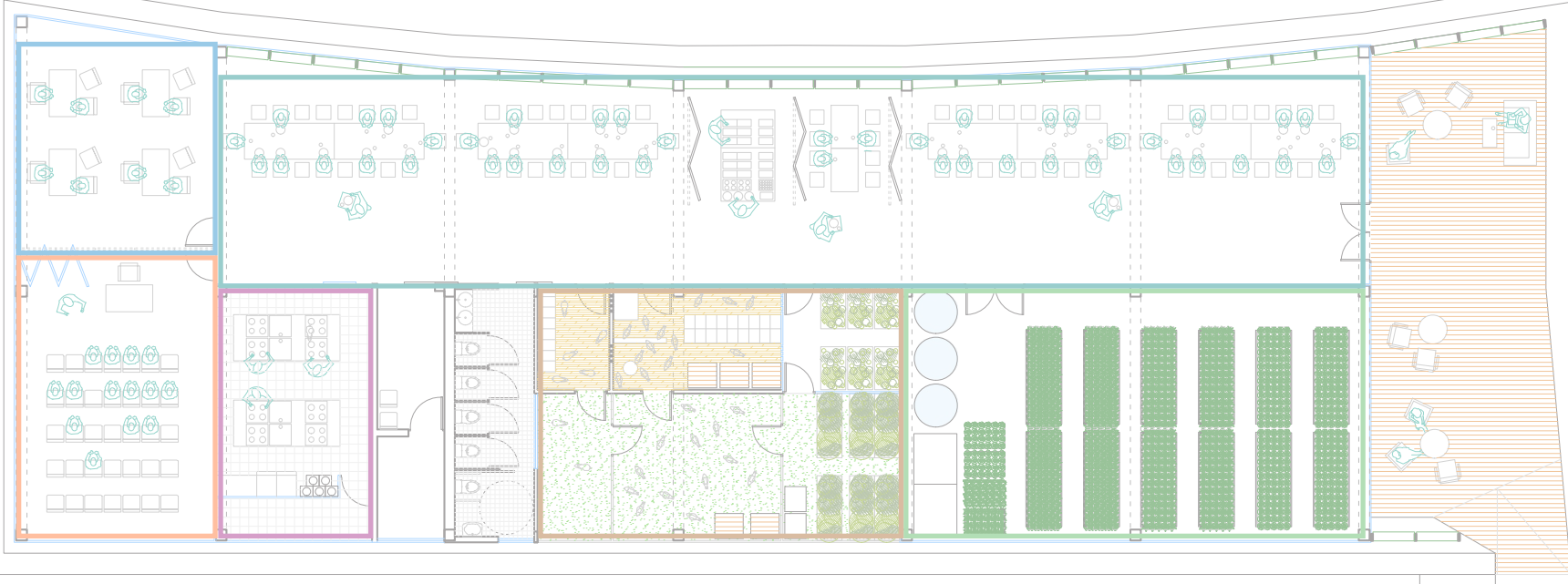


DESCRIPTION: Greenhouse

⊙ N 0 1 5 10 m

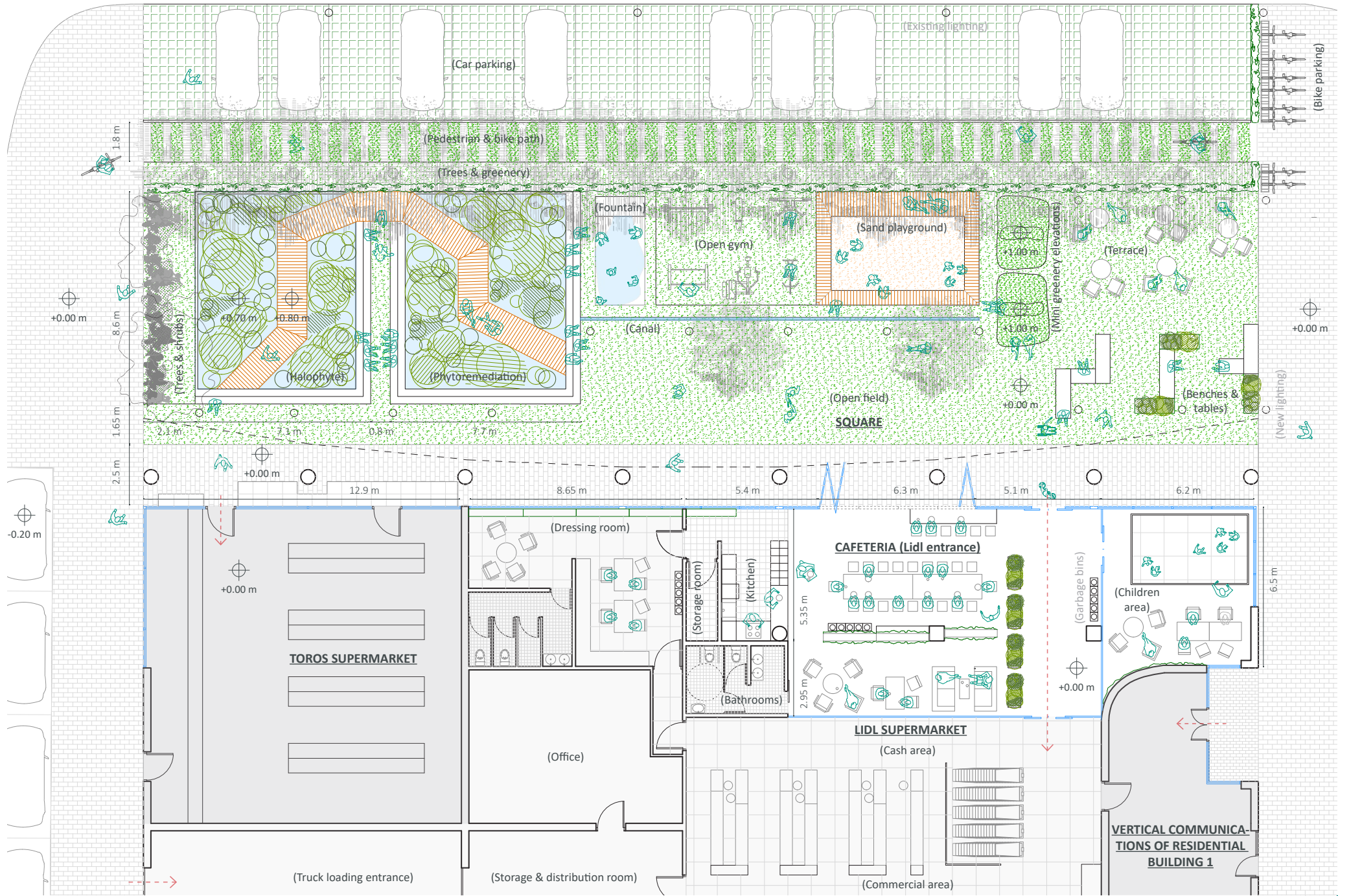
Qiao-Ling Cendón- P5- Lidl Supermarket

