



Mix to the Max, or Max to the Mix?

*Research by design into how spatial qualities and characteristics shape the future
of mixed-use business parks in the Province of South-Holland*

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Theme | 'How will we live together?'

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Overbevolking is wél een probleem



Klaar voor de start? Af. Als starter een koopwoning zoeken voelt op de huidige woningmarkt soms als meelopen in een race. Om te winnen moet je een lange adem én diepe zakken hebben, plus een enorm deelnemersveld achter je laten.

Positie van koopstarter: niet dramatisch, wel lastig



KIJKEN, KIJKEN NIET KUNNEN KOPEN

Bevolkingsgroei vooral in de Randstad



Bevolking eerste negen maanden van 2022 fors gegroeid door immigratie

Verder constateert het CBS dat het aantal geboortes in de eerste negen maanden is afgevlakt. Vorig jaar was er nog sprake van een 'coronababyboom' - er werden in tien jaar niet zo veel baby's geboren als vorig jaar - maar aan die groei lijkt nu een einde gekomen te zijn. Tegelijk was de sterfte naar verhouding hoog.

Gezocht: ruimte voor nieuwe industrie

Meer ruimte voor makers graag, maar waar?



Er is veel meer nodig om grondstofverspilling in de Nederlandse economie tegen te gaan. In 2030 moet eigenlijk de helft van de voor de Nederlandse economie gebruikte grondstoffen worden gerecycled, in 2050 moet de economie helemaal circulair zijn. Dat concludeert het Planbureau voor de Leefomgeving (PBL) in een nieuw rapport.

'Overheid moet meer doen om verspilling grondstoffen tegen te gaan'

Ruimte voor bedrijventerreinen: topprioriteit voor next economy

Grondstoffen vaker, intensiever en langer gebruiken vermindert de genoemde milieuproblemen en kan de leveringszekerheid van grondstoffen verbeteren



Figure 1: Drivers of change causing spatial pressure between residential and industrial functions (Tong, 2018; Stec groep, 2022; Jager, 2022, Hill et al., 2020; Freepik, n.d.; NOS op 3, 2017; Davidson, 2016; NOS nieuws, 2022; NOS nieuws, 2021; Binnenlands bestuur, 2019; Conijn, 2020; Agrivest, n.d.)

Where can this find place in already densely populated the Province of South-Holland?

- Reserach locations
- Environmental factor:
 - 3
 - 4
- A12 High way



Figure 2: A12 functioning as the spine of the business parks that are essential according to the Province of South-Holland
(Scale 1:200000, 50% reduced. Based upon IBIS dataset, edited by author)

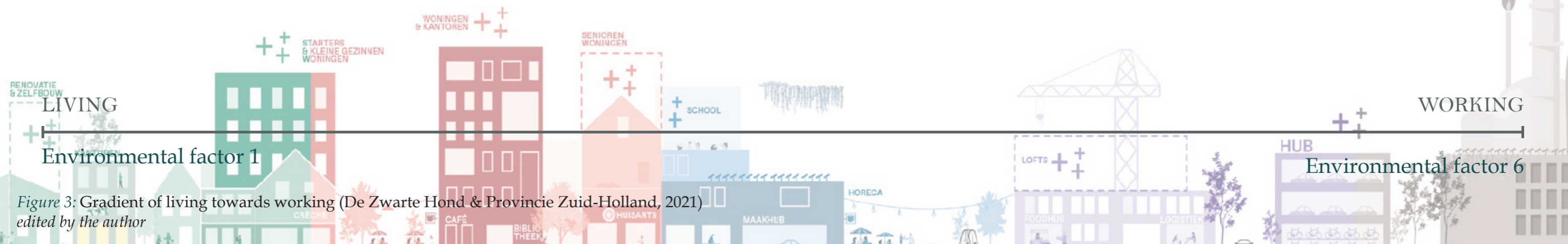
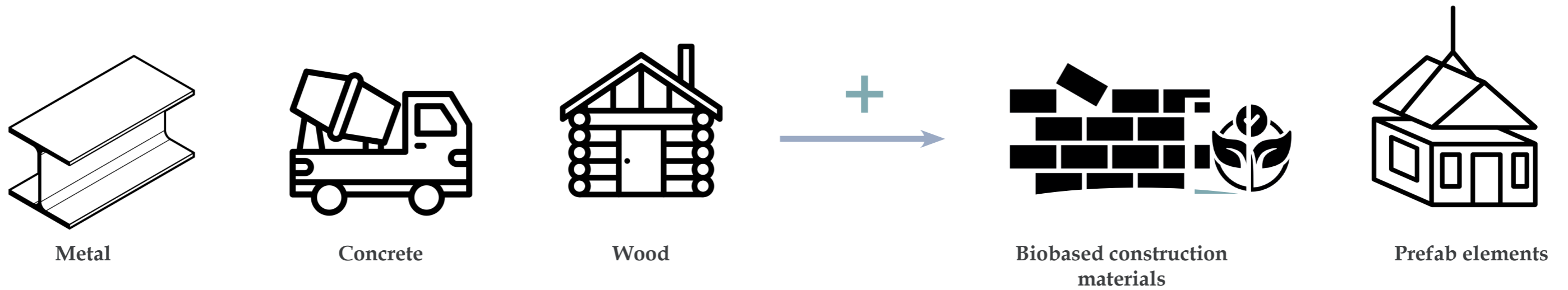


Figure 3: Gradient of living towards working (De Zwarte Hond & Provincie Zuid-Holland, 2021)
edited by the author

What is the future of the business ecosystem with a focus on construction materials?



(RTL nieuws, 2021; Worldsteel association, n.d.)



(Van Wijnen groep, n.d.; Stichting Bouwtuin, 2021)

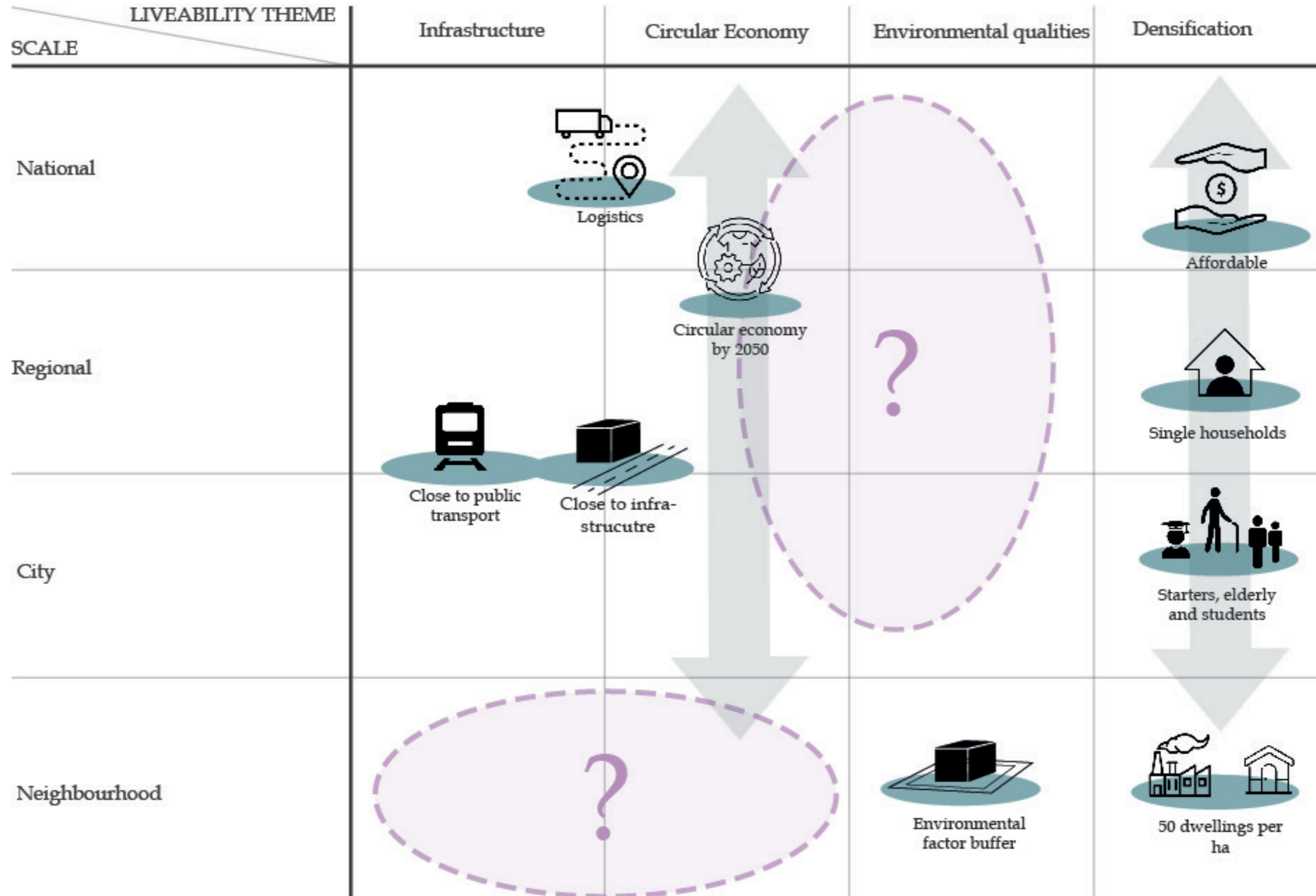


Figure 4: Currently lacking policy framework at topics like circular economy and liveability at business parks

MAIN RESEARCH QUESTION:

How do spatial qualities and characteristics of business ecosystems with a focus on construction materials shape the future possibilities of mixed-use business parks in the Province of South-Holland by 2050?

sub question 1

What different mixed-use strategies are there and how could they be applied in the Province of South-Holland?

sub question 2

How do spatial requirements frame the liveability of mixed-use business ecosystems with a focus on construction materials?

sub question 3

What spatial preconditions shape a viable circular economy?

sub question 4

How do the wishes and challenges of stakeholders influence the applied mixed-use strategies?

sub question 5

What are future scenarios for mixed-use business parks and construction materials?

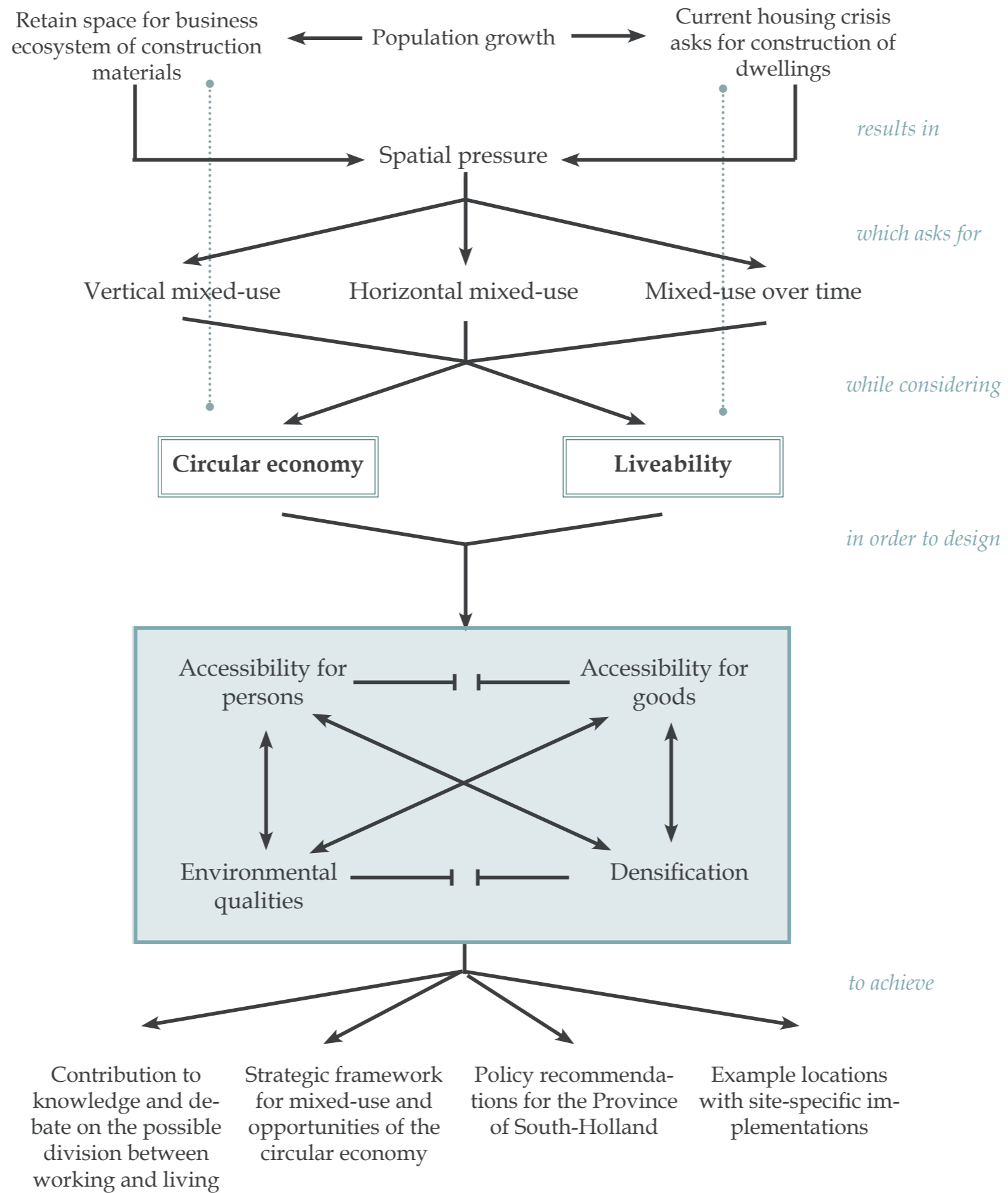


Figure 5: The relationship of concepts forming the structure of this thesis



Figure 6: Network of different business parks serving the economy of the Province of South-Holland (Scale 1:200000. Based upon IBIS dataset, edited by author)

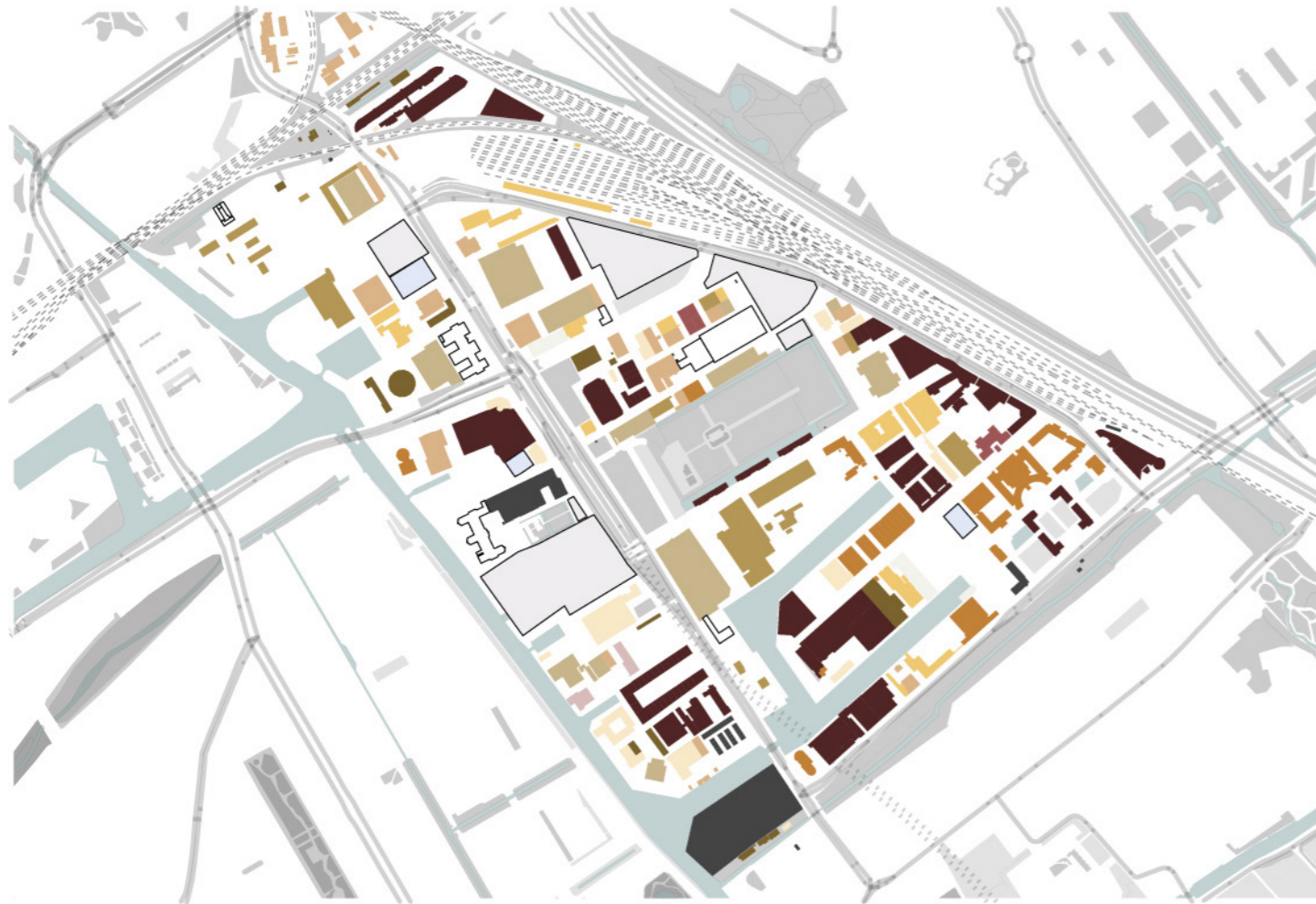


Figure 7: A variation in employment opportunities
(Scale 1:6000, 50% reduced)

- Manufacturing
- Distribution
- Vehicle maintenance
- Offices
- Shop / services
- Storage
- Catering industry
- Multiple companies under one roof
- Education
- Sport
- Vacancy
- Transformation



Figure 8: Binckhorst close to dense city centre which offers a lot of functions
(Scale 1:20000, 50% reduced. Data set: Urban Atlas 2018)

- Greenry
- Industrial
- High density
- Medium density
- Low density
- Very low density



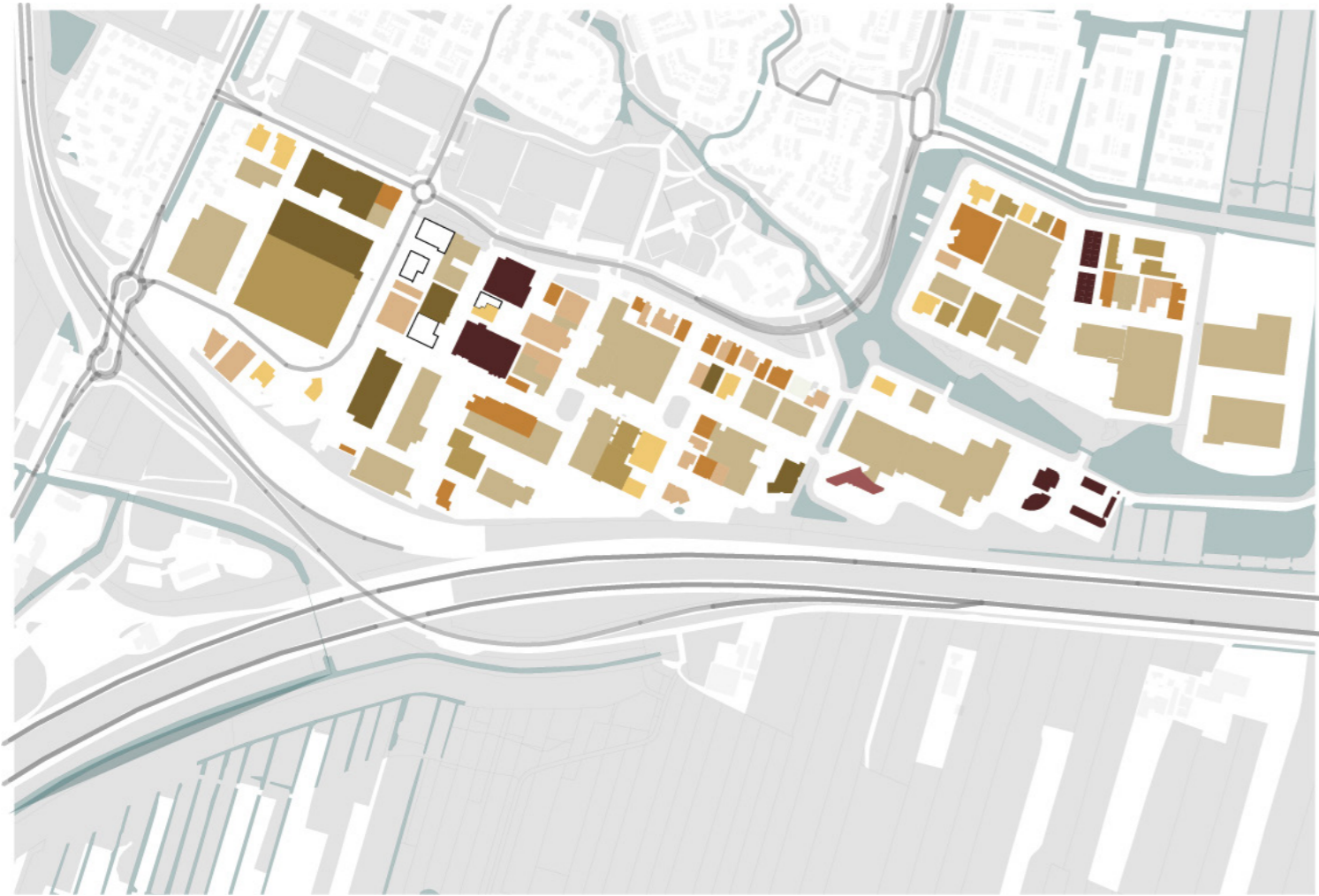


Figure 9: Broekvelden with the expertise of distribution
(Scale 1:6000, 50% reduced)

- Manufacturing
- Distribution
- Vehicle maintenance
- Offices
- Shop / services
- Storage
- Catering industry
- Multiple companies under one roof
- Education
- Sport
- Vacancy
- Transformation



Figure 10: Broekvelden separated from low density residential area
(Scale 1:20000, 50% reduced. Data set: Bestand Bodemgebruik 2017)

- Greenry
- Industrial
- High density
- Medium density
- Low density
- Very low density





Figure 11: Smooth gradient from disruptive businesses towards residential area (Scale 1:6000, 50% reduced)

- Manufacturing
- Distribution
- Vehicle maintenance
- Offices
- Shop / services
- Storage
- Catering industry
- Multiple companies under one roof
- Education
- Sport
- Vacancy
- Transformation

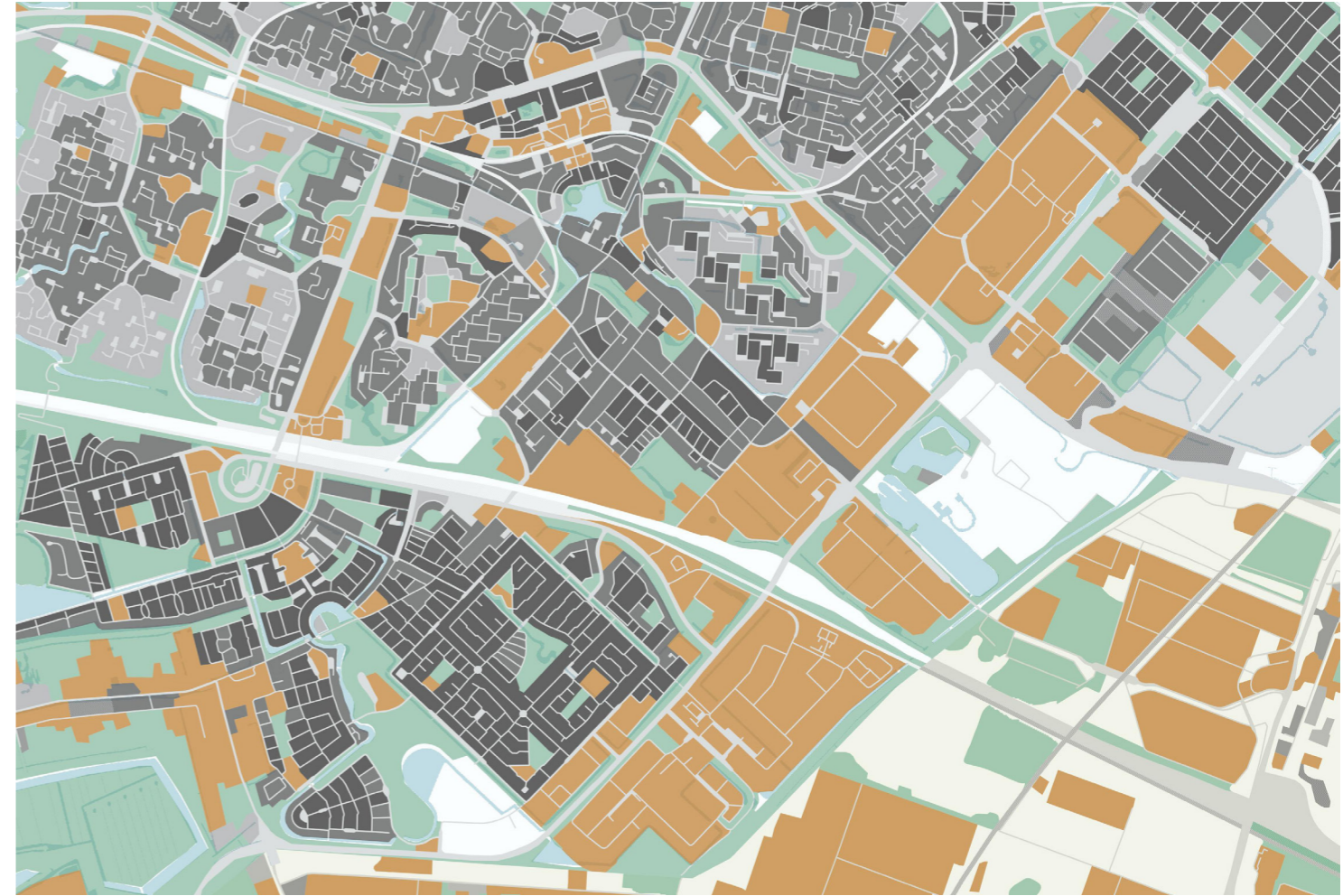


Figure 12: Lansinghage surrounded by industry and dense urban fabric (Scale 1:20000, 50% reduced. Data set: Urban Atlas 2018)

- Greenry
- Industrial
- High density
- Medium density
- Low density
- Very low density



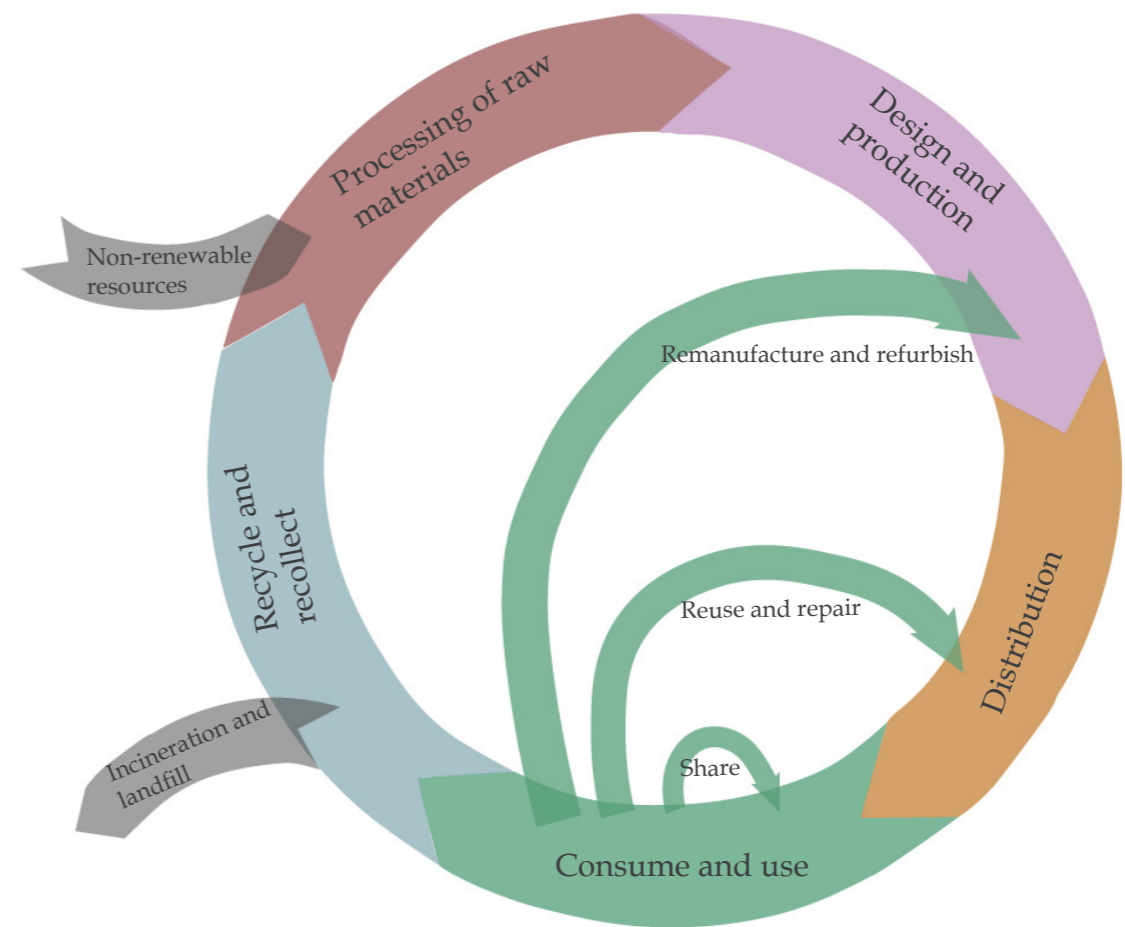
Liveability



Main theories:

- 1] Mastura, Ab Ghafar, Ahmed, and Keumala (2017) : *A Systematic Review on City Liveability Global Research in the Built Environment: Publication and Citation Matrix.*
- 2] Easton, Saldais, Dumovic, Carrodus, and Machar (2016) : *Chapter 5: Liveable cities.*

Circular economy



Main theories:

- 1 Van den Berghe, Dabrowski, Ersoy & Van Bueren (2019) : *The Circular Economy: a Re-Emerging Industry?*
- 2] Kennedy & Linnenluecke (2022) : *Circular economy and resilience: A research agenda*
- 3] Hill, Croxford, Domenech, Hausleitner, Meijer, Orban, Munoz Sanz, Vanin, & Warden (2020) : *Foundries of the Future: a guide to 21st century cities of making*
- 6] Verga & Khan (2022) : *Space Matters: Barriers and Enablers for Embedding Urban Circularity Practices in the Brussels Capital Region.*

1. What places are assigned to business due to environmental factors and produced nuisances?

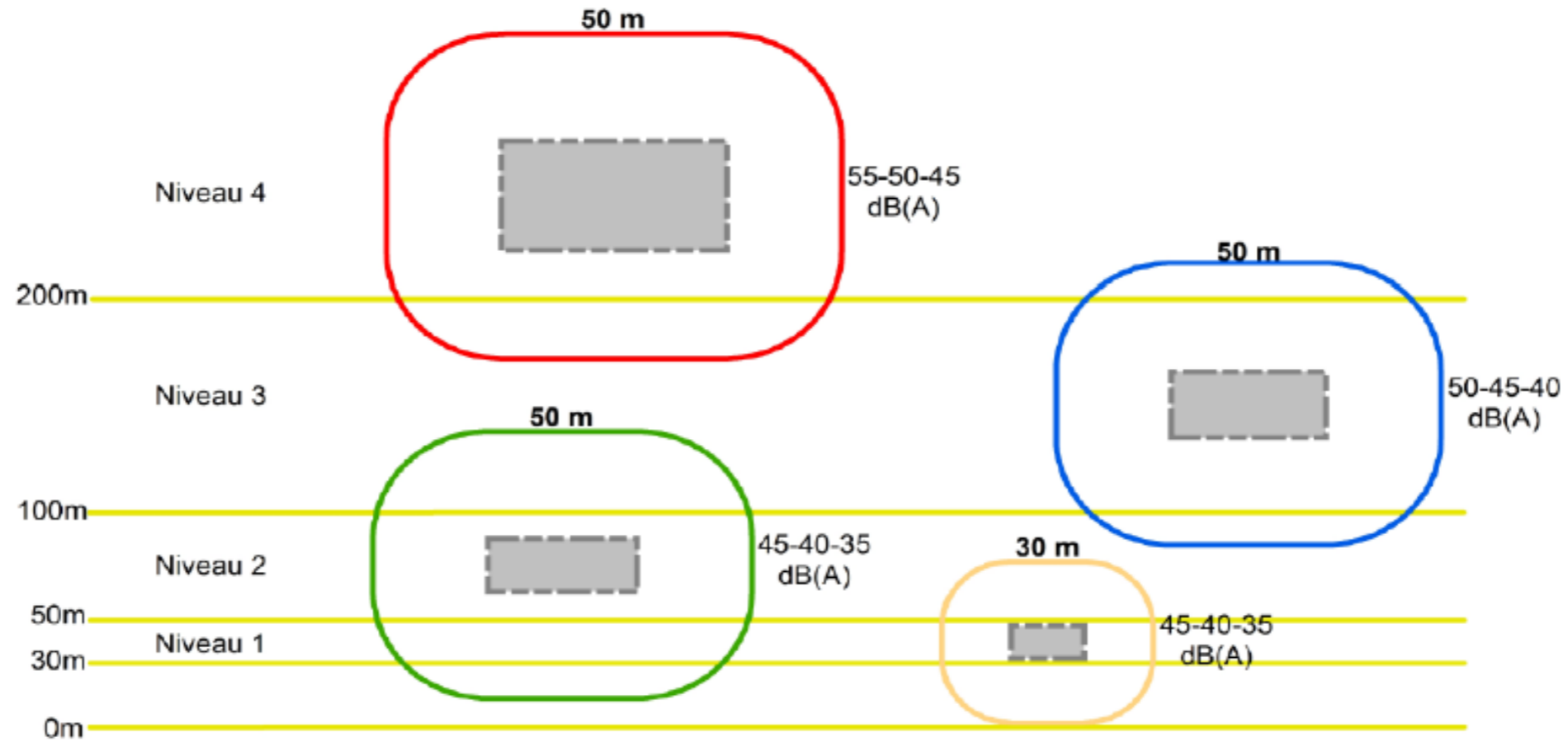


Figure 13: Different distances from industries to protect living environment and development areas industrial processes (Vereniging Nederlandse Gemeente, 2019)