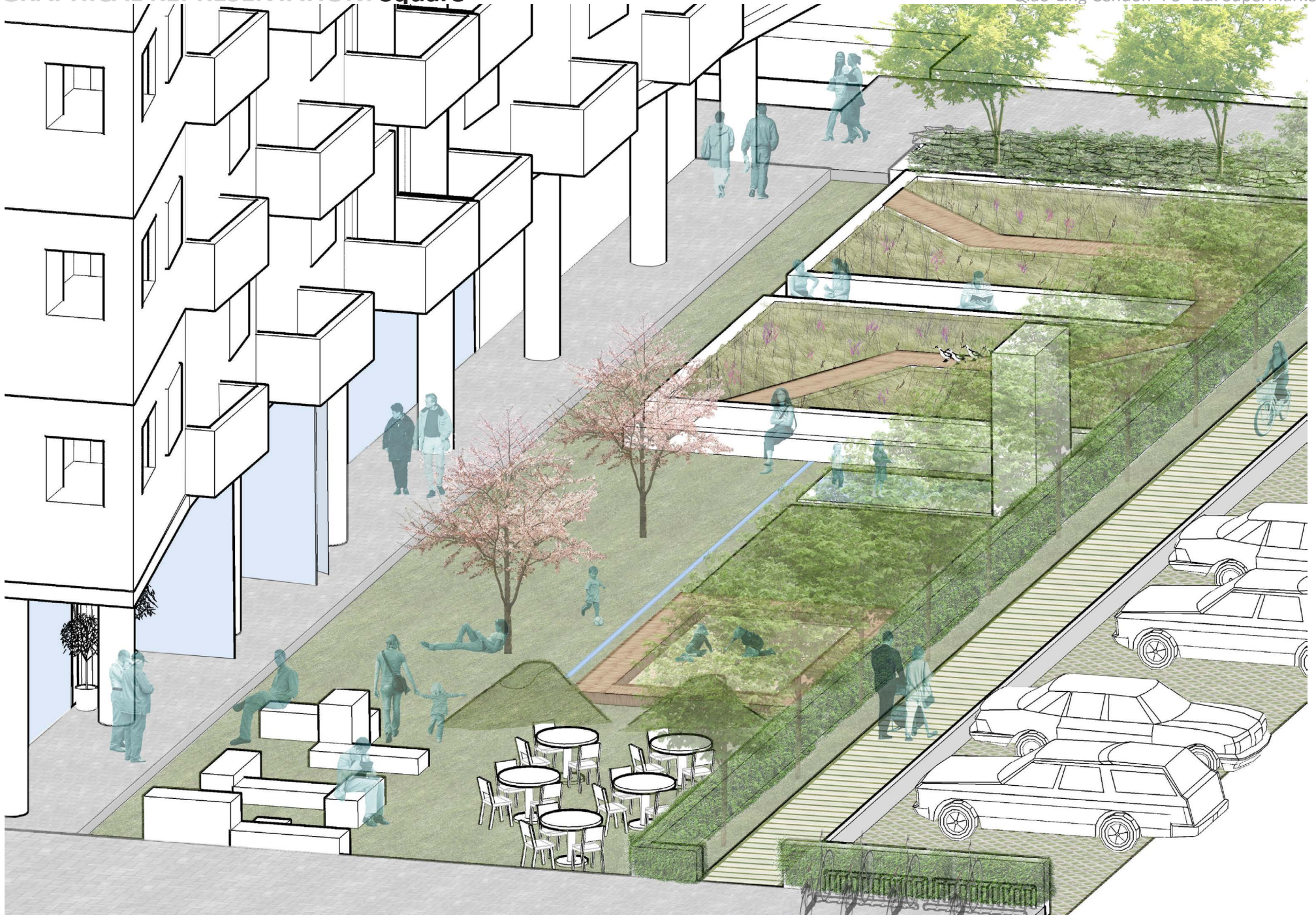
Active activities

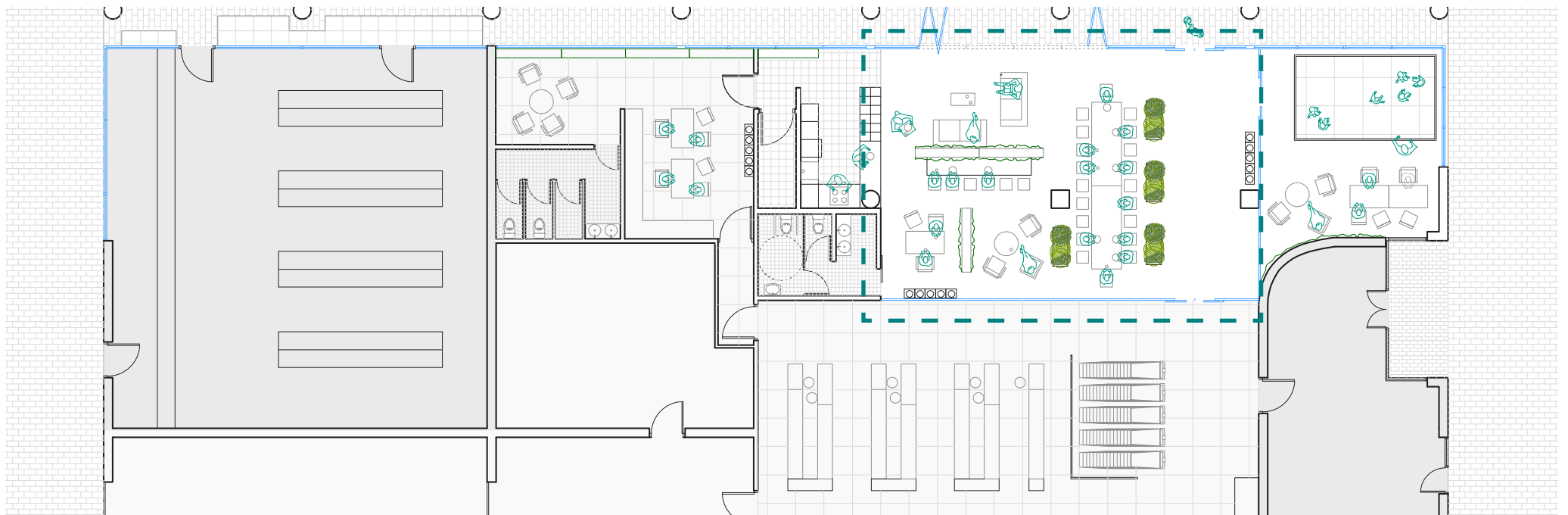
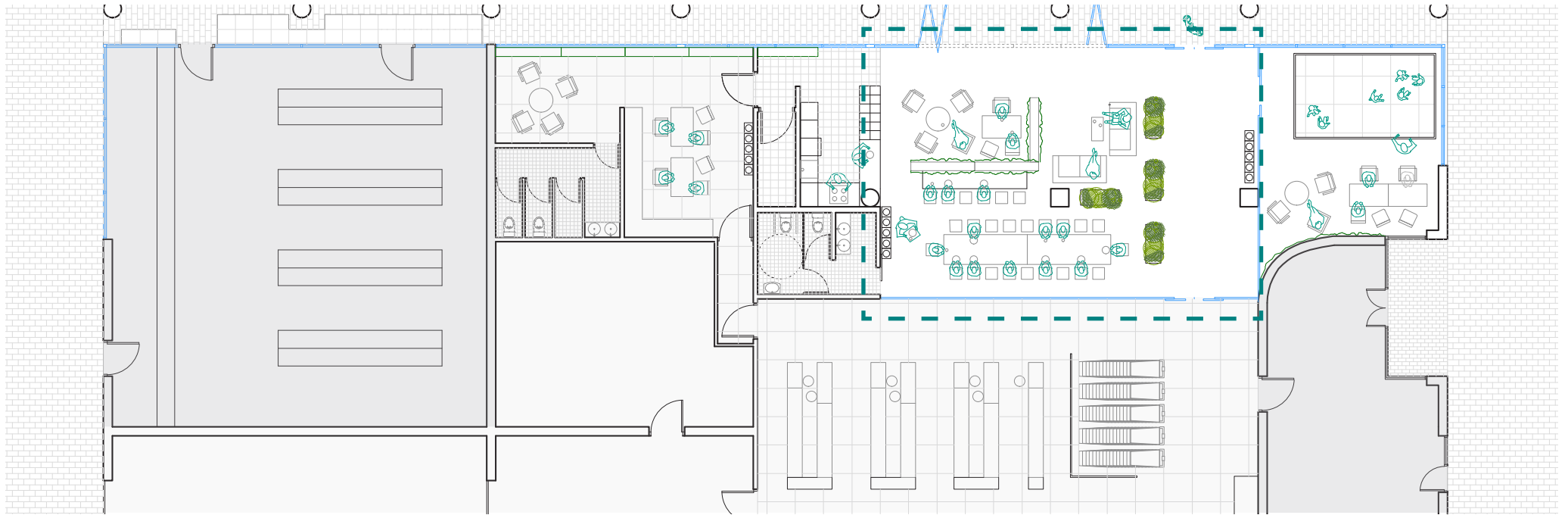