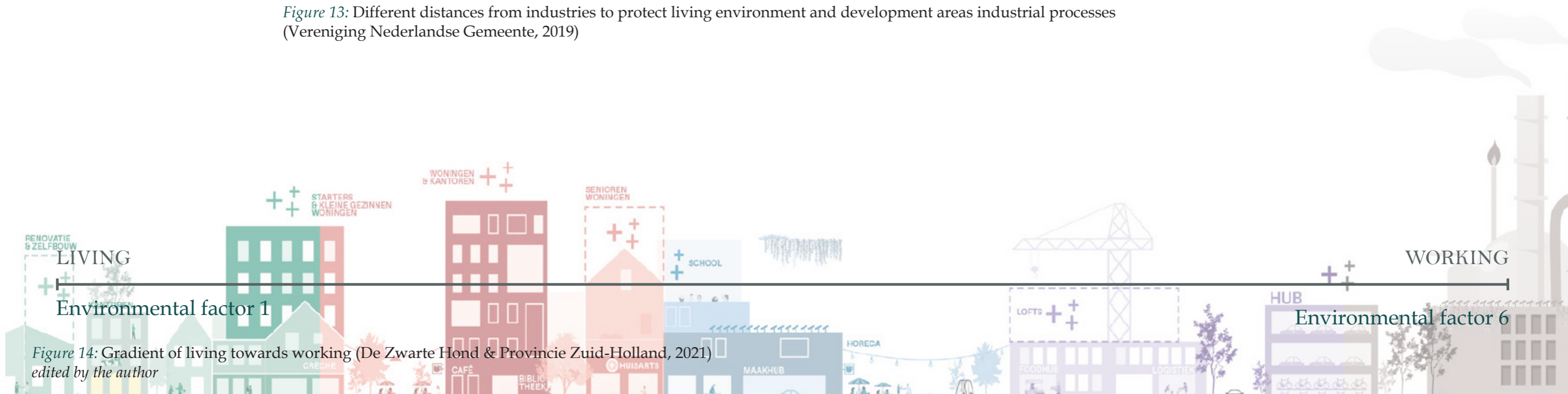






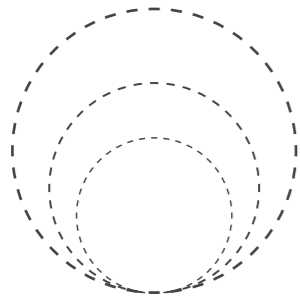


Figure 14: Gradient of living towards working (De Zwarte Hond & Provincie Zuid-Holland, 2021) edited by the author

-  Manufacturing
-  Distribution
-  Processing
-  Storage
-  Recycling
-  Other (services, office, education)



Environmental buffer:
100, 200 and 300 m

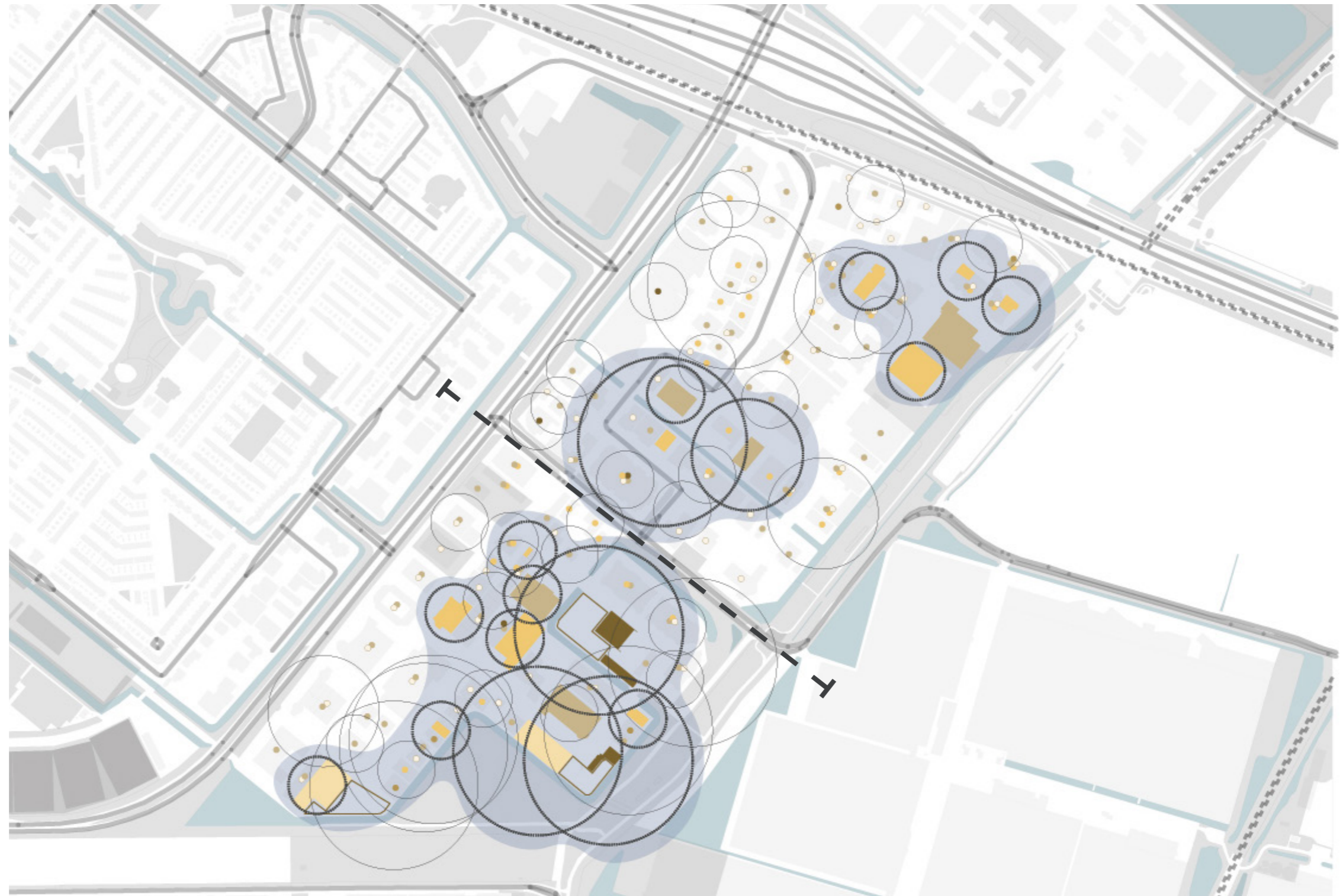


Figure 15: Network of different business parks serving the economy of the Province of South-Holland (Scale 1:200000.. Based upon IBIS dataset, edited by author)

NORTH - MIXED-USE



CIRUCLAR ECONOMY - SOUTH



Figure 16: Atmosphere of the industrial buildings at business park Lansinghage (Fieldtrip 26-09-2022, 27-09-2022 & 28-09-2022)

2. How are the roads used by different vehicles and how does this influence the mixed-use possibilities?



Figure 17: Companies relying on infrastructure designed for transportation via trucks
(Scale 1.6000, 75% reduced)



Figure 18: Infrastructure creating access to companies via the car
(Scale 1.6000, 75% reduced)

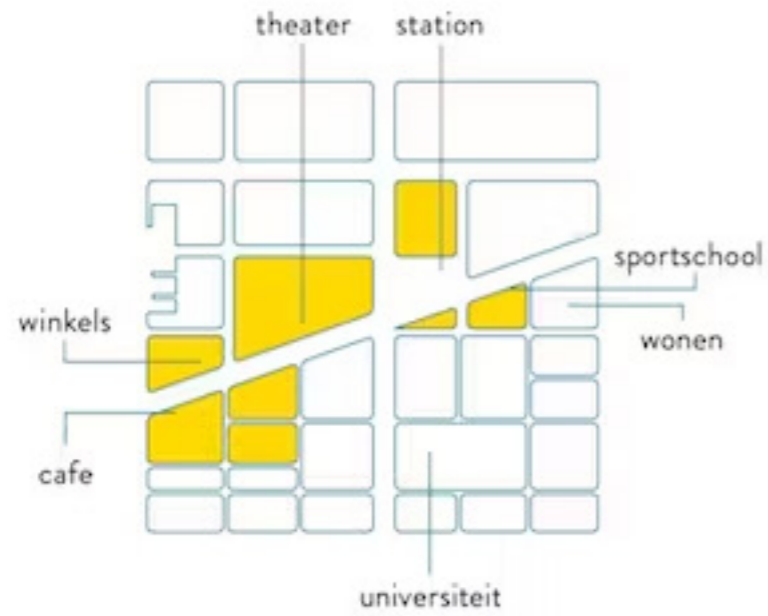


Figure 19: Mismatch between business accessible for slow traffic and the infrastructure supporting this
(Scale 1.6000, 75% reduced)

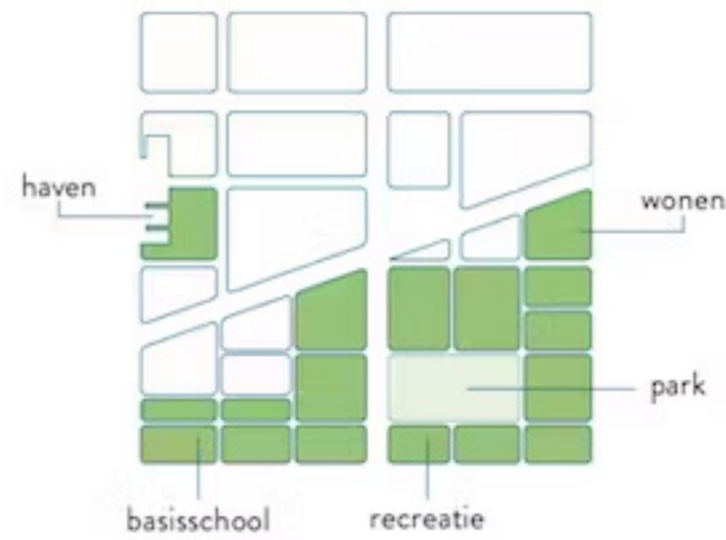


Figure 20: Experimenting with the roadnetwork to create space for other functions

REURING



- RUST -



RUIS

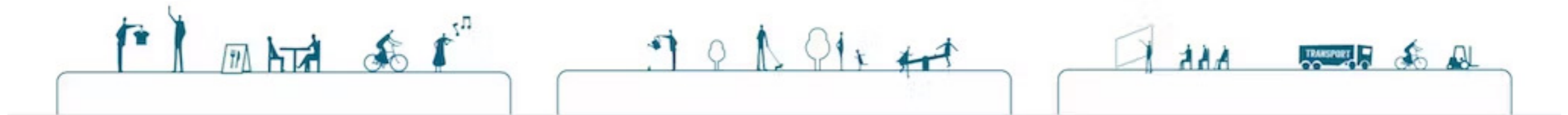
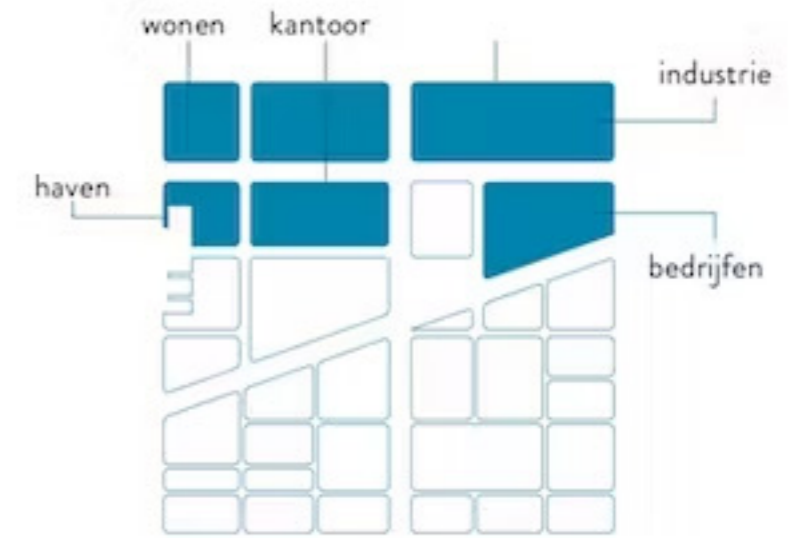


Figure 21: Explanation Rust, Ruis and Reuring theory



Figure 22: Streets that should remain for industry (scale 1.6000, 50% reduced; based upon Ruis)

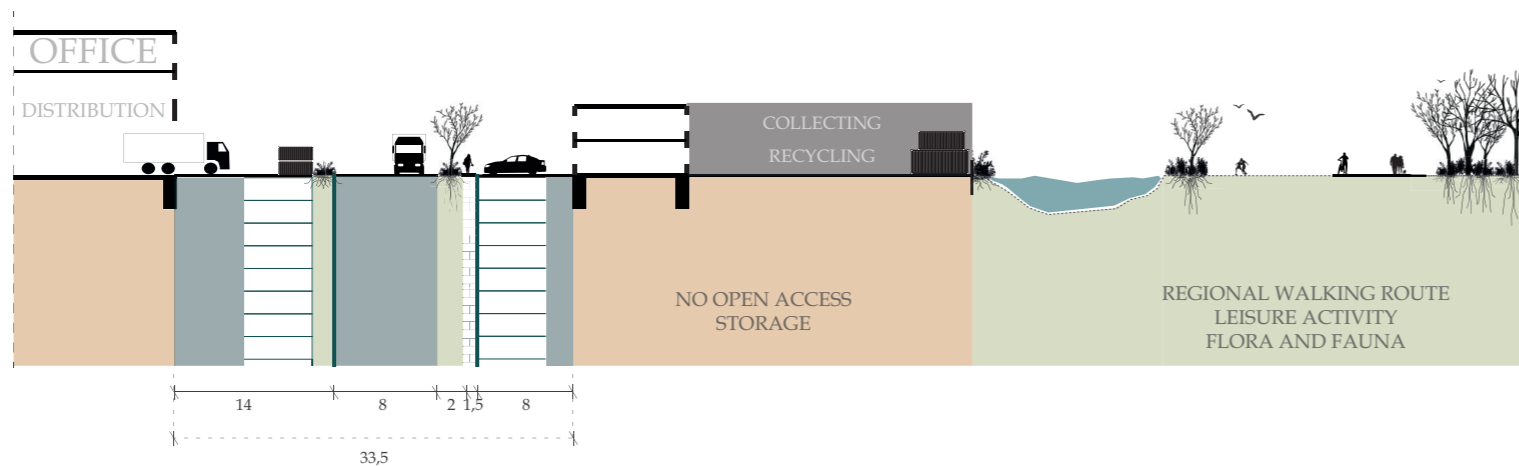


Figure 23: Section A Lansinghage - Industry demanding accessibility of trucks (scale 1.500, 25% reduced)

- Transport via road
- Access or orientation buildings
- Environmental buffer



Figure 24: Lacking in space for trucks to turn (Photo 1, field trip 26-09-2022; photo 2, google earth, 2023)



- Transport via road
- Access or orientation buildings
- Environmental buffer

Figure 25: Infrastructure serving commotion at Lansinghage (scale 1.6000, 50% reduced; based upon Reuring)

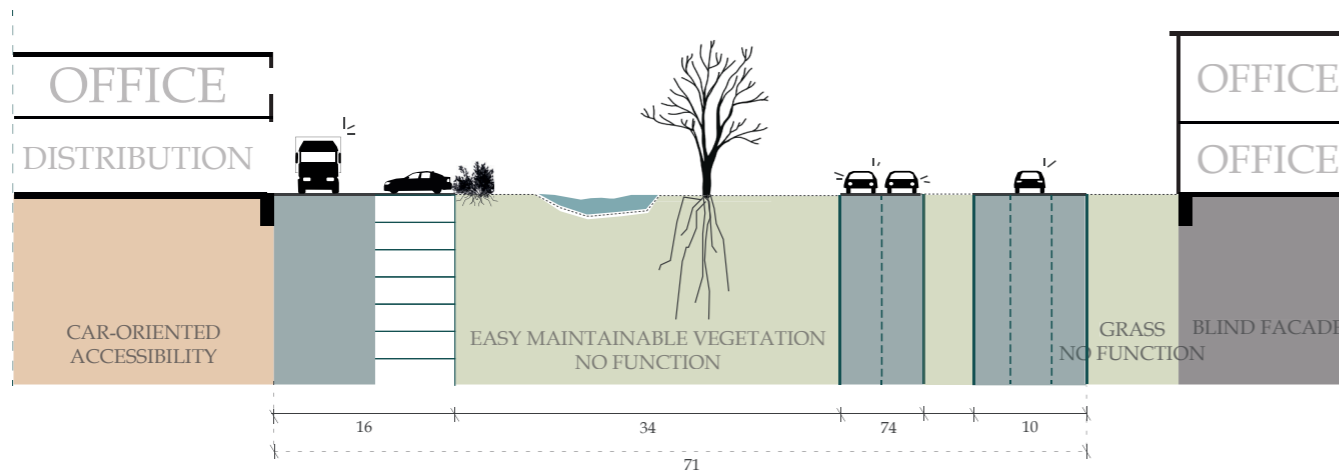


Figure 26: Section B Lansinghage - Lansinghageweg passing through the area (scale 1.500, 25% reduced)



Figure 27: Small businesses with a lot of visitors (Photo 3, field trip 26-09-2022; photo 4, google earth, 2023)



- Transport via road
- Access or orientation buildings
- Environmental buffer

Figure 28: Infrastructure creating opportunities to form a walking network (scale 1:6000, 50% reduced; based upon Rust)

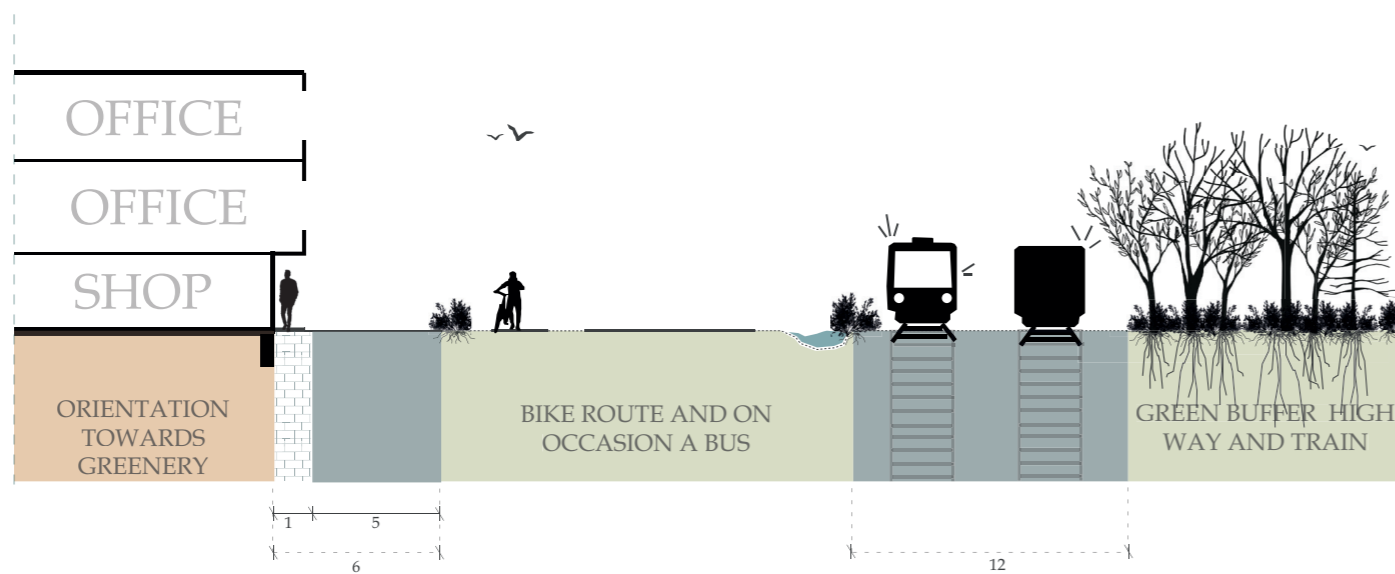


Figure 29: Section C Lansinghage - Mix of different types of vehicles throughout the day (scale 1:500, 25% reduced)



Figure 30: Separated roads from the rest of the business park (Photo 5 and 6, field trip 26-09-2022)

3. How are people attracted to Lansinghage and what needs to be added?



Figure 31: Lack of amenities at Lansinghage
(Scale 1.6000, 75% reduced)

- Restaurants / coffee bar
- Playground
- Leisure activity Transition zone

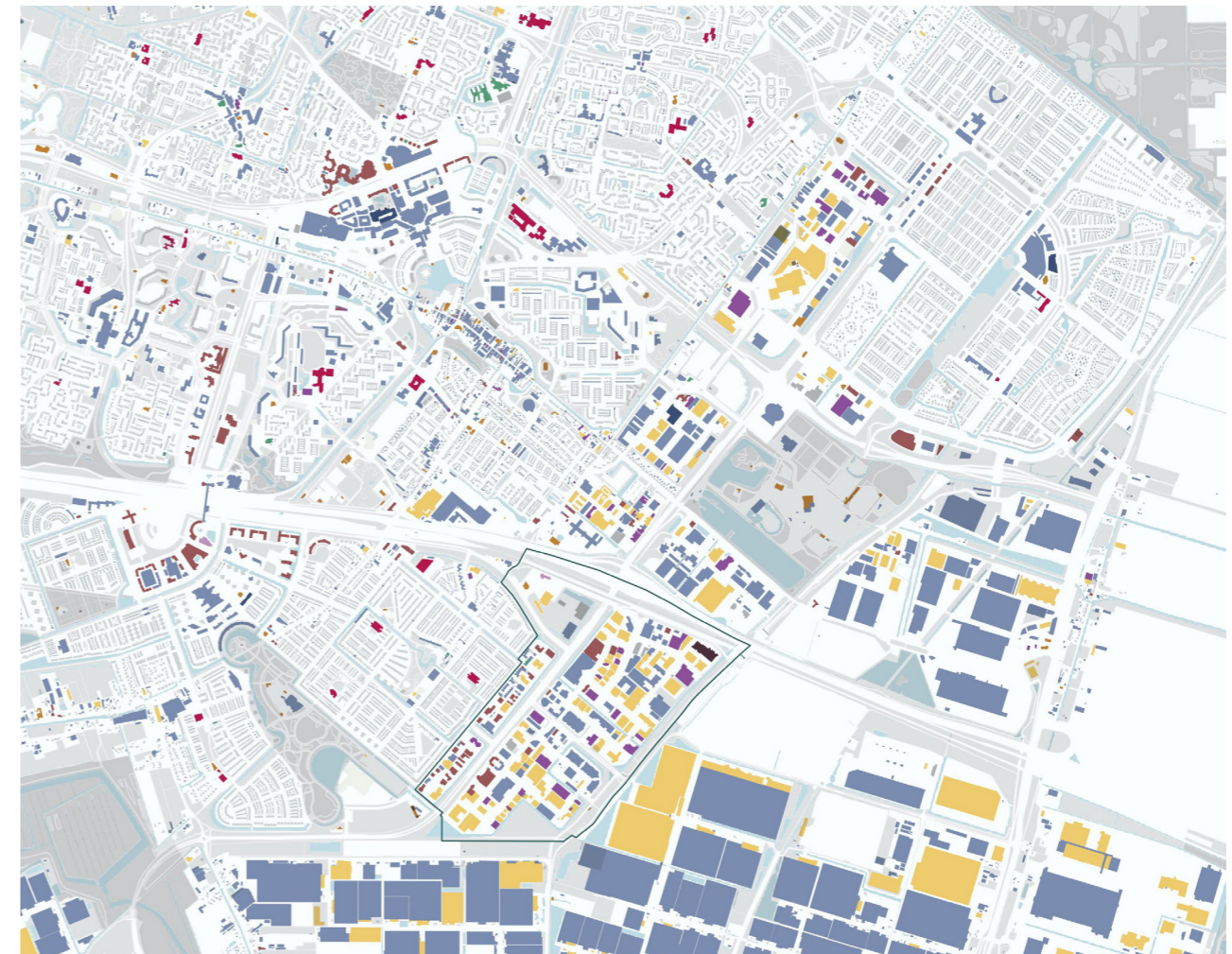


Figure 32: City centre too far away for Lansinghage to benefit from it
(Scale 1.25000, 75% reduced; Based upon data set BAG panden)

- Meeting Place
- Health care
- Industry
- Office
- Accomodation
- Education
- Commercial
- Sport
- Unknown
- Other
- Living



Figure 33: Greenery embracing the business park
(Scale 1:6000, 75% reduced)

- Focus connecting green network
- Surrounding greenery
- Transition zone

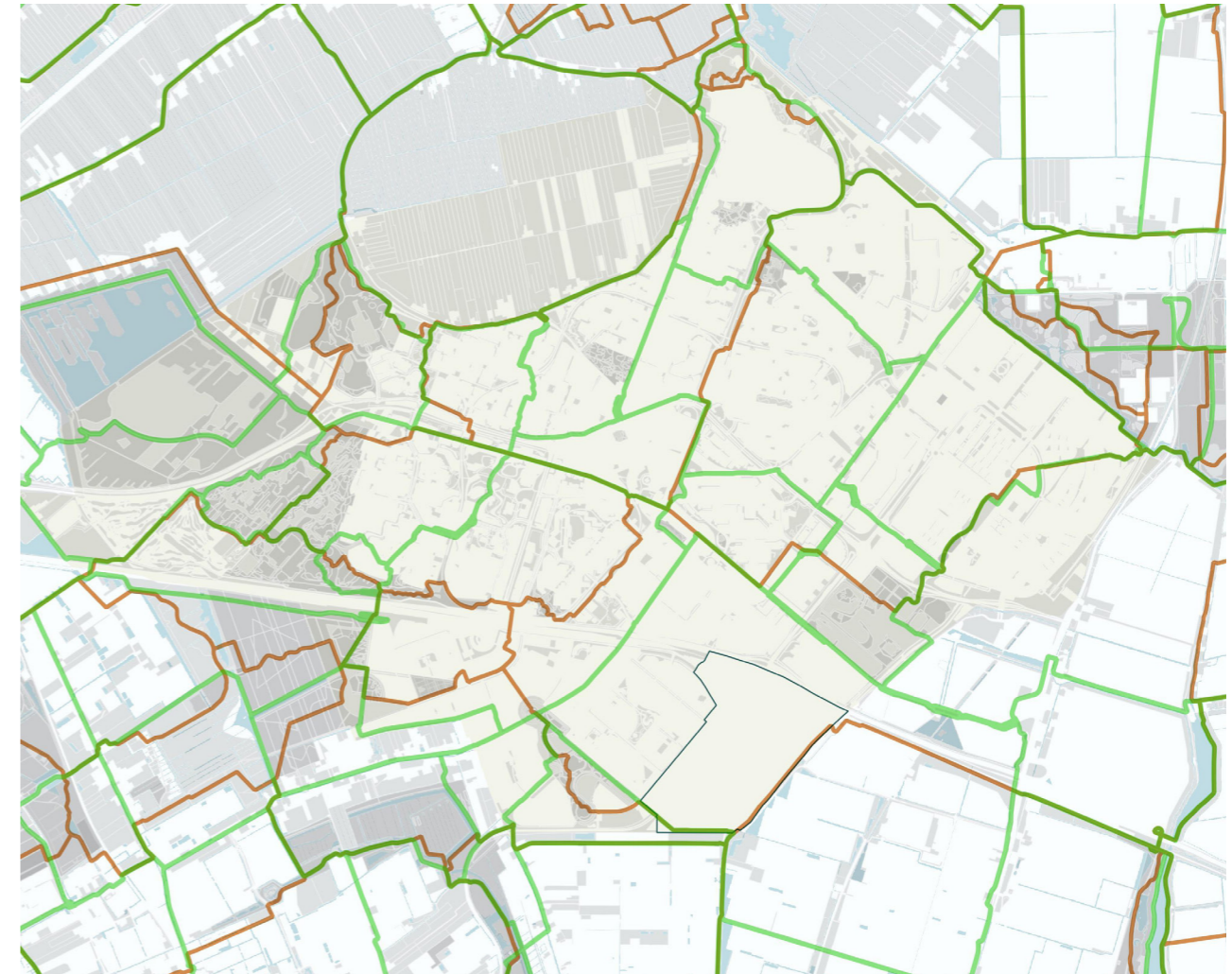


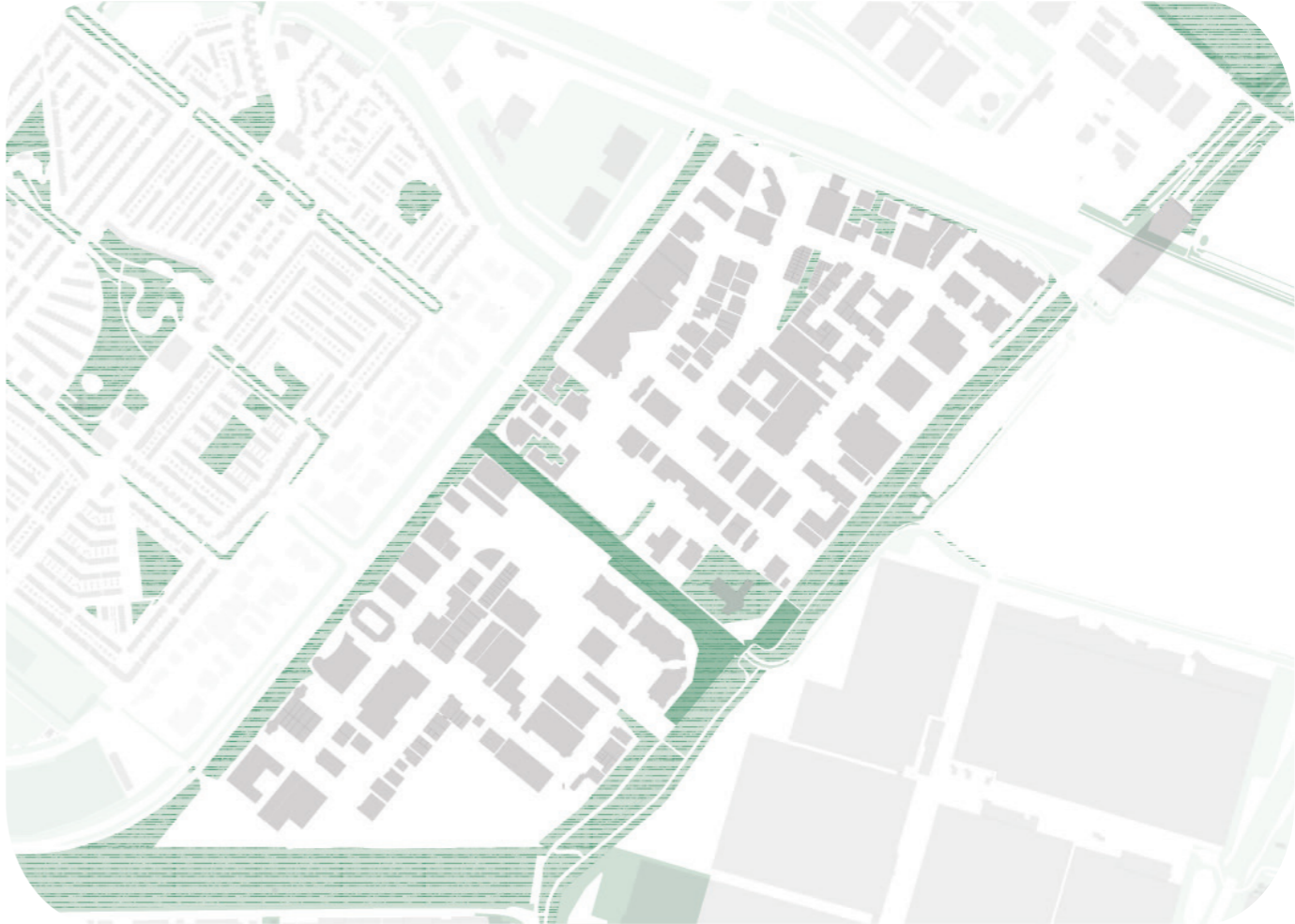
Figure 34: Regional bike and walking routes connecting Lansinghage to rest of the region
(Scale 1:40000, 75% reduced. Based upon data set Wandelnetwerken)

- Green network
- Zoetermeer
- Regional walking routes
- Regional bike routes



What network should remain to facilitate the heavy industry?

- Wide streets connecting businesses to the rest of the region
- Enough space to improve environmental conditions



How could the green structure be strenghtened?

- New road network results in open space for other function
- Park does not only function as a public space but also contributes to climate adaptivity and biodiveristy



What is the opportunity of station Lansingerland?

- Addition to the current network
- Connect with the region via multiple forms of transportation



What roads should become more active?

- Next to dwellings and facilitate slow traffic
- Open doors welcome visitors to look inside at the industrial processes



Where are amenities needed to serve the employees, visitors and residents?

- Serve the future residents, employees and visitors
- Next to circular hub, regional walk and bike routes and added dwellings



What private space do the future residents have?