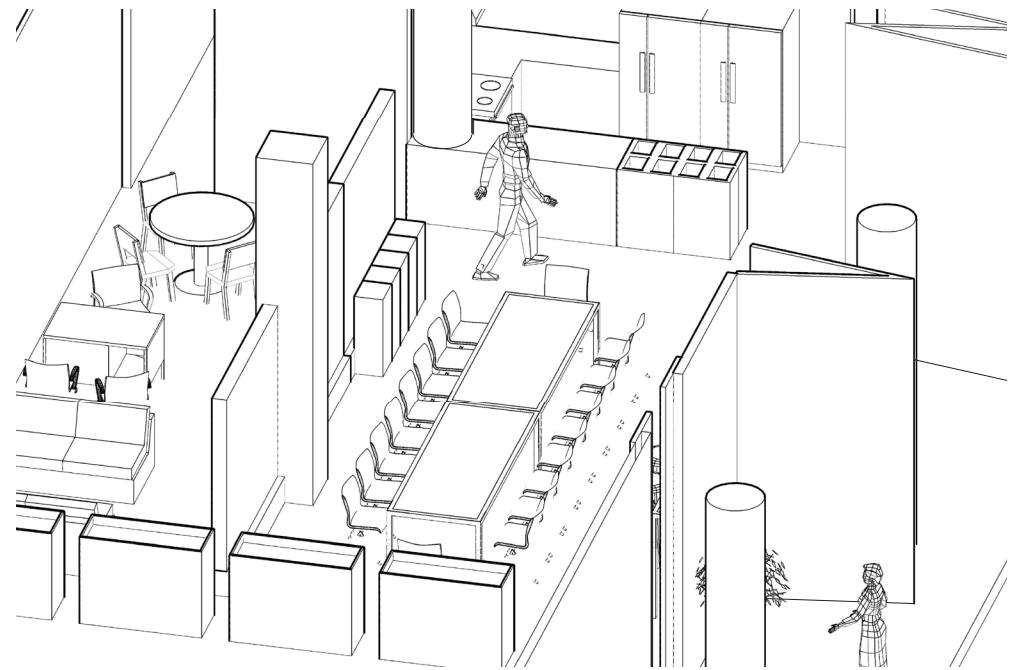
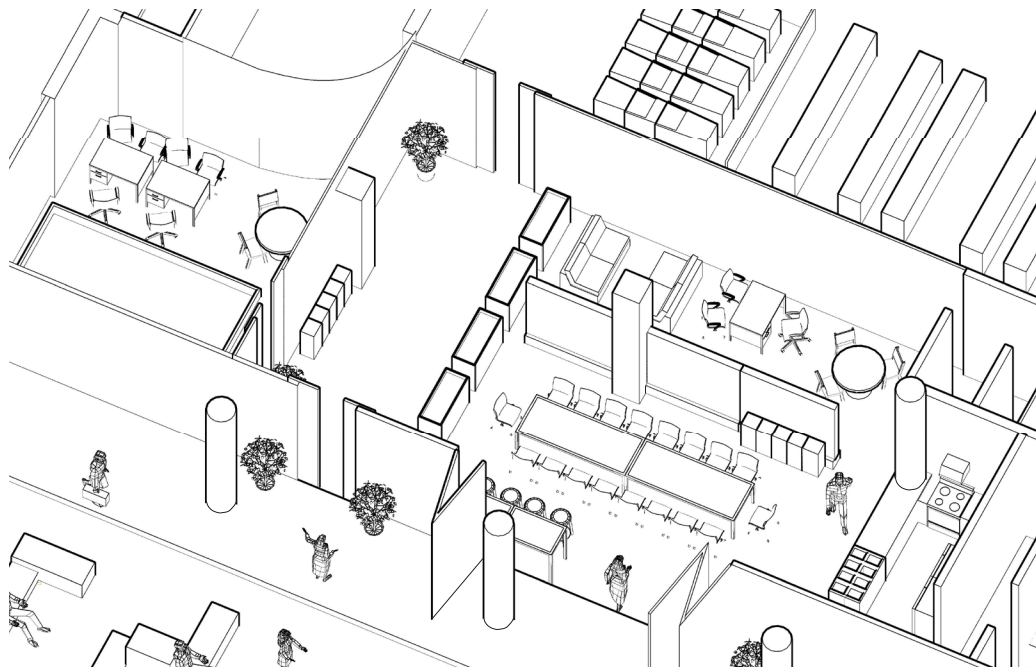
Passive activities