- No private spaces facilitated yet
- Courtyard only accessible for residents and employees

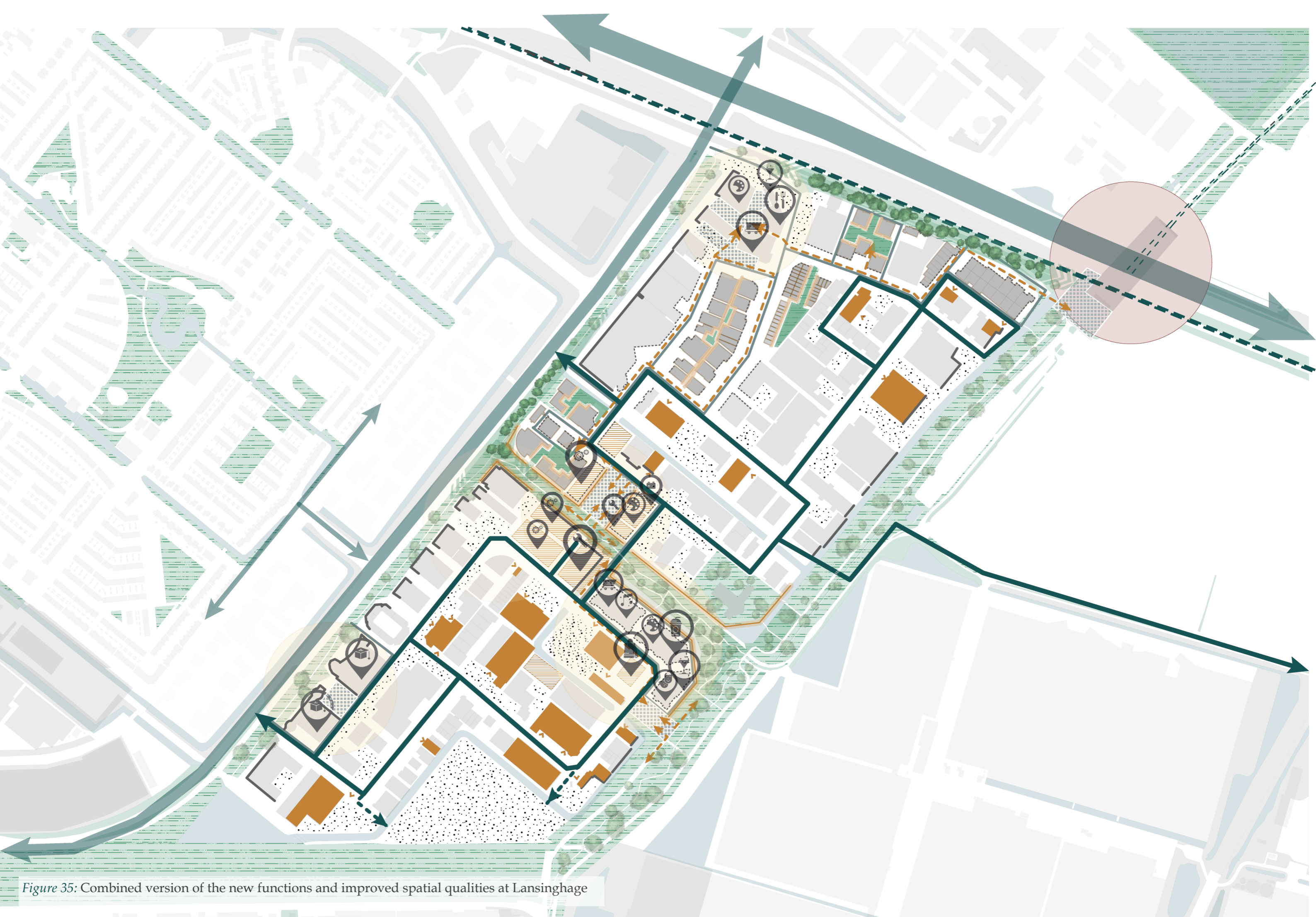


Figure 35: Combined version of the new functions and improved spatial qualities at Lansinghage

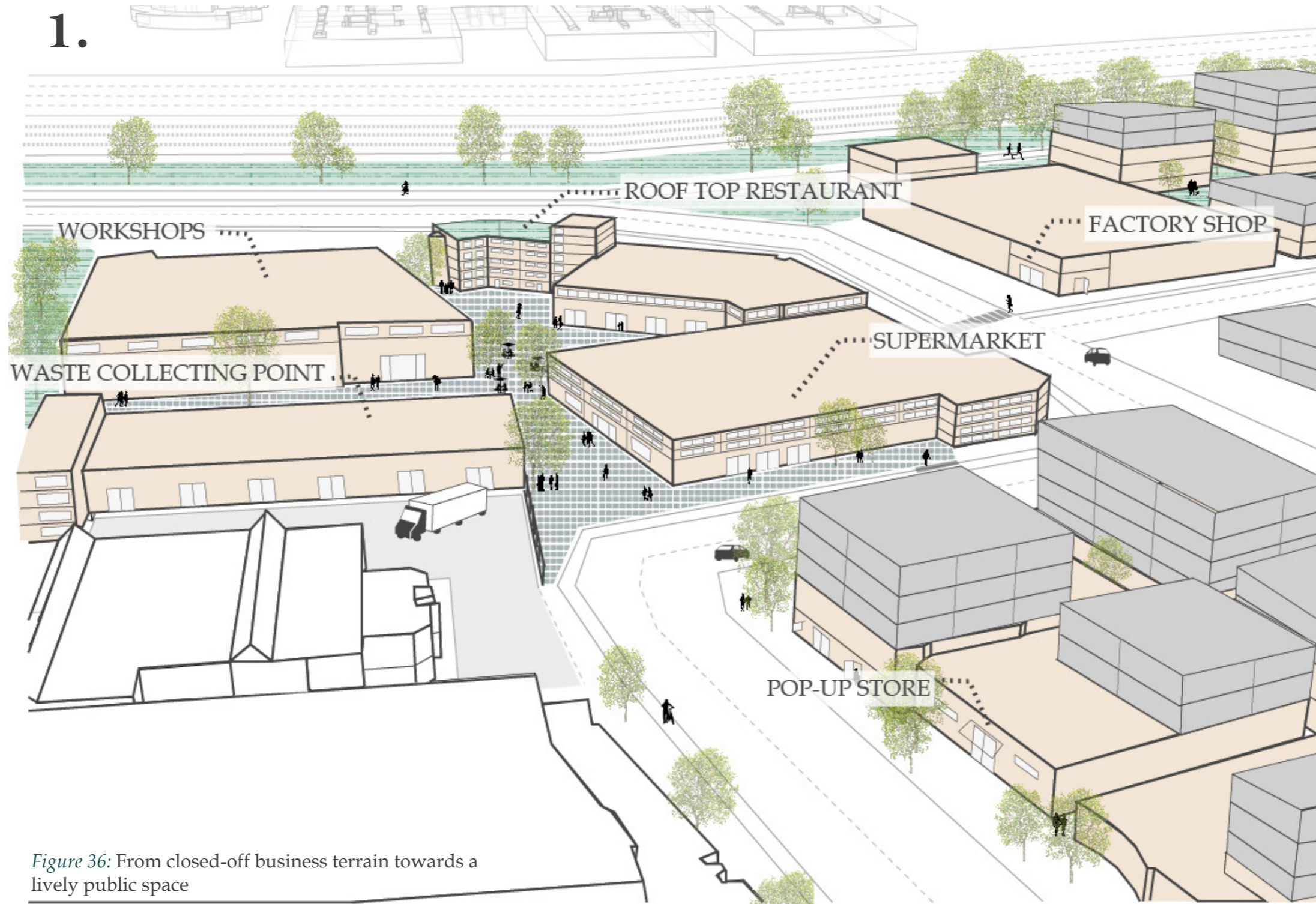
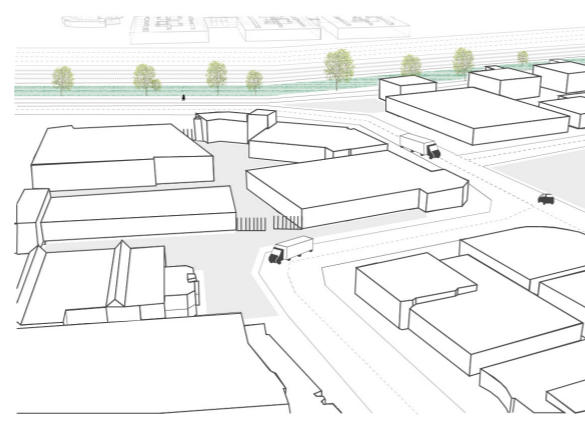
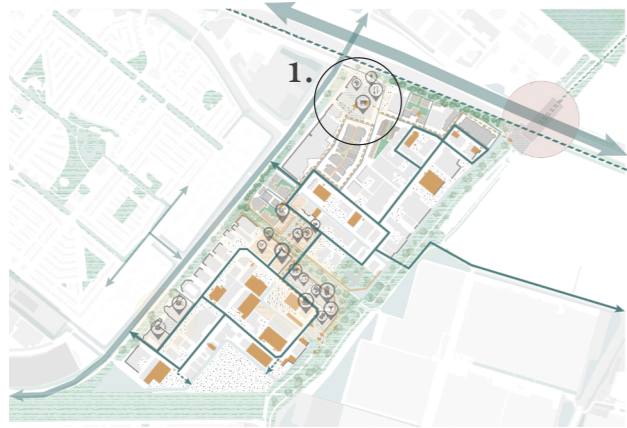
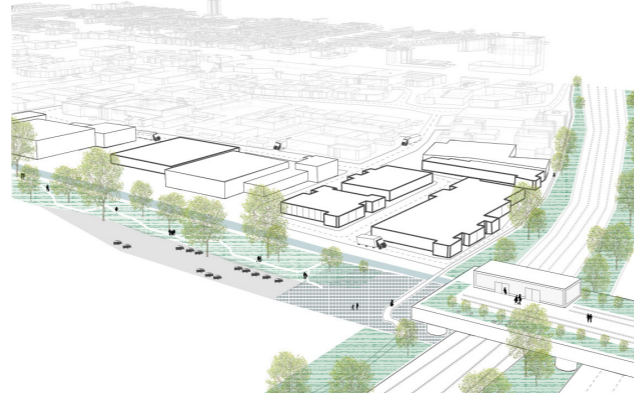
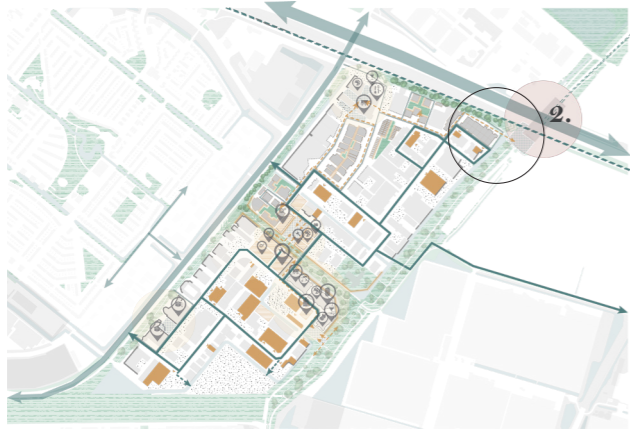


Figure 36: From closed-off business terrain towards a lively public space



2.

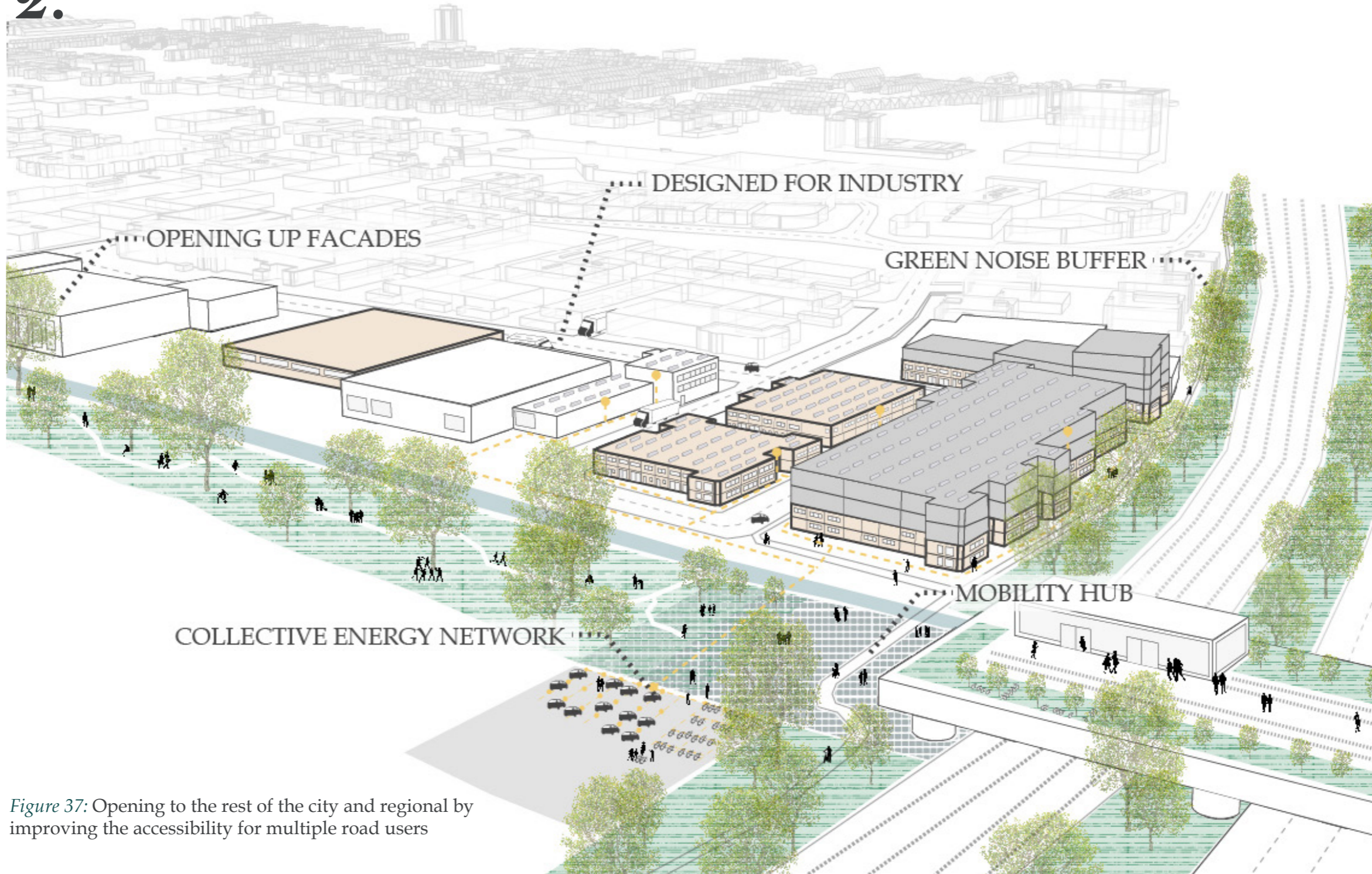


Figure 37: Opening to the rest of the city and regional by improving the accessibility for multiple road users

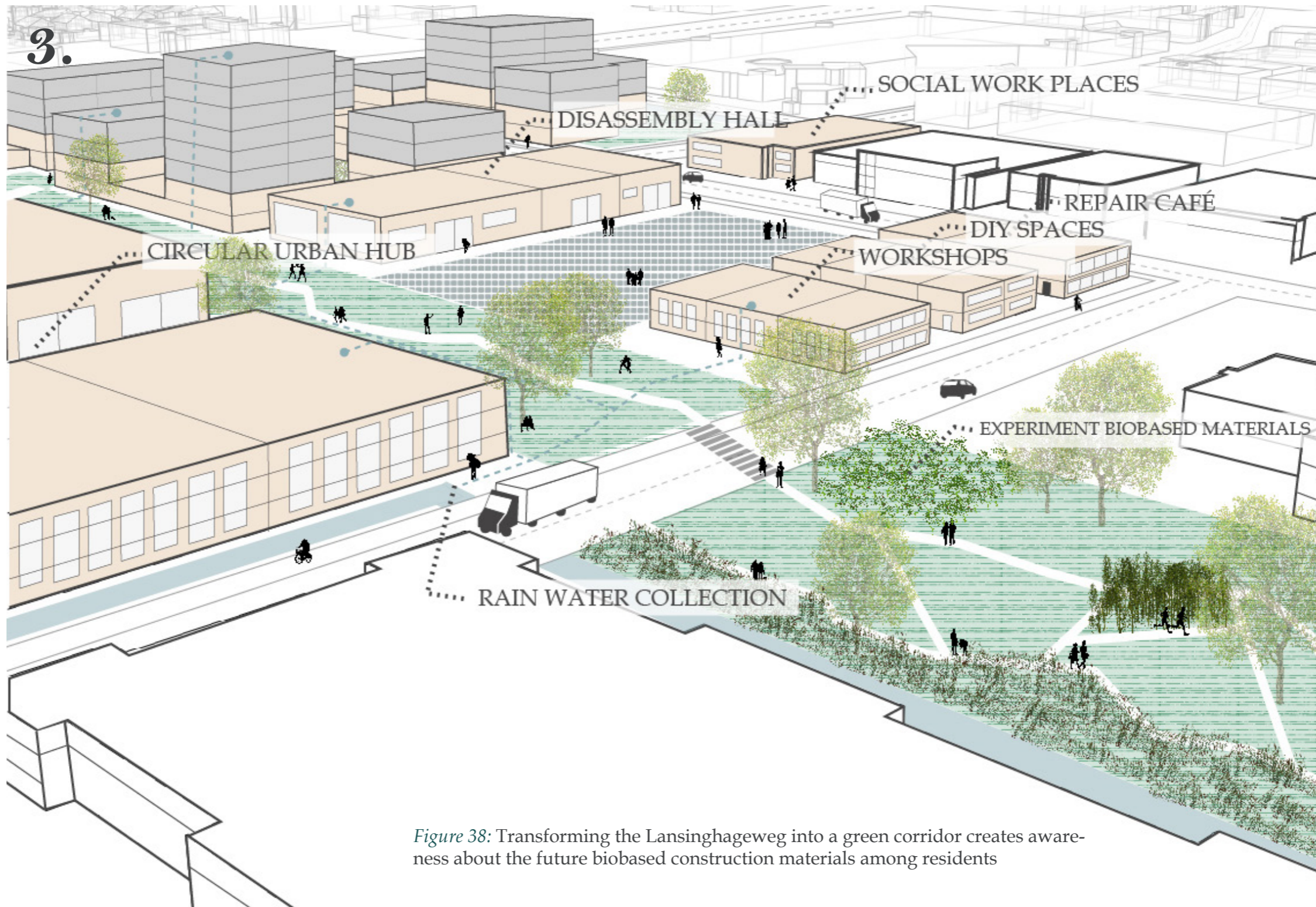
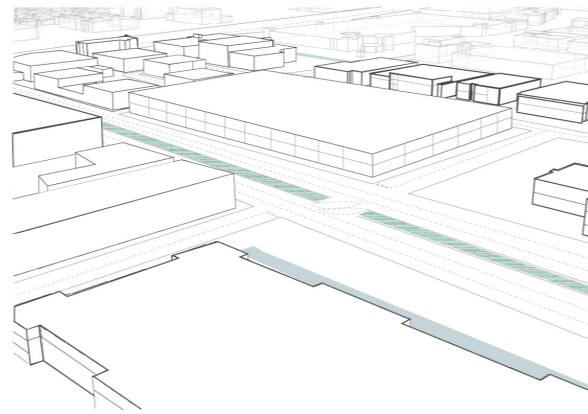


Figure 38: Transforming the Lansinghageweg into a green corridor creates awareness about the future biobased construction materials among residents



Reference case: Merwedekanaalzone Utrecht

The park ensures the green anchoring of the new city district with its surroundings. The favourable location of the new centre of Utrecht makes it an ideal testing ground for innovative mobility concepts and provides a high-quality public space. Furthermore, the water system can be linked to the park to make it climate adaptive as well.

Figure 40: Unknown, n.d.

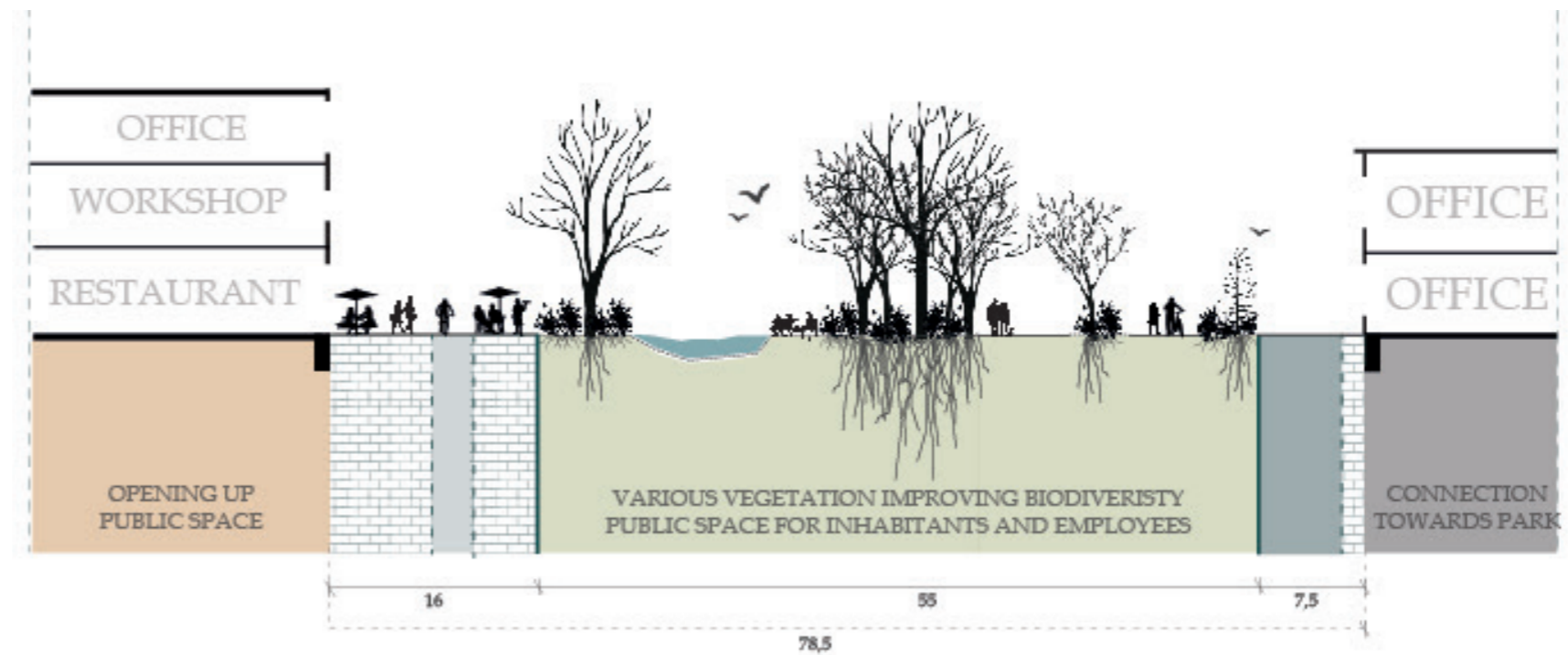


Figure 39: Creating a public space from instead of a major thoroughfare (Scale 1.500)

- Zone 1: Primary working at disruptive industries
- Zone 2: Public industries forming gradient between working and living
- Zone 3: Mixed-use
- Zone 4: Green corridor

- Merging roads
- Roads assigned for industries
- Roads assigned for mixed-use
- Roads assigned for slow traffic

- Active facades
- Attractive facades
- Orientation entrances for trucks



Figure 41: Zones described by the 'kavelpaspoort'

Set of rules 1:

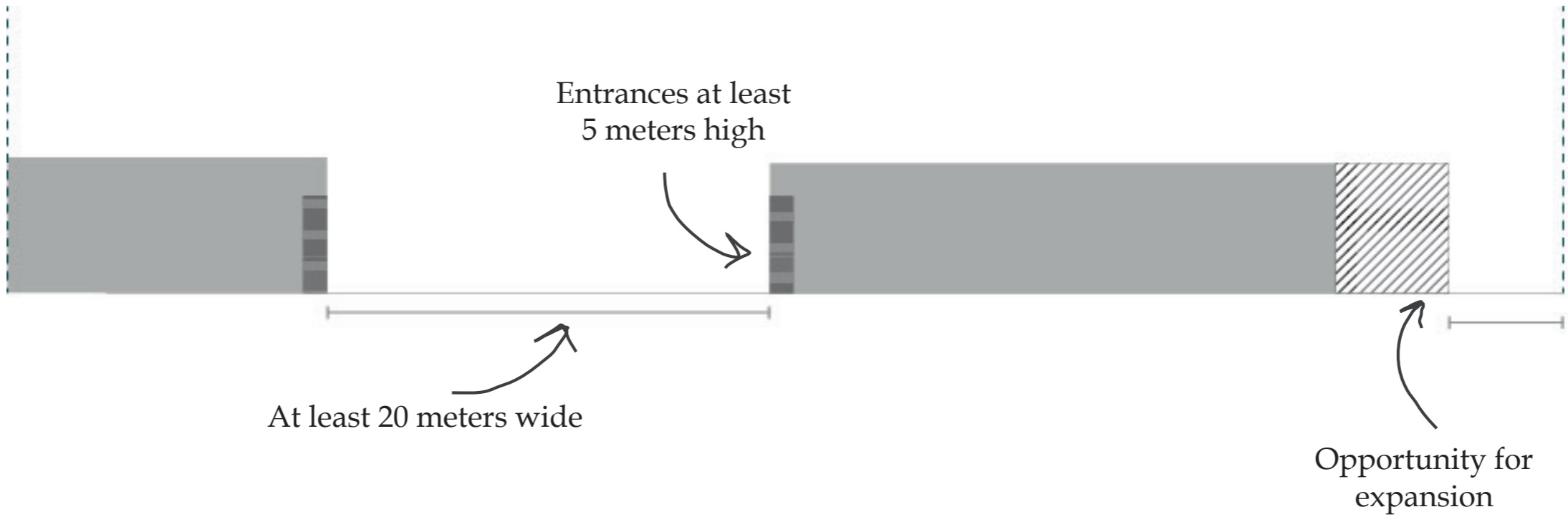


Figure 42: Primary industrial working area

Set of rules 2:

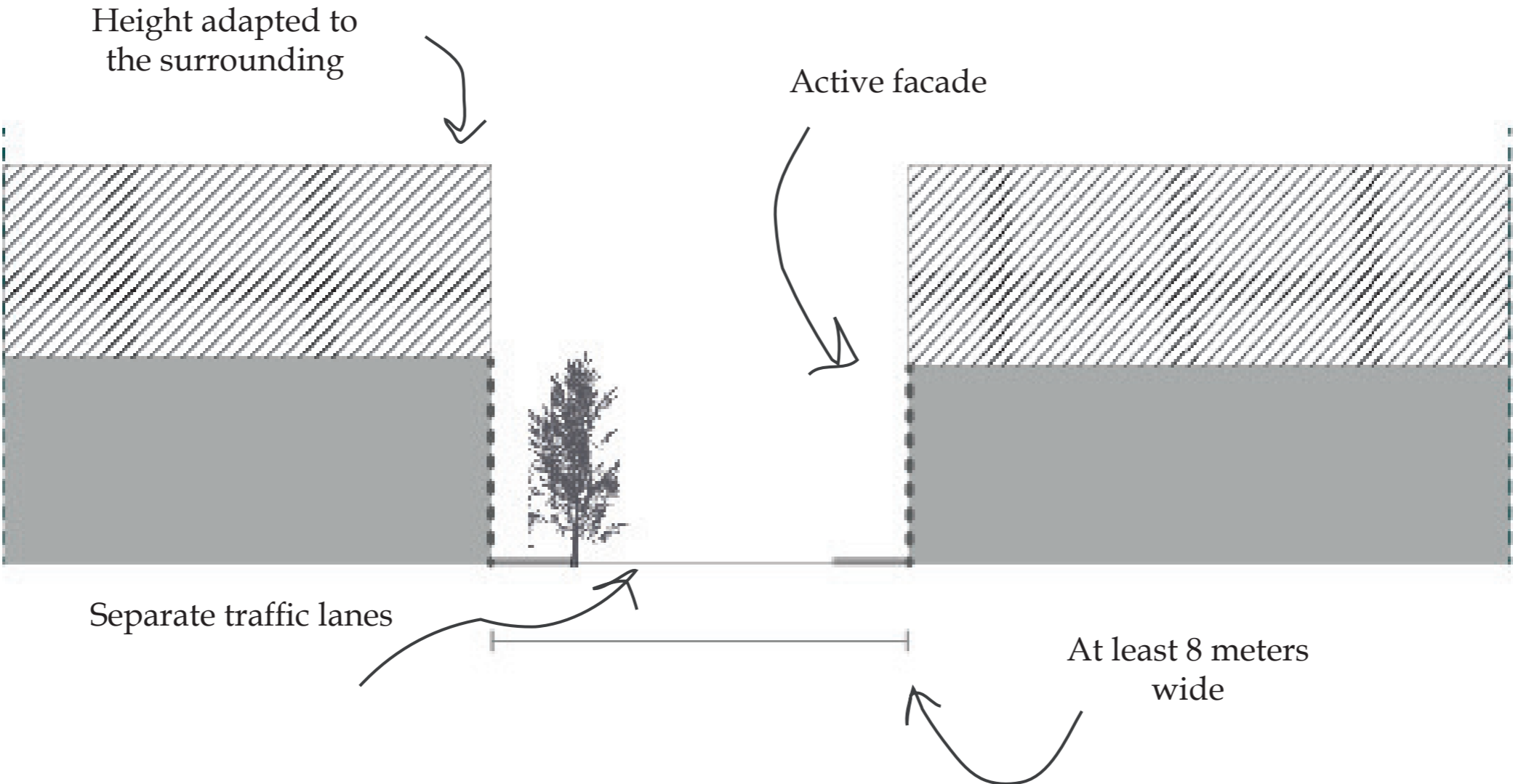


Figure 43: Mixed-use strategies causing new streets

Set of rules 3:

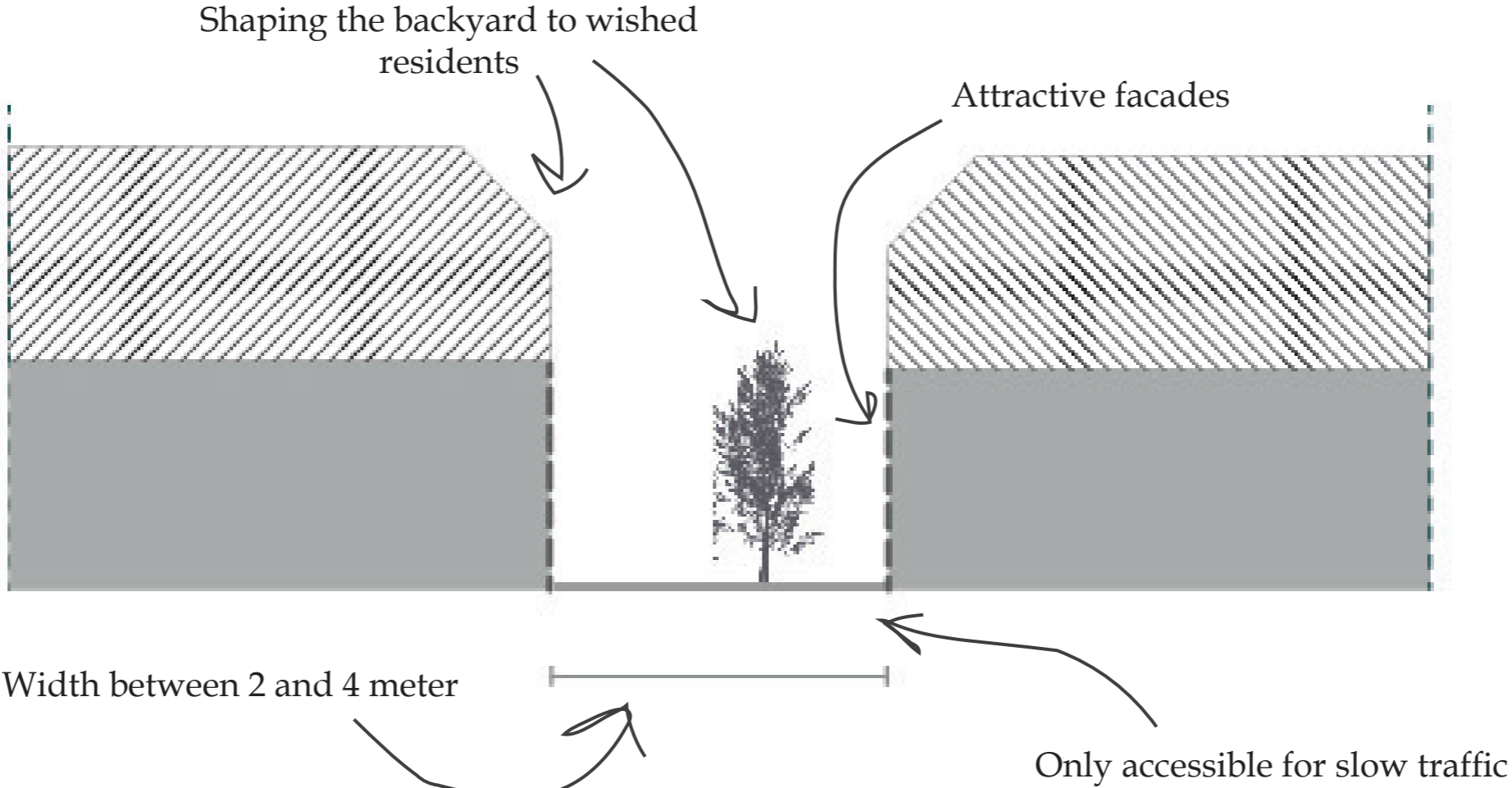
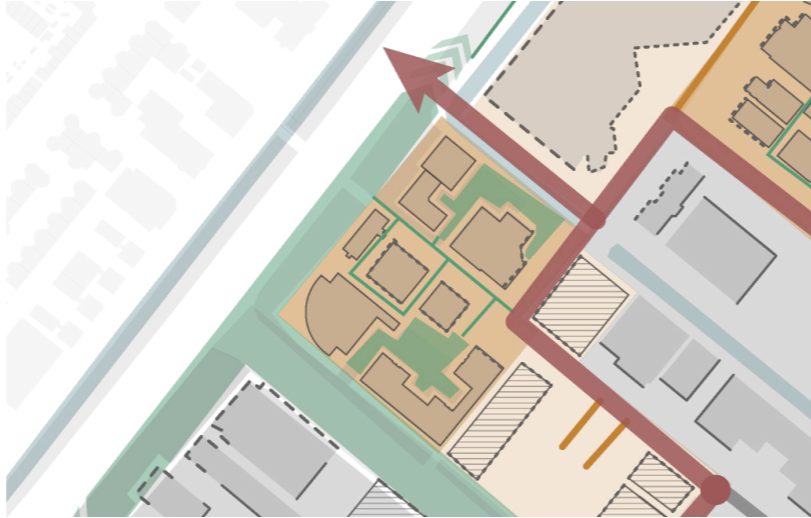