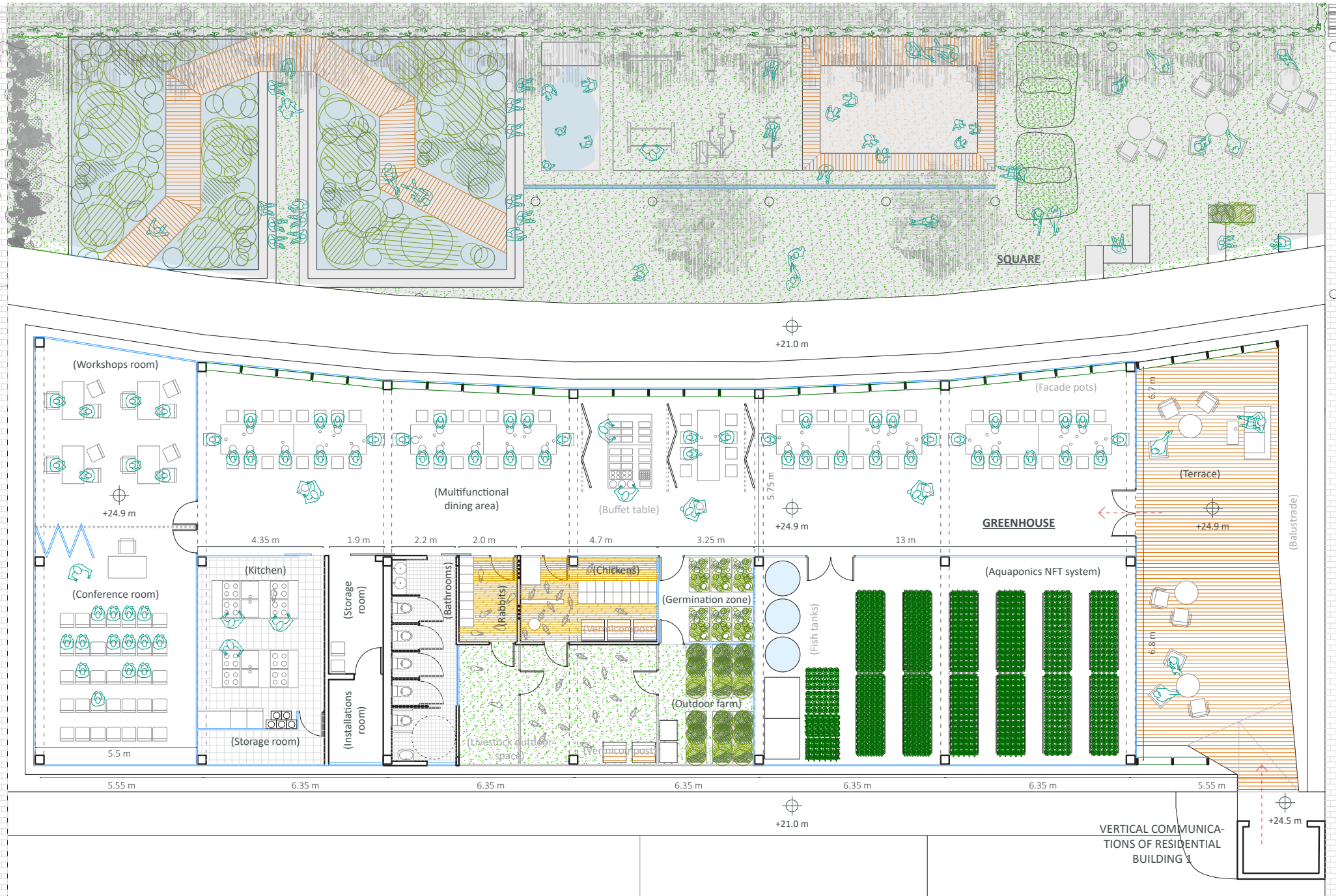












VERTICAL COMMUNICATIONS OF RESIDENTIAL BUILDING 1

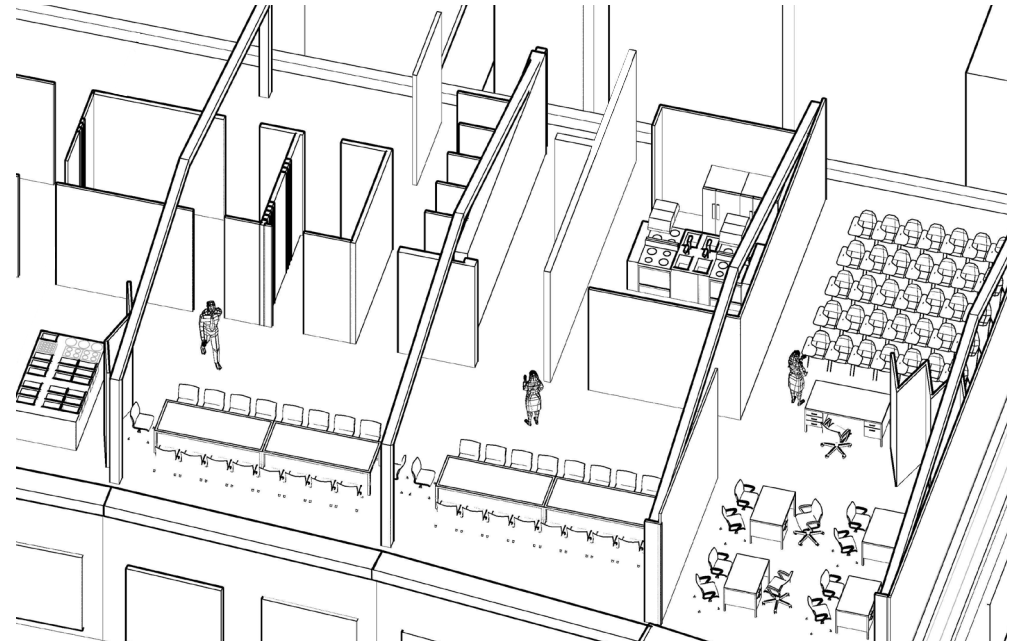
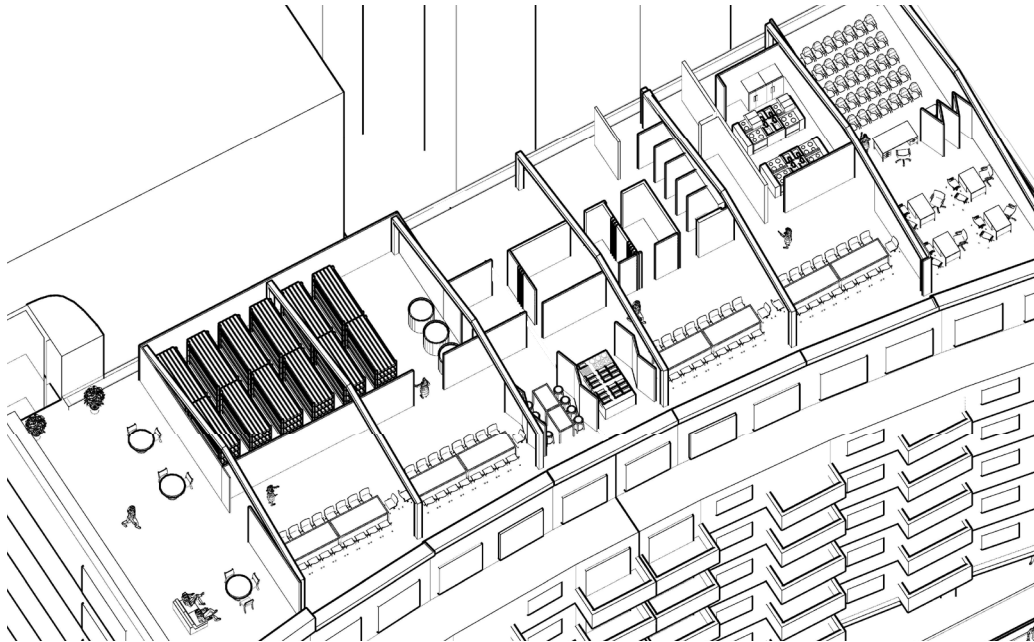
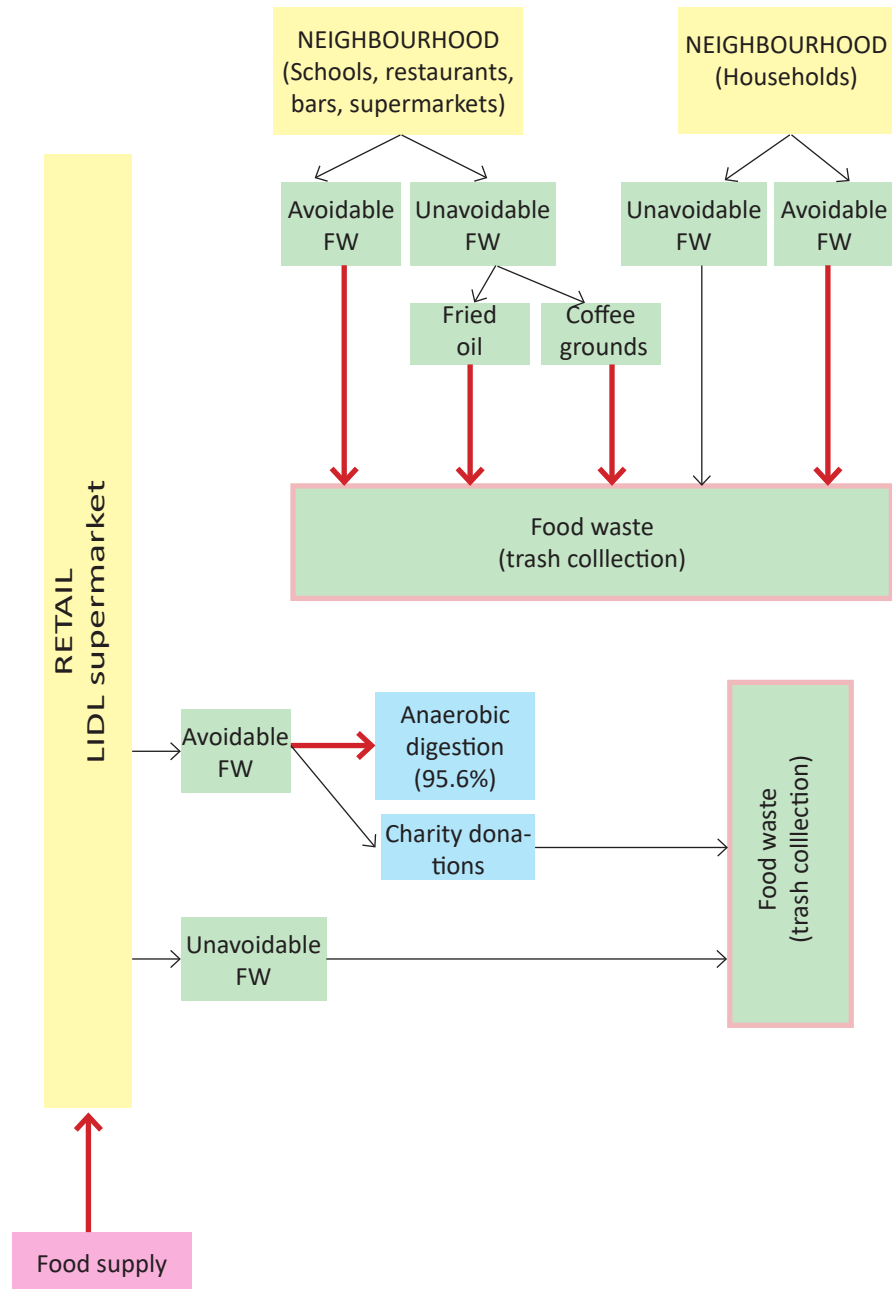


DIAGRAM OF FLOWS: Food (before)



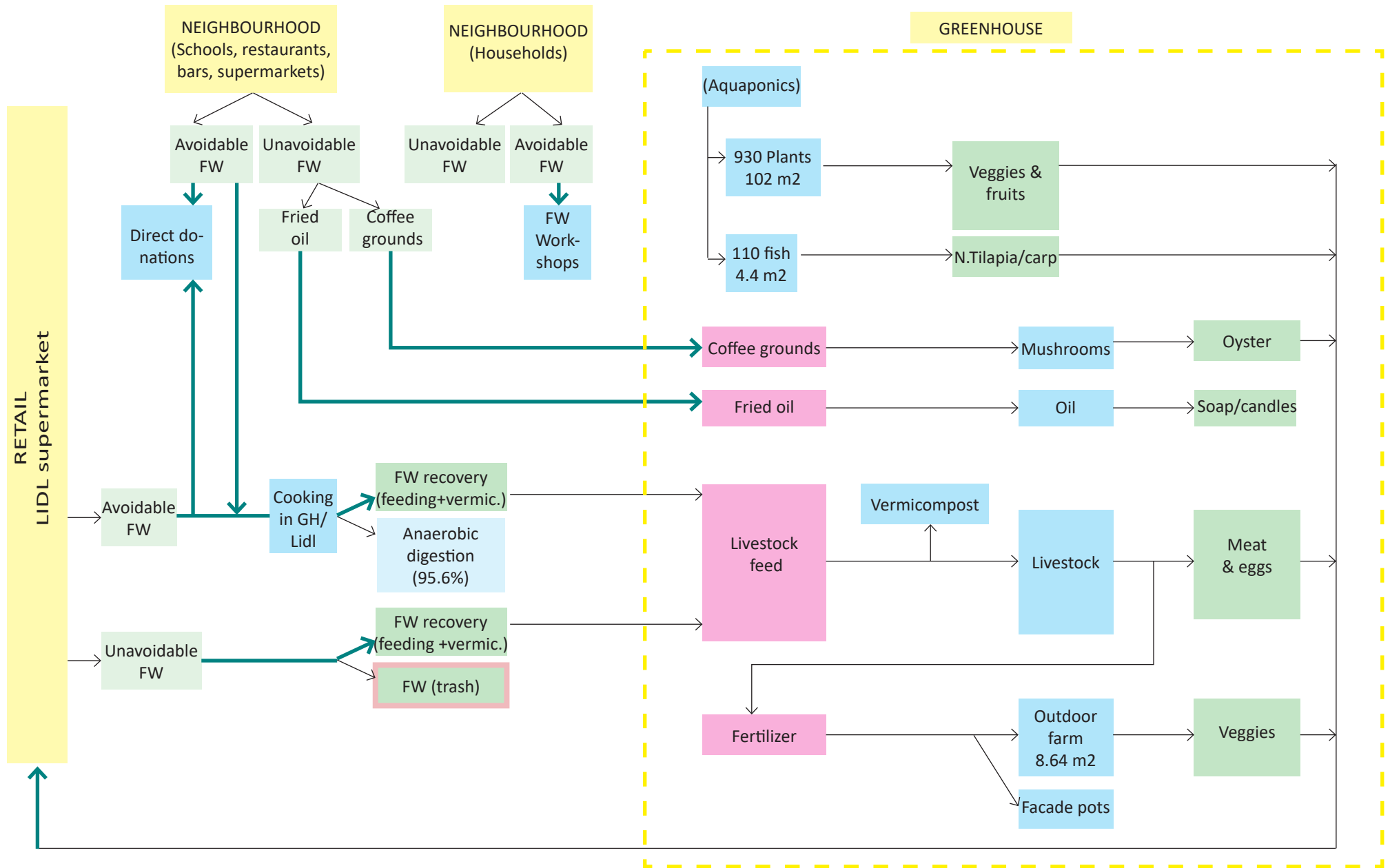


DIAGRAM OF FLOWS: Water (before)

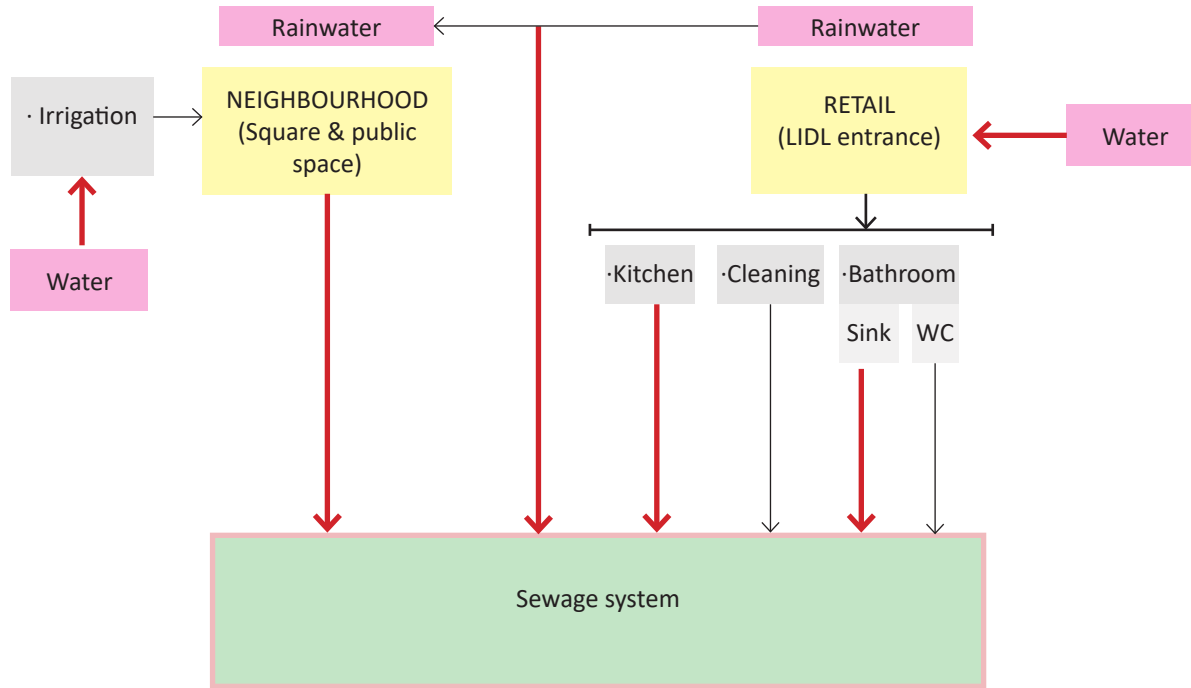


DIAGRAM OF FLOWS: Water (after)