Figure 44: Private backyard of added dwellings

Set of rules 4:

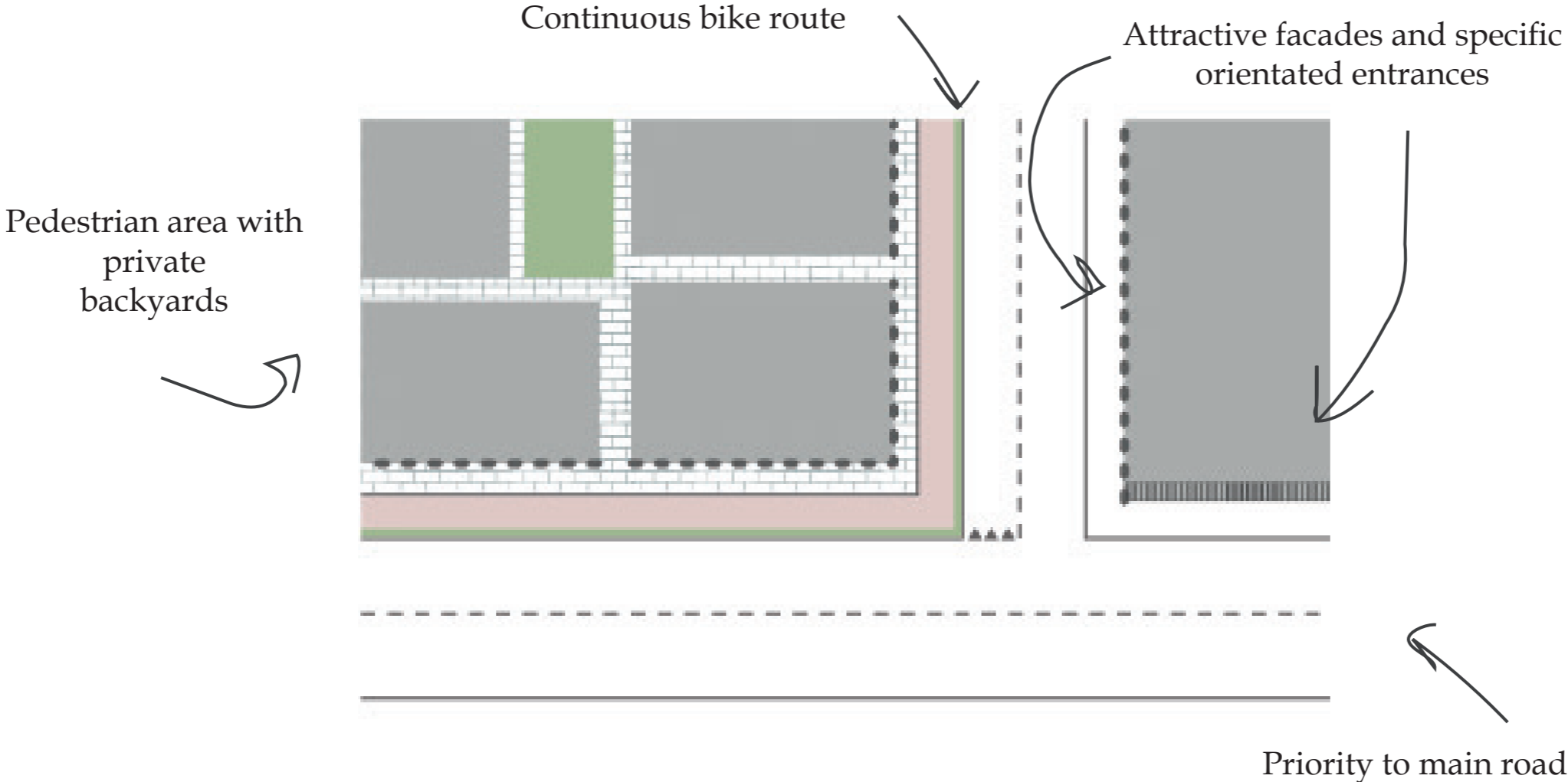


Figure 45: Different streets come together

DESIGN - REGIONAL

What is the role of each business park on the regional scale
and how do they work together?

What locations and processes should remain for industry only to achieve the circular economy goal by 2050?

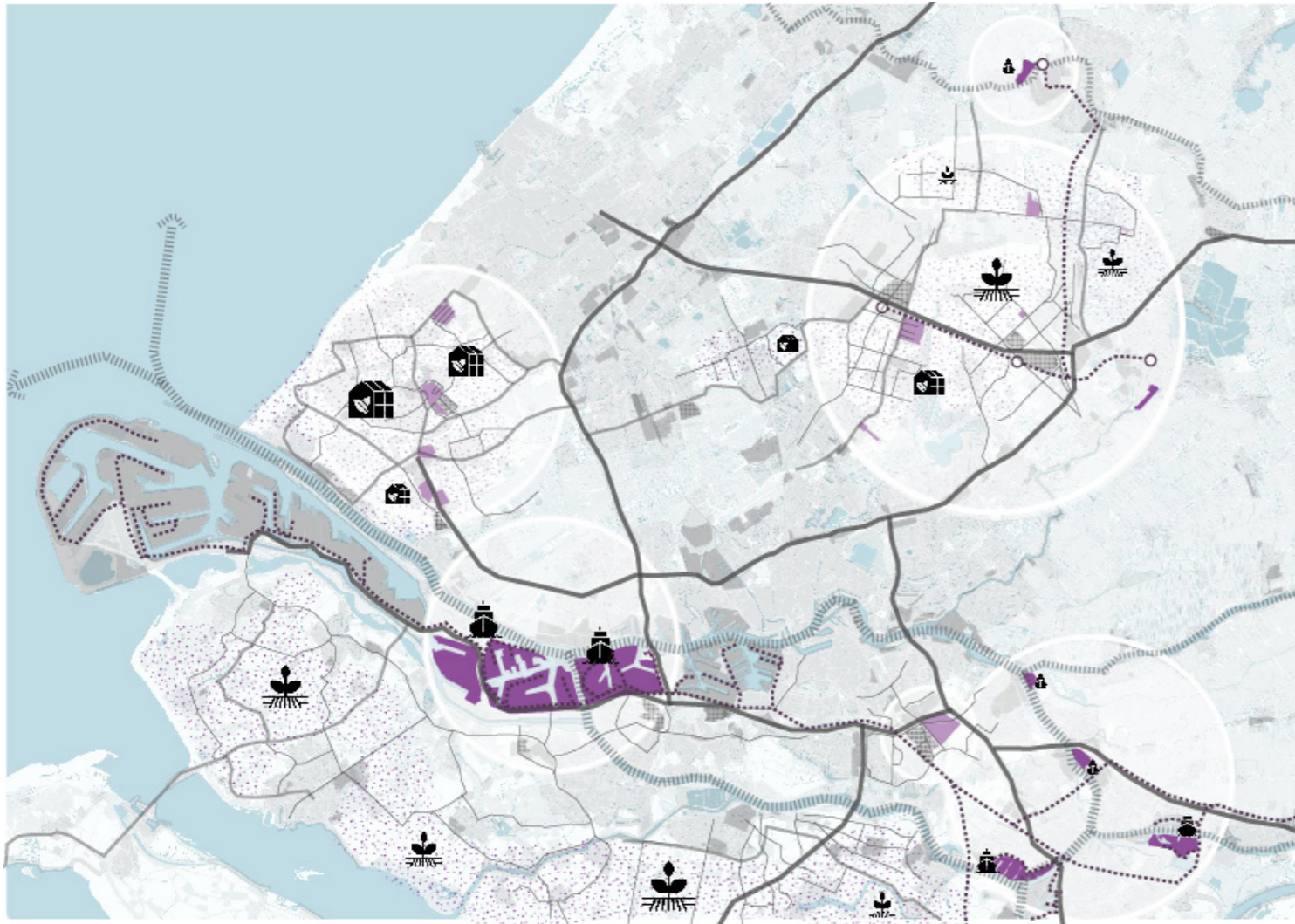


Figure 46: First group: Not mixable business parks that focus on the manufacturing of components that are needed in the circular economy Business parks occur as islands that focus on their own expertise (Scale 1.200000, 50% reduced)

- Mining - waterbound
- Mining - biobased materials
- Water way
- Highway
- Train track
- Farmland
- Greenhouses



Figure 47: Second group: Not mixable business parks related to the distribution of (raw) materials, components and products (Scale 1.200000, 50% reduced)

- Distribution hub - biobased materials
- Distribution hub - other products
- Distribution hub - waterbound
- Water way
- Highway
- Train track

What locations and processes facilitate mixed-use strategies and a circular economy?



Figure 48: Third group: Mixed functions serving the addition of dwellings through the region
(Scale 1:200000, 50% reduced)

- Processing and storage
- Processing and storage - waterbound
- Water way
- Highway
- Train track



Figure 49: Fourth groep: Innovative companies contributing towards mixed-use strategies and the circular economy
(Scale 1:200000, 50% reduced)

- High tech
- Highway
- Train track
- U University
- H HBO
- M MBO

PROBLEM STATEMENT - RESEARCH QUESTION - EXAMPLE LOCATIONS - ANALYSES - DESIGN - POLICY RECOMMENDATION

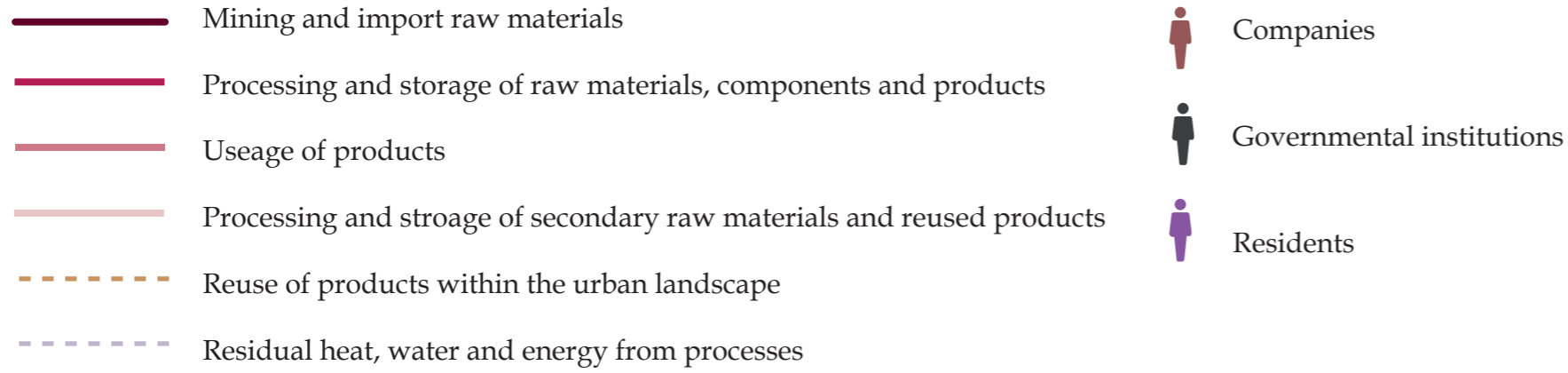
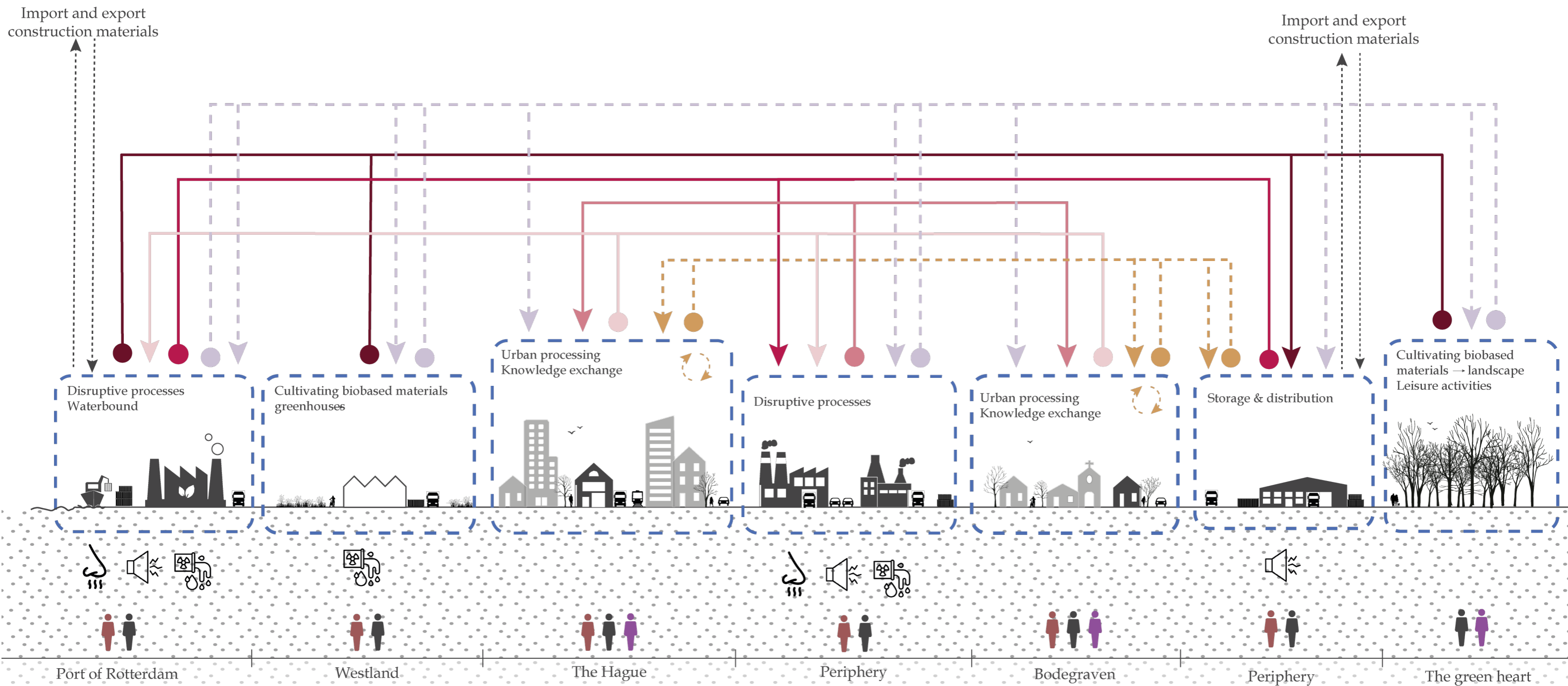


Figure 50: Systemic section that shows the flows, stakeholders, and atmospheres in this new business ecosystem of construction materials



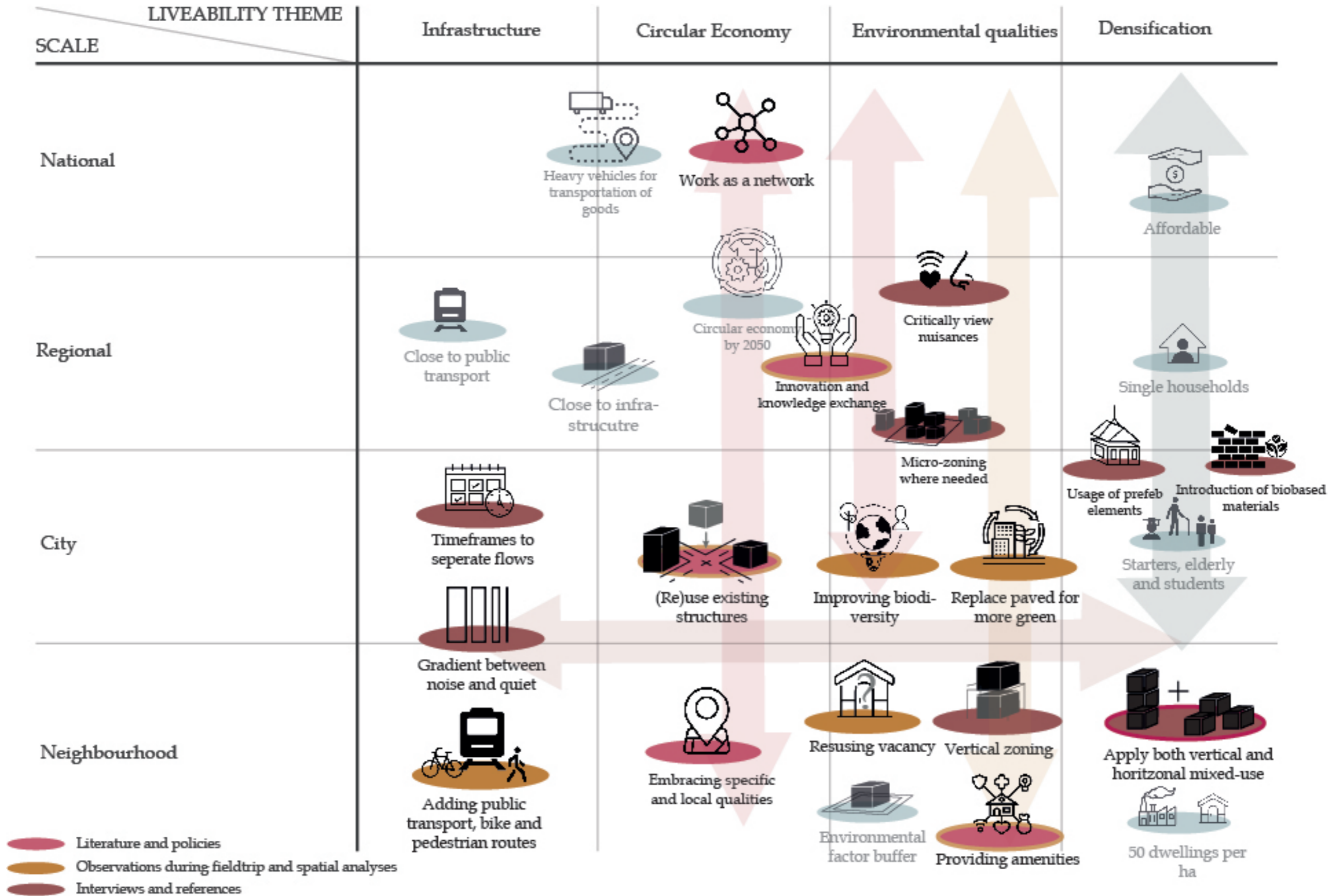


Figure 51: Implementing all the guidelines derived during this research to create regulations, funding and events on liveability and circularity at business parks

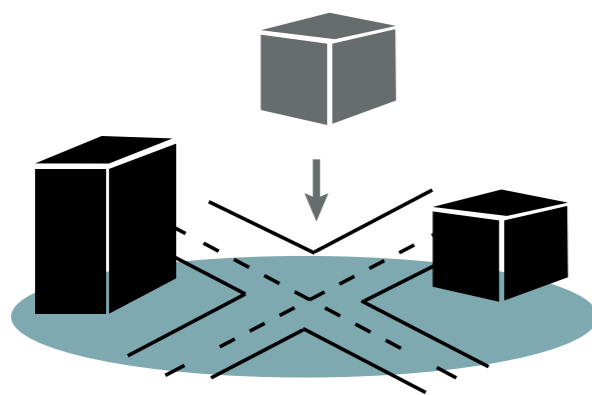
1] *Protect spaces for industry*

Why:

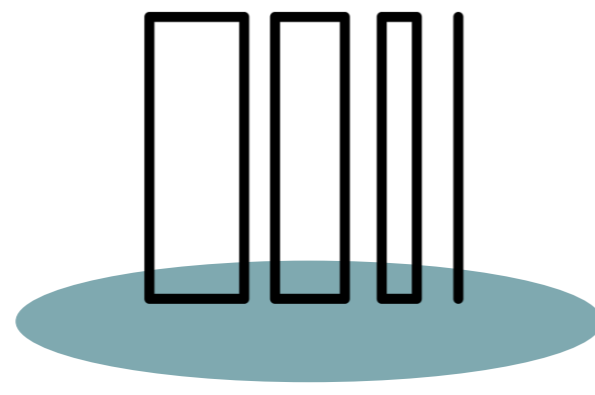
Without these spaces, the companies located at business parks are not able to grow towards a circular economy. Especially **water-bound** businesses are in need of specific spatial qualities, like access to water, for their production processes. These companies chose the location for a reason and **work together** on a bigger scale like Binckhorst is connected to the Port of Rotterdam. Protect these companies by looking at the **existing structures** and using **zoning** where needed.



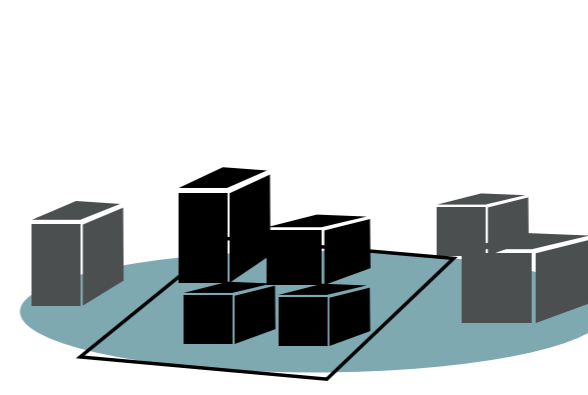
Figure 52: Waste processor - Binckhorst, The Hague (Google earth, 2023)



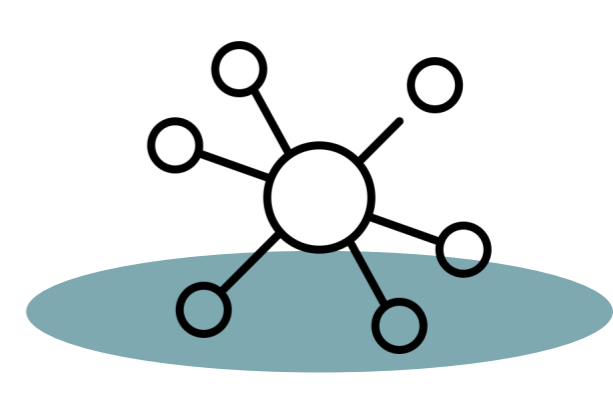
Use the existing structure



Provide a gradient



Micro-zoning



Work as a network

2] Provide an indication of spaces assigned to dwellings and industry by a spatial framework

Why:

To be sure that a mix between working and living does not cause conflicts between different stakeholders, it is important to provide a **spatial framework**. These opportunities and limitations differ for each business park. Looking at the **infrastructure**, facades and spaces to develop a circular economy is important.

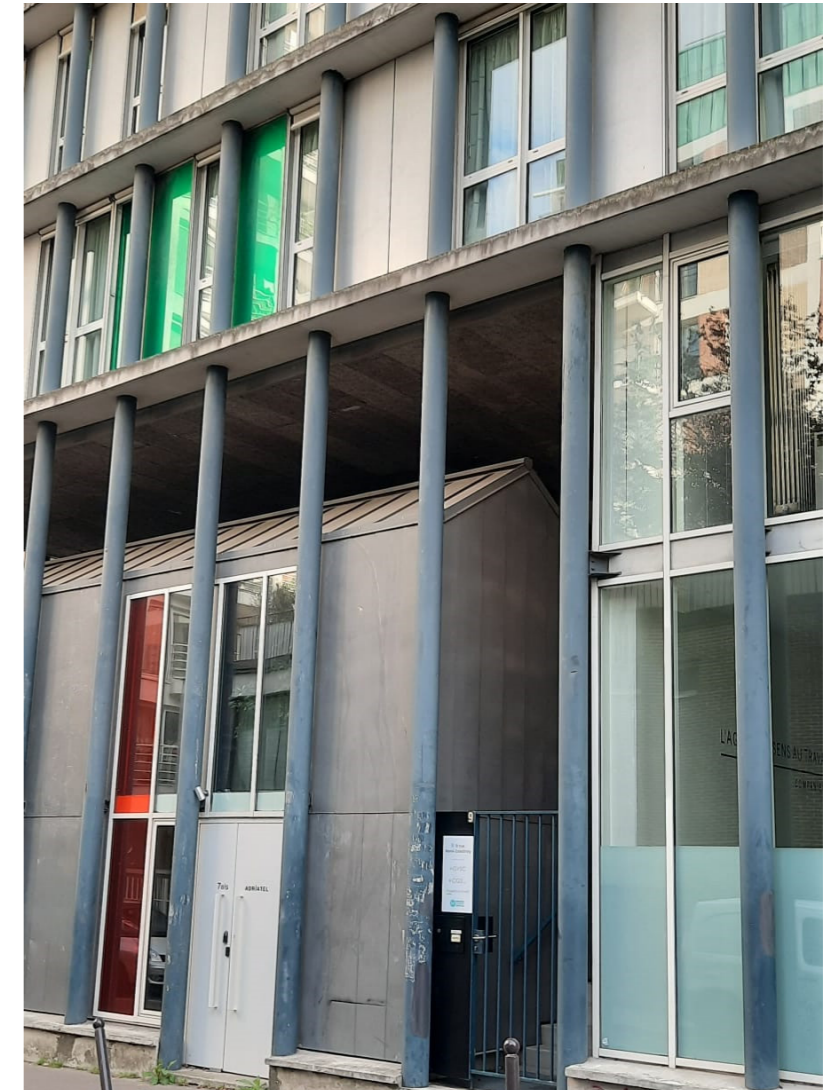
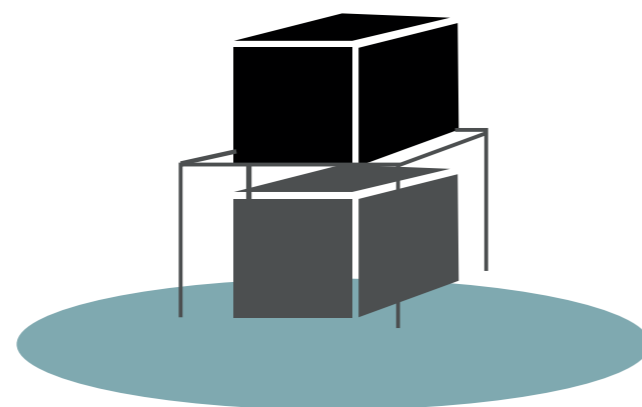


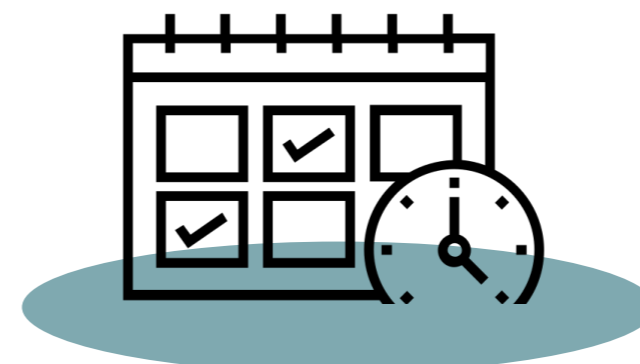
Figure 53: Quartier Massena - Paris (Fieldtrip Paris (07/09-09-2023))



Reusing vacancy and wastelands



Vertical zoning



Use timeframes



Micro-zoning

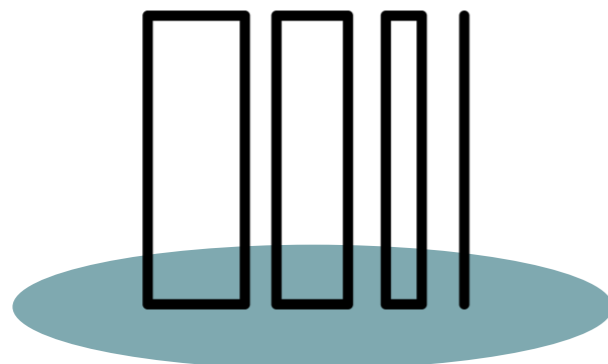
3] Regulate access for different vehicles

Why:

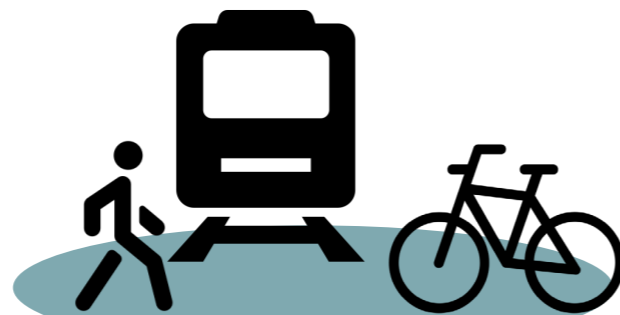
The urgency to **adapt the infrastructure** is caused by the arrival of new forms of transportation, residents, and material flows. The addition of **slow traffic** opportunities in the form of sidewalks and bike paths is crucial. In addition, a theory like rust, ruis and reuring can provide support for the different functions at a business park.



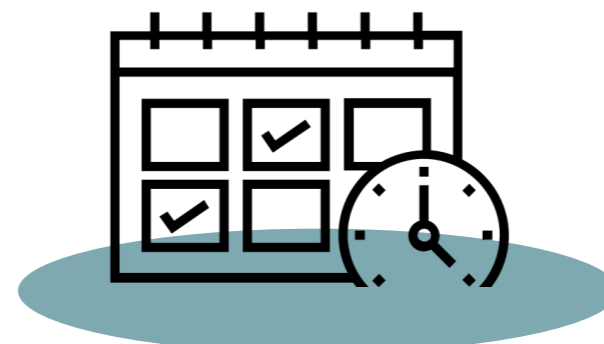
Figure 54: Parc de la vitleet - Paris
(Google earth, 2023)



Provide a gradient



*Facilitate different traffic flows,
especially slow traffic*



Use timeframes

4] Improve climate adaptivity, biodiversity, and public spaces

Why:

Business parks are currently paved and ask for diver vegetation to become **climate adaptive** and improve **biodiversity**. In addition, these green networks add to the **recreational opportunities** for surrounding neighbourhoods, visitors, and employees.



Figure 54: Cheonggye Freeway - Seoul (Oh, 2015)



Improve towards divers flora and fauna



Facilitate different traffic flows, especially slow traffic



Replace paved for open soil



Addition of amenities

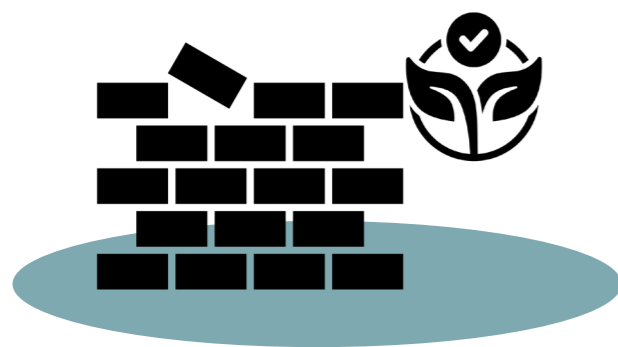
5] Funding to promote circularity

Why:

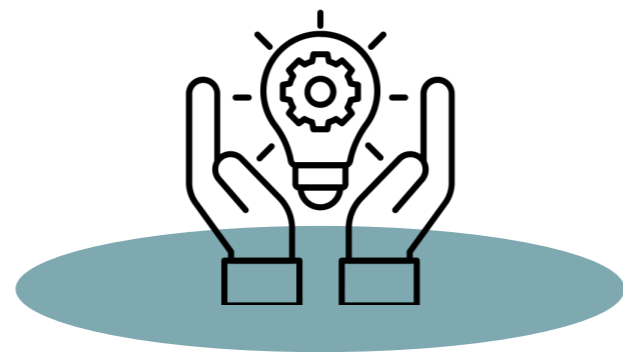
The improvement of industrial processes is needed to provide less nuisances. The goal to become 100% circular in 2050 is therefore important. Currently, **bettering the environmental conditions** is expensive and unimportant for companies. Using a fund, this can change and create a support base.



Figure 55: Green village - TU Delft (Google earth, 2023)



Experiment with new construction materials



Create space for innovation



Facilitate shared working places to steer towards knowledge exchange

6] Facilitate events for knowledge exchange and education

Why:

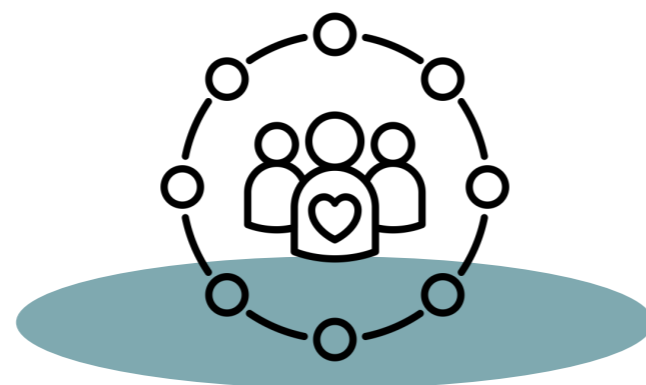
Facilitate **informal and public spaces** for companies and residents to collaborate on existing transitions. Events create **awareness** among stakeholders about cases like the circular economy or mixed-use strategies. Giving insight into the industrial processes creates **acceptance**.



Figure 56: RDM terrein - Rotterdam
(Unknown, 2017)



*Facilitate shared working places
to steer towards knowledge ex-
change*



Achieve togetherness



Organise events



Keep the door open for visitors

What else can you find in my report?

- Introduction with benefits and origin of the term mixed-use
 - Theoretical foundation
- Analyses of the two other locations, Binckhorst and Broekvelden
 - Stakeholder analyses
 - Future scenarios Province of South-Holland
- Phasing on how to achieve the design for Lansinghage