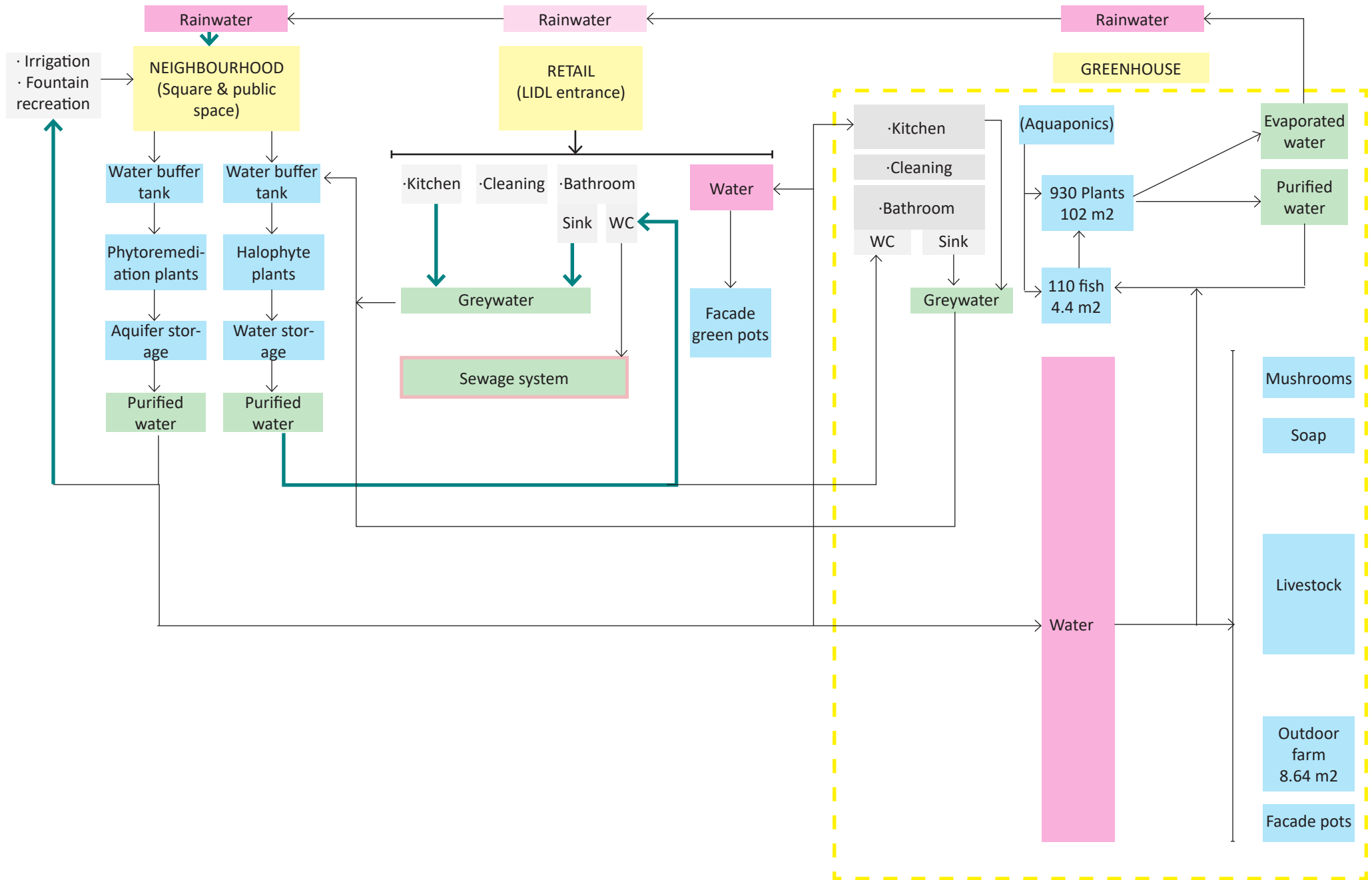


DIAGRAM OF FLOWS: Air (before)

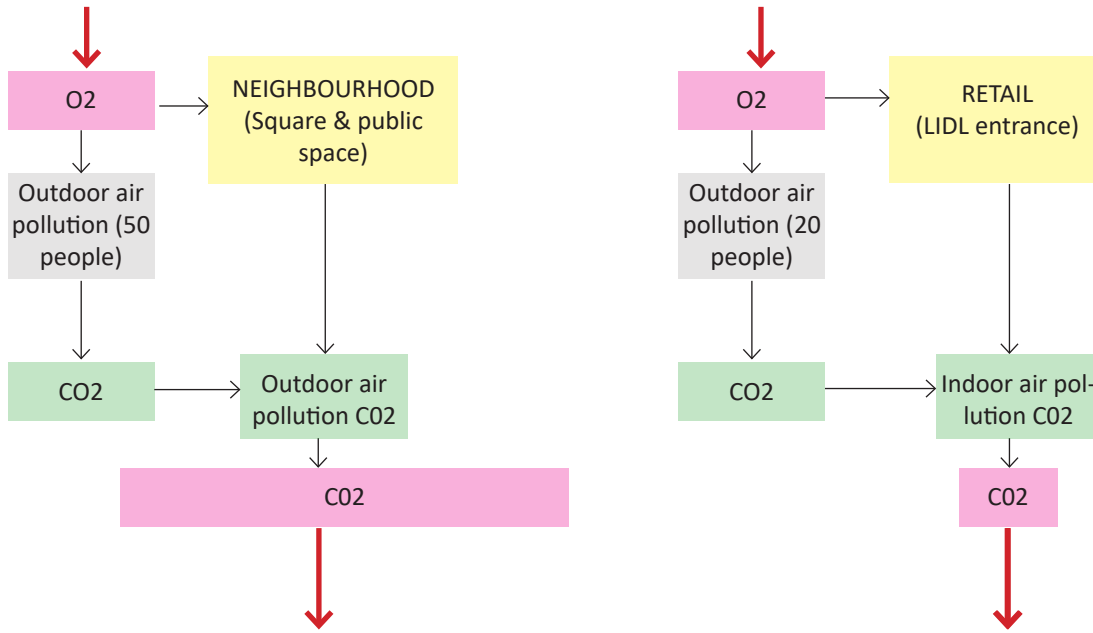
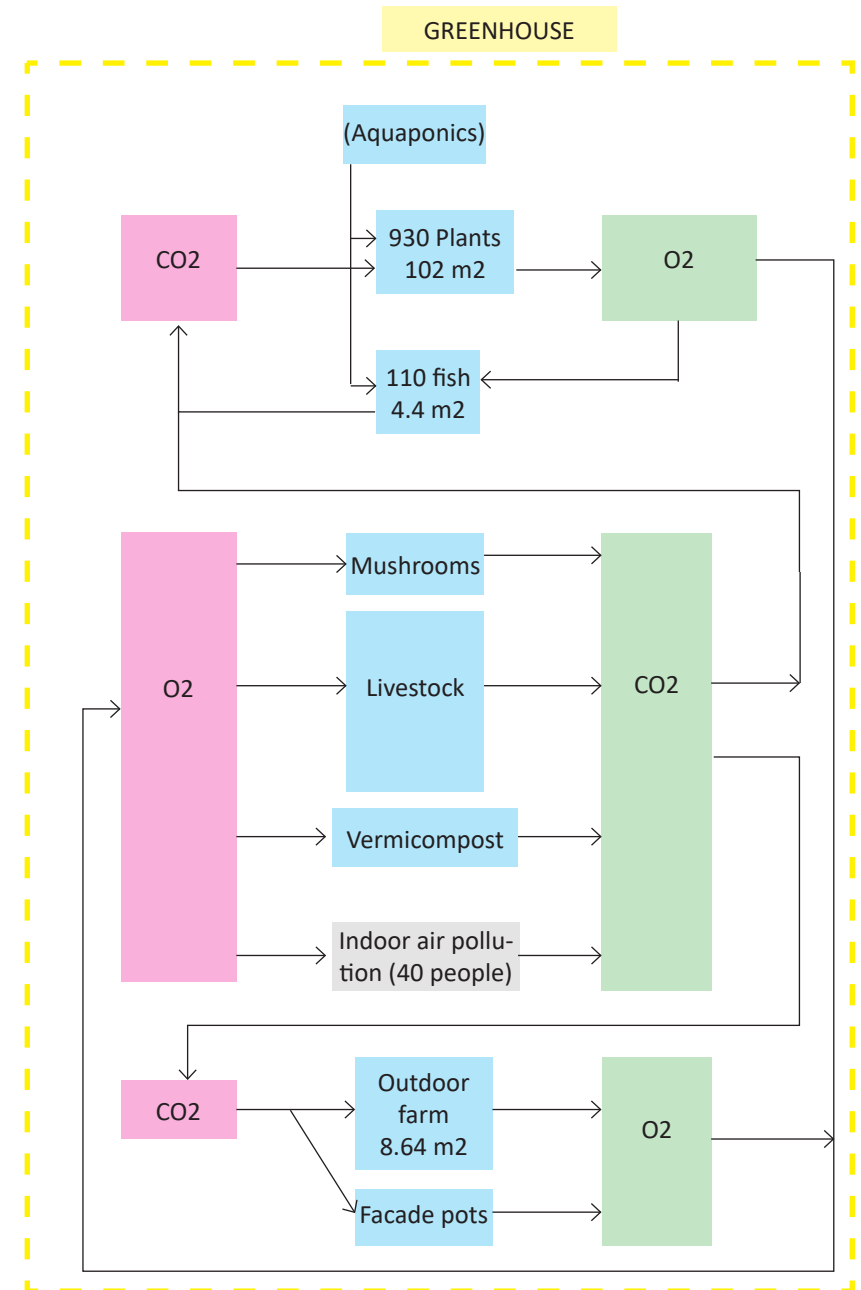
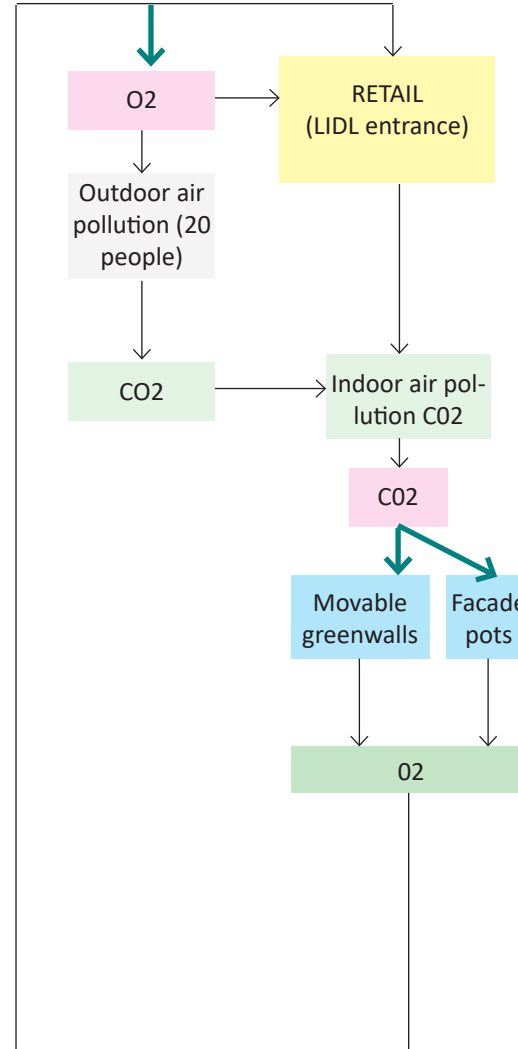
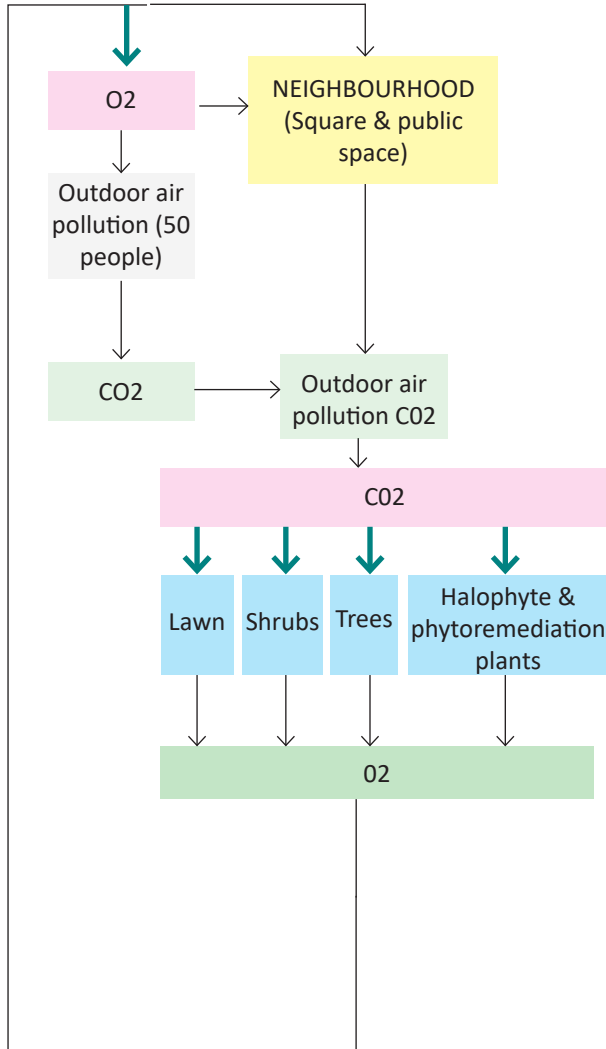
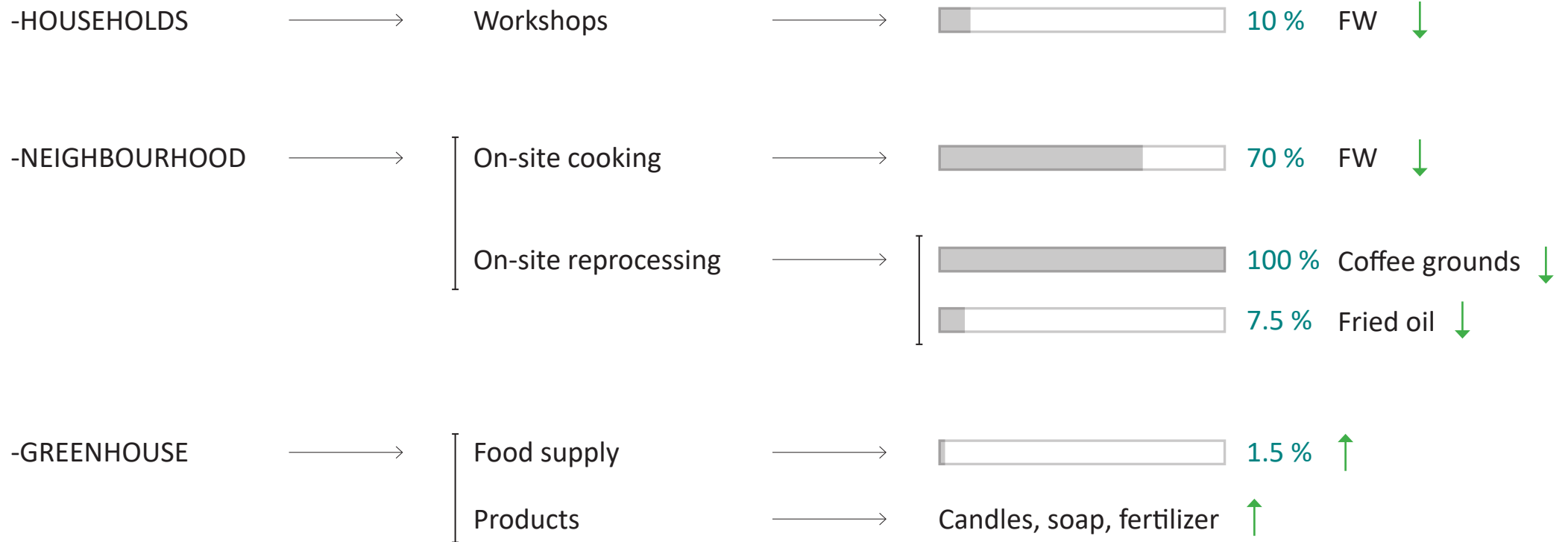


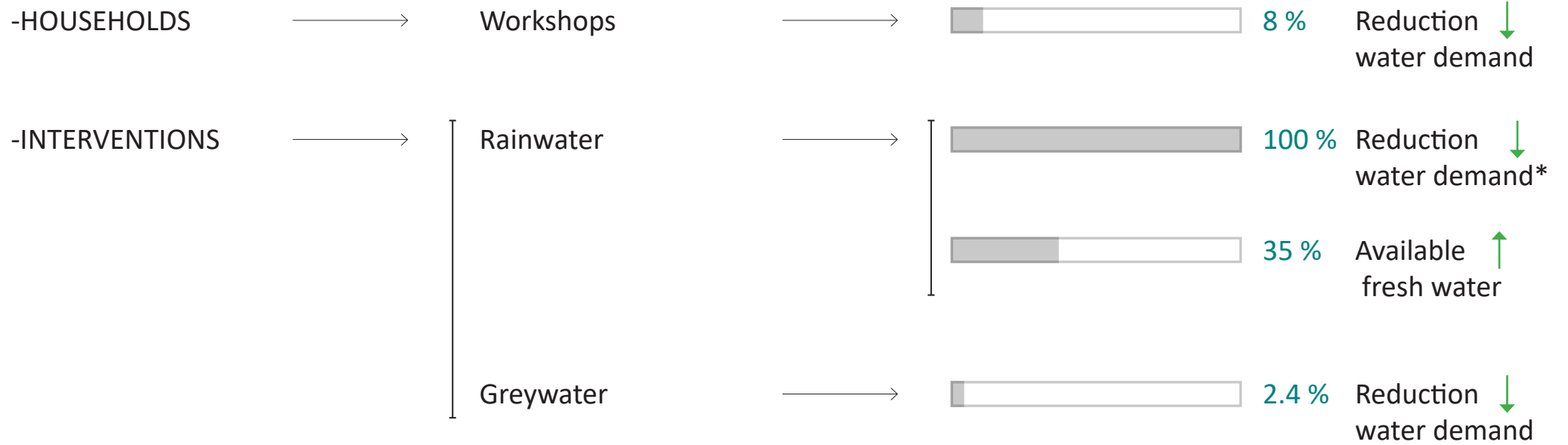
DIAGRAM OF FLOWS: Air (after)



FOOD FLOWS:

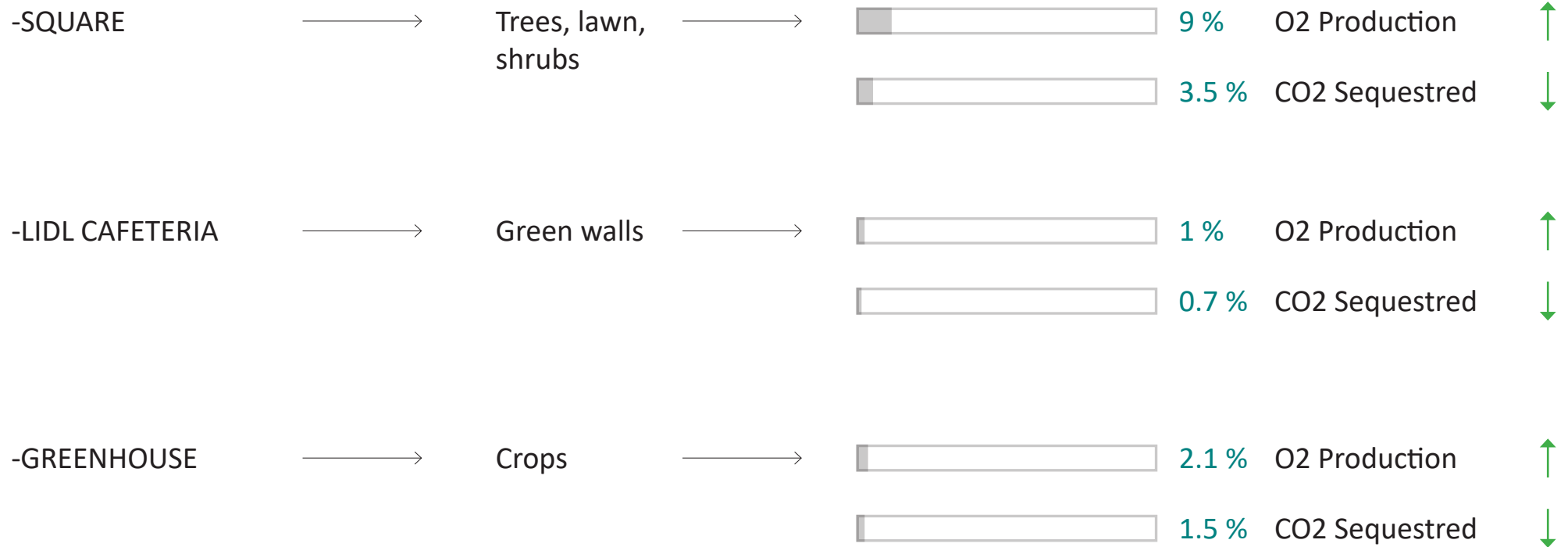


WATER FLOWS:



*Without considering kitchen & bathrooms

AIR FLOWS:



ECONOMIC & SUSTAINABLE BUSINESS

- Energy production (LSC red panels and PV).
- Lightweight (GH) and low technology
- Partnership with local stores (Buurman) and citizens involvement
- Neighbourhood synergy
- Quality
- Higher productivity/m2
- Job creation
- Local & sustainable food production
- Diverse food production

SUSTAINABLE ENVIRONMENT

- Minimum resources inputs
- Climatology
- Water recircularity.
- Food recircularity
- Closer and smaller loops of resources
- Natural and ecological processes
- Local species & biodiversity
- Animal welfare & natural behaviour
- Non toxic chemicals and substances.
- Smart use of greenery spaces

SOCIO-CULTURAL WELLBEING



- Climate awareness, connection natural system.
- Teaching and learning process
- Active spaces
- Physical, cultural and social activities. Mental health and well-being.
- Public, semipublic, semiprivate, private spaces
- All genders, ages, ethnicities, groups and individuals.
- Integration within the landscape, urban and social conditions.
- Universal access
- Multifunction
- Indoor and outdoor spaces (connection).
- Stimulation of 5 senses
- Identity, community feeling

7- CONCLUSION

- Conclusion
- Room for discussion
- Further steps for P5

Research question:

To what extent the sustainable redesign of Lidl supermarket can improve the social context, urban metabolism related to essential flows and help to achieve Sustainable Development Goals (SDGs) in Spangen?






CHALLENGES & NEEDS (what):	
	1- Low income & unemployment
	2- Criminality & vandalism
	3- Bad health, scarcity & bad management of greenery spaces
	4- Loneliness, disaggregation, racism, dissatisfaction, difficulties for integration (Dutch language)
	5- Sustainability unawareness and ignorance
POTENTIALS IMPROVEMENTS (what):	
	1- Boost employment (local economy)
	2- Cohesion and integration through employment opportunities, talent's improvement possibilities...
	3- Satisfaction regarding air purification, experience through 5 senses.
	4- Cohesion, participation, integration, connectivity
	5- Climate awareness & education, recyclability and reduction of waste, learning innovations... (sense of commitment, responsibility and positive feeling)







SQUARE:

		Safety
		Greenery
		Cohesion & integration

LIDL CAFETERIA:

		Climate awareness & innovation
		Local employment
		Cohesion & integration

GREENHOUSE:

		Local employment
		Cohesion & integration
		Climate awareness & innovation

FOOD FLOWS:

60 %



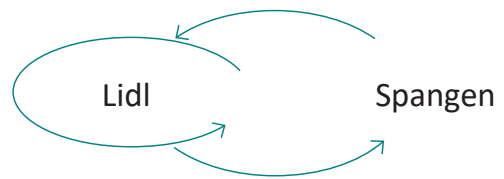
WATER FLOWS:

35 %



AIR FLOWS:

4 %



BEFORE:

AFTER:

Neighbourhood (N)
Lidl (L)

· SDG 2: Zero hunger	N, L	· SDG 2: Zero hunger	N, L
· SDG 3: Good health & well-being	N	· SDG 3: Good health & well-being	N, <u>L</u>
· SDG 4: Quality education	N	· SDG 5: Gender equality	N, <u>L</u>
· SDG 5: Gender equality	N	· SDG 6: Clean water & sanitation	<u>N, L</u>
		· SDG 7: Affordable & clean energy	L
		· SDG 8: Decent work & economic growth	<u>L</u>
· SDG 10: Reduced inequalities	N	· SDG 10: Reduced inequalities	N, <u>L</u>
· SDG 11: Sustainable cities & communities	L	· SDG 11: Sustainable cities & communities	<u>N</u> , L
· SDG 12: Responsible consumption & production	N	· SDG 12: Responsible consumption & production	N, <u>L</u>
· SDG 13: Climate action	N, L	· SDG 13: Climate action	N, L
· SDG 14: Life below water	N	· SDG 14: Life below water	N, <u>L</u>
· SDG 15: Life on land	N	· SDG 15: Life on land	N, <u>L</u>
· SDG 17: Partnership for the goals	L	· SDG 17: Partnership for the goals	<u>N</u> , L

- 1 or 2 rooftops
- Wider Lidl refurbishment
- Intensive food production
- Water collection surface

- Financial feasibility
- Relation to the rest of flows
- Food production variety & competitiveness
- Social activity
- Other circular routes
- On-site biodigester
- Decentralization

- FW rules & regulations
- Livestock & crop production
- Flows calculations
- Air flows
- SDGs
- Covid-19 effects
- Top roof structure

Q & A

Thank you